

SYSMAC CS Series
CS1W-LC001

Loop Control Unit
Version 2.5

FUNCTION BLOCK
REFERENCE MANUAL

OMRON

CS1W-LC001




Loop Control Unit

FUNCTION BLOCK REFERENCE MANUAL

Revised August 2003

Notice:

OMRON products are manufactured for use according to proper procedures by a qualified operator and only for the purposes described in this manual. The following conventions are used to indicate and classify precautions in this manual. Always heed the information provided with them. Failure to heed precautions can result in injury to people or damage to property.

- | | |
|---|--|
|  DANGER | Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. |
|  WARNING | Indicates an imminently hazardous situation which, if not avoided, could result in death or serious injury. |
|  Caution | Indicates an imminently hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage. |

OMRON Product References

All OMRON products are capitalized in this manual. The work "Unit" is also capitalized when it refers to an OMRON product, regardless of whether or not it appears in the proper name of the product.

The abbreviation "Ch" which appears in some displays and on some OMRON products, often means "word" and is abbreviated "Wd" in documentation in this sense.

The abbreviation "PC" means Programmable Controller and is not used as an abbreviation for anything else.

Visual Aids

The following headings appear in the left column of the manual to help you locate different types of information.

Note Indicates information of particular interest for efficient and convenient operation of the product.

1, 2, 3... 1. Indicates lists of one sort or another, such as procedures, checklists, etc.

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About this Manual:

This manual describes the installation and operation of the CS1W-LC001 Loop Control Unit, and includes the sections described below.

The CS1W-LC001 Loop Control Unit (CS1W-LC001) helps you build an instrumentation system comprising multiple loops and is intended as a CPU Bus Unit on a PLC (Programmable Controller).

Please read this manual and the other manuals related to the CS1W-LC001 Loop Control Unit carefully and be sure you understand the information provided before attempting to install and operate the Loop Control Unit.

There are four manuals used with the CS1W-LC001. These manuals are listed in the following table. The suffixes have been omitted from the catalog numbers. Be sure you are using the most recent version for your area.

| Name | Cat. No. (Suffixes omitted) | Contents |
|---|-----------------------------|--|
| SYSMAC CS1 Series CS1W-LC001 Loop Control Unit Function Block Reference Manual | W375 | Provides detailed information on the function blocks. |
| SYSMAC CS1 Series CS1W-LC001 Loop Control Unit Operation Manual | W374 | Describes the basic running of the Loop Control Unit (excluding detailed descriptions of the function blocks). |
| SYSMAC CS1 Series WS02-LCTC1 CX-Process Tool Operation Manual | W372 | Describes operation of the CX-Process Tool. |
| SYSMAC CS1 Series WS02-LCTC1 CX-Process Monitor Operation Manual | W373 | Describes operation of the CX-Process Monitor. |

Section 1 provides an overall list of the function blocks provided on CS1W-LC001 Loop Control Units and describes how they can be applied to specific control operations.

Section 2 describes the functions of each function block and details of ITEM settings.

Appendix provides information on errors that may occur during running of CS1W-LC001 Loop Control Units and guidelines for troubleshooting these errors.



WARNING

Failure to read and understand the information provided in this manual may result in personal injury or death, damage to the product, or product failure. Please read each section in its entirety and be sure you understand the information provided in the section and related sections before attempting any of the procedures or operations given.

Restrictions in Use of Function Blocks According to Version

- The following function blocks described in this manual can be used only when Loop Control Unit CS1W-LC001 Ver.1.20 and onwards and CX-Process Tool Ver.1.20 and onwards are used:
 - The following function blocks can be registered on CX-Process Tool when Loop Control Unit Ver.1.0□ and CX-Process Tool Ver1.20 or onwards are used. However, if the data of these function blocks is downloaded to the Loop Control Unit in major item units (units of Loop Control Unit) when these function blocks are registered on CX-Process Tool, an error occurs, and the download is canceled. (Other function blocks also are not downloaded.)
 - The following function blocks cannot be registered on CX-Process Tool when Loop Control Unit Ver.1.20 and onwards and CX-Process Tool Ver.1.00 are used. For this reason, these function blocks cannot also be downloaded to the Loop Control Unit.
If the following function blocks already exist on the Loop Control Unit and are uploaded to CX-Process Tool, only the following function blocks are not uploaded. (When a new upload is performed, these blocks become empty.)

2-position ON/OFF (Block Model 001), 3-position ON/OFF (Block Model 002), Blended PID (Block Model 013), 3-input Selector (Block Model 163), 3-output Selector (Block Model 164), Batch Data Collector (Block Model 174), DI terminal from Expanded CPU Unit (Block Model 455), DO Terminal from Expanded CPU Unit (Block Model 456), AI Terminal from Expanded CPU Unit (Block Model 457), AO Terminal from Expanded CPU Unit (Block Model 458)

Note The version of the Loop Control Unit can be verified in the Monitor run status screen ([Execute]-[Run]-[Monitor run status]) on CX-Process Tool. When the above function blocks are used, check in the Check System Operation screen on CX-Process Tool beforehand that the content of ITEM 099 onwards in the System Common block (Block Model 000) is as follows:

| ITEM | Data name | Data |
|------|-----------------------------|------------|
| 099 | MPU/FROM version indication | V1.20V1.20 |

Version V1.20 and onwards must be indicated.

- The following function blocks described in this manual can be used only when Loop Control Unit CS1W-LC001 Ver.1.50 and onwards and CX-Process Tool Ver.1.50 and onwards are used:
 - The following function blocks can be registered on CX-Process Tool when versions of Loop Control Unit earlier than Ver.1.50 (Ver.1.0□ or Ver.1.20) and CX-Process Tool Ver1.50 or onwards are used. However, if the data of these function blocks is downloaded to the Loop Control Unit in major item units (units of Loop Control Unit) when these function blocks are registered on CS-Process Tool, an error occurs, and only those function blocks are not downloaded. (Other function blocks are downloaded successfully.)

- The following function blocks cannot be registered on CX-Process Tool when Loop Control Unit Ver.1.50 and onwards and versions of CX-Process

Tool earlier than Ver.1.50 (Ver.1.00 or Ver. 1.20) are used. For this reason, these function blocks cannot also be downloaded to the Loop Control Unit.

If the following function blocks already exist on the Loop Control Unit and are uploaded to CX-Process Tool, only the following function blocks are not uploaded. (When a new upload is performed, these blocks become empty.)

Segment Program 2 (Block Model 157), Accumulated Value Input Adder (Block Model 182), Accumulated Value Input Multiplier (Block Model 183), Constant Comparator (Block Model 202), Variable Comparator (Block Model 203), Clock Pulse (Block Model 207), ON/OFF Valve Manipulator (Block Model 221), Motor Manipulator (Block Model 222), Reversible Motor Manipulator (Block Model 223), Motor Opening Manipulator (Block Model 224)

Likewise, the following functions can be used only when Loop Control Unit CS1W-LC001 Ver.1.50 and onwards and CX-Process Tool Ver.1.50 and onwards are used:

- The following ITEMS can be set on CX-Process Tool when versions of Loop Control Unit earlier than Ver.1.50 (Ver.1.0□ or Ver.1.20) and CX-Process Tool Ver1.50 or onwards are used. However, if the data of these ITEMS is downloaded to the Loop Control Unit when these ITEMS are set on CX-Process Tool, only those ITEMS are not downloaded. (Other ITEMS are downloaded successfully.)
- The following ITEMS cannot be set on CX-Process Tool when Loop Control Unit Ver.1.50 or onwards and versions of CX-Process Tool earlier than Ver.1.50 (Ver.1.00 or Ver. 1.20) are used. For this reason, these ITEMS cannot also be downloaded to the Loop Control Unit.

If a download in major item units (units of Loop Control Unit) or a download in function blocks units including initial setting data is performed, the respective defaults are set to the following ITEMS on the Loop Control Unit.

If the following ITEMS are already set on the Loop Control Unit and are uploaded to the CX-Process Tool, only the following ITEMS are not uploaded.

AT (auto-tuning) functions of Basic PID block (Block Model 011) and Advanced PID (Block Model 012), and wait function and additional steps (step numbers 8 to 15) of the Ramp Program block (Block Model 155)

Note1 For details on which actual ITEM this restriction applies to, refer to the ITEM list for the relevant function block in the Function Block Reference Manual.

Note2 The version of the Loop Control Unit can be verified in the Monitor run status screen ([Execute]-[Run]-[Monitor run status]) on CX-Process Tool. When the above function blocks are used, check in the Check System Operation screen on CX-Process Tool beforehand that the content of ITEM 099 onwards in the System Common block (Block Model 000) is as follows:

| ITEM | Data name | Data |
|------|-----------------------------|------------|
| 099 | MPU/FROM version indication | V1.50V1.50 |

Version V1.50 and onwards must be indicated.

About this Manual:

- The following function blocks described in this manual can be used only when Loop Control Unit CS1W-LC001 Ver. 2.00 and onwards and CX-Process Tool Ver. 2.00 and onwards are used:
 - The following function blocks can be registered on CX-Process Tool when versions of Loop Control Unit earlier than Ver. 2.00 (Ver. 1.0□, Ver. 1.20, or Ver. 1.50) and CX-Process Tool Ver 1.50 or onwards are used. However, if the data of these function blocks is downloaded to the Loop Control Unit in major item units (units of Loop Control Unit) when these function blocks are registered on CX-Process Tool, an error occurs, and only those function blocks are not downloaded. (Other function blocks are downloaded successfully.)
 - The following function blocks cannot be registered on CX-Process Tool when Loop Control Unit Ver. 2.00 and onwards and versions of CX-Process Tool earlier than Ver. 2.00 (Ver. 1.00 Ver. 1.20, or Ver. 1.50) are used. For this reason, these function blocks cannot also be downloaded to the Loop Control Unit. If the following function blocks already exist on the Loop Control Unit and are uploaded to CX-Process Tool, only the following function blocks are not uploaded. (When a new upload is performed, these blocks become empty.)

| |
|---|
| ES100X Controller Terminal (Block Model 045), 4-point Warning Indicator (Block Model 110), Arithmetic Operation (Block Model 126), Time Sequence Data Statistics (Block Model 153), Receive All Blocks (Block Model 461), Send All Blocks (Block Model 462) |
|---|

Likewise, the following functions can be used only when Loop Control Unit CS1W-LC001 Ver. 2.00 and onwards and CX-Process Tool Ver. 2.00 and onwards are used:

- The following ITEMS can be set on CX-Process Tool when versions of Loop Control Unit earlier than Ver. 2.00 (Ver. 1.00 Ver. 1.20, or Ver. 1.50) and CX-Process Tool Ver, 2.00 or onwards are used. However, if the data of these ITEMS is downloaded to the Loop Control Unit when these ITEMS are set on CX-Process Tool, only those ITEMS are not downloaded. (Other ITEMS are downloaded successfully.)
- The following ITEMS cannot be set on CX-Process Tool when Loop Control Unit Ver. 2.0 or onwards and versions of CX-Process Tool earlier than Ver. 2.00 (Ver. 1.00 Ver. 1.20, or Ver. 1.50) are used. For this reason, these ITEMS cannot also be downloaded to the Loop Control Unit. If a download in major item units (units of Loop Control Unit) or a download in function blocks units including initial setting data is performed, the respective defaults are set to the following ITEMS on the Loop Control Unit. If the following ITEMS are already set on the Loop Control Unit and are uploaded to the CX-Process Tool, only the following ITEMS are not uploaded.

| |
|--|
| MV Output Retrace Time for PV Error has been added to 2-position ON/OFF (Block Model 001), 3-position ON/OFF (Block Model 002), Basic PID (Block Model 011), and Advanced PID (Block Model 012). High MV Limit Output and Low MV Limit Output have been added to Basic PID (Block Model 011), Indication and Operation (Block Model 032), and Ratio Setting (Block Model 033). MV Error Input and MV Error Display have been added to Batch Flowrate Capture (Block Model 014), Indication and Operation (Block Model 032), and Ratio Setting (Block Model 033). PV Error Input and PV Error Display have been added to Indication and Setting (Block Model 031), Indication and Operation (Block Model 032), Ratio Setting (Block Model 033), and Indicator (Block Model 034). Inputs X1 to X8 have been added to Constant Comparator (Block Model 202). Inputs X1 to X8 and Comparison Input R1 to R8 have been added to Variable Comparator (Block Model 203). Contact Inputs S33 to S224 have been added to Internal Switch (Block Model 209). |
|--|

Note1 For details on which actual ITEM this restriction applies to, refer to the ITEM list for the relevant function block in the Function Block Reference Manual.

Note2 The version of the Loop Control Unit can be verified in the Monitor run status screen ([Execute]-[Run]-[Monitor run status]) on CX-Process Tool.
When the above function blocks are used, check in the Check System Operation screen on CX-Process Tool beforehand that the content of ITEM 099 onwards in the System Common block (Block Model 000) is as follows:

| ITEM | Data name | Data |
|------|-----------------------------|------------|
| 099 | MPU/FROM version indication | V2.00V2.00 |

Version V2.00 and onwards must be indicated.

- The following function blocks described in this manual can be used only when Loop Control Unit CS1W-LC001 Ver.2.50 and onwards and CX-Process Tool Ver.2.50 and onwards are used:

- The following function blocks can be registered on CX-Process Tool when the Loop Control Unit is pre-Ver.2.50 and the CX-Process Tool is Ver 2.50 or later. However, if the data of these function blocks is downloaded to the Loop Control Unit in major item units (units of Loop Control Unit) when these function blocks are registered on CX-Process Tool, an error occurs, and the download is canceled. (Other function blocks will be downloaded normally.)
- The following function blocks cannot be registered on CX-Process Tool when the Loop Control Unit is Ver. 2.50 or later and CX-Process Tool is pre-Ver.2.50. For this reason, these function blocks cannot also be downloaded to the Loop Control Unit.

If the following function blocks already exist on the Loop Control Unit and are uploaded to CX-Process Tool, only the following function blocks are not uploaded. (When a new upload is performed, these blocks become empty.)

Fuzzy Logic (Block Model 016), Range Conversion (Block Model 127), Level Check (Block Model 210), Ai4 Terminal (DRT1-AD04) (Block Model 588), Ao2 Terminal (DRT1-DA02) (Block Model 589)

About this Manual:

Likewise, the following functions can be used only when Loop Control Unit CS1W-LC001 Ver. 2.50 or onwards and CX-Process Tool Ver. 2.50 or onwards are used:

- The following ITEMS can be set on CX-Process Tool when versions of Loop Control Unit earlier than Ver. 2.50 and CX-Process Tool Ver. 2.50 or onwards are used. However, if the data of these ITEMS is downloaded to the Loop Control Unit when these ITEMS are set on CX-Process Tool, only those ITEMS are not downloaded. (Other ITEMS are downloaded successfully.)
- The following ITEMS cannot be set on CX-Process Tool when Loop Control Unit Ver. 2.50 or onwards and versions of CX-Process Tool earlier than Ver. 2.50 are used. For this reason, these ITEMS cannot also be downloaded to the Loop Control Unit. If a download in major item units (units of Loop Control Unit) or a download in function blocks units including initial setting data is performed, the respective defaults are set to the following ITEMS on the Loop Control Unit. If the following ITEMS are already set on the Loop Control Unit and are uploaded to the CX-Process Tool, only the following ITEMS are not uploaded.

Block Registration Flag (ITEM 039) and Tool Version (ITEM 110) in System Common (Block Model 000).
 Warning Limit (ITEM 012) in Basic PID (Block Model 011, Advanced PID (Block Model 020), 2-Position ON/OFF (Block Model 001), 3-Position ON/OFF (Block Model 002), Indication and Setting (Block Model 031), Indication and Operation (Block Model 032), Ratio Setting (Block Model 033), Indicator (Block Model 034), and 4-Point Warning Indicator (Block Model 110).
 SP Rate-of-change Limit Time Unit (ITEM 030) in Advanced PID (Block Model 012).
 Local SP Setting, Upper 4 Digits (ITEM 024), Remote SP Setting, Upper 4 Digits (ITEM 028), Current SP Value, Upper 4 Digits (ITEM 030), Preset Value, Upper 4 Digits (ITEM 061), and Batch Accumulated Value, Upper 4 Digits (ITEM 065) in Batch Flowrate (Block Model 014).
 Time Unit (ITEM 013) in Rate-of-change Limit (Block Model 143).
 Reference Input Disable Switch (ITEM 020) in Segment Program 2 (Block Model 157).
 Output Type (ITEM 006) in Contact Distributor (Block Model 201).
 Range settings in AI Terminal from CPU Unit (Block Model 453), AO Terminal to CPU Unit (Block Model 454), Ai4 Terminal (Block Model 561), Pi4 Terminal (Block Model 562), and Ai8 Terminal (Block Model 564).
 Receive Disable Switch (ITEM 225) in Expanded DI Terminal from CPU Unit (Block Model 455) and Expanded AI Terminal from CPU Unit (Block Model 457) and Send Disable Switch (ITEM 225) in Expanded DO Terminal from CPU Unit (Block Model 456) and Expanded AO Terminal from CPU Unit (Block Model 458).

Note1 For details on which actual ITEM this restriction applies to, refer to the ITEM list for the relevant function block in the *Function Block Reference Manual*.

Note2 The version of the Loop Control Unit can be verified in the Monitor run status screen ([Execute]-[Run]-[Monitor run status]) on CX-Process Tool. When the above function blocks are used, check in the Check System Operation screen on CX-Process Tool beforehand that the content of ITEM 099 onwards in the System Common block (Block Model 000) is as follows:

| ITEM | Data name | Data |
|------|-----------------------------|------------|
| 099 | MPU/FROM version indication | V2.50V2.50 |

Version V2.50 and onwards must be indicated.

Precautions

This section provides general precautions for using the Programmable Controller (PLC) and related devices.

The information contained in this section is important for the safe and reliable application of the Programmable Controller. You must read this section and understand the information contained before attempting to set up or operate a PLC system.

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1 Intended Audience

This manual is intended for the following personnel, who must also have knowledge of electrical systems (an electrical engineer or the equivalent) and knowledge about instrumentation system.

- Personnel in charge of installing FA systems
- Personnel in charge of designing FA systems
- Personnel in charge of managing FA systems and facilities

2 General Precautions

The user must operate the product according to the performance specifications described in the operation manuals.

Before using the product under conditions which are not described in this manual or applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, petrochemical plants, and other systems, machines, and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.

Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment, and be sure to provide the system, machines and equipment with double safety mechanism.

This manual provides information for running OMRON Loop Control Units. Be sure to read this manual before attempting to use the Loop Control Units and related software (CX-Process Tool and CX-Process Monitor) and keep this manual close at hand for reference during running.



It is extremely important that a PLC and all PLC Units be used for the specified purpose and under the specified conditions, especially in applications that directly or indirectly affect human life. You must consult with your OMRON representative before applying a PLC System to the above-mentioned applications.

3 Safety Precautions



Do not attempt to take any Unit apart while power is being supplied. Doing so may result in electric shock.

Provide safety measures in external circuits (i.e., not in the Programmable Controller), including the following items, to ensure safety in the system if an abnormality occurs due to malfunction of the PLC or another external factor affecting the PLC operation. Not doing so may result in serious accidents.

- Emergency stop circuits, interlock circuits, limit circuits, and similar safety measures must be provided in external control circuits.
- The PLC will turn OFF all outputs when its self-diagnosis function detects any error or when a severe failure alarm (FALS) instruction is executed. As a countermeasure for such errors, external safety measures must be provided to ensure safety in the system.
- The PLC outputs may remain ON or OFF due to deposition or burning of the output relays or destruction of the output transistors. As a countermeasure for such problems, external safety measures must be provided to ensure safety in the system.
- When the 24-VDC output (service power supply to the PLC) is overloaded or short-circuited, the voltage may drop and result in the outputs being turned OFF. As a countermeasure for such problems, external safety measures must be provided to ensure safety in the system.



Check the following items before starting to run the Loop Control Unit:

- Analog Input/Output Units used in combination with the Loop Control Unit must be mounted correctly, and the unit number set on the front panel of the Analog Input/Output Unit must match the unit number set on the Field Terminal block. If the unit numbers do not match, input/output (read/write) is performed on the data of another Special I/O Unit (whose unit number is set on the Field Terminal block).
- The defaults of the System Common block on the Loop Control Unit must be set correctly. In particular, make sure that the Data Memory (D) for the Node Terminals on the CPU Unit used by the Loop Control Unit is not set in duplicate for other applications on the PLC. If the application of the Data Memory is set in duplicate, the PLC system may act unexpectedly and cause injury.
- When writing data to the I/O memory in the CPU Unit with function blocks (e.g., using Send All Blocks, Expanded DO/AO Terminal to CPU Unit, or DO/AO Terminal to CPU Unit), be sure that the words written to in the I/O memory are not being used for any other purpose. If I/O memory words are allocated to more than one purpose, the PLC system may act unexpectedly and cause injury.



Do not perform processing in such a way that the Loop Control Unit and CPU Unit perform writing on identical I/O memory addresses allocated to a contact output or analog output to an external Unit. If writing is performed on identical addresses, the externally connected load may act unexpectedly and cause injury.

4 Operating Environment Precautions



Caution

Do not operate the control system in the following places:

- Locations subject to direct sunlight
- Locations subject to temperature or humidity outside the range specified in the specifications
- Locations subject to condensation as the result of severe changes in temperature
- Locations subject to corrosive or flammable gases
- Locations subject to dust (especially iron dust) or salts
- Locations subject to exposure to water, oil, or chemicals
- Locations subject to shock or vibration



Caution

Take appropriate and sufficient countermeasures when installing systems in the following locations:

- Locations subject to static electricity or other forms of noise
- Locations subject to strong electromagnetic fields
- Locations subject possible exposure to radioactivity
- Locations close to power supplies



Caution

The operating environment of the PLC System can have a large effect on the longevity and reliability of the system. Improper operating environments can lead to malfunction, failure, and other unforeseeable problems with the PLC System. Be sure that the operating environment is within the specified conditions at installation and remains within the specified conditions during the life of the system.

5 Application Precautions

Observe the following precautions when using the PLC.

WARNING

Always heed these precautions. Failure to abide by the following precautions could lead to serious or possibly fatal injury.

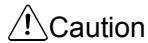
- Always connect to a class-3 ground (to 100 Ω or less) when installing the Units. Not connecting to a class-3 ground may result in electric shock.
- Always turn OFF the power to the PLC before attempting any of the following. Not turning OFF the power may result in malfunction or electric shock.
 - Mounting or dismounting I/O Units
 - Assembling the Units
 - Setting DIP switches or unit number setting switches
 - Connecting or wiring the cables
 - Connecting or disconnecting the connectors

Caution

Failure to abide by the following precautions could lead to faulty operation of the PLC or the system, or could damage the PLC or PLC Units. Always heed these precautions.

- The Loop Control Unit can read and write I/O memory on the CPU Unit using the Field Terminal block or CPU Terminal block regardless of the user program (Step Ladder Program) on the CPU nit. So, do not write to the same I/O memory address in communications between the Loop Control Unit and the CPU Unit.
- To hold analog outputs or contact outputs at specific values (for example, maximum value or minimum value) when the Loop Control Unit has stopped running, create a Step Ladder Program on the CPU Unit so that each of the allocated relays on the Analog Output Unit or Contact Output Unit are set to a specific value taking the b contact of the Loop Control Unit Running flag (bit 00 allocated relay n word) as the input conditions.
- When a fatal error occurs on the CPU Unit (including during execution of the FALS command), the Loop Control Unit also stops running. To hold the analog output to the previous value before the stop occurred, and to set the analog output to either the minimum value or maximum value, use the output hold function of the Analog Output Unit or Analog Input/Output Unit.
- Before turning ON the power to the PLC, make sure that the facilities are safe.

The analog output values and contact outputs from the Loop Control Unit are updated at the same time that the power to the PLC is turned ON regardless of the operation mode of the CPU Unit (including the PROGRAM mode). (Internally, the analog output values and contact outputs are sent via the CPU Unit to the Basic I/O Unit and Analog Output Unit.)
- The Loop Control Unit itself does not have a human-machine interface. So, an external interface such as CX-Process Monitor must be provided.



Caution

- Fail-safe measures must be taken by the customer to ensure safety in the event of incorrect, missing, or abnormal signals caused by broken signal lines, momentary power interruptions or other causes.
- Before touching the PLC, be sure to first touch a grounded metallic object in order to discharge any static build-up. Otherwise, it might result in a malfunction or damage.
- Before you replace the battery while the Loop Control Unit is ON, be sure to touch a grounded metal object to discharge any static electricity from your body
- Never short-circuit the plus and minus poles of the battery, charge, disassemble or heat the battery, or throw the battery into a fire.
- Interlock circuits, limit circuits, and similar safety measures in external circuits (i.e. not in the Programmable Controller) must be provided by the customer.
- Always use the power supply voltage specified in this manual. An incorrect voltage may result in malfunction or burning.
- Take appropriate measures to ensure that the specified power with the rated voltage and frequency is supplied. Be particularly careful in places where the power supply is unstable. An incorrect power supply may result in malfunction.
- Install external breakers and take other safety measures against short-circuiting in external wiring. Insufficient safety measures against short-circuiting may result in burning.
- Do not apply voltages to input sections in excess of the rated input voltage. Excess voltages may result in burning.
- Do not apply voltages or connect loads in excess of the maximum switching capacity to output sections. Excess voltage or loads may result in burning.
- Turn OFF the power to the PLC before performing the following operations:
 - Mounting or removing the Loop Control Unit, CPU Unit, or the Memory Pack
 - Assembling Racks
 - Setting the DIP switch or unit number setting switch
 - Performing wiring or connecting cables
 - When connecting or disconnecting cables
- Do not attempt to disassemble, repair, or modify any Units.
- Be sure to confirm that the DIP switch and the Data Memory (D) are properly set.
- Leave the dust-protection label attached to the top Unit when wiring. Removing the label may result in malfunction.
- Remove the labels after the completion of wiring to ensure proper heat dissipation. Leaving the label attached may result in malfunction.
- Mount the Unit only after checking the terminal block and switch settings completely.
- Be sure that all mounting screws, terminal screws, and cable connector screws are tightened to the torque specified in the user manuals.
Incorrect tightening torque may result in malfunction.

**Caution**

- Check the user program for proper execution before actually running it on the Unit. Not checking the program may result in an unexpected operation.
- Use crimp terminals for wiring. Do not connected stranded wires directly to terminals. Connection of bare stranded wires may result in burning.
- Double-check all the wiring before turning ON the power supply. Incorrect wiring may result in burning.
- Confirm that no adverse effect will occur in the system before attempting any of the following:
 - Changing the operating mode of the PLC
 - Force-setting/force-resetting of any contact in memory
- Changing the present value or any set value in memory

6 EC Directives

CS Series Units confirm to EC Directives. For the system to conform to EC Directives, however, the following precautions must be adhered to.

- CS Series Units must be installed within control panel.
- Use reinforced insulation of double insulation for the DC power supplies used for the I/O power supplies.
- CS Series Units that meet EC Directives also meet the Common Emission Standard (EN50081-2). The measure necessary to ensure that standards, such as the radiated emission standard (10 m), are met, however, will vary depending on the overall configuration of the control panel, the other devices to the control panel, and wiring. You must therefore confirm that EC Directives are met for the overall machine or device.

7 Applicable Directives

Applicable Directives

- EMC Directive
- Low Voltage Directive

EMC and Low Voltage Directives

EMC Directive

In order that OMRON products can be used with any machinery and in combination with other manufacturer's equipment, the products themselves are designed to comply with EMC standards (see Note), so that the assembled machinery or device can then also easily comply with EMC standards.

Even if machinery and equipment complies with EMC standards before assembly, this compliance may change depending on the device, the configuration of the control panel, and wiring, so OMRON cannot guarantee that a particular system complies with the directive. You must therefore confirm that EMC Directives are met for the overall machine or device.

Note EMC: One directive relating to Electro-Magnetic Compatibility
EMS: Electro-Magnetic Susceptibility standard EN61131-2
EMI: Electro-Magnetic Interference standard EN50081-2
Common Emission Standard EN50081-2, radiated emission standard (10 m)

Low Voltage Directive

The Low Voltage Directive provides that necessary safety standards are guaranteed for devices operating at voltages of 50 to 1,000 VAC or 75 to 1,500 VDC.

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SECTION 1

List of Function Blocks

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1-1 List of Function Blocks

The following function blocks can be combined and used in Loop Control Unit operations.

| Category | Type | Block Model | Block Name | Function | Allocatable Block Address | Page |
|---------------------------|---------------------------------|-------------|------------------------------------|--|---|------|
| System Common Block | | 000 | System Common | Makes settings common to all function blocks and outputs signals for the system. | 000 | 38 |
| Control Block | Controller | 001 | 2-position ON/OFF | 2-position type ON/OFF controller | 001 to 032 | 50 |
| | | 002 | 3-position ON/OFF | 3-position type ON/OFF controller for heating/cooling ON/OFF control | | 56 |
| | | 011 | Basic PID | Performs basic PID control. | | 63 |
| | | 012 | Advanced PID | Performs PID with two degrees of freedom control for enabling deviation/MV compensation, MV tracking, etc. | | 78 |
| | | 013 | Blended PID | Performs PIF control on the cumulative value (cumulative deviation) between the accumulated value PV and accumulated value Remote Set Point. | | 91 |
| | | 016 | Fuzzy Logic | Outputs up to two analog outputs based on fuzzy logic performed on up to 8 analog inputs. | | 104 |
| | | 014 | Batch Flowrate Capture | Functions to open the valve at a fixed opening until a fixed batch accumulated value is reached. | | 98 |
| | | 031 | Indication and Setting | Manual setter with PV indication and SP setting functions | | 116 |
| | | 032 | Indication and Operation | Manual setter with PV indication and MV setting functions | | 120 |
| | | 033 | Ratio Setting | Ratio and bias setter with PV indication and ratio setting function | | 124 |
| | | 034 | Indicator | PV indicator with PV alarm | | 128 |
| External Controller Block | External Controller Block | 045 | ES100X Controller Terminal | Performs monitoring and setting for an ES100X Controller connected directly to the RS-232C port on the Loop Control Unit. | 065 to 096 | 131 |
| Operation Block | Alarm/Signal restrictions/ Hold | 110 | 4-Point Warning Indicator | Provides the alarm contact outputs for the high/high, high, low, and low/low limits of single analog signals. This function block provides the same function as the Indicator block (model 034). | 100 to 349 (Note: 349 is an internal switch in CX-Process Tool (One Block Model 209 is already allocated as the default.)) | 143 |
| | | 111 | High/Low Alarm | Provides the alarm contact outputs for the high and low limits of single analog signals. | | 146 |
| | | 112 | Deviation Alarm | Provides the alarm contact outputs for the deviation of two analog signals. | | 148 |
| | | 113 | Rate-of-change Operation and Alarm | Provides the alarm contact outputs for the high and low limits of rate-of-change operation when the analog signal rate-of-change is output. | | 150 |
| | | 115 | High/Low Limit | Limits the high and low limits of single analog signals. | | 152 |
| | | 116 | Deviation Limit | Calculates the deviation between two analog signals, and limits the deviation within that range. | | 154 |

1-1 List of Function Blocks

| Category | Type | Block Model | Block Name | Function | Allocatable Block Address | Page |
|--------------------------------|--|--------------|---|---|---|---|
| Operation Block (continued) | Alarm/ Signal restrictions/ Hold (continued) | 118 | Analog Signal Hold | Holds the maximum, minimum or instantaneous value of single analog signals. | | 156 |
| | Arithmetic | 121 | Addition or Subtraction | Performs addition/subtraction with gain and bias on up to 4 analog signals. | 100 to 349 (Note: 349 is an internal switch in CX-Process Tool (One Block Model 209 is already allocated as the default.)) | 158 |
| | | 122 | Multiplication | Performs multiplication with gain and bias on up to 2 analog signals. | | 160 |
| | | 123 | Division | Performs division with gain and bias on up to 2 analog signals. | | 162 |
| | | 126 | Arithmetic Operation | Performs various math operation (trigonometric, logarithmic, etc.) on floating-point decimal values converted (to industrial units) from up to 8 analog inputs. | | 164 |
| | | 127 | Range Conversion | Easily converts up to 8 analog signals simply by inputting the 0% and 100% input values and 0% and 100% output values. | | 171 |
| | | Functions | 131 | Square Root | | Performs square root extraction (with low-end cutout) on single analog signals. |
| | 132 | | Absolute Value | Performs non-linear (3 gain values) operation on single analog signals. Analog signals can also set as a dead band (with different gap). | 176 | |
| | 133 | | Non-linear Gain (Dead Band) | Outputs the absolute value of single analog signals. | 178 | |
| | 134 | | Low-end Cutout | Sets output to zero close to the zero point of single analog signals. | 180 | |
| | 135 | | Segment Linearizer | Converts single analog signals to 15 segments before the signals is output. | 181 | |
| | 136 | | Temperature And Pressure Correction | Performs temperature and pressure correction. | 184 | |
| | Time Function | | 141 | First-order Lag | Performs first-order lag operation on single analog signals. | 186 |
| | | 143 | Rate-of-change Limit | Performs rate-of-change restriction on single analog signals. | 188 | |
| | | 145 | Moving Average | Performs moving average operation on single analog signals. | 190 | |
| | | 147 | Lead/Delay | Performs lead/delay operation on single analog signals. | 192 | |
| | | 148 | Dead Time | Performs dead time and first-order lag operations on single analog signals. | 194 | |
| | | 149 | Dead Time Compensation | Used for Smith's dead time compensation PID control | 196 | |
| | | 150 | Accumulator for instantaneous value input | Accumulates analog signals, and outputs 8-digit accumulated value signals. | 198 | |
| | | 151 | Run Time Accumulator | Accumulates the operating time, and outputs the pulse signal per specified time. | 202 | |
| | | 153 | Time Sequence Data Statistics | Records time sequence data from analog signals and calculates statistics, such as averages and standard deviations. | 204 | |
| | 155 | Ramp Program | Ramp program setter for combining ramps for time and hold values. | 208 | | |

1-1 List of Function Blocks

| Category | Type | Block Model | Block Name | Function | Allocatable Block Address | Page |
|-----------------------------|---|-------------|---|---|--|------|
| Operation Block (continued) | Time functionn (continued) | 156 | Segment Program | Segment program setter setting the output values with respect to time. | 100 to 349 (Note: 349 is an internal switch in CX-Process Tool (One Block Model 209 is already allocated as the default.)) | 217 |
| | | 157 | Segment Program 2 | Segment program setting with wait function for setting the output values with respect to time | | 221 |
| | Signal Selection/ Switching | 161 | Rank Selector | Selects the rank of up to 8 analog signals. | | 234 |
| | | 162 | Input Selector | Selects the specified analog signals specified by the contact signal from up to 8 analog signals. | | 237 |
| | | 163 | 3-input Selector | Selects and outputs one of three analog input signals. | | 240 |
| | Signal Selection/ Switching (continued) | 164 | 3-output Selector | Outputs one analog input signal in three switched direction. | | 243 |
| | | 165 | Constant Selector | Selects 8 preset constants by the contact signal. | | 246 |
| | | 166 | Constant Generator | Outputs 8 independent constants. | | 249 |
| | | 167 | Ramped Switch | Switches two analog inputs (or constants) with a ramp. | | 251 |
| | ITEM Settings | 171 | Constant ITEM Setting | Writes the constant to the specified ITEM at the rising edge of the send command contact. | | 253 |
| | | 172 | Variable ITEM Setting | Writes the analog signal to the specified ITEM at the rising edge of the send command contact. | | 256 |
| | | 174 | Batch Data Collector | Stores each of max. 8 analog inputs to buffer by a certain timing within sequential processing. | | 260 |
| | Pulse Train Operation | 182 | Accumulated Value Input Adder | Adds up to four accumulated value signals. | | 263 |
| | | 183 | Accumulated Value Analog Multiplier | Multiplies analog signals by the accumulated value signals. | | 266 |
| | | 184 | Accumulator for accumulated value input | Converts 4-digit accumulated value signals to 8 digits. | | 269 |
| | | 185 | Contact input/ Accumulated value output | Counts low-speed contact pulses, and outputs 8-digit accumulated signals. | | 273 |
| | | 186 | Accumulated Value Input/ Contact Output | Converts 4-digit accumulated value signals to low-speed contact pulses before they are output. | | 276 |
| | Others | 192 | Analog/Pulse Width Converter | Changes the ON/OFF duration ratio in a constant cycle duration so that it is proportional to the analog signal. | | 279 |
| | Sequence Operation | 201 | Contact Distributor | Connect contact signals between function blocks in a 1:1 connection. | | 281 |
| | | 202 | Constant Comparator | Compares up to eight sets of analog signals and constants, and outputs the comparison results as contacts. | | 283 |
| | | 203 | Variable Comparator | Compares up to eight pairs of analog signals, and outputs the comparison results as contacts. | | 287 |
| | | 205 | Timer | 2-stage output type addition timer for forecast values and reached values. Can also output the present value. | | 291 |
| | | 206 | ON/OFF Timer | Timer for performing ON-OFF operation at preset ON and OFF times. | | 293 |
| | | 207 | Clock Pulse | Manipulates and monitors ON/OFF valves with open/close limit switches. | | 295 |

1-1 List of Function Blocks

| Category | Type | Block Model | Block Name | Function | Allocatable Block Address | Page |
|--------------------------------|--------------------------------------|-------------|------------------------------------|---|---|---|
| Operation Block (continued) | Sequence Operation (continued) | 208 | Counter | 2-stage output type addition timer for forecast values and arrival values. Can also output the current value. | 100 to 349 (Note: 349 is an internal switch in CX-Process Tool (One Block Model 209 is already allocated as the default.)) | 297 |
| | | 209 | Internal Switch | Temporary storage contact for accepting relays in the Step Ladder Program block. (Note: One internal switch is already allocated as "temporary storage" in CX-Process Tool.) | | 299 |
| | | 210 | Level Check | Checks an analog input for 8 levels and outputs a contact corresponding to the level. The level number is also output as an analog value.<0} | | 301 |
| | Contact Type Control Target | 221 | ON/OFF Valve Manipulator | Manipulates and monitors ON/OFF valves with open/close limit switches. | | 306 |
| | | 222 | Motor Manipulator | Manipulates and monitors motor operation. | | 310 |
| | | 223 | Reversible Motor Manipulator | Manipulates and monitors reversible motor operation. | | 315 |
| | | 224 | Motor Opening Manipulator | Inputs a target opening, and manipulates an electric positional-proportional motor. | | 320 |
| | Sequential Control | | 301 | Step Ladder Program | | Performs logic sequence and step progression control. |
| Node Terminal | Send to Computer | 401 | DO to Computer | Sends 128 contacts to the send-to-computer area. When CX-Process Monitor is used, the contact signals to be monitored are connected to this function block. | 501 to 532 | 346 |
| | | 402 | AO to Computer | Sends 16 analog values to the send-to-computer area. When CX-Process Monitor is used, the analog signals to be monitored are connected to this function block. | | 348 |
| | | 403 | 1-Block Send Terminal to Computer | Sends a specified 1 block to the send-to-computer area. When CX-Process Monitor is used, the 1 block to be monitored are connected to this function block. | | 350 |
| | | 404 | 4-Block Send Terminal to Computer | Sends a specified 4 block to the send-to-computer area. When CX-Process Monitor is used, the 4 block to be monitored are connected to this function block. | | 352 |
| | Send to All Nodes | 407 | DO Terminal to All Nodes | Sends 32 contacts to nodes on the Controller Link Data Link. | 550 to 599 | 355 |
| | | 408 | AO Terminal to All Nodes | Sends 2 analog values to nodes on the Controller Link Data Link. | | 357 |
| | | 409 | DO Terminal Settings from Computer | Receives 32 contacts sent from the computer. (Can also be downloaded to the send-to-all nodes area.) | | 358 |
| | | 410 | AO Terminal Settings from Computer | Receives 2 analog values sent from the computer. (Can also be downloaded to the send-to-all nodes area.) | | 360 |
| | Receive from All Nodes | 414 | DI Terminal from All Nodes | Receives 32 contacts sent from nodes on the Controller Link Data Link. | 600 to 699 | 362 |
| | | 415 | AI Terminal from All Nodes | Receives 2 analog values sent from nodes on the Controller Link Data Link. | | 364 |

1-1 List of Function Blocks

| Category | Type | Block Model | Block Name | Function | Allocatable Block Address | Page |
|-------------------|-----------------------------|---|------------------------------------|---|---------------------------|------|
| CPU Unit Terminal | | 451 | DI Terminal from CPU Unit | Inputs max. 128 points from any leading address in CPU Unit I/O memory (one of CIO, WR, HR, DM and EM area types). (read) | 861 to 876 | 365 |
| | | 452 | DO Terminal to CPU Unit | Outputs max. 128 points from any leading address in CPU Unit I/O memory (one of CIO, WR, HR, DM and EM area types). (read and write) | | 367 |
| | | 453 | AI Terminal from CPU Unit | Inputs max. 8 words from any leading address in CPU Unit I/O memory (one of CIO, WR, HR, DM and EM area types). (read) | | 369 |
| | | 454 | AO Terminal to CPU Unit | Outputs max. 8 words from any leading address in CPU Unit I/O memory (one of CIO, WR, HR, DM and EM area types). (read and write) | | 372 |
| SCADA Interface | Expanded CPU Unit Terminals | 455 | Expanded DI Terminal from CPU Unit | Inputs any contact data in CPU Unit I/O Memory, and writes max. 64 points on another function block. | | 375 |
| | | 456 | Expanded DO Terminal from CPU Unit | Inputs the contact data of another function block, and writes max. 64 points on any I/O Memory in the CPU Unit. | | 377 |
| | | 457 | Expanded AI Terminal from CPU Unit | Inputs any analog data in CPU Unit I/O Memory, and writes max. 64 words on another function block. | | 379 |
| | | 458 | Expanded AO Terminal from CPU Unit | Inputs the analog data of another function block, and writes max. 64 words on any CPU Unit I/O Memory. | | 382 |
| | Send/Receive All Blocks | 461 | Receive All Blocks | Reads ITEM data specified for Send/Receive All Blocks for up to 32 Control Blocks, 249 Operation Blocks, and 32 External Controller Blocks starting from a specified address in the I/O memory of the CPU Unit. | 897 | 385 |
| | | 462 | Send All Blocks | Writes ITEM data specified for Send/Receive All Blocks for up to 32 Control Blocks, 249 Operation Blocks, and 32 External Controller Blocks starting to a specified address in the I/O memory of the CPU Unit. | 898 | 393 |
| Field Terminal | Contact I/O | 501 | DI 8-point Terminal | Inputs 8 contacts from 8-point Input Unit. | 901 to 980 | 396 |
| | | 502 | DI 16-point Terminal | Inputs 16 contacts from 16-point Input Unit. | | 397 |
| | | 503 | DI 32-point Terminal | Inputs 32 contacts from 32-point Input Unit. | | 398 |
| | | 504 | DI 64-point Terminal | Inputs 64 contacts from 64-point Input Unit. | | 399 |
| | | 511 | DO 5-point Terminal | Outputs 5 contacts from 5-point Output Unit. | | 401 |
| | | 512 | DO 8-point Terminal | Outputs 8 contacts from 8-point Output Unit. | | 402 |
| | | 513 | DO12-point Terminal | Outputs 12 contacts from 12-point Output Unit. | | 403 |
| | | 514 | DO16-point Terminal | Outputs 16 contacts from 16-point Output Unit. | | 404 |
| | | 515 | DO32-point Terminal | Outputs 32 contacts from 32-point Output Unit. | | 405 |
| | | 516 | DO64-point Terminal | Outputs 64 contacts from 64-point Output Unit. | | 406 |
| | | 518 | DI 16-point/DO16-point Terminal | Inputs and outputs 16 contacts each from 16-point Input/16-point Output Units. | | 407 |
| 525 | DI 96-point Terminal | Inputs 96 contacts from 96-contact Input Units. | 408 | | | |

1-1 List of Function Blocks

| Category | Type | Block Model | Block Name | Function | Allocatable Block Address | Page |
|-------------------------------|----------------------------|-------------|---|--|---------------------------|------|
| Field Terminal (continued) | Contact I/O (continued) | 537 | DO 96-point Terminal | Outputs 96 contacts from 96-contact Output Units. | | 409 |
| | | 544 | DI 48-point/ DO 48-point Terminal | Inputs and outputs 48 contacts each from 48-point Input/48-point Output Units. | | 410 |
| | Analog I/O | 551 | AI 8-point Terminal (AD003) | Inputs 8 analog signals from the C200H-AD003. | | 411 |
| | | 552 | AO 8-point Terminal (DA003/4) | Inputs 8 analog signals from the C200H-DA003/DA003. | | 412 |
| | | 553 | AI 2-point/ AO 2-point Terminal (MAD01) | Inputs and outputs 2 analog signals each from the C200H-MAD01. | 901 to 980 | 414 |
| | | 561 | AI 4-point Terminal (PTS01/02/03, PDC01, PTW01) | Inputs 4 analog signals from one of CS1W-PTS01 (Isolated-type Thermocouple Input Unit), CS1W-PTS02/03 (Isolated-type Temperature-resistance Thermometer Input Unit), CS1W-PDC01 (Isolated-type Analog Input Unit) or CS1W-PTW01 (2-lead Transmitter Input Unit). | | 416 |
| | | 562 | PI 4-point Terminal (PPS01) | Inputs 4 instantaneous values and accumulated values each from CS1W-PPS01 (Isolated-type Pulse Input Unit). | | 419 |
| | | 563 | AO 4-point Terminal (PMV01) | Outputs 4 analog signals from CS1W-PMV01 (Isolated-type Control Output Unit). | | 422 |
| | | 564 | AI 8-point Terminal (PTR01/02/03) | Inputs 8 analog signals from CS1W-PTR01 (Power Transducer Input Unit) or CS1W-PTR02 (Analog Input Unit (100 mV)). | | 424 |
| | | 583 | AI 4-point/AO 4-point Terminal (MAD44) | Inputs and outputs 4 analog signals each from the CS1W-MAD44. | | 426 |
| | | 584 | AI 8-point Terminal (AD081) | Inputs 8 analog signals from the CS1W-AD081. | | 428 |
| | | 585 | AO 8-point Terminal (DA08V/C) | Outputs 8 analog signals from the CS1W-DA08V/C. | | 430 |
| | | 586 | AI 4-point Terminal (AD041) | Inputs 4 analog signals from the CS1W-AD041. | | 432 |
| | | 587 | AO 4-point Terminal (DA041) | Outputs 4 analog signals from the CS1W-DA041. | | 434 |
| | | 588 | AI 4-point Terminal (DRT1-AD04) | Inputs four analog signals from a DRT1-AD04 DeviceNet Slave Analog Input Unit. | | 436 |
| | | 589 | AO 2-point Terminal (DRT1-DA02) | Outputs two analog signals from a DRT1-DA02 DeviceNet Slave Analog Output Unit. | | 438 |

1-2 How to Use Function Blocks for Specific Operations

| To Perform This Specific Operation | | Perform The Following | See Page: |
|------------------------------------|--|--|---|
| Data Exchange | Direct exchange of large amounts of data between the CPU Unit and function blocks for data exchange with a PT (Programmable Terminal) for example | Use the Expanded CPU Unit Terminal blocks (Block Models 455 to 458). | Expanded CPU Unit Terminal blocks |
| | Continuous data exchange with the CPU Unit | Use the CPU Unit Terminal blocks (Block Models 451 to 454). | CPU Unit Terminal blocks |
| | Read/write of specified data (ITEMs) from a CPU Unit (including a CPU Unit on a networked PLC) whenever necessary | Execute the CMND (DELIVER COMMAND) instruction in the Step Ladder Program, and issue the FINS command (ITEM read/write command). | Section 6 of the Operation Manual |
| | Continuous data exchange with a Loop Control Unit at another node | Use Controller Link and the Node Terminal blocks (Send Terminal to All Nodes, Receive Terminal from All Nodes), and execute the Controller Link Data Link (at any setting). | 3-3 and Appendix 2 of the Operation Manual |
| | Continuous monitoring and manipulation of all ITEM data in multiple Control blocks (max. 4 blocks) on CX-Process Monitor | Use the Node Terminal blocks (4-Block Send Terminal to Computer or 1-Block Send Terminal to Computer). | Node Terminal blocks |
| | Reading/writing specific ITEMs for Control, Operation, and External Controller Blocks with SCADA software | Using Receive All Blocks (Block Model 461) and Send All Blocks (Block Model 462) to transfer Loop Control Unit data using tags created with CX-Process Tool. | 3-4 <i>Exchanging Data with CX-Process Monitor/SCADA Software and with Other Nodes in Operation Manual.</i> |
| Run/Stop | Instruction of run start/stop of the Loop Control Unit (all function blocks) from the CPU Unit whenever necessary | Execute the CMND (DELIVER COMMAND) instruction in the Step Ladder Program, and issue the FINS command (ITEM read/write command) to change ITEM 014 (run/stop command) of the System Common block. Or, use the ITEM setting commands (Block Models 171 and 172) to stop ITEM 014 (run/stop command) of the System Common block. (In this case, operation cannot be started.) Note: Operation can also be stopped or started on CX-Process Tool and CX-Process Monitor. | 3-2 of the Operation Manual |
| | Instruction of operation stop/stop cancellation on individual function blocks from the CPU Unit whenever necessary | Execute the CMND (DELIVER COMMAND) instruction in the Step Ladder Program, and issue the FINS command (ITEM read/write command) to change ITEM 000 (stop block operation command) of the relevant block. Note: Arithmetic operation stop/stop cancel on a relevant block can also be indicated by monitoring the run status on CX-Process Tool. | |
| | Execution of required processing on the CPU Unit according to run status (e.g. in RUN mode, execution error, function block data error) of the Loop Control Unit | Execute the required processing on the CPU Unit taking bits 00 to 05 of the nth leading words of the CPU Bus Unit as the input conditions. | 3-3 of the Operation Manual |
| | Execution of required processing on the Loop Control Unit according to run status (e.g. operation mode, fatal error, Output OFF) of the CPU Unit | Execute the required processing on the Loop Control Unit using the Step Ladder Program block based upon the CPU Unit run status of ITEMs 007 to 011 and 013 in the System Common block. | |
| High-speed processing | High-speed processing of specific function blocks | Set the operation cycle of the relevant function block to a shorter value. | 3-2 of the Operation Manual |
| High-density monitor | High-density monitoring of analog signals | Monitor analog signals by the Field Terminal blocks (Block Models 501 to 587) and Send to Computer blocks (Block Models 401 to 404) | 3-4 of the Operation Manual |

1-2 How to Use Function Blocks for Specific Operations

| To Perform This Specific Operation | | Perform The Following | See Page: |
|---|--|---|--|
| Monitoring/ Setting External Controllers | Monitoring and setting a stand-alone external controller. | Connect an ES100X Controller to the RS-232C port on the Loop Control Unit and use the ES100X Controller Terminal (Block Model 045). | ES100X Controller Terminal |
| Batch Data Collection | Data collection by a certain timing within sequence processing in a batch processing plant | Use the Batch Data Collector block (Block Model 174) | Batch Data Collector block |
| Analog control | ON/OFF control | Use the 2-position ON/OFF block (Block Model 001). | 2-position ON/OFF block |
| | Heating/cooling ON/OFF control | Use the 3-position ON/OFF block (Block Model 002). | 3-position ON/OFF block |
| | Time-proportional control | Use the Analog/Pulse Width Converter block (Block Model 192). | Analog/Pulse Width Converter block, and 5-1 of the Operation Manual |
| | Application of input filter on PV | Use the First-order Lag block (Block Model 141). | First-order Lag block |
| | Application of bias on PV | Use the Ratio Setting block (Block Model 033) or the Addition/Subtraction block (Block Model 121). | Ratio Setting block , Addition/Subtraction block |
| | Application of ratio on Set Point and PV | Use the Addition/Subtraction block (Block Model 121). | Addition/Subtraction block |
| | Input of error between multiple PVs | Use the Addition/Subtraction block (Block Model 121). | Addition/Subtraction block |
| | Entry of differential pressure transmitter to calculate flowrate | Use the Square Root block (Block Model 131) (with low-end cutout function). | Square Root block |
| | Entry of pulse output flowmeter for accumulation of flowrate | Use the Pulse Input Unit, and enter to the Accumulator for accumulated value input block (Block Model 184) for continuous accumulation. | Pulse Input Unit, and 5-1 of the Operation Manual |
| | Temperature and pressure correction | Use the Temperature and Pressure Correction block (Block Model 136). | Temperature and Pressure Correction block |
| | Setting of the PID constant values for multiple words | Use the Constant Item Setting block (Block Model 171). | Constant Item Setting block, and 5-1 of the Operation Manual |
| | Switching of multiple Set Point values | Use the Constant Selector block (Block Model 165) or the Constant Item Setting block (Block Model 171). | Constant Selector block and Constant Item Setting block, and 5-1 of the Operation Manual |
| | Switching of multiple PID sets | Use the Constant Item Setting block (Block Model 171). | 211, and 5-1 of the Operation Manual |
| | Ramp control of Set Point values (program control) | Use the Ramp Program block (Block Model 155) or the Segment Program block (Block Model 156). | Ramp Program block and Segment Program block, and 5-1 of the Operation Manual |
| | Cascade control | Use a serial connection for the Basic PID block (Block Model 011) or Advanced PID block (Block Model 012). | Basic PID block and Advanced PID, and 5-2 of the Operation Manual |
| | Dead time compensation control | Use the Dead Time Compensation block (Block Model 149) or the Advanced PID block (Block Model 012). | Dead Time Compensation block and Advanced PID block, and 5-2 of the Operation Manual |
| Feedforward control | Use the Advanced PID block (Block Model 012) or the Lead/Delay block (Block Model 147). | Advanced PID block and Lead/Delay block, and 5-2 of the Operation Manual | |
| Non-interfering control | | | |
| Sample PI control | Use the ON/OFF Timer block (Block Model 206). | ON/OFF Timer block, and 5-2 of the Operation Manual | |
| PID control with differential gap | Use the Constant Item Setting block (Block Model 171). | Constant Item Setting block | |
| Selective control | Use the Rank Selector block (Block Model 161). | Rank Selector block | |
| Using fuzzy control based on knowledge from ambiguous expressions | Use the Fuzzy Logic block (Block Model 016). | Fuzzy Logic block | |
| Special math operations | Performing calculation is engineering units rather than percentages | Use the Arithmetic Operation block (Block Model 126). | Arithmetic Operation block |

1-2 How to Use Function Blocks for Specific Operations

| To Perform This Specific Operation | | Perform The Following | See Page: |
|---|--|--|--|
| | Performing special calculations, such as trigonometric or logarithmic operation | | |
| | Calculating statistics (e.g., average, standard deviation, etc) for time sequence data | Use the Time Sequence Data Statistics block (Block Model 153). | Time Sequence Data Statistics block |
| Accumulation processing | Accumulation (accumulator) of instantaneous analog signals such as flowrate signals on the Loop Control Unit | Use the Accumulator for instantaneous value input block (Block Model 150). | Accumulator for instantaneous value input block, and 5-1 of the Operation Manual |
| | Continuous accumulation of 4-digit accumulated value signals (repeat signals 0000 to 9999) and conversion to 8-digit signals | Use the Accumulator for accumulated value input block (Block Model 184). | Accumulator for accumulated value input block |
| | Input and accumulation of low-speed pulse signals such as the power signal | Use the Contact input/Accumulated value output block (Block Model 185). | Contact input/Accumulated value output block |
| | Notification of accumulated values on a field mechanical counter for contact inputs | Use the Accumulated Value Input/Contact Output block (Block Model 186). | Accumulated Value Input/Contact Output block |
| | Batch flowrate capture | Use the Batch Flowrate Capture block (Block Model 014). | Batch Flowrate Capture block |
| | Ratio control of accumulated values | Use the Batch Flowrate Capture block (Block Model 014) and the Blended PID block (Block Model 013). | Batch Flowrate Capture block, Blended PID block |
| | Addition of accumulated values | Use the Accumulated Value Input Adder block (Block Model 182). | Accumulated Value Input Adder block |
| | Multiplication of analog signals with accumulated values | Use the Accumulated Value Analog Multiplier block (Block Model 183). | Accumulated Value Analog Multiplier block |
| | Sequence control | AND, OR and other logical operations on the Loop Control Unit | Use the Step Ladder Program block (Block Model 301). Use the Internal Switch block (Block Model 209). |
| One-shot contact output of the ON input state when the contact state changes from OFF to ON and vice versa only in 1-operation cycles (system common operation cycle) | | | |
| Constantly ON contacts and other system contacts | | | |
| Step progression control and other control on the Loop Control Unit | | | |
| Acceptance of relays in the Step Ladder Program | | | |
| Execution of special processing at each fixed cycle longer than operation cycle in Step Ladder Program | | Generate a fixed cycle timing signal by the Clock Pulse block (Block Model 207). | Clock Pulse block |
| Execution of timers/counters on the Loop Control Unit | | Use the Timer block (Block Model 205) and the Counter block (Block Model 208). | Timer block, Counter block |
| Constant setting/selection | Constant transmission of constants as analog signals | Use the Constant Generator block (Block Model 166). | Constant Generator block |
| | Setting of constants to specified ITEMs under certain conditions | Use the Constant Item Setting block (Block Model 171). | Constant Item Setting block |
| | Selection of one of multiple constants and transmission of that constant as an analog signal | Use the Constant Selector block (Block Model 165). | Constant Selector block |
| | Changing PID constants and other parameters in stages according to a process value (e.g., temperature). | Use the Level Check block (Block Model 210) and the Constant ITEM Setting block (Block Model 171) together to change parameters for other blocks according to the level. | Level Check block, Constant ITEM Setting block |

1-2 How to Use Function Blocks for Specific Operations

| To Perform This Specific Operation | Perform The Following | See Page: | |
|---|--|---|--|
| Analog signal setting/ selection | Setting of analog signals to specified ITEMS under certain conditions | Use the Variable ITEM Setting block (Block Model 171). | Variable ITEM Setting block |
| | Selection of one of multiple analog signals and transmission of that analog signal as an analog signal | Use the Input Selector block (Block Model 162). | Input Selector block |
| | Selection of the maximum value from multiple analog signals and transmission of that maximum value as an analog signal | Use the Rank Selector block (Block Model 161). | Rank Selector block |
| | Selection of the minimum value from multiple analog signals and transmission of that minimum value as an analog signal | | |
| | Selection of the nth largest value from multiple analog signals and transmission of the signal as an analog signal | | |
| | Switching of sensors on a different measuring system or measurement target | Use the 3-input Selector block (Block Model 163). | 3-input Selector block |
| | Switching of operation nodes on a different measuring system or measurement target | Use the 3-output Selector block (Block Model 164). | 3-output Selector block |
| | Changing two settings with a ramp (e.g., opening and closing valves) | Use the Ramped Switch block (Model Block 167). | Ramped Switch block |
| Converting ranges of analog signals merely by setting values for 0% and 100% inputs and 0% and 100% outputs | Use the Range Conversion block (Block Model 127). | Range Conversion block | |
| Analog signal/ constant comparison | Comparison of constant and analog signals | Use the Constant Comparator block (Block Model 202). | Constant Comparator block |
| | Comparison of two analog signals | Use the Variable Comparator block (Block Model 203). | Variable Comparator block |
| Manipulation/ monitor/ control of special external control target | Manipulation and monitoring of ON/OFF valve with open/close limit switches | Use the ON/OFF Valve Manipulator block (Block Model 221). | ON/OFF Valve Manipulator block |
| | Manipulation and monitoring of motors | Use the Motor Manipulator block (Block Model 222). | Motor Manipulator block |
| | Manipulation and monitoring of reversible motors | Use the Reversible Motor Manipulator block (Block Model 223). | Reversible Motor Manipulator block |
| | Manipulation of a electric positional-proportional motor as the control target | Use the Basic PID (Block Model 011)/Advanced PID block (Block Model 012) and Motor Opening Manipulator block (Block Model 224). | Basic PID, Advanced PID block, Motor Opening Manipulator block |

SECTION 2

Description of Function Blocks

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Conventions Used in Function Block Descriptions

Each of the function blocks is described using the following conventions.

Outline

Describes an outline of the functions of the function block.

Function block applications

Gives examples of typical applications that the function block can be used in.

Block diagram

Shows the input ITEMS and output ITEMS of the function block, and internal processes specific to the function block.

ITEM list

- ITEM Type: Indicates the type of ITEM according to the following categories:
(For details of categories, see 3-1-1 "Configuration of Function Blocks" in the User's Manual.
Contact input, contact output, analog input, analog output, analog input connection information, accumulated value input, accumulated value output, accumulated value input connection information and parameter
- ITEM: Indicates the ITEM number in ascending order.
- Symbol: Indicates the symbol that is indicated in CX-Process Tool.
Analog input: X, Analog output: Y, Contact input: S, Contact output: U, etc.
- Data Description: Indicates the name of the ITEM and its content.
- Data Range: Indicates the range of data that can be stored.
- Default: Indicates the default on CX-Process Tool.
- COLD start initialization: Indicates whether the content of the ITEM is initialized when a cold start is performed
- R/W Mode: Indicates which of the following modes each ITEM can be read or written by. (R: Read, W: Write, R/W: R/W-enabled)
CX-Process Tool, CX-Process Monitor (Tuning screen, Control screen), ITEM Setting blocks (Block Model 171/172), Step Ladder Program (Block Model 301), Send/Receive All Blocks (Block Model 462/461)
Note: On CX-Process Tool, the R/W mode is indicated by W: Download in file units, R: Upload in file units, r: Read in the Monitor run status screen, r/w: Read/write in Operation Check screen, (S): Default data (can be set only in Support Software), (O): Run data (can be set in both CX-Process Tool and CX-Process Monitor)
- Data length: Indicates the data length (bytes) when each ITEM is read or written by a FINS command. This item has no meaning for other commands.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | | | | Data Length (bytes) |
|---------------|-------|--------|--|---------------|------------|--|------------------------------|---------------------------------|---------------------------------|----------------------------------|
| | | | | | | R/W Mode | R/W Mode | R/W Mode | R/W Mode | |
| | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled | According to CX-Process Tool | According to CX-Process Monitor | According to ITEM Setting block | According to Step Ladder Program |
| Contact input | (000) | | Be sure to set this ITEM to 0. Note: If set to 1, processing for all function blocks stops, and data exchange between the Loop Control Unit and the CPU Unit stops. | 0, 1 | 0 | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | 24 |
| | 002 | | Block Model: Ssystem | 000 | 000 | - | - | - | - | 2 |

1 System Common blocks

<000> System Common blocks 000 (fixed)

| Block Model | Block Name | Block Address |
|-------------|----------------------|---------------|
| <000> | System Common blocks | 000 (fixed) |

Outline

This function block sets the functions that are used in common to all function blocks, and outputs various signals for system use and the CPU Unit run status.

Setting of functions common to all function blocks

- Setting of the system common operation cycle
- Run/stop command and run indication
- Indication of the load rate for each operation cycle group
- System indication and setting for node terminals
- Error indication
- Memory processing

Output of CPU Unit run status

- Operating mode, fatal error, output OFF, function block change

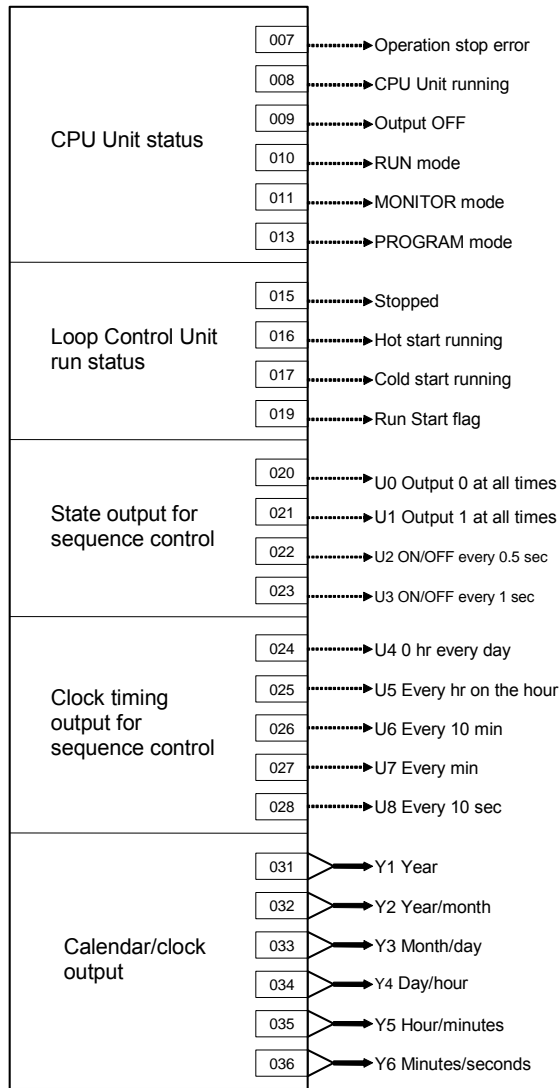
Output of Loop Control Unit run/stop command and status

- Output of states for sequence control

Output of various signals for system use

- Output of states for sequence control
- Clock timing output signals
- Calendar and clock output

Block diagram



1 System Common blocks

<000> System Common blocks 000 (fixed)

ITEM list

CX-Process Tool must be used to set ITEM004, ITEM042 and ITEM043 in the following list as initial settings when the Loop Control Unit is to be used.

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | Data Length (bytes) | |
|---------------|-------|--------|--|---------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|---------------------|--|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | |
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | | |
| Contact input | (000) | | Be sure to set this ITEM to 0. Note: If set to 1, processing for all function blocks stops, and data exchange between the Loop Control Unit and the CPU Unit stops. | 0, 1 | 0 | - | - | - | - | - | 1 | |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 | |
| | 002 | | Block Model: System Common | 000 | 000 | - | - | - | - | - | 2 | |
| Special | 003 | | Execution error display 0: Normal, Other: Error(See Appendix "Execution Error Code List.") | | 0000 | - | r | R | - | - | 2 | |
| Parameter | 004 | | System common operation cycle (sec) 1: 0.1s, 2: 0.2s, 3: 0.5s, 4: 1s, 5: 2s Note: Before changing the operation cycle, first stop the Loop Control Unit., | 1 to 5 | 4 (:1s) | - | R/W(S) | - | - | - | 2 | |

CPU Unit run status

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | Data Length (bytes) | |
|----------------|------|--------|---|------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|---------------------|--|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | |
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | | |
| Contact output | 007 | | Fatal error 0: A fatal error has not occurred on the CPU Unit. 1: A fatal error has occurred on the CPU Unit. (Fatal error was detected by system self-diagnostics or the FALS command was executed.) | 0, 1 | 0 | Yes | r | R | - | R | 1 | |
| | 008 | | CPU Unit running 0: CPU Unit has stopped. (PROGRAM mode or fatal error) 1: CPU Unit is running. (RUN mode or MONITOR mode) | 0, 1 | 0 | Yes | r | R | - | R | 1 | |
| | 009 | | Output OFF 0: CPU Unit output is not OFF. 1: CPU Unit output is OFF. (Auxiliary Area A50015 ON) | 0, 1 | 0 | Yes | r | R | - | R | 1 | |
| | 010 | | RUN mode 0: CPU Unit not in RUN mode 1: CPU Unit in RUN mode | 0, 1 | 0 | Yes | r | R | - | R | 1 | |
| | 011 | | MONITOR mode 0: CPU Unit not in MONITOR mode 1: CPU Unit in MONITOR mode | 0, 1 | 0 | Yes | r | R | - | R | 1 | |
| | 013 | | PROGRAM mode 0: CPU Unit not in PROGRAM mode 1: CPU Unit in PROGRAM mode | 0, 1 | 0 | Yes | r | R | - | R | 1 | |

1 System Common blocks

<000> System Common blocks 000 (fixed)

Loop Control Unit run/stop command and status

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | Data Length (bytes) |
|-----------|------|--------|---|------------|---------|---------------------------|------------------------------|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Parameter | 014 | | Run/stop command 0: Stop, 1: Hot start, 2: Cold start Note 1: Unit already running. Change to 1 or 2 invalid Note 2: Only setting of 0 (stop) can be performed in the ITEM Setting blocks. (For details, see "3-2 Description of Operation" in the User's Manual.) | 0 to 2 | 0 | Yes | r/w | R/W | W (Note 2) | - | 2 |
| | 015 | | Run/stop Status 1: Stop 0: Running | 0, 1 | 0 | Yes | r | R | - | R | 2 |
| | 016 | | Hot start 1: Hot start in operation 0: Other | 0, 1 | 0 | Yes | r | R | - | R | 2 |
| | 017 | | Cold start 1: Cold start in operation, 0: Other | 0, 1 | 1 | Yes | r | R | - | R | 2 |
| | 018 | | START mode at power ON 1: Hot start, 2: Cold start Note: If pin2 of the DIP switch is ON, this setting will be ignored and the Unit will always use a cold start. | 1, 2 | 1 | - | R/W(S) | - | - | R | 2 |
| | 019 | | Run Start flag 1: Running is started (hot or cold start) 0: 0 is set by the user. Note: The Run Start flag is latched to 1 when the Loop Control Unit starts running, and remains at 1 as long as the flag is not reset to 0. (This flag differs from constantly ON flags in that it can be set to 0 by the user.) | 0, 1 | 1 | Yes | r | - | - | W | 1 |

Status output for sequence control

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | Data Length (bytes) | |
|----------------|------|----------------------------------|---|------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|--|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | |
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | | |
| Contact output | 020 | U0 | Output 0 0 is output at all times at power ON. | 0 | 0 | Yes | r | - | - | R | 1 | |
| | 021 | U1 | Output 1 1 is output at all times at power ON. | 1 | 1 | Yes | r | - | - | R | 1 | |
| | 022 | U2 | ON/OFF every 0.5 sec | 0, 1 | 0 | Yes | r | - | - | R | 1 | |
| | 023 | U3 | ON/OFF every 1 sec | 0, 1 | 0 | Yes | r | - | - | R | 1 | |
| | 024 | U4 | Differential output at 0 hr every day | 0, 1 | 0 | Yes | r | - | - | R | 1 | |
| | 025 | U5 | Differential output at every hour on the hour | 0, 1 | 0 | Yes | r | - | - | R | 1 | |
| | 026 | U6 | Differential output every 10 min | 0, 1 | 0 | Yes | r | - | - | R | 1 | |
| | 027 | U7 | Differential output every min | 0, 1 | 0 | Yes | r | - | - | R | 1 | |
| 028 | U8 | Differential output every 10 sec | 0, 1 | 0 | Yes | r | - | - | R | 1 | | |

Calendar and clock output

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | Data Length (bytes) | |
|-----------|------|--------|---|------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|--|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | |
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | | |
| Parameter | 031 | Y1 | Year | YYYY | | Yes | - | - | - | - | 2 | |
| | 032 | Y2 | Year/month (year: lower 2 digits of year) | YYMM | | Yes | - | - | - | - | 2 | |
| | 033 | Y3 | Year/day | MMDD | | Yes | - | - | - | - | 2 | |
| | 034 | Y4 | Day/hours | DDhh | | Yes | - | - | - | - | 2 | |
| | 035 | Y5 | Hour/minutes | hhmm | | Yes | - | - | - | - | 2 | |
| | 036 | Y6 | Minutes/seconds | mmss | | Yes | - | - | - | - | 2 | |

Note: This calendar data is based upon the calendar data of the CPU Unit.

1 System Common blocks

<000> System Common blocks 000 (fixed)

Download indication for individual function blocks

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | Data Length (bytes) |
|-----------|-------|--------|---|------------|---------|---------------------------|------------------------------|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Parameter | 039*6 | BT | Function Block Changed flag 1: Function blocks have been downloaded from the CX-Process Tool software in units of function blocks. 0: Function blocks have not been downloaded from the CX-Process Tool software in units of function blocks, or a hot or cold start was made after a download. | 0, 1 | 0 | Yes | - | - | - | - | 1 |

*6: Supported only by Loop Control Unit version 2.50 or later.

System display and setting for Node Terminals

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | Data Length (bytes) |
|-----------|------|--------|---|---|--------------------------------------|---------------------------|------------------------------|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Parameter | 041 | | Self unit address (automatically stored) | 16 to 31 | 00 | Yes | R | - | - | - | 2 |
| | 042 | | LCU number 0: Basic, 1: Expansion 1, 2: Expansion 2 | 0 to 2 | 0 | - | R/W(S) | - | - | - | 2 |
| | 043 | | Start address of Data Memory (D) for the Node Terminals Note: The same address must be set to all LCU numbers on the same PLC. | 0 to 32767 (words) Note: Corresponds to D00000 to D32767 | 16020 Note: Corresponds to D16020 | - | R/W(S) | - | - | - | 2 |

Operation indication

System common cycle (ITEM004) blocks

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Sym bol | Data Description | Data Range | Default | COLD start initializ ation | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|-----------|------|------------|---|------------|---------|-------------------------------------|---|---|--|---|---------------------------|
| | | | | | | | Accordi ng to CX-Pro cess Tool | Accordi ng to CX-Pro cess Monitor *1 | Accordi ng to ITEM Setting block | Accordi ng to Step Ladder Progra m | |
| Parameter | 051 | | Processing time load rate | % display | | Yes | r | - | - | - | 2 |
| | 052 | | Max. control load rate indication (reset by 0) | % display | | Yes | r/w | - | - | - | 2 |
| | 053 | | Operation Cycle Automatic Switching Generator flag (1: Generated, reset by 0) | 0, 1 | 0 | Yes | r/w | - | - | - | 2 |

0.1-second operation cycle blocks

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Sym bol | Data Description | Data Range | Default | COLD start initializ ation | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|-----------|------|------------|---|------------|---------|-------------------------------------|---|---|--|---|---------------------------|
| | | | | | | | Accordi ng to CX-Pro cess Tool | Accordi ng to CX-Pro cess Monitor *1 | Accordi ng to ITEM Setting block | Accordi ng to Step Ladder Progra m | |
| Parameter | 054 | | Processing time load rate | % display | | - | r | - | - | - | 2 |
| | 055 | | Max. control load rate indication (reset by 0) | % display | | - | r/w | - | - | - | 2 |
| | 056 | | Operation Cycle Automatic Switching Generator flag (1: Generated, reset by 0) | 0, 1 | 0 | - | r/w | - | - | - | 2 |

1 System Common blocks

<000> System Common blocks 000 (fixed)

0.2-second operation cycle blocks

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|-----------|------|--------|---|------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Parameter | 057 | | Processing time load rate | % display | | - | r | - | - | - | 2 |
| | 058 | | Max. control load rate indication (reset by 0) | % display | | - | r/w | - | - | - | 2 |
| | 059 | | Operation Cycle Automatic Switching Generator flag (1: Generated, reset by 0) | 0, 1 | 0 | - | r/w | - | - | - | 2 |

0.5-second operation cycle blocks

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|-----------|------|--------|---|------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Parameter | 060 | | Processing time load rate | % display | | - | r | - | - | - | 2 |
| | 061 | | Max. control load rate indication (reset by 0) | % display | | - | r/w | - | - | - | 2 |
| | 062 | | Operation Cycle Automatic Switching Generator flag (1: Generated, reset by 0) | 0, 1 | 0 | - | r/w | - | - | - | 2 |

1-second operation cycle blocks

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|-----------|------|--------|---|------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Parameter | 063 | | Processing time load rate | % display | | - | r | - | - | - | 2 |
| | 064 | | Max. control load rate indication (reset by 0) | % display | | - | r/w | - | - | - | 2 |
| | 065 | | Operation Cycle Automatic Switching Generator flag (1: Generated, reset by 0) | 0, 1 | 0 | - | r/w | - | - | - | 2 |

2-second operation cycle blocks

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|-----------|------|--------|---|------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Parameter | 066 | | Processing time load rate | % display | | - | r | - | - | - | 2 |
| | 067 | | Max. control load rate indication (reset by 0) | % display | | - | r/w | - | - | - | 2 |
| | 068 | | Operation Cycle Automatic Switching Generator flag (1: Generated, reset by 0) | 0, 1 | 0 | - | r/w | - | - | - | 2 |

1 System Common blocks

<000> System Common blocks 000 (fixed)

Error indication

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|-----------|------|--------|---|------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Parameter | 091 | | Smallest block address where PV error input is ON ² (000: Normal) | 000 to 032 | 000 | Yes | r | R | - | - | 2 |
| | 092 | | Smallest block address where MV error input is ON ³ (000: Normal) | 000 to 032 | 000 | Yes | r | R | - | - | 2 |
| | 093 | | Smallest block address where execution error (other than error code 0) occurs ON ⁴ | 000 to | 000 | Yes | r | R | - | - | 2 |
| | 094 | | Smallest block address where function block database error occurs ON ⁵ | 000 to | 000 | Yes | r | R | - | - | 2 |
| | 095 | | Battery error (1: Error, 0: Normal) | 0, 1 | 0 | Yes | r | R | - | - | 2 |

*2: Specify this when PV error contact input is ON (set source designation at ITEM018 and error indication at ITEM019) in the Basic PID or Advanced PID blocks.

*3: Specify this when MV error contact input is ON (set source designation at ITEM090 and error indication at ITEM091) in the Basic PID or Advanced PID blocks.

*4: The smallest block number of the function block where the error occurred is stored when the error code to be stored to ITEM003 of each function block is other than 0 (normal).
For details on error codes, see Appendix "Execution Error Code List."

*5: The function blocks in which the database error is occurring are cyclically checked, and the block address is overwritten and displayed each time that an error is detected. FFFF indicates that the database error is occurring on all function blocks.

Memory processing

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|-----------|------------------|--------|--|------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Parameter | 099 | | MPU/FROM version display (V*. **V*. **) | | | Yes | r | - | - | - | 16 |
| | 100 ^b | | All clear | | | Yes | w | - | - | - | 2 |
| | 101 ^b | | Backup start command (RAM to flash memory) Note: The Unit will be in a stopped state after data has been backed up. Either execute a cold or hot start from the CX-Process Tool or turn the power supply OFF and ON. | 0, 1 | 0 | Yes | r/w | R/W | - | - | 2 |
| | 102 ^b | | Recovery start command (flash memory to RAM) Note: The Unit will be in a stopped state after data has been restored. Either execute a cold or hot start from the CX-Process Tool or turn the power supply OFF and ON. | 0, 1 | 0 | Yes | r/w | R/W | - | - | 2 |
| | 103 ^b | | Backup error display 1: Error, 0: Normal | 0, 1 | 0 | Yes | r | R | - | - | 2 |
| | 104 ^b | | Flash memory write count display | 0 to 32767 | 0 | - | r | R | - | - | 2 |
| | 110 ^b | | CX-Process Tool software version (Indicates the version of the CX-Process Tool used to create the function block data. For example, "250" is given for version 2.50.) Note: This value cannot be set by the user. It is set by the CX-Process Tool. | 0 to 32767 | 0 | - | R/W (S) | - | - | - | 2 |

*5: Supported only by Loop Control Unit version 2.00 or later.

*6: Supported only by Loop Control Unit version 2.50 or later.

- Note**
- Before changing ITEM004 (system common operation cycle) of the System Common block (Block Model 000), be sure to stop running of the Loop Control Unit. Start running of the Loop Control Unit by a cold start after changing ITEM004. Otherwise, the Loop Control Unit will not run correctly.
 - Be sure to set 0 to ITEM000 of the System Common block (Block Model 000). If this ITEM is set to 1, running of the Loop Control Unit stops, and data exchange with the CPU Unit stops.

Note The internal data on the CS1 CPU Unit and not the data on the Loop Control Unit is output as the calendar and clock output data of ITEM031 to ITEM036 of the System Common block (Block Model 000).

2 Control blocks

<001> 2-position ON/OFF 001 to 032

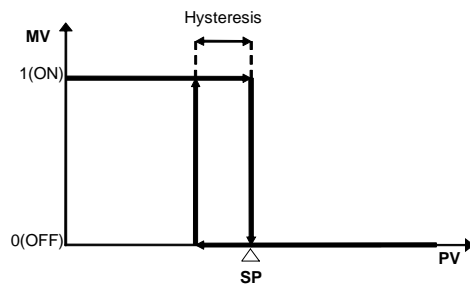
| Block Model | Block Name | Block Address |
|-------------|-------------------|---------------|
| <001> | 2-position ON/OFF | 001 to 032 |

Outline

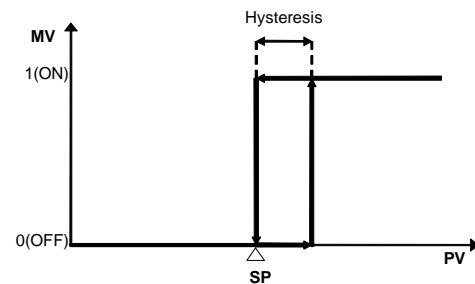
This function block is a 2-position type ON/OFF controller.

- Remote/Local switching is possible.
- This function block is provided with four PV alarm outputs and a deviation alarm output.

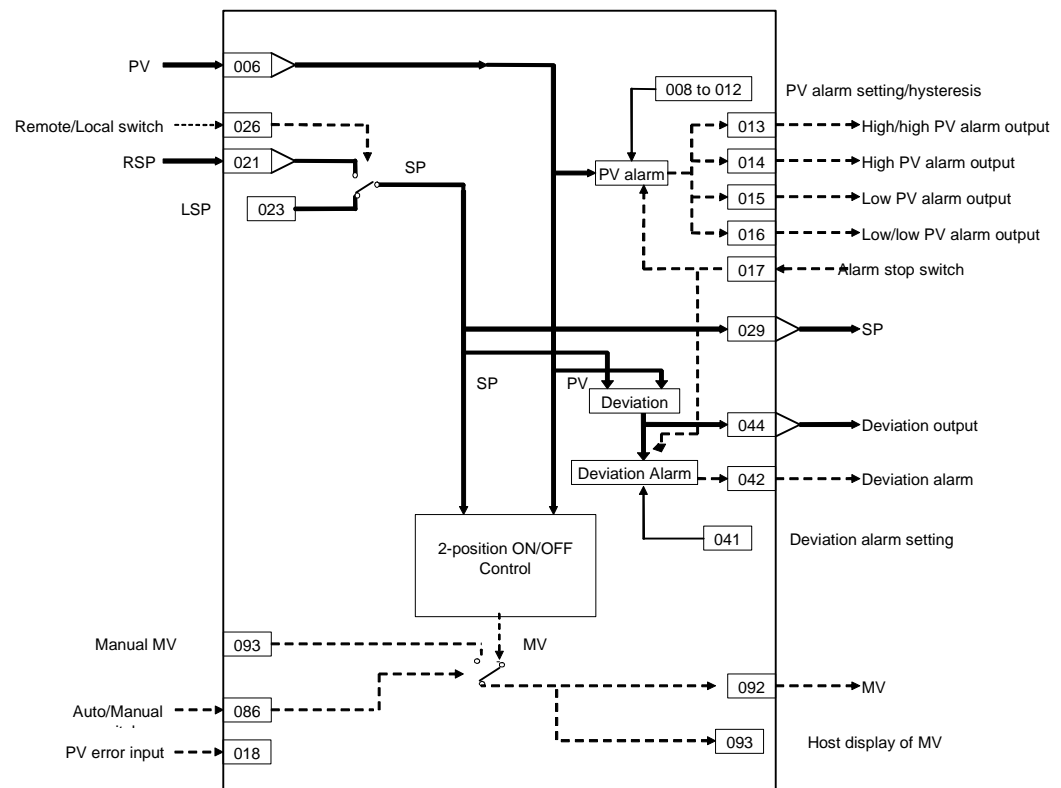
• During reverse action



• During forward action



Block diagram



ITEM list

Note The values of ITEMS that cannot be set (indicated as either "-" or "r/w" in the above list) on CX-Process Tool such as the alarm stop switch that were active before the instantaneous power interruption or running of the Loop Control Unit was stopped are cleared when a cold start is performed. When a hot start is performed, these values are held. The internally held values for the standby states in standby sequences that were active before the instantaneous power interruption or running of the Loop Control Unit was stopped are also cleared. When a hot start is performed, these values are held.

Contact input

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|---------------|------|--------|--|---------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | |
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | R/W | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: 2-position ON/OFF | 001 | 001 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |

PV

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|---------------------------------|------|--------|--|--------------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | |
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Analog input wiring information | 006 | | PV source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 007 | PV | PV input | -15.00 to +115.00% | 0.00 | Yes | - | R | - | - | S | 2 |
| Parameter | 008 | | High/high alarm setting | -15.00 to +115.00% | 115.00 | - | R/W (O) | R/W | W | - | S/R | 2 |
| | 009 | | High alarm setting | -15.00 to +115.00% | 100.00 | - | R/W (O) | R/W | W | - | S/R | 2 |
| | 010 | | Low alarm setting | -15.00 to +115.00% | 0.00 | - | R/W (O) | R/W | W | - | S/R | 2 |
| | 011 | | Low/low alarm setting | -15.00 to +115.00% | -115.00 | - | R/W (O) | R/W | W | - | S/R | 2 |
| | 012 | | Hysteresis setting | 0 to 115.00% | 1.00 | - | R/W(S) | - | W | - | - | 2 |
| Contact output | 013 | HH | High/high alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 014 | H | High alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 015 | L | Low/low alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 016 | LL | Low alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| Contact input | 017 | S1 | Alarm stop switch 0: Alarm, 1: Stop | 0, 1 | 0 | Yes | R/W (O) | R/W | - | R/W | S/R | 1 |

2 Control blocks

<001> 2-position ON/OFF 001 to 032

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------------------------------|------|--------|--|------------|---------|---------------------------|---|-----------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor*1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Connection terminal contact input | 018 | | PV error contact source designation | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Contact output | 019 | PVE | PV error indication 0: Normal, 1: Error → MANUAL mode | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| Parameter | 020 | | Alarm limit*2 0: No, 1: Yes Note: Limits the alarm set value to between 0.00% and 100.00%. | 0, 1 | 0 | - | R/W (S) | - | - | - | - | 1 |

*2: If ITEM 020 (alarm limit) is set to 1 (ON), the alarm set range will be limited to between 0.00% and 100.00% as follows (supported by Loop Control Unit version 2.50 or later):

- If the high/high alarm setting (ITEM 008) or the high alarm set value (ITEM 009) is set to a value over 100.00%, the alarm output will not turn ON even if the PV exceeds the alarm set value.
- If the low/low alarm setting (ITEM 011) or the low alarm set value (ITEM 010) is set to a value below 0.00%, the alarm output will not turn ON even if the PV exceeds the alarm set value.
- If the deviation alarm setting (ITEM 041) is set to a value over 100.00%, the alarm output will not turn ON even if the PV exceeds the deviation range.

Setting Value Set Point

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|---------------------------------|------|--------|---|--------------------|---------|---------------------------|---|-----------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor*1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Analog input wiring information | 021 | | Remote Set Point source designation | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 022 | RSP | Remote Set Point input | -15.00 to +115.00% | 0.00 | Yes | - | R | - | - | - | 2 |
| Parameter | 023 | | Local Set Point setting | -15.00 to +115.00% | 0.00 | - | R/W (O) | R/W | W | - | R | 2 |
| Parameter | 024 | | Set Point setting mode (default) 0: Local only, 1: Remote/Local Note: Setting to 0 invalidates ITEM026. | 0, 1 | 0 | - | R/W(S) | R | - | - | S/R | 1 |
| Contact input/parameter | 026 | R/L | Remote/Local switch 0: Local, 1: Remote Note: Valid only when ITEM024 is 1 | 0, 1 | 0 | Yes | R/W (O) | R/W | - | R/W | S/R | 1 |
| Analog output | 029 | SP | Current Set Point output | -15.00 to +115.00% | 0.00 | Yes | r/w | R | - | - | S | 2 |

Deviation

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|----------------|------|--------|---|--------------|---------|---------------------------|---|-----------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor*1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 041 | | Deviation alarm setting (Hysteresis is set at ITEM012.) | 0 to 115.00% | 115.00 | - | R/W (O) | R/W | W | - | S/R | 2 |
| Contact output | 042 | DA | Deviation alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| Parameter | 043 | | Deviation alarm standby sequence 0: Not used, 1: Used Note: Restart in standby sequence by cold start | 0, 1 | 0 | - | R/W(S) | - | - | - | - | 1 |
| Analog output | 044 | Y1 | Deviation output (deviation = PV – SP) | ±115.00% | 0.00 | Yes | r/w | - | - | - | - | 2 |

Control

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------|------------------|--------|---|--------------|---------|---------------------------|---|-----------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor*1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 052 | | Control action 0: Reverse (MV=1 by PV < SP) 1: Direct (MV=1 by PV > SP) | 0, 1 | 0 | - | R/W(S) | - | - | - | - | 1 |
| | 055 | | Control hysteresis setting | 0 to 115.00% | 1.00 | - | R/W(S) | - | W | - | - | 2 |
| | 062 ³ | | MV Output Retrace Time for PV Error ² 0: Disabled | 0 to 10 | 0 | - | R/W(S) | - | - | - | - | 2 |

*2: Based on the value specified in ITEM062, the MV will be restored to the output value at the times specified below when a PV error is detected.

If the operation cycle (ITEM004) is 1 s, the value specified in ITEM062 x 1 s

If the operation cycle is 2 s, the value specified in ITEM062 x 2 s

*3: These ITEMS were added in Loop Control Unit Ver. 2.00.

2 Control blocks

<001> 2-position ON/OFF 001 to 032

MV

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|-------------------------|------|--------|--|------------|---------|---------------------------|------------------------------|-----------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor*1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input/parameter | 086 | A/M | Auto/Manual switch 0: Manual, 1: Auto | 0, 1 | 0 | Yes | R/W (O) | R/W | - | R/W | S/R | 1 |
| Contact output | 092 | MV | Output | 0, 1 | 0 | Yes | - | R | - | R | - | 1 |
| Parameter | 093 | | Host display of MV (Auto/Manual switch : Auto, Manual) or Manual MV (Auto/Manual switch : Manual) | 0, 1 | 0 | Yes | R/W (O) | R/W | - | R/W | S/R | 1 |

Data for host display

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|-----------|------|--------|------------------|------------|---------|---------------------------|------------------------------|-----------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor*1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 099 | | Label | 0 to 15 | 0 | Yes | R/W(O) | R/W | W | - | S/R | 2 |

Note To send data of the 2-position ON/OFF block to CX-Process Monitor by the Block Send Terminal to Computer blocks (Block Models 403 and 404), set the operation cycle of the Send to Computer blocks to the same or longer than that of the 2-position ON/OFF block at ITEM004. If the operation cycle of Send to Computer blocks is set to a shorter value, the Set Point momentarily becomes 0 when a cold start is performed.

List of tag ITEMS on CX-Process Monitor or SCADA software

The following tag ITEMS are used to specify ITEMS with either 1) Monitor tags when sending function blocks to the CX-Process Monitor from 1-Block/4-Block Send Terminal to Computer (Block Model 403/404) or 2) CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (Block Model 461)/Send All Blocks (Block Model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in CX-Process Monitor | CSV Tags in SCADA Software |
|------|--|--------------------------------|----------------------------|
| | | Tag ITEM (fixed) | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST | MT_ST |
| 003 | Execution error display | None | ERR |
| 007 | PV input | PV | PV |
| 008 | High/high alarm setting | HH_SP | HH_SP |
| 009 | High alarm setting | H_SP | H_SP |
| 010 | Low alarm setting | L_SP | L_SP |
| 011 | Low/low alarm setting | LL_SP | LL_SP |
| 013 | High/high alarm output | HH | HH |
| 014 | High alarm output | H | H |
| 015 | Low alarm output | L | L |
| 016 | Low/low alarm output | LL | LL |
| 017 | Alarm stop switch | ALM_OFF | AOF |
| 019 | PV error indication | PV_ABN | PV_ABN |
| 023 | Local Set Point setting | None | SP |
| 024 | Set Point setting mode (default) | CAS_SET | CAS_SET |
| 026 | Remote/Local switch | R/L_SW | R/L_SW |
| 029 | Current Set Point output | SP | SP |
| 041 | Deviation alarm setting | DVA_SP | DVA_SP |
| 042 | Deviation alarm output | DVA | DVA |
| 086 | Auto/Manual switch | A/M_SW | A/M_SW |
| 093 | Host display of MV (Auto/Manual switch : Auto, Manual) or Manual operation value (Auto/Manual switch : Manual) | MV | MV |
| 099 | Label | OP_MK | OP_MK |

2 Control blocks

<002> 3-position ON/OFF 001 to 032

| Block Model | Block Name | Block Address |
|-------------|-------------------|---------------|
| <002> | 3-position ON/OFF | 001 to 032 |

Outline

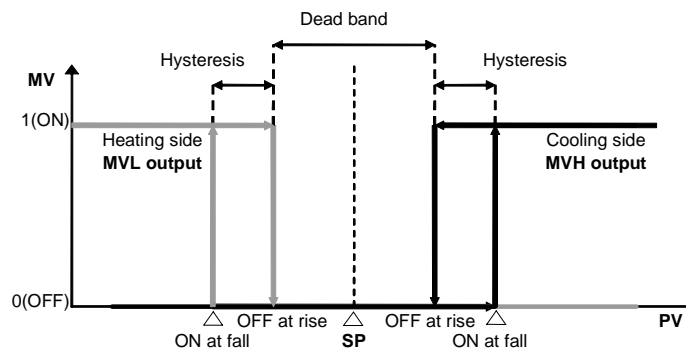
This function block is a 3-position type ON/OFF controller for heating/cooling ON/OFF control.

- Two outputs are provided for heating and cooling.
- Dead band and hysteresis can be set.
- Remote/Local switching is possible.

3-position ON/OFF action

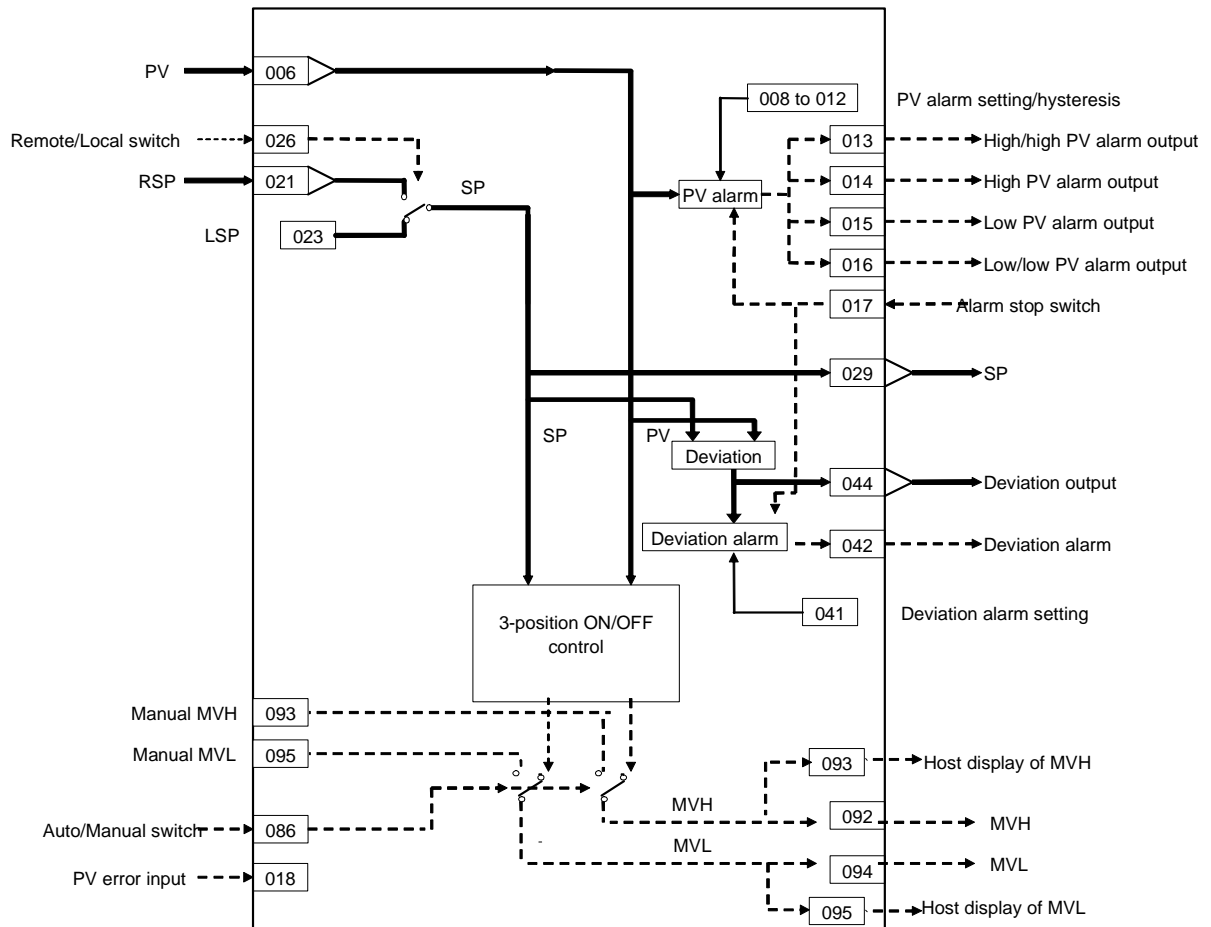
MVH output turns ON during MV rise by "Set Point + dead band ÷ 2 + MVH side hysteresis, " and turns OFF during MV fall by "Set Point + dead band ÷ 2".

MVL output turns ON during MV fall by "Set Point - dead band ÷ 2 - MVH side hysteresis, " and turns OFF during MV rise by "Set Point - dead band ÷ 2".



Note: To reverse action, use the Step Ladder Program block (Block Model 301) to invert output.

Block diagram



2 Control blocks

<002> 3-position ON/OFF 001 to 032

ITEM list

Note: The values of ITEMS that cannot be set (indicated as either "-" or "r/w" in the above list) on CX-Process Tool such as the alarm stop switch that were active before the instantaneous power interruption or running of the Loop Control Unit was stopped are cleared when a cold start is performed. When a hot start is performed, these values are held. The internally held values for the standby states in standby sequences that were active before the instantaneous power interruption or running of the Loop Control Unit was stopped are also cleared. When a hot start is performed, these values are held.

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Sym bol | Data Description | Data Range | Default | COLD start initializ ation | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|---------------|------|------------|--|------------------|---------------|-------------------------------------|---|---|--|---|-----------------------------------|---------------------------|
| | | | | | | | Accordi ng to CX-Pro cess Tool | Accordi ng to CX-Pro cess Monitor *1 | Accordi ng to ITEM Setting block | Accordi ng to Step Ladder Progra m | Send/ Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | R/W | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: 3-position Control | 002 | 002 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |

PV

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------------------------------|------|--------|--|--------------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Analog input wiring information | 006 | | PV source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 007 | PV | PV input | -15.00 to +115.00% | 0.00 | Yes | - | R | - | - | S | 2 |
| Parameter | 008 | | High/high alarm setting | -15.00 to +115.00% | 115.00 | - | R/W (O) | R/W | W | - | S/R | 2 |
| | 009 | | High alarm setting | -15.00 to +115.00% | 100.00 | - | R/W (O) | R/W | W | - | S/R | 2 |
| | 010 | | Low/low alarm setting | -15.00 to +115.00% | 0.00 | - | R/W (O) | R/W | W | - | S/R | 2 |
| | 011 | | Low/low alarm setting | -15.00 to +115.00% | -115.00 | - | R/W (O) | R/W | W | - | S/R | 2 |
| | 012 | | Hysteresis setting | 0 to 115.00% | 1.00 | - | R/W(S) | - | W | - | - | 2 |
| Contact output | 013 | HH | High/high alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 014 | H | High alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 015 | L | Low alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 016 | LL | Low/low alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| Contact input | 017 | S1 | Alarm stop switch 0: Alarm, 1: Stop | 0, 1 | 0 | - | R/W (O) | R/W | - | R/W | S/R | 1 |
| Connection terminal contact input | 018 | | PV error contact source designation | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Contact output | 019 | PVE | PV error indication 0: Normal, 1: Error → MANUAL mode | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| Parameter | 020 | | Alarm limit*2 0: No, 1: Yes Note: Limits the alarm set value to between 0.00% and 100.00%. | 0, 1 | 0 | - | R/W (S) | - | - | - | - | 1 |

- *2: If ITEM 020 (alarm limit) is set to 1 (ON), the alarm set range will be limited to between 0.00% and 100.00% as follows (supported by Loop Control Unit version 2.50 or later):
- If the high/high alarm setting (ITEM 008) or the high alarm set value (ITEM 009) is set to a value over 100.00%, the alarm output will not turn ON even if the PV exceeds the alarm set value.
 - If the low/low alarm setting (ITEM 011) or the low alarm set value (ITEM 010) is set to a value below 0.00%, the alarm output will not turn ON even if the PV exceeds the alarm set value.
 - If the deviation alarm setting (ITEM 041) is set to a value over 100.00%, the alarm output will not turn ON even if the PV exceeds the deviation range.

2 Control blocks

<002> 3-position ON/OFF 001 to 032

Setting Value Set Point

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|---------------------------------|------|--------|---|--------------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Analog input wiring information | 021 | | Remote Set Point source designation | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 022 | RSP | Remote Set Point input | -15.00 to +115.00% | 0.00 | Yes | - | R | - | - | - | 2 |
| Parameter | 023 | | Local Set Point setting | -15.00 to +115.00% | 0.00 | - | R/W (O) | R/W | W | - | R | 2 |
| | 024 | | Set Point setting mode (default) 0: Local only, 1: Remote/Local Note: Setting to 0 invalidates ITEM026. | 0, 1 | 0 | - | R/W(S) | R | - | - | S/R | 1 |
| Contact input/parameter | 026 | R/L | Remote/Local switch 0: Local, 1: Remote Note: Valid only when ITEM024 is 1 | 0, 1 | 0 | Yes | R/W (O) | R/W | - | R/W | S/R | 1 |
| Analog output | 029 | SP | Current Set Point output | -15.00 to +115.00% | 0.00 | Yes | r/w | R | - | - | S | 2 |

Deviation

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|----------------|------|--------|---|--------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 041 | | Deviation alarm setting (hysteresis is set in ITEM012) | 0 to 115.00% | 115.00 | - | R/W (O) | R/W | W | - | S/R | 2 |
| Contact output | 042 | DA | Deviation alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| Parameter | 043 | | Deviation alarm standby sequence 0: Not used, 1: Used Note: Restart in standby sequence by cold start | 0, 1 | 1 | - | R/W(S) | - | - | - | - | 1 |
| Analog output | 044 | Y1 | Deviation output (deviation = PV - SP) | ±115.00% | 0.00 | Yes | r/w | - | - | - | - | 2 |

Control

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------|-------|--------|--|--------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 054 | | Deadband setting | 0 to 115.00% | 1.00 | - | R/W(O) | - | W | - | - | 2 |
| | 055 | | Control hysteresis setting (MVH) | 0 to 115.00% | 1.00 | - | R/W(S) | - | W | - | - | 2 |
| | 056 | | Control hysteresis setting (MVL) | 0 to 115.00% | 1.00 | - | R/W(S) | - | W | - | - | 2 |
| | 062*4 | | MV Output Retrace Time for PV Error*3 0: Disabled | 0 to 10 | 0 | - | R/W(S) | - | - | - | - | 2 |

*3: Based on the value specified in ITEM062, the MV will be restored to the output value at the times specified below when a PV error is detected.

If the operation cycle (ITEM004) is 1 s, the value specified in ITEM062 x 1 s

If the operation cycle is 2 s, the value specified in ITEM062 x 2 s

*4: These ITEMS were added in Loop Control Unit Ver. 2.00.

MV

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------|------|--------|---|------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input/parameter | 086 | A/M | Auto/Manual switch 0: Manual, 1: Auto | 0, 1 | 0 | Yes | R/W(O) | R/W | - | R/W | S/R | 1 |
| Contact output | 092 | MVH | MVH output | 0, 1 | 0 | Yes | - | R | - | R | - | 1 |
| Parameter | 093 | | Host display of MVH (Auto/Manual switch : Auto, Manual) or Manual MVH (Auto/Manual switch : Manual) | 0, 1 | 0 | Yes | R/W(O) | R/W | W | R/W | S/R | 1 |
| Contact output | 094 | MVL | MVL output | 0, 1 | 0 | Yes | - | R | - | R | - | 1 |
| Parameter | 095 | | Host display of MVL(Auto/Manual switch : Auto, Manual) or Manual MVL (Auto/Manual switch : Manual) | 0, 1 | 0 | Yes | R/W(O) | R/W | W | R/W | S/R | 1 |

2 Control blocks

<002> 3-position ON/OFF 001 to 032

Data for host display

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------|------|--------|------------------|------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 099 | | Label | 0 to 15 | 0 | Yes | R/W(O) | R/W | W | - | S/R | 2 |

Note To send data of the 3-position ON/OFF block to CX-Process Monitor by the Block Send Terminal to Computer blocks (Block Models 403 and 404), set the operation cycle of the Send to Computer blocks to the same or longer than that of the 3-position ON/OFF block at ITEM004. If the operation cycle of Send to Computer blocks is set to a shorter value, the Set Point momentarily becomes 0 when a cold start is performed.

List of tag ITEMS on CX-Process Monitor or SCADA software

The following tag ITEMS are used to specify ITEMS with either 1) Monitor tags when sending function blocks to the CX-Process Monitor from 1-Block/4-Block Send Terminal to Computer (Block Model 403/404) or 2) CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (Block Model 461)/Send All Blocks (Block Model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in CX-Process Monitor | CSV Tags in SCADA Software |
|------|---|--------------------------------|----------------------------|
| | | Tag ITEM (fixed) | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST | MT_ST |
| 003 | Execution error display | None | ERR |
| 007 | PV input | PV | PV |
| 008 | High/high alarm setting | HH_SP | HH_SP |
| 009 | High alarm setting | H_SP | H_SP |
| 010 | Low alarm setting | L_SP | L_SP |
| 011 | Low/low alarm setting | LL_SP | LL_SP |
| 013 | High/high alarm output | HH | HH |
| 014 | High alarm output | H | H |
| 015 | Low alarm output | L | L |
| 016 | Low/low alarm output | LL | LL |
| 017 | Alarm stop switch | ALM_OFF | AOF |
| 019 | PV error indication | PV_ABN | PV_ABN |
| 023 | Local Set Point setting | None | SP |
| 024 | Set Point setting mode (default) | CAS_SET | CAS_SET |
| 026 | Remote/Local switch | R/L_SW | R/L_SW |
| 029 | Current Set Point output | SP | SP |
| 041 | Deviation alarm setting | DVA_SP | DVA_SP |
| 042 | Deviation alarm output | DVA | DVA |
| 086 | Auto/Manual switch | A/M_SW | A/M_SW |
| 093 | Host display of MVH(Auto/Manual switch : Auto, Manual) or MVH manual operation value (Auto/Manual switch : Manual) | MVH | MVH |
| 095 | Host display of MVL(Auto/Manual switch : Auto, Manual) or MVL manual operation value (Auto/Manual switch : Manual) | MVL | MVL |
| 099 | Label | OP_MK | OP_MK |

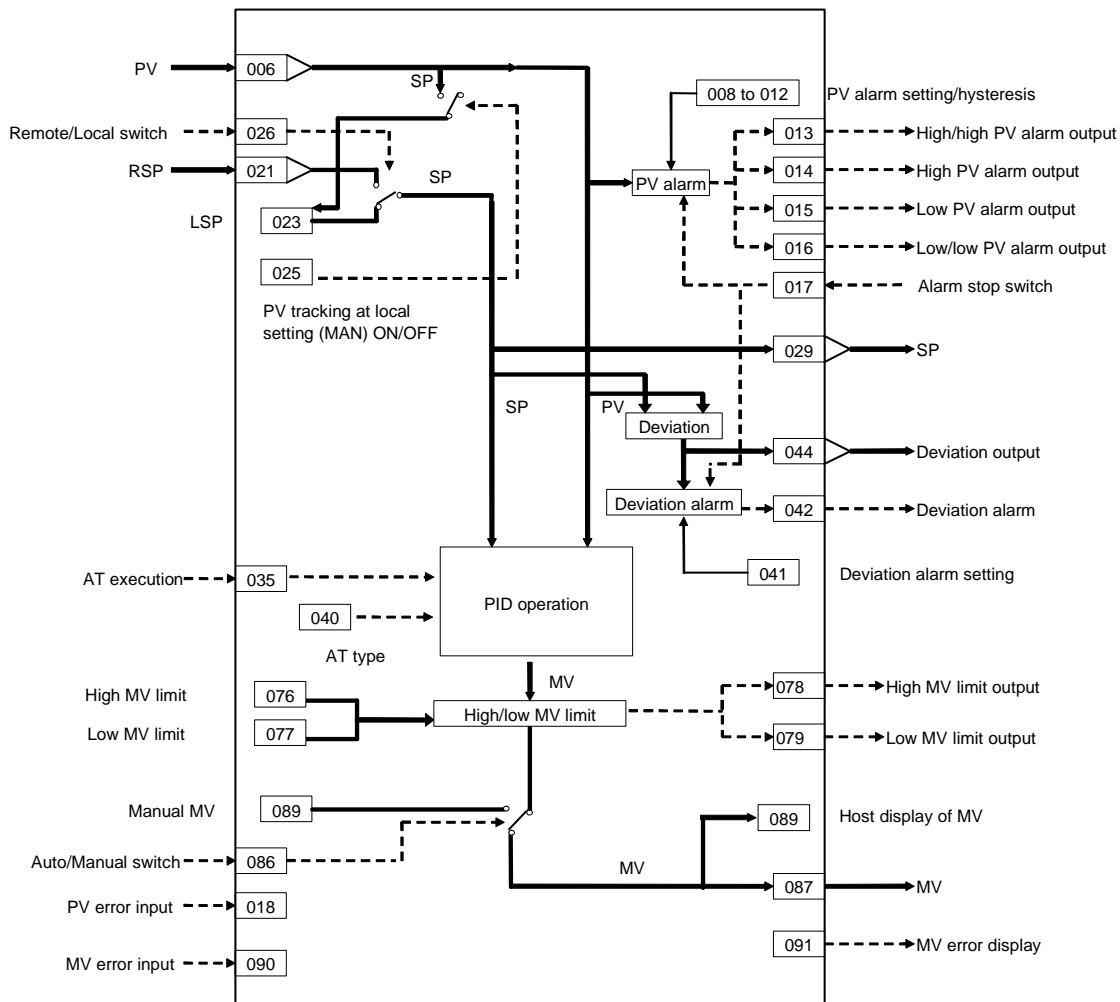
| Block Model | Block Name | Block Address |
|-------------|------------|---------------|
| <011> | Basic PID | 001 to 032 |

Outline

This function block is a controller whose PID functions have been narrowed down to the basic functions for fixed value control and cascade control.

- This function block is provided with four PV alarm outputs and a deviation alarm output, allowing standby sequences.
- Bumpless output of MV at switching from the Remote to the Local mode is possible.
- The Set Point can be made to track PV when the Manual mode is switched to in fixed value control.
- Bumpless output of primary side MV (without tracking) can be performed when the MV is used on the secondary loop side in cascade control.
- Auto-tuning of PID constants can be executed according to the limit cycle mode. (For details, see "About the PID Constant AT (auto-tuning) Function" on page 39)

Block diagram



2 Control blocks

<011> Basic PID 001 to 032

ITEM list

Note The values of ITEMS that cannot be set (indicated as either "-" or "r/w" in the above list) on CX-Process Tool such as the alarm stop switch that were active before the instantaneous power interruption or running of the Loop Control Unit was stopped are cleared when a cold start is performed. When a hot start is performed, these values are held. The internally held values for the standby states in standby sequences that were active before the instantaneous power interruption or running of the Loop Control Unit was stopped are also cleared. When a hot start is performed, these values are held.

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Sym bol | Data Description | Data Range | Default | COLD start initializ ation | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|---------------|------|------------|--|------------------|---------------|-------------------------------------|---|---|--|---|-----------------------------------|---------------------------|
| | | | | | | | Accordi ng to CX-Pro cess Tool | Accordi ng to CX-Pro cess Monitor *1 | Accordi ng to ITEM Setting block | Accordi ng to Step Ladder Progra m | Send/ Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | R/W | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Basic PID | 011 | 011 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |

PV

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------------------------------|------|--------|---|--------------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Analog input wiring information | 006 | | PV source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | 000000 | R/W(S) | - | - | - | - | 4 |
| Analog input | 007 | PV | PV input | -15.00 to +115.00% | 0.00 | 0.00 | - | R | - | - | S | 2 |
| Parameter | 008 | | High/high alarm setting | -15.00 to +115.00% | 115.00 | 115.00 | R/W (O) | R/W | W | - | S/R | 2 |
| | 009 | | High alarm setting | -15.00 to +115.00% | 100.00 | 100.00 | R/W (O) | R/W | W | - | S/R | 2 |
| | 010 | | Low alarm setting | -15.00 to +115.00% | 0.00 | 0.00 | R/W (O) | R/W | W | - | S/R | 2 |
| | 011 | | Low/low alarm setting | -15.00 to +115.00% | -15.00 | -15.00 | R/W (O) | R/W | W | - | S/R | 2 |
| | 012 | | Hysteresis setting | 0 to 115.00% | 1.00 | 1.00 | R/W(S) | - | W | - | - | 2 |
| Contact output | 013 | HH | High/high alarm output | 0, 1 | 0 | 0 | - | R | - | R | S | 1 |
| | 014 | H | High alarm output | 0, 1 | 0 | 0 | - | R | - | R | S | 1 |
| | 015 | L | Low alarm output | 0, 1 | 0 | 0 | - | R | - | R | S | 1 |
| | 016 | LL | Low/low alarm output | 0, 1 | 0 | 0 | - | R | - | R | S | 1 |
| Contact input | 017 | S1 | Alarm stop switch 0: Alarm, 1: Stop | 0, 1 | 0 | 0 | R/W (O) | R/W | - | R/W | S/R | 1 |
| Connection terminal contact input | 018 | | PV error contact source designation | BBBIII | 000000 | 000000 | R/W(S) | - | - | - | - | 4 |
| Contact output | 019 | PVE | PV execution error indication 0: Normal, 1: Error → MANUAL mode | 0, 1 | 0 | 0 | - | - | - | R | S | 1 |
| Parameter | 020 | | Alarm limit ² 0: No, 1: Yes Note: Limits the alarm set value to between 0.00% and 100.00%. | 0, 1 | 0 | 0 | R/W (S) | - | - | - | - | 1 |

*2: If ITEM 020 (alarm limit) is set to 1 (ON), the alarm set range will be limited to between 0.00% and 100.00% as follows (supported by Loop Control Unit version 2.50 or later):

- If the high/high alarm setting (ITEM 008) or the high alarm set value (ITEM 009) is set to a value over 100.00%, the alarm output will not turn ON even if the PV exceeds the alarm set value.
- If the low/low alarm setting (ITEM 011) or the low alarm set value (ITEM 010) is set to a value below 0.00%, the alarm output will not turn ON even if the PV exceeds the alarm set value.
- If the deviation alarm setting (ITEM 041) is set to a value over 100.00%, the alarm output will not turn ON even if the PV exceeds the deviation range.
- If the high MV limit (ITEM 076) is set to a value over 100.00%, the high MV limit output will not turn ON even if the high limit is reached. The high limit function, however, will work.
- If the low MV limit (ITEM 077) is set to a value below 0.00%, the low MV limit output will not turn ON even if the low limit is reached. The low limit function, however, will work.

2 Control blocks

<011> Basic PID 001 to 032

Setting Value Set Point

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|---------------------------------|------|--------|---|--------------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Analog input wiring information | 021 | | Remote Set Point source designation | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 022 | RSP | Remote Set Point input | -15.00 to +115.00% | 0.00 | Yes | - | - | - | - | - | 2 |
| Parameter | 023 | | Local Set Point setting | -15.00 to +115.00% | 0.00 | - | R/W(O) | W | W | - | R | 2 |
| | 024 | | Set Point setting mode (default) 0: Local only, 1: Remote/Local Note: Setting to 0 invalidates ITEM026. | 0, 1 | 0 | - | R/W(S) | R | - | - | S/R | 1 |
| | 025 | | PV tracking at local setting (Manual) 0: Not used, 1: Used | 0, 1 | 0 | - | R/W(S) | - | - | - | - | 1 |
| Contact input/parameter | 026 | R/L | Remote/Local switch 0: Local, 1: Remote Note: Valid only when ITEM024 is 1 | 0, 1 | 0 | Yes | R/W(O) | R/W | - | R/W | S/R | 1 |
| Analog output | 029 | SP | Current Set Point output | -15.00 to +115.00% | 0.00 | Yes | r/w | R | - | - | S | 2 |
| Parameter | 032 | | Bumpless output between primary/secondary loops (self node is secondary side) 0: Not used, 1: Used | 0, 1 | 0 | - | R/W(S) | - | - | - | - | 1 |

AT (auto-tuning)

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------|------------------|--------|---|---------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 035 ² | | AT command/AT Executing •0: Cancel AT, 1: Execute AT as AT command •AT Executing flag remains at 1 during AT execution. Flag returns to 0 automatically after AT execution ends normally. | 0, 1 | 0 | Yes | R/W(O) | R/W | W | R/W | S/R | 1 |
| | 036 ² | | Limit cycle MV amplitude Note: Set as ±%. | 5.00 to 50.00 | 20.00 | - | R/W(O) | - | - | - | - | 2 |
| | 037 ² | | Limit cycle hysteresis | 0 to 10.00% | 0.20 | - | R/W(O) | - | - | - | - | 2 |
| | 038 ² | | AT calculation gain | 0.10 to 10.00 | 1.00 | - | R/W(O) | - | - | - | - | 2 |
| | 039 ² | | Judgment deviation for provisional AT execution | 0 to 100.00% | 10.00 | - | R/W(O) | - | - | - | - | 2 |
| | 040 ² | | AT type (0: Standard, 1: Short) | 0, 1 | 0 | - | R/W(O) | - | - | - | - | 1 |

*2: These ITEMS were added in Loop Control Unit Ver.1.50.

Deviation

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|----------------|------|--------|---|--------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | |
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 041 | | Deviation alarm setting (hysteresis is set in ITEM012) | 0 to 115.00% | 115.00 | 115.00 | R/W(O) | R/W | W | - | S/R | 2 |
| Contact output | 042 | DA | Deviation alarm output | 0, 1 | 0 | 0 | - | R | - | R | S | 1 |
| Parameter | 043 | | Deviation alarm standby sequence 0: Not used, 1: Used Note: Restart in standby sequence by cold start | 0, 1 | 1 | 1 | R/W(S) | - | - | - | - | 1 |
| Analog output | 044 | Y1 | Deviation output (deviation = PV - SP) | ±115.00% | 0.00 | 0.00 | r/w | - | - | - | S | 2 |

Control

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|----------------------------------|------------------|--------|---|-----------------------------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | |
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 051 | | Processing cycle of PID control (0: cycle specified at ITEM004) Note: When operation cycle is set to value other than "0", the setting value of ITEM004 is automatically changed to "4". | (0), 1, 2, 4, 8, 16, 32, 64, 128s | 0 | - | R/W(S) | - | - | - | - | 2 |
| | 052 | | Control action 0: Reverse (MV decreases by PV increase.), 1: Direct (MV increases by PV increase.) | 0, 1 | 0 | - | R/W(S) | - | - | - | - | 1 |
| | 054 | P | Proportional band | 0.1 to 999.9% | 100.0 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 055 | I | Integral time (0: No integral action) | 0 to 9999s | 0 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 056 | D | Differential time (0: No differential action) | 0 to 9999s | 0 | - | R/W(O) | R/W | W | - | S/R | 2 |
| Contact input wiring information | 061 | | Out-of-range processing at MV output destination block (BBB: Destination block address, III: ITEM No., 000000: Processing OFF) Note: When contact turns ON, accumulator in PID control is stopped. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Parameter | 062 ³ | | MV Output Retrace Time for PV Error ⁴ 0: Disabled | 0 to 10 | 0 | - | R/W(S) | - | - | - | - | 2 |
| | 065 | | PID with 2 degrees of freedom parameter α | 0.00 to 1.00 | 0.65 | - | R/W(S) | - | - | - | - | 2 |
| | 066 | | PID with 2 degrees of freedom parameter β | 0.00 to 1.00 | 1.00 | - | R/W(S) | - | - | - | - | 2 |

*3: These ITEMS were added in Loop Control Unit Ver. 2.00.

*4: Based on the value specified in ITEM062, the MV will be restored to the output value at the times specified below when a PV error is detected.

If the operation cycle (ITEM004) is 1 s, the value specified in ITEM062 x 1 s

If the operation cycle is 2 s, the value specified in ITEM062 x 2 s

2 Control blocks

<011> Basic PID 001 to 032

MV

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------------------------------|-------------------|--------|--|------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 076 | MH | High MV limit | ±320.00% | 105.00 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 077 | ML | Low MV limit | ±320.00% | -5.00 | - | R/W(O) | R/W | W | - | S/R | 2 |
| Contact output | 078 ^{*3} | U1 | High MV limit arrival output 1: High limit or higher Vaild for AUTO mode only; always 0 for Manual mode. | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 079 ^{*3} | U2 | Low MV limit arrival output 1: Low limit or lower Vaild for AUTO mode only; always 0 for Manual mode. | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| Contact input/parameter | 086 | A/M | Auto/Manual switch 0: Manual, 1: Auto | 0, 1 | 0 | Yes | R/W(O) | R/W | - | R/W | S/R | 1 |
| Analog output | 087 | MV | MV output | ±320.00% | 0.00 | Yes | r/w | - | - | - | - | 2 |
| Parameter | 088 | | Inversion of host display of MV 0: Not used, 1: Used Note: "Inversion" changes 0 to 100% range to 100 to 0%. | 0, 1 | 0 | - | R/W(S) | - | - | - | - | 1 |
| | 089 | | Host display of MV (Auto/Manual switch : Auto, Manual) or Manual MV (Auto/Manual switch : Manual) | ±320.00% | 0.00 | Yes | R/W(O) | R/W | W | - | S/R | 2 |
| Connection terminal contact input | 090 | | MV error contact source designation | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Contact output | 091 | MV E | MV error display 0: Normal, 1: Error | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |

*3: These ITEMS were added in Loop Control Unit Ver. 2.00.

Data for host display

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------|------|--------|-------------------|--------------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 098 | | MV index position | -15.00 to +115.00% | 0.00 | Yes | R/W(O) | R/W | W | - | S/R | 2 |
| | 099 | | Label | 0 to 15 | 0 | Yes | R/W(O) | R/W | W | - | S/R | 2 |

- Note**
- To send data of the Basic PID block to CX-Process Monitor by the Block Send Terminal to Computer blocks (Block Models 403 and 404), set the operation cycle of the Send to Computer blocks to the same or longer than that of the Basic PID block at ITEM004. If the operation cycle of Send to Computer blocks is set to a shorter value, the Set Point momentarily becomes 0 when a cold start is performed.
 - Bumpless output of MV functions when PID constants are changed in the Basic PID block (Block Model 011). For this reason, MV is no longer updated and PID control is not executed correctly if variables are written to PID constants at each operation cycle by the Variable ITEM Setting block (Block Model 172). If this happens, use the Step Ladder Program block (Block Model 301) to provide a time interval for writing by the ITEM Setting block.

List of tag ITEMS on CX-Process Monitor or SCADA software

The following tag ITEMS are used to specify ITEMS with either 1) Monitor tags when sending function blocks to the CX-Process Monitor from 1-Block/4-Block Send Terminal to Computer (Block Model 403/404) or 2) CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (Block Model 461)/Send All Blocks (Block Model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in CX-Process Monitor | CSV Tags in SCADA Software |
|------|--|--------------------------------|----------------------------|
| | | Tag ITEM (fixed) | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST | MT_ST |
| 003 | Execution error display | None | ERR |
| 007 | PV input | PV | PV |
| 008 | High/high alarm setting | HH_SP | HH_SP |
| 009 | High alarm setting | H_SP | H_SP |
| 010 | Low alarm setting | L_SP | L_SP |
| 011 | Low/low alarm setting | LL_SP | LL_SP |
| 013 | High/high alarm output | HH | HH |
| 014 | High alarm output | H | H |
| 015 | Low alarm output | L | L |
| 016 | Low/low alarm output | LL | LL |
| 017 | Alarm stop switch | ALM_OFF | AOF |
| 019 | PV error indication | PV_ABN | PV_ABN |
| 023 | Local Set Point setting | None | SP |
| 024 | Set Point setting mode (default) | CAS_SET | CAS_SET |
| 026 | Remote/Local switch | R/L_SW | R/L_SW |
| 029 | Current Set Point output | SP | SP |
| 035 | AT command/AT Executing | AT | AT |
| 041 | Deviation alarm setting | DVA_SP | DVA_SP |
| 042 | Deviation alarm output | DVA | DVA |
| 044 | Deviation output | None | DV |
| 054 | Proportional band | P | P |
| 055 | Integral time (0: No integral action) | I | I |
| 056 | Differential time (0: No differential action) | D | D |
| 076 | High MV limit | MH_LMT | MH_LMT |
| 077 | Low MV limit | ML_LMT | ML_LMT |
| 078 | High MV limit output | MLA | MLA |
| 079 | Low MV limit output | MLA | MLA |
| 086 | Auto/Manual switch | A/M_SW | A/M_SW |
| 089 | Host display of MV (Auto/Manual switch : Auto, Manual) or Manual MV (Auto/Manual switch : Manual) | MV | MV |
| 091 | MV error indication | MV_ABN | MV_ABN |
| 098 | MV index position | MV_IDX | MV_IDX |
| 099 | Label | OP_MK | OP_MK |

2 Control blocks

<011> Basic PID 001 to 032

Description of functions

| Item | | Description | |
|-----------------------------------|--|---|---|
| PV (Process Variable) Input | Number of points | 1 | |
| | Input range | -15.00 to +115.00% | |
| | Operation function | None (Calculation of square root, first-order lag, bias, etc. Is required by external blocks) | |
| | Sampling cycle | According to the specified operation cycle of this block (one of 0.1, 0.2, 0.5, 1, 2 seconds or 1 to 128 seconds) Note, however, that the external input refresh cycle of the entire instrumentation system differs from this operation cycle. (See 3-2 Description of Operation in the User's Manual.) | |
| | PV error input | When the PV error contact turns ON, the Loop Control Unit is forced to enter the Manual mode, and the MV value active at that moment is held. At the same time, the PV error is transferred to the CX-Process Monitor. The disconnected line detection output ITEM of analog input (AI) function blocks is specified as the source designation for use. This enables forced switching to the Manual mode when a disconnected line is detected on the Analog Input Unit, and transfer of the PV error to CX-Process Monitor at the same time. | |
| | PV compensation | None | |
| SP (Set Point) | Number of points | 1 | |
| | Setting range | -15 to +115.00% | |
| | Remote/Local switching | Possible | |
| | Bumpless output of MV when Local Set Point changes | The Local Set Point is made to match the Remote Set Point value to ensure bumpless (without sudden changes) switching of MV when the Remote Set Point is switched to the Local Set Point. | |
| | SP rate-of-change limit | None | |
| | PV tracking at manual setting of the Local Set Point | The Local Set Point can be made to track PV when the mode is switched to the Manual mode. When the mode is returned to the Auto mode, control is started with PV equaling the Set Point. Sudden changes in the MV caused at switching back to the Auto mode do not occur. | |
| | Bumpless processing between primary/secondary loops | When the self node is performing cascade control as the secondary controller, processing is performed on the MV of the primary controller to be input as follows: <ul style="list-style-type: none"> • When the Set Point of the self node is Local (LSP): The primary controller is switched to the Manual mode, and the Local Set Point of the self node is overwritten on the MV of the primary controller. • When the Set Point of the self node is Remote (RSP): The primary controller is switched to the Auto mode, and the MV of the primary controller is input as the Remote Set Point as per normal. | |
| PID Control | Control method | Advanced PID Various PID methods (proportional priority type, PV differential priority type, deviation differential type, etc.) can be selected according to the settings of parameters α and β .) | |
| | Control action | Direct/reverse switchable | |
| | PID constant | 1 set AT (auto-tuning) can be automatically set according to limit cycle mode. (For details, see page 39 "About PID Constant AT Functions.") | |
| | | Proportional band | 0.1 to 999.9% (0.1% increments) |
| | | Integral time | 0 to 9999 sec. (1 second increments) 0: No accumulator Stepping of accumulation can be indicated from external contacts. |
| | | Differential time | 0 to 9999 sec. (1 second increments) 0: No differentiation |
| | Manual reset | None | |

| Item | | Description |
|------------------------------|---|--|
| MV (Manipulated Variable) | Number of points | 1 |
| | Output range | -320.00 to +320.00% |
| | Output refresh cycle | According to the specified operation cycle of this block (one of 0.1, 0.2, 0.5, 1, 2 seconds) |
| | Auto/manual switching | Possible (according to CX-Process Monitor, CX-Process Tool or correct signal from Step Ladder Program block/Contact Distributor block) |
| | High/low MV limit | High limit: -320.00 to +320.00%, low limit: -320.00 to +320.00% Note: The default low limit is -5.00% and default high limit is 105.00% to ensure that the valve becomes fully open or fully closed. If output less than 0.00% or more than 100% is meaningless, for example, in the case of time-proportional ON/OFF control for a heater, set these limits to 0.00% and 100.00, respectively, to prevent overshoot. |
| | MV high rate-of-change limit | None |
| | Preset MV switching | None |
| | MV hold | None |
| | MV tracking | None |
| | MV compensation | None |
| | Out-of-range processing at MV output destination block | PID integral action is stopped when the range is exceeded on the function block to which MV is connected, and unnecessary fluctuation of MV is prevented. |
| MV error input | MV error is transferred to CX-Process Monitor when the MV error contact turns ON. | |
| Alarm | PV alarm | 4 (high/high limit, high limit, low limit, low/low limit), setting range: -15.00 to +115.00% Hysteresis: 0 to +115.00% |
| | Deviation alarm | 1 (ON outside deviation) Standby sequence can be provided: standby started at power ON (alarm OFF even outside deviation range), alarm ON outside deviation range after entering deviation |
| State Output | | 1 current Set Point output (-15.00 to +115.00%), deviation output provided, no output for MV compensation |

Note About PID Constant AT (auto-tuning) Function

The following description is applicable to both the Basic PID block (Block Model 011) and Advanced PID block (Block Model 012).

What is the "AT (auto-tuning) function?"

The AT function forcibly changes the manipulated variable (MV) according to the limit cycle mode to observe the characteristics of the control target, and automatically calculates the PID constants based upon the observation results.

This AT function is supported on the Loop Control Unit in the both the Basic PID block (Block Model 011) and Advanced PID block (Block Model 012).

Two types of AT function modes are available: standard AT and short AT.

| AT Type | Description |
|-------------|--|
| Standard AT | <ul style="list-style-type: none"> When AT is started with PV outside of the "judgment deviation for provisional AT execution" range. Before the Set Point is reached, provisional AT is executed temporarily so that provisional PID constants bring PV closer to the Set Point. The limit cycle is then generated by the specified limit cycle MV amplitude, and the PID constants are automatically calculated and stored. |
| | <ul style="list-style-type: none"> When AT is started with PV inside of the "judgment deviation for provisional AT execution" range. After PID control brings the PV closer to the Set Point without executing provisional AT, the limit cycle is then generated by the specified limit cycle MV amplitude, and the PID constants are automatically calculated and stored. |
| Short AT | <ul style="list-style-type: none"> The limit cycle is generated directly by the MV amplitude of the MV high and low limit function without executing provisional AT, and the PID constants are automatically calculated and stored. |

Note: By setting the AT calculation gain (ITEM038), the user can adjust the extent that automatically stored values are influenced by new PID constants calculated by auto-tuning in either of the available AT types.

Description of AT-related ITEMS

| Item | Description | Method use |
|---|---|---|
| AT type | Standard: Provisional AT (when the PV at the start of auto-tuning is outside of the judgment deviation for provisional AT execution) is executed, and the limit cycle is generated by the limit cycle MV amplitude. Short: Provisional AT is not executed. MV is amplified by the high and low values of the MV limit function to generate the limit cycle. Default is standard auto-tuning. | To shorten the time required for auto-tuning, select short auto-tuning. Note, however, that in this case distortion of the PV caused by the limit cycle increases as MV is amplified by the high and low values of the MV limit function. If the resulting values obtained by reducing the MV limit function high and low values to limit the amplitude are inappropriate, the limit cycle may not be generated. |
| AT command/AT Executing | This doubles as the AT command and the AT Executing flag. ●AT command: Instructs execution of standard auto-tuning. When execution is instructed, the limit cycle is generated on the Set Point, and the PID constants are automatically calculated and stored. ●AT Executing flag: This flag remains at 1 during execution of auto-tuning. When execution ends, the flag automatically returns to 0. | Execution is instructed after AT execution conditions are set to enabled. Execution of PID control using the AT result is first started when this flag is set to 0 after execution is instructed. For the duration that this flag is 0, apply interlocks to other controls as required using the Step Ladder Program. Note 1 If AT execution is instructed when the remote Set Point or SP rate-of-change limit is valid, execute auto-tuning with the current Set Point held. After AT execution, cancel the current Set Point hold. Note 2 When AT cancel is instructed during auto-tuning, PID control is started in a bumpless manner from MV at that moment in time. |
| Limit cycle MV amplitude | With standard auto-tuning, set the amplitude of MV for the Set Point when the limit cycle is generated. With short auto-tuning, limit cycle MV amplitude is invalid. Default is an MV amplitude of $\pm 20\%$ (total 40%). | To disable changes to MV of $\pm 20\%$ (total 40%) (for generating the limit cycle), decrease the MV amplitude value. To prevent generation of the limit cycle at changes of MV of $\pm 20\%$ (total 40%), increase the MV amplitude value. |
| Limit cycle hysteresis | Set the hysteresis for the Set Point when generating the limit cycle. In the case of reverse action, MV is turned ON by a hysteresis of SP-0.20%. (default) | If an unstable PV prevents a normal limit cycle from being generated, increase the limit cycle hysteresis value. Note, however, that setting the hysteresis value larger than necessary, impairs AT accuracy. |
| AT calculation gain | Set the gain for calculating the PID constants by AT. Default is 1.00. | Decrease gain to give priority to response. Increase gain to give priority to stability. |
| Judgment deviation for provisional AT execution | With standard auto-tuning, provisional AT is started when PV is within the range "SP - judgment deviation for provisional AT execution." With short auto-tuning, judgment deviation for provisional AT execution is invalid. Default is 10.00%. | If it takes too long to arrive at the Set Point as provisional AT is not executed, and overshooting caused by execution of provisional AT is not a problem, decrease the deviation setting. Alternatively, if overshooting caused by execution of provisional AT is a problem, increase the deviation. |

AT non-executable states (conditions)

The table below shows the states in which AT cannot be executed. AT execution is canceled when these states are reached during AT execution.

Note: AT is also canceled when AT-related ITEMS have been changed.

AT can be executed in all states other than those in the following table.

| | |
|---------------------------------------|--|
| AT non-executable states (conditions) | <ul style="list-style-type: none"> •Manual mode •PV compensation in progress (Advanced PID block only) •PV tracking in progress •PV error generated •MV compensation in progress •MV rate-of-change limit function in use •Preset MV in progress •MV hold in progress •MV tracking in progress •MV error generated •Integral action stopped (according to integral action stop switch) (Advanced PID block only) •When bumpless output between primary/secondary loops is enabled on the secondary side, and the secondary loop side is set as the Local Set Point, auto-tuning cannot be executed on the primary loop itself. |
| AT cancel conditions | <ul style="list-style-type: none"> •Auto-tuning is canceled when a parameter ITEM is written, and auto-tuning remains canceled after writing ends (applies to Loop Control Units of version 2.00 or before). •Auto-tuning is canceled when a cold start is performed. •When an auto-tuning error occurs (error is canceled when a cold start is performed or when AT execution is instructed again) |

Limitations in writing ITEMS during AT

ITEMs other than stop block operation command (ITEM 000), AT command/AT executing (ITEM 035), and auto/manual switch (ITEM086) cannot be written during autotuning. (Applies to Loop Control Units of version 2.50 or later for both Basic PID and Advanced PID blocks.)

About AT errors

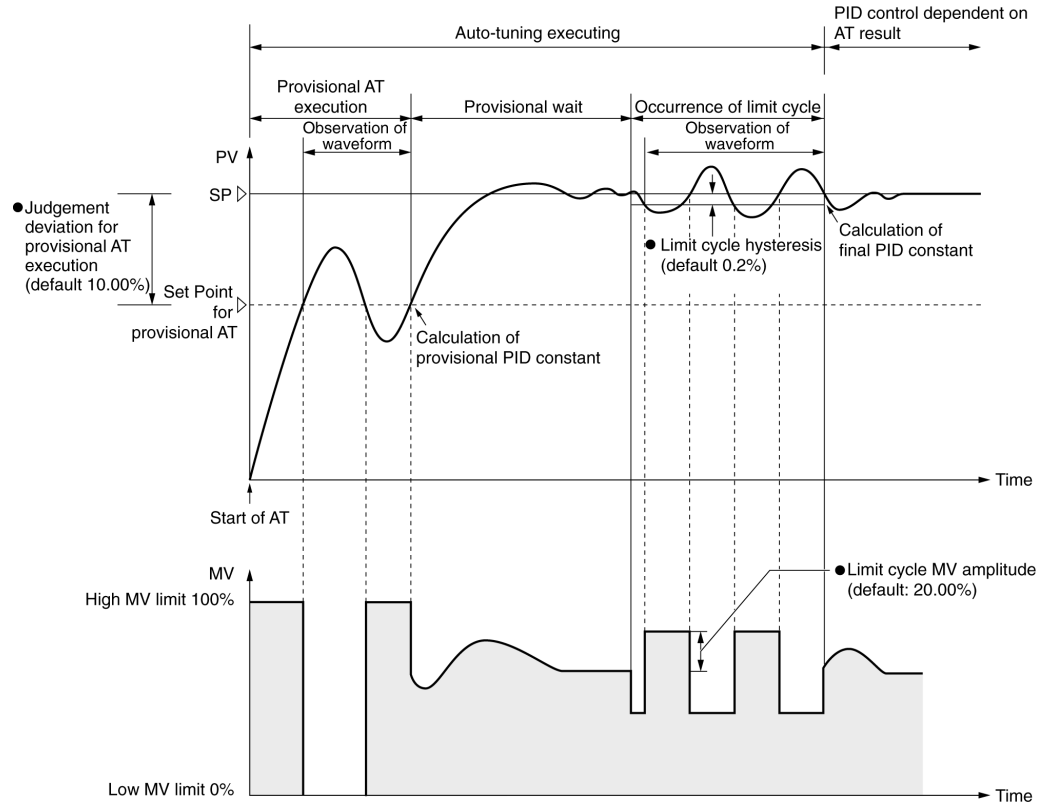
AT errors are stored as execution error code 15 to ITEM003 of Basic PID block (Block Model 011) and Advanced PID block (Block Model 012) if either of the following execution errors occurs:

- The limit cycle cannot be generated.
- The appropriate PID constants cannot be calculated even if the limit cycle is generated.

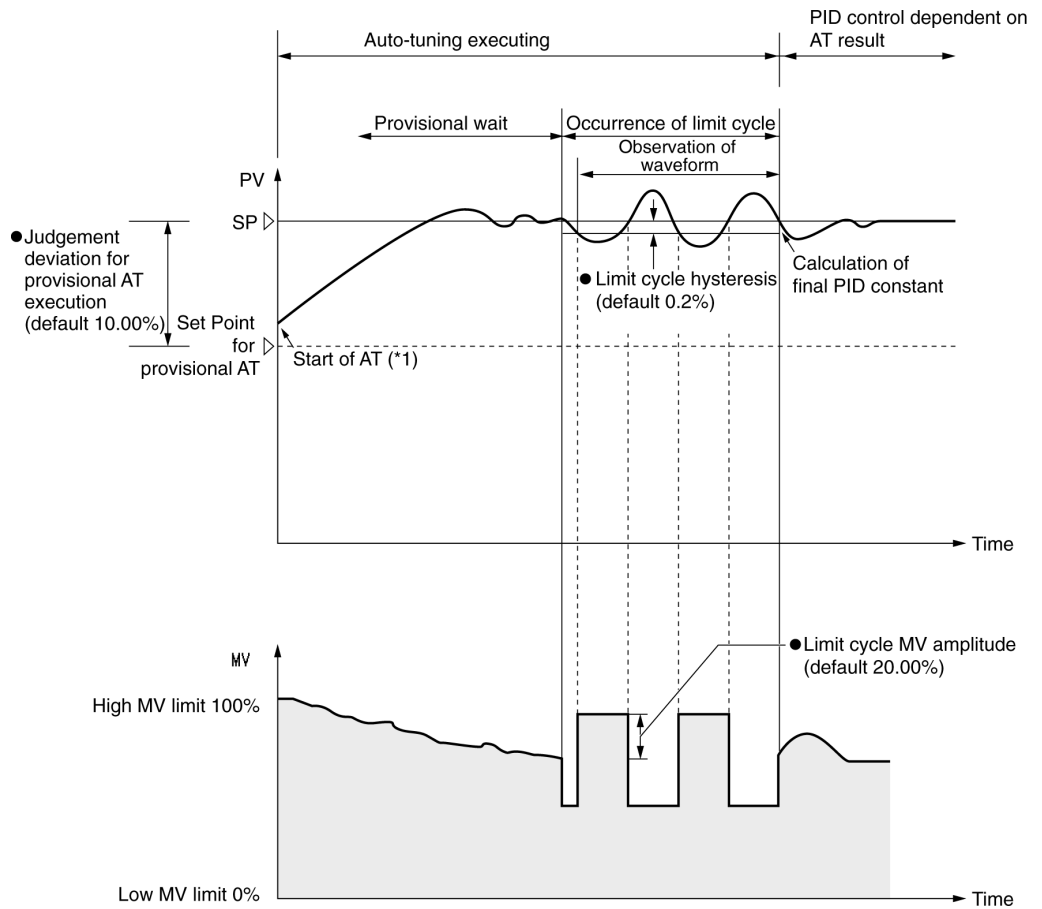
Example of waveforms produced during AT execution

Operation by standard AT

a) When AT is started with PV outside the "judgment deviation for provisional AT execution" range:

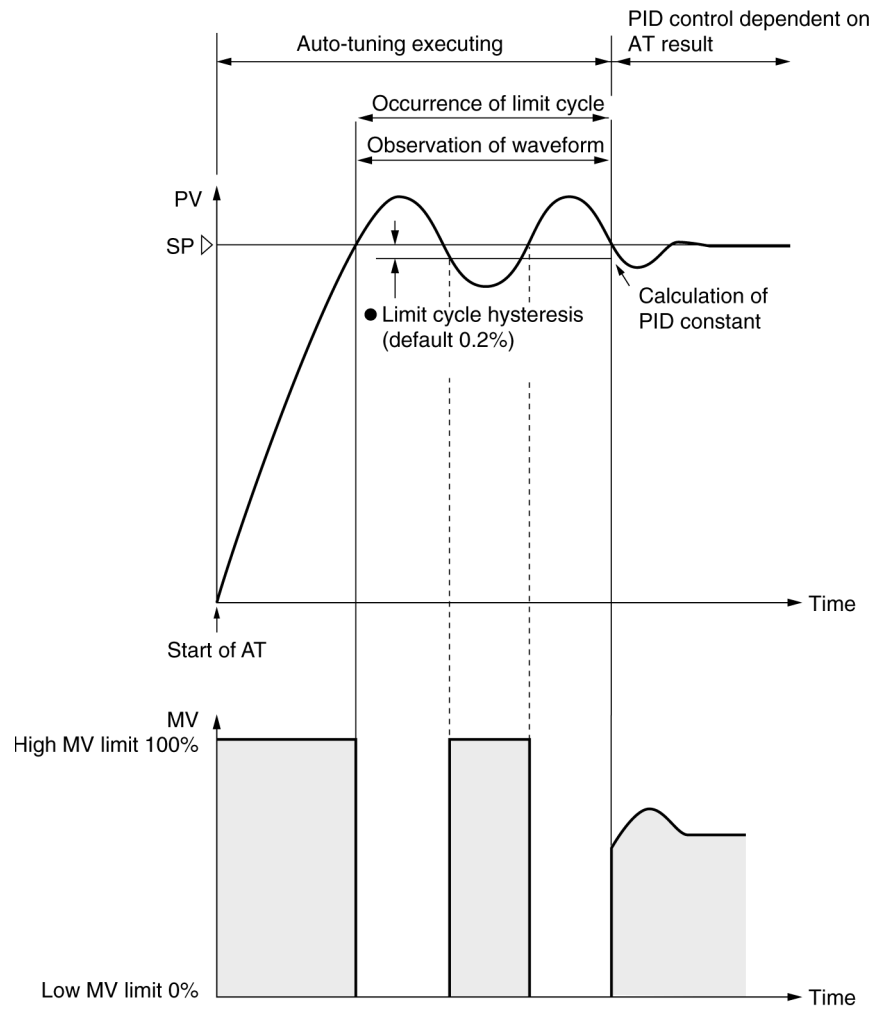


b) When AT is started with PV inside the "judgment deviation for provisional AT execution" range:



- *1: •When the PID constants are at their default settings (P=100%, I=0 s, D=0 s) with PV within the judgment deviation for provisional AT execution range, it takes some time for PV to arrive at the Set Point and for limit cycle to start.
 •When integral time I is 0 s with PV within the judgment deviation for provisional AT execution range, the Loop Control Unit converts the integral time to 240 s for execution of PID constants to bring the PV closer to the Set Point excluding offsets.

Operation by short AT



About 2 Degrees of Freedom PID Parameters α and β

2 degrees of freedom PID can be achieved based on the PID constants set automatically (by AT) or manually in Basic PID block (Block Model 011) and Advanced PID block (Block Model 012).

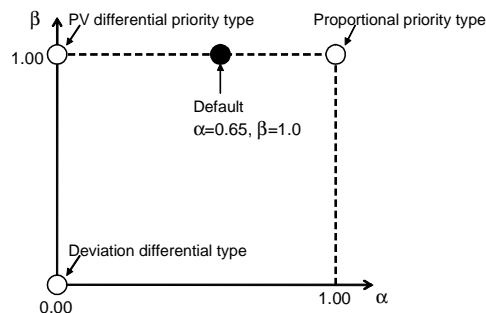
"2 degrees of freedom PID" is PID that adapts to the two characteristics of disturbance response and trackability to changes in the Set Point. This type of PID is used as the PID on the Loop Control Unit.

The various types of PID control shown in the figure below can be selected by the user setting the two parameters α and β as desired. Selection in this way enables tracking to changes in the Set Point without changing the disturbance response.

The setting values are:

$$\alpha = 0.65$$

$$\beta = 1.0$$



- **Proportional priority type (I-PD):**

Proportional and differential operations function on PV, and accumulation is performed on the deviation. Tracking to changes in the Set Point is slower than the PV differential priority type and deviation differential type. Bumps (sudden changes) do not occur in MV even if the Set Point changes. This control type is effective when overshooting is not allowed in the control.

- **PV differential priority type:**

Disturbance response is high as differential operation functions on the PV. Trackability to changes in the Set Point is slower than the deviation differential type.

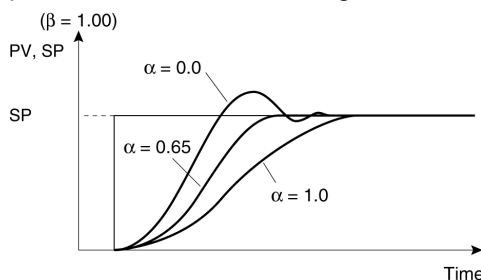
- **Deviation differential type:**

Trackability to changes in the Set Point is high as differential operation functions on the deviation. This control type is effective when control is used for PID on the secondary side in cascade control.

The default values of both parameters α and β enable satisfactory control in almost all applications. However, adjustment is effective in the following instances.

- If the control waveform is flat and settling is slow when moving from a ramp to a soak in program control, set parameter α to a smaller value.
- If tracking to changes in the Set Point is poor in Remote Set Point control, set parameter α to a smaller value.

The following figure shows the response with respect to changes in the Set Point when parameter α has been changed:



2 Control blocks

<012> Advanced PID 001 to 032

| Block Model | Block Name | Block Address |
|-------------|--------------|---------------|
| <012> | Advanced PID | 001 to 032 |

Outline

This function block is provided with the functions required for achieving advanced PID.

- This function block has all of the functions provided in the Basic PID block.
- It is also provided with the following functions:

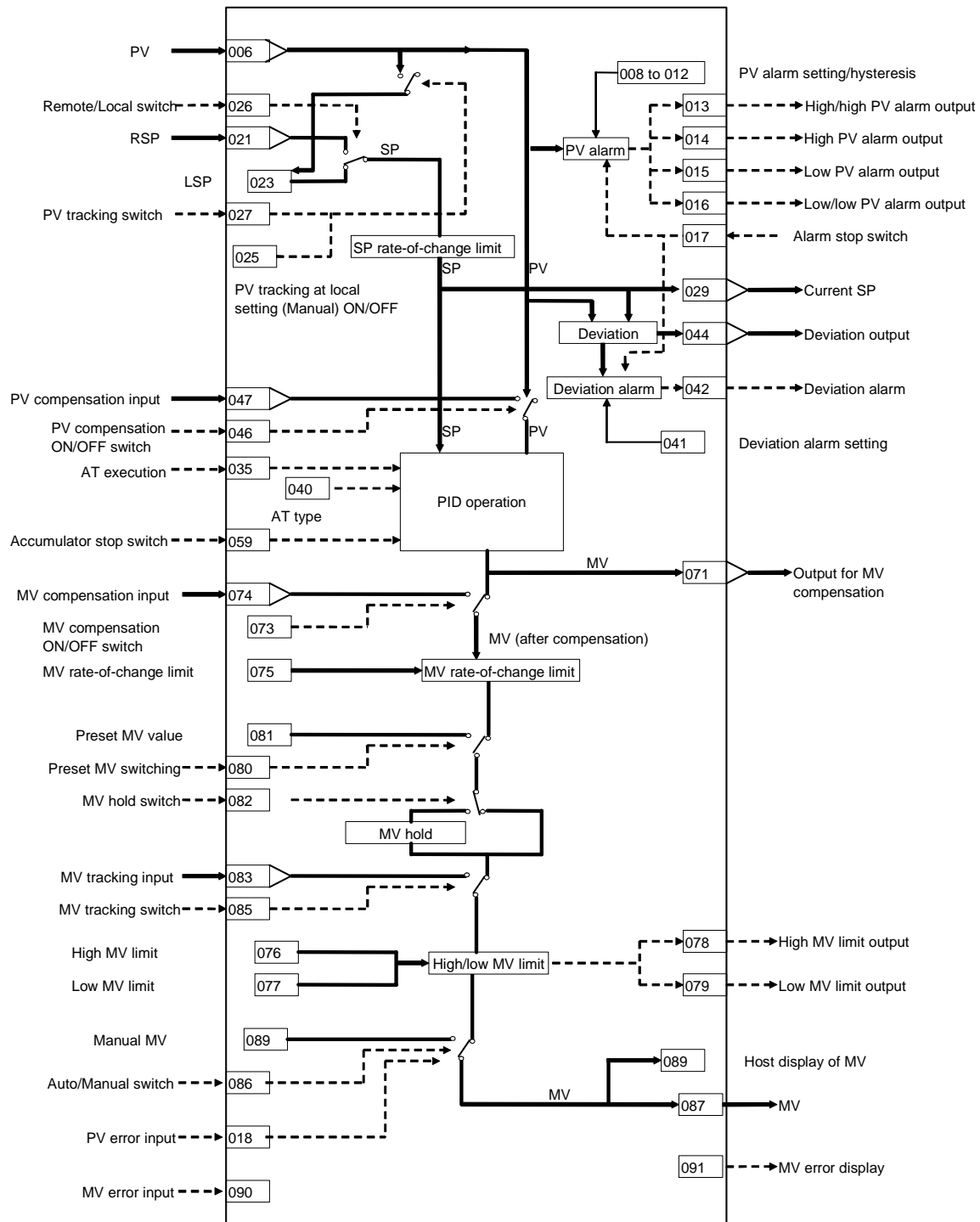
SP rate-of-change limit, PV compensation, manual reset/integration OFF, MV compensation, MV rate-of-change limit, MV high/low limit, preset MV, MV hold, MV tracking

- Auto-tuning of PID constants can be executed according to the limit cycle mode. (For details, see "About the PID Constant AT (auto-tuning) Function" on page 39.)

Function block applications

Cascade control with tracking function, override control, dead time compensation, sample PI control, feedforward control

Block diagram



2 Control blocks

<012> Advanced PID 001 to 032

ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|---------------|------|--------|---|---------------|------------|---------------------------|------------------------------|-----------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor*1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | R/W | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Advanced PID | 012 | 012 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |

PV

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------------------------------|------|--------|--|--------------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Analog input wiring information | 006 | | PV source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 007 | PV | PV input | -15.00 to +115.00% | 0.00 | Yes | r | R | - | - | S | 2 |
| Parameter | 008 | | High/high alarm setting | -15.00 to +115.00% | 115.00 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 009 | | High alarm setting | -15.00 to +115.00% | 100.00 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 010 | | Low alarm setting | -15.00 to +115.00% | 0.00 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 011 | | Low/low alarm setting | -15.00 to +115.00% | -15.00 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 012 | | Hysteresis setting | 0 to 115.00% | 1.00 | - | R/W(S) | - | W | - | - | 2 |
| Contact output | 013 | HH | High/high alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 014 | H | High alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 015 | L | Low alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 016 | LL | Low/low alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| Contact input | 017 | S1 | Alarm stop switch 0: Alarm, 1: Stop | 0, 1 | 0 | - | R/W(O) | R/W | - | R/W | S/R | 1 |
| Connection terminal contact input | 018 | | PV error contact source designation | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Contact output | 019 | PVE | PV execution error indication 0: Normal, 1: Error → MANUAL mode | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| Parameter | 020 | | Alarm limit * 0: No, 1: Yes Note: Limits the alarm set value to between 0.00% and 100.00%. | 0, 1 | 0 | - | R/W (S) | - | - | - | - | 1 |

*2: If ITEM 020 (alarm limit) is set to 1 (ON), the alarm set range will be limited to between 0.00% and 100.00% as follows (supported by Loop Control Unit version 2.50 or later):

- If the high/high alarm setting (ITEM 008) or the high alarm set value (ITEM 009) is set to a value over 100.00%, the alarm output will not turn ON even if the PV exceeds the alarm set value.
- If the low/low alarm setting (ITEM 011) or the low alarm set value (ITEM 010) is set to a value below 0.00%, the alarm output will not turn ON even if the PV exceeds the alarm set value.
- If the deviation alarm setting (ITEM 041) is set to a value over 100.00%, the alarm output will not turn ON even if the PV exceeds the deviation range.
- If the high MV limit (ITEM 076) is set to a value over 100.00%, the high MV limit output will not turn ON even if the high limit is reached. The high limit function, however, will work.
- If the low MV limit (ITEM 077) is set to a value below 0.00%, the low MV limit output will not turn ON even if the low limit is reached. The low limit function, however, will work.

2 Control blocks

<012> Advanced PID 001 to 032

Setting Value Set Point

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|---------------------------------|------------------|--------|---|------------------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Analog input wiring information | 021 | | Remote Set Point source designation | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 022 | RSP | Remote Set Point input | -15.00 to +115.00% | 0.00 | Yes | - | - | - | - | - | 2 |
| Parameter | 023 | | Local Set Point setting | -15.00 to +115.00% | 0.00 | - | R/W(O) | W | W | - | R | 2 |
| | 024 | | Set Point setting mode (default) 0: Local only, 1: Remote/Local Note: Setting to 0 invalidates ITEM026. | 0, 1 | 0 | - | R/W(S) | R | - | - | S/R | 1 |
| | 025 | | PV tracking at local setting (Manual) 0: Not used, 1: Used | 0, 1 | 0 | - | R/W(S) | - | - | - | - | 1 |
| Contact input/parameter | 026 | R/L | Remote/Local switch 0: Local, 1: Remote Note: Valid only when ITEM024 is 1 | 0, 1 | 0 | Yes | R/W(O) | R/W | - | R/W | S/R | 1 |
| Contact input | 027 | S2 | PV tracking switch 0: Not used, 1: Used (valid only in Local mode) | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| Parameter | 028 | | SP rate-of-change limit (0: No restriction) Note: The time unit is set in ITEM 030. | 0 to 115.00%/Time unit | 0.00 | - | R/W(S) | - | W | - | - | 2 |
| Analog output | 029 | SP | Current SP output | -15.00 to +115.00% | 0.00 | Yes | r/w | R | - | - | S | 2 |
| Parameter | 030 ^z | TMU | SP rate-of-change limit time unit 0: s, 1: min, 2: hr | 0 to 2 | 0 | - | R/W (S) | - | - | - | - | 1 |
| Parameter | 032 | | Bumpless output between primary/secondary loops (self node is secondary side) 0: Not used, 1: Used | 0, 1 | 0 | - | R/W(S) | - | - | - | - | 1 |

*2: These ITEMS were added in Loop Control Unit Ver.2.50.

AT (auto-tuning)

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------|------------------|--------|---|---------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 035 ^z | | AT command/AT Executing •0: Cancel AT, 1: Execute AT as AT command •AT Executing flag remains at 1 during AT execution. Flag returns to 0 automatically after AT execution ends normally. | 0, 1 | 0 | Yes | R/W(O) | R/W | - | R/W | S/R | 1 |
| | 036 ^z | | Limit cycle MV amplitude Note: Set as ±%. | 5.00 to 50.00 | 20.00 | - | R/W(O) | - | - | - | - | 2 |
| | 037 ^z | | Limit cycle hysteresis | 0 to 10.00% | 0.20 | - | R/W(O) | - | - | - | - | 2 |
| | 038 ^z | | At calculation gain | 0.10 to 10.00 | 1.00 | - | R/W(O) | - | - | - | - | 2 |
| | 039 ^z | | Judgment deviation for provisional AT execution | 0 to 100.00% | 10.00 | - | R/W(O) | - | - | - | - | 2 |
| | 040 ^z | | AT type (0: Standard type, 1: Reduced time type) | 0, 1 | 0 | - | R/W(O) | - | - | - | - | 1 |

*2: These ITEMS were added in Loop Control Unit Ver.1.50.

Deviation

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|---------------------------------|------|--------|---|--------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 041 | | Deviation alarm setting (hysteresis is set at ITEM012) | 0 to 115.00% | 115.00 | - | R/W(O) | - | W | - | S/R | 2 |
| Contact output | 042 | DA | Deviation alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| Parameter | 043 | | Deviation alarm standby sequence 0: Not used, 1: Used Note: Restart in standby sequence by cold start | 0, 1 | 1 | - | R/W(S) | - | - | - | - | 1 |
| Analog output | 044 | Y1 | Deviation output (deviation = PV - SP) | ±115.00% | 0.00 | Yes | r/w | - | - | - | S | 2 |
| Parameter | 045 | | PV compensation mode 0: Not used, 1: Addition, 2: Subtraction, 3: Substitution | 0 to 3 | 0 | - | R/W(S) | - | - | - | - | 1 |
| Contact input | 046 | S3 | PV compensation ON/OFF switch 0: OFF, 1: ON | 0, 1 | 0 | - | R/W(O) | - | - | R/W | S/R | 1 |
| Analog input wiring information | 047 | X1 | PV compensation source designation | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |

2 Control blocks

<012> Advanced PID 001 to 032

Control

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|----------------------------------|------------------|--------|--|-----------------------------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 051 | | Processing cycle of PID control (0: cycle set at ITEM004) Note: When operation cycle is set to value other than "0", the setting value of ITEM004 is automatically changed to "4". | (0), 1, 2, 4, 8, 16, 32, 64, 128s | 0 | - | R/W(S) | - | - | - | - | 2 |
| | 052 | | Control action 0: Reverse (MV decreases by PV increase.), 1: Direct (MV increases by PV increase.) | 0, 1 | 0 | - | R/W(S) | - | - | - | - | 1 |
| | 054 | P | Proportional band | 0.1 to 999.9% | 100.0 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 055 | I | Integral time (0: No integral action) | 0 to 9999s | 0 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 056 | D | Differential time (0: No differential action) | 0 to 9999s | 0 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 057 | MRT | Manual reset (enabled when accumulator is OFF) | ±320.00% | 0.00 | - | R/W(O) | R/W | W | - | S/R | 2 |
| Contact input | 059 | S4 | Input of accumulator stop switch 0: Not used, 1: Stop accumulation | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| Contact input wiring information | 061 | MIE | Out-of-range processing at the MV output destination block (BBB: Destination block address, III: ITEM No., 000000: Processing OFF) Note: When contact turns ON, accumulator in PID control is stopped. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Parameter | 062 ³ | | MV Output Retrace Time for PV Error ⁴ 0: Disabled | 0 to 10 | 0 | - | R/W(S) | - | - | - | - | 2 |
| | 065 | | Advanced PID parameter α | 0.00 to 1.00 | 0.65 | - | R/W(S) | - | - | - | - | 2 |
| | 066 | | Advanced PID parameter β | 0.00 to 1.00 | 1.00 | - | R/W(S) | - | - | - | - | 2 |

*2: These ITEMS were added in Loop Control Unit Ver.1.50.

*3: These functions were added in Loop Control Unit Ver.2.00.

*4: Based on the value specified in ITEM062, the MV will be restored to the output value at the times specified below when a PV error is detected.

If the operation cycle (ITEM004) is 1 s, the value specified in ITEM062 x 1 s. If the operation cycle is 2 s, the value specified in ITEM062 x 2 s

MV

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------------------------------|------|--------|---|----------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Analog output | 071 | Y2 | Output for MV compensation | ±320.00% | 0.00 | Yes | r/w | - | - | - | - | 2 |
| Parameter | 072 | | MV compensation mode 0: Not used, 1: Addition, 2: Subtraction, 3: Substitution | 0 to 3 | 0 | - | R/W(S) | - | - | - | - | 1 |
| | 073 | S5 | MV compensation ON/OFF switch 0: OFF, 1: ON | 0, 1 | 0 | - | R/W(O) | - | - | R/W | S/R | 1 |
| Analog input wiring information | 074 | X2 | MV compensation source designation | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Parameter | 075 | | MV rate-of-change limit (0: No restriction) | 0 to 115.00%/s | 0.00 | - | R/W(O) | - | W | - | - | 2 |
| | 076 | MH | High MV limit | ±320.00% | 105.00 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 077 | ML | Low MV limit | ±320.00% | -5.00 | - | R/W(O) | R/W | W | - | S/R | 2 |
| Contact output | 078 | U1 | High MV limit output 1: High limit or higher, 0: Lower than limit Valid only for AUTO mode; always 0 for Manual mode. | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 079 | U2 | Low MV limit output 1: Low limit or lower, 0: Higher than limit Valid only for AUTO mode; always 0 for Manual mode. | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| Contact input | 080 | S6 | Preset MV switch 1: Select preset MV | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| Parameter | 081 | | Preset MV value | ±320.00% | 0.00 | - | R/W(O) | - | W | - | - | 2 |
| Contact input | 082 | S7 | MV hold switch 0: Not used, 1: Hold MV | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| Analog input wiring information | 083 | X3 | MV tracking source designation | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Parameter | 084 | X3 | MV tracking input | ±320.00% | 0.00 | Yes | - | - | - | - | - | 2 |
| Contact input | 085 | S8 | MV tracking switch 0: Not used, 1: Used | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| Contact input/parameter | 086 | A/M | Auto/Manual switch 0: Manual, 1: Auto | 0, 1 | 0 | Yes | R/W(O) | R/W | - | R/W | S/R | 1 |
| Analog output | 087 | MV | MV output | ±320.00% | 0.00 | Yes | r/w | - | - | - | - | 2 |
| Parameter | 088 | | Inversion of host display of MV 0: Not used, 1: Used Note: "Inversion" changes 0 to 100% range to 100 to 0%. | 0, 1 | 0 | - | R/W(S) | - | - | - | - | 1 |
| | 089 | | Host display of MV (Auto/Manual switch : Auto, Manual) or Manual MV (Auto/Manual switch : Manual) | ±320.00% | 0.00 | Yes | R/W(O) | R/W | W | - | S/R | 2 |
| Connection terminal contact input | 090 | | MV error contact source designation | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Contact output | 091 | MVE | MV error display 0: Normal, 1: Error | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |

2 Control blocks

<012> Advanced PID 001 to 032

Data for host display

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------|------|--------|-------------------|--------------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 098 | | MV index position | -15.00 to +115.00% | 0.00 | Yes | R/W(O) | R/W | W | - | S/R | 2 |
| | 099 | | Label | 0 to 15 | 0 | Yes | R/W(O) | R/W | W | - | S/R | 2 |

Note1 The values of ITEMS that cannot be set (indicated as either "-" or "r/w" in the above list) on CX-Process Tool such as the PV tracking switch, PV compensation ON/OFF switch and alarm stop switch that were active before the instantaneous power interruption or running of the Loop Control Unit was stopped are cleared when a cold start is performed. When a hot start is performed, these values are held. The internally held values for the standby states in standby sequences that were active before the instantaneous power interruption or running of the Loop Control Unit was stopped are also cleared. When a hot start is performed, these values are held.

Note2 To send data of the Advanced PID block to CX-Process Monitor by the Block Send Terminal to Computer blocks (Block Models 403 and 404), set the operation cycle of the Send to Computer blocks to the same or longer than that of the Advanced PID block at ITEM004. If the operation cycle of Send to Computer blocks is set to a shorter value, the Set Point momentarily becomes 0 when a cold start is performed. Bumpless output of MV functions when PID constants are changed in the Advanced PID block (Block Model 012). For this reason, MV is no longer updated and PID control is not executed correctly if variables are written to PID constants at each operation cycle by the Variable ITEM Setting block (Block Model 172). If this happens, use the Step Ladder Program block (Block Model 301) to provide a time interval for writing by the ITEM Setting block.

List of tag ITEMS on CX-Process Monitor or SCADA software

The following tag ITEMS are used to specify ITEMS with either 1) Monitor tags when sending function blocks to the CX-Process Monitor from 1-Block/4-Block Send Terminal to Computer (Block Model 403/404) or 2) CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (Block Model 461)/Send All Blocks (Block Model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in CX-Process Monitor | CSV Tags in SCADA Software |
|------|---|--------------------------------|----------------------------|
| | | Tag ITEM (fixed) | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST | MT_ST |
| 003 | Execution error display | None | ERR |
| 007 | PV input | PV | PV |
| 008 | High/high alarm setting | HH_SP | HH_SP |
| 009 | High alarm setting | H_SP | H_SP |
| 010 | Low alarm setting | L_SP | L_SP |
| 011 | Low/low alarm setting | LL_SP | LL_SP |
| 013 | High/high alarm output | HH | HH |
| 014 | High alarm output | H | H |
| 015 | Low alarm output | L | L |
| 016 | Low/low alarm output | LL | LL |
| 017 | Alarm stop switch | ALM_OFF | AOF |
| 019 | PV error indication | PV_ABN | PV_ABN |
| 023 | Local Set Point setting | None | SP |
| 024 | Set Point setting mode (default) | CAS_SET | CAS_SET |
| 026 | Remote/Local switch | R/L_SW | R/L_SW |
| 027 | PV tracking switch | None | S2 |
| 029 | Current Set Point output | SP | SP |
| 035 | AT command/AT Executing | AT | AT |
| 041 | Deviation alarm setting | DVA_SP | DVA_SP |
| 042 | Deviation alarm output | DVA | DVA |
| 044 | Deviation output | None | DV |
| 046 | PV compensation ON/OFF switch | None | S3 |
| 054 | Proportional band | P | P |
| 055 | Integral time | I | I |
| 056 | Differential time | D | D |
| 057 | Manual reset | None | MRT |
| 059 | Input of accumulator stop switch | None | S4 |
| 073 | MV compensation ON/OFF switch | None | S5 |
| 076 | High MV limit | MH_LMT | MH_LMT |
| 077 | Low MV limit | ML_LMT | ML_LMT |
| 078 | MV high limit output | MHA | MHA |
| 079 | MV low limit output | MLA | MLA |
| 080 | Preset MV switch | None | S6 |
| 082 | MV hold switch | None | S7 |
| 085 | MV tracking switch | None | S8 |
| 086 | Auto/Manual switch | A/M_SW | A/M_SW |
| 089 | Host display of MV (Auto/Manual switch : Auto, Manual) or Manual MV (Auto/Manual switch : Manual) | MV | MV |
| 091 | MV error display | MV_ABN | MV_ABN |
| 098 | MV index position | MV_IDX | MV_IDX |
| 099 | Label | OP_MK | OP_MK |

2 Control blocks

<012> Advanced PID 001 to 032

Description of functions

| Item | | Description |
|-----------------------------|--|--|
| PV (Process Variable) Input | Number of points | 1 |
| | Input range | -15.00 to +115.00% |
| | Operation function | None (Calculation of square root, first-order-lag, bias, etc. Is required by external blocks.) |
| | Sampling cycle | According to the specified operation cycle of this block (one of 0.1, 0.2, 0.5, 1, 2 seconds) Note, however, that the external input refresh cycle of the entire instrumentation system differs from this operation cycle. (See 3-2 Description of Operation in the User's Manual.) |
| | PV error input | When the PV error contact turns ON, the Loop Control Unit is forced to enter the Manual mode, and the MV value active at that moment is held. At the same time, the PV error is transferred to the CX-Process Monitor. The disconnected line detection output ITEM of analog input (AI) function blocks is specified as the source designation for use. This enables forced switching to the Manual mode when a disconnected line is detected on the Analog Input Unit, and transfer of the PV error to CX-Process Monitor at the same time. |
| | PV compensation | When the PV compensation input switch is set to 1 (ON), arithmetic operation is performed on the PV signal that is input to PID control. PV compensation is enabled only in the Auto mode. One of the following three operations is possible: •Addition: The external PV compensation input value is added to the PV signal, and the result is assigned to PID control. •Subtraction: The external PV compensation input value is subtracted from the PV signal, and the result is assigned to PID control. •Substitution: The PV signal is substituted with the external PV compensation input value, and the result is assigned to PID control. When the PV compensation input switch is OFF, the PV signal is returned to. Example: This operation is used for dead time compensation control (additive). |
| SP (Set Point) | Number of points | 1 |
| | Setting range | -15.00 to +115.00% |
| | Remote/Local switching | Possible |
| | SP rate-of-change limit | Possible (0 to 115.00%/s) |
| | PV tracking at manual setting of the Local Set Point | The Local Set Point can be made to track PV when the mode is switched to the Manual mode. When the mode is returned to the Auto mode, control is started with PV equaling the Set Point. Sudden changes in the MV caused at switching back to the Auto mode do not occur. |
| | PV tacking | Matches the SP (Set Point) to the PV (Process Variable) when the PV tracking switch is set to 1 (ON), and hold SP and PV in this matched relationship. When the PV tracking switch is OFF, the Loop Control Unit can be run in a bumpless manner from the PV value. |
| | Bumpless processing between primary/secondary loops | When the self node is performing cascade control as the secondary controller, processing is performed on the MV of the primary controller to be input as follows: •When the Set Point of the self node is Local (LSP): The primary controller is switched to the Manual mode, and the Local Set Point of the self node is overwritten on the MV of the primary controller. •When the Set Point of the self node is Remote (RSP): The primary controller is switched to the Auto mode, and the MV of the primary controller is input as the Remote Set Point as per normal. |

| Item | | Description | |
|------------------------------|-------------------------|--|---|
| PID Control | Control method | Advanced PID Various PID methods (proportional priority type, PV differential priority type, deviation differential type, etc.) can be selected according to the settings of parameters α and β . (For details, refer to the description for the Basic PID block.) | |
| | Control action | Direct/reverse switchable | |
| | PID Constant | | 1 set AT (auto-tuning) can automatically set according to limit cycle mode. (For details, see page 39 "About PID Constant AT Functions. ") |
| | | Proportional band | 0.1 to 999.9% (0.1% increments) |
| | | Integral time | 0 to 9999 sec. (1 second increments) 0: No accumulator Integral stop can be indicated from external contacts. |
| | | Differential time | 0 to 9999 sec. (1 second increments) 0: No differentiation |
| | Manual reset | -320.00 to +320.00% (0.00% increments) Bumpless output at manual reset | |
| MV (Manipulated Variable) | Number of points | 1 | |
| | Output range | -320.00 to +320.00% | |
| | Output refresh cycle | According to the specified operation cycle of this block (one of 0.1, 0.2, 0.5, 1, 2 seconds) | |
| | Auto/manual switching | Possible (according to CX-Process Monitor, CX-Process Tool or correct signal from Step Ladder Program block/Contact Distributor block) | |
| | High/low MV limit | High limit: -320.00 to +320.00%, low limit: -320.00 to +320.00% Note: The default low limit is -5.00% and default high limit is 105.00% to ensure that the valve becomes fully open or fully closed. If output less than 0.00% or more than 100% is meaningless, for example, in the case of time-proportional ON/OFF control for a heater, set these limits to 0.00% and 100.00, respectively, to prevent overshoot. | |
| | MV rate-of-change limit | 0 to 115.00%/s | |
| | Preset MV switching | Possible (according to contacts from other function blocks) When the preset MV switch is set to ON, the MV switches to the preset MV (fixed value) and control is continued at this value. When the PV tracking switch is OFF, the Loop Control Unit can be run in a bumpless manner from the preset MV value. Preset MV switching is enabled only in the Auto mode. | |
| | MV hold | Possible (according to contacts from other function blocks) The MV (Manipulated Variable) is held at the current value when the MV hold switch is set to 1 (ON). When the MV hold switch is OFF, the MV is returned to from in a bumpless manner from the MV hold value. (MV hold is enabled only in the Auto mode.) | |
| | MV tracking | Possible (according to contacts from other function blocks) The MV is switched (tracks) to the input value from other function blocks. When the MV tracking switch is set to 1 (ON), the MV is made to match the value of the external MV tracking input, and the MV and MV tracking input are held in this matched relationship. When the switch is OFF, MV is returned to on a bumpless manner from the value of the MV tracking input. MV tracking is enabled only in the Auto mode. MV output is also bumpless when switching between the Auto and Manual modes. | |
| | MV compensation | Possible (according to contacts from other function blocks) When the MV compensation input switch is set to 1 (ON), arithmetic operation is performed on the MV signal that is input to PID control. MV compensation is enabled only in the Auto mode. One of the following three operations is possible: •Addition: The external MV compensation input value is added to the MV signal. •Subtraction: The external MV compensation input value is subtracted from the MV signal. •Substitution: The MV signal is substituted with the external MV compensation input value. When the MV compensation input switch is OFF, the MV signal from the PID control is returned to. MV at this time changes in a bumpless manner. | |

2 Control blocks

<012> Advanced PID 001 to 032

| Item | | Description |
|---------------------------------|---|--|
| MV (Manipulated Variable) | Out-of-range processing MV output destination block | PID integral action is stopped when the range is exceeded on the function block to which MV is connected, and unnecessary fluctuation of MV is prevented. |
| | MV error input | MV error is transferred to CX-Process Monitor when the MV error contact turns ON. The disconnected line detection output ITEM of analog output (AO) function blocks is specified as the source designation for use. This enables transfer of the MV error to CX-Process Monitor when a disconnected line is detected on the Analog Output Unit. |
| Alarm | PV alarm | 4 (high/high limit, high limit, low limit, low/low limit), setting range: -15.00 to +115.00% Hysteresis: 0 to +115.00% |
| | Deviation alarm | 1 (ON outside deviation) Standby sequence can be provided: standby started at power ON (alarm OFF even outside deviation range), alarm ON outside deviation range after entering deviation |
| State Output | | 1 deviation output (-115.00 to +115.00%) 1 output for MV compensation (-320.00 to +320.00%) |

Note1 About PID Constant AT (auto-tuning) Function
For details on this function, see the item of the same description in the Basic PID block (Block Model 011).

Note2 About 2 Degrees of Freedom PID Parameters α and β
"2 degrees of freedom PID" is PID that adapts to the two characteristics of disturbance response and trackability to changes in the Set Point. This type of PID is used as the PID on the Loop Control Unit. For details, see the description for the Basic PID block (Block Model 011).

| Block Model | Block Name | Block Address |
|-------------|-------------|---------------|
| <013> | Blended PID | 001 to 032 |

Outline

This function block performs PID control on the cumulative value (cumulative deviation) between the accumulated value PV and accumulated value Remote Set Point. Ratio control of flowrate accumulated values is possible as this function block is provided with a ratio to accumulated Remote Set Point function.

- This function block is provided with cumulative deviation alarm output.
- It is also provided with an accumulation counter for converting PV four digits to eight digits.
- It is also provided with PV and Remote Set Point instantaneous value output.

Note: As this function block is a Remote Set Point input type function block, it is generally used as the slave for a Batch Flowrate Capture block (Block Model 014) as the master.

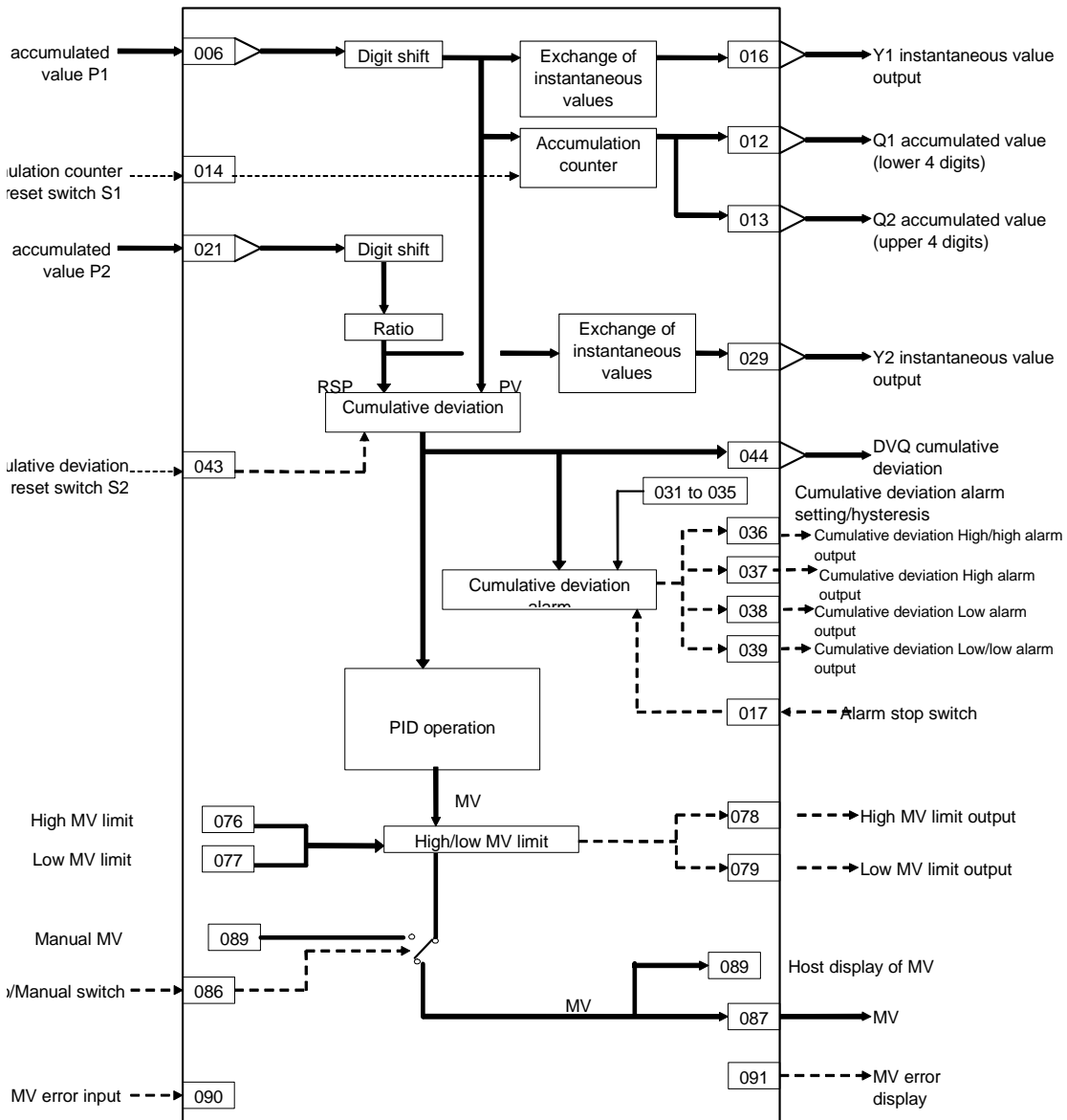
Function block applications

The PV is input in series as the Remote Set Point with the Batch Flowrate Capture block (Block Model 014) set as the master. Accumulated values (0 to 9999) from a container type flowmeter (e.g. oval type) are input as the PV to perform ratio control between multiple function blocks.

Note: The value obtained by accumulating the pulse input from a Pulse Input Unit (CS1W-PPS01) by the PI 4-point Terminal block (Block Model 562) is input as the accumulated value PV.

Example Control while maintaining the ratio between batch capture amounts of liquids B and C at a constant ratio in response to the batch capture amount of liquid A.

Block diagram



ITEM list

Note The values of ITEMS that cannot be set (indicated as either "-" or "r/w" in the above list) on CX-Process Tool such as the alarm stop switch that were active before the instantaneous power interruption or running of the Loop Control Unit was stopped are cleared when a cold start is performed. When a hot start is performed, these values are held. The internally held values for the standby states in standby sequences that were active before the instantaneous power interruption or running of the Loop Control Unit was stopped are also cleared. When a hot start is performed, these values are held.

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|---------------|------|--------|---|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | |
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | R/W | - | R/W | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: Blended PID | 013 | 013 | - | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display (0: Normal, Other: Error (See Appendix "Execution Error Code List.")) | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) (0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2) | 0 to 5 | 0 | - | - | R/W(S) | - | - | - | 2 |

PV

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|--|------|--------|---|-----------------|----------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | |
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Accumulated value input wiring information | 006 | | PV source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | - | R/W(S) | - | - | - | 4 |
| Accumulated value input | 007 | P1 | Input | 0 to 9999 | 0 | Yes | r | - | - | - | S | 2 |
| Parameter | 009 | | Digit shift (10x, -3: x0.001, -2: x0.01, -1: x0.1, 0: x1, 1: x10) ² | -3 to +1 | 0 | - | - | R/W(S) | - | - | - | 1 |
| | 010 | | PV instantaneous value conversion coefficient (number of pulses per second at instantaneous value output 100% is set) | 0 to 99999.9999 | 100.0000 | - | - | R/W(S) | - | - | - | 4 |
| | 011 | | Number of moving average data at PV instantaneous value conversion | 1 to 16 | 16 | - | - | R/W(S) | - | - | - | 1 |
| Accumulated value output | 012 | Q1 | Accumulated value (lower 4 digits) | 0000 to 9999 | 0 | Yes | r/w | R | - | - | S | 2 |
| | 013 | Q2 | Accumulated value (upper 4 digits) | 0000 to 9999 | 0 | Yes | r/w | R | - | - | S | 2 |
| Contact input | 014 | S1 | Accumulation counter reset switch (1: Reset) | 0, 1 | 0 | Yes | R/W(O) | R/W | - | R/W | S/R | 1 |

2 Control blocks

<013> Blended PID 001 to 032

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|---------------|------|--------|---|--------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 015 | PR | Pulse rate (for host display: scale unit/pulse) | 0 to 10.000 | 1.000 | - | R/W(S) | - | - | - | - | 2 |
| Analog output | 016 | Y1 | Instantaneous value output | 0 to 320.00% | 0.00 | Yes | r/w | - | - | - | S | 2 |
| Contact input | 017 | | Alarm stop switch 0: Alarm, 1: Stop | 0, 1 | 0 | Yes | R/W(O) | R/W | - | R/W | S/R | 1 |
| Parameter | 020 | | Alarm limit ³ 0: No, 1: Yes Note: Limits the alarm set value to between 0.00% and 100.00%. | 0, 1 | 0 | - | R/W (S) | - | - | - | - | 1 |

*2: When decimal point shift is set to -3 to -1, only integer pulses are used for instantaneous value calculation. Digits past the decimal point are added to the next calculation.

*3: If ITEM 020 (alarm limit) is set to 1 (ON), the alarm set range will be limited to between 0.00% and 100.00% as follows (supported by Loop Control Unit version 2.50 or later):

- If the high MV limit (ITEM 076) is set to a value over 100.00%, the high MV limit output will not turn ON even if the high limit is reached. The high limit function, however, will work.
- If the low MV limit (ITEM 077) is set to a value below 0.00%, the low MV limit output will not turn ON even if the low limit is reached. The low limit function, however, will work.

Setting Value Set Point

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|--|------|--------|--|-----------------|----------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Accumulated value input wiring information | 021 | | P2 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Accumulated value input | 022 | P2 | Input | 0 to 9999 | 0 | Yes | r | - | - | - | - | 2 |
| Parameter | 024 | | Digit shift (10x, -3: x0.001, -2: x0.01, -1: x0.1, 0: x1, 1: x10) Note 1 | -3 to +1 | 0 | - | R/W(S) | - | - | - | - | 1 |
| | 025 | | SP instantaneous value conversion coefficient (number of pulses per second at instantaneous value output 100% is set) | 0 to 99999.9999 | 100.0000 | - | R/W(S) | - | - | - | - | 4 |
| | 026 | | Number of moving average data at SP instantaneous value conversion | 1 to 16 | 16 | - | R/W(S) | - | - | - | - | 1 |
| | 027 | K1 | Ratio | 0 to 3.2000 | 1.0000 | - | R/W(O) | R/W | W | - | S/R | 2 |
| Analog output | 029 | Y2 | Current SP instantaneous value output | 0 to 320.00% | 0.00 | Yes | r/w | R | - | - | S | 2 |
| Parameter | 031 | | Cumulative deviation High/high alarm setting | ±32000 | 32000 | - | R/W(O) | R/W | W | - | - | 2 |
| | 032 | | Cumulative deviation High alarm setting | ±32000 | 32000 | - | R/W(O) | R/W | W | - | - | 2 |
| Parameter | 033 | | Cumulative deviation Low alarm setting | ±32000 | -32000 | - | R/W(O) | R/W | W | - | - | 2 |
| | 034 | | Cumulative deviation Low/low alarm setting | ±32000 | -32000 | - | R/W(O) | R/W | W | - | - | 2 |
| | 035 | | Hysteresis setting | 0 to 32000 | 0 | - | R/W(S) | - | W | - | - | 2 |

Deviation

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|----------------|------|--------|--|------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact output | 036 | HH | Cumulative deviation High/high alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 037 | H | Cumulative deviation High alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 038 | L | Cumulative deviation Low alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 039 | LL | Cumulative deviation Low/low alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| Parameter | 040 | | Cumulative deviation value normalization constant | 1 to 32000 | 10000 | - | R/W(S) | - | W | - | - | 2 |
| | 041 | S3 | Operation mode at cumulative deviation High/High and Low/Low alarm 0: Normal, 1: Stop cumulative deviation counter at alarm | 0, 1 | 0 | - | R/W(S) | - | - | - | - | 1 |
| | 042 | S4 | Cumulative deviation operation mode at Auto start 0: Normal, 1: Reset | 0, 1 | 0 | - | R/W(S) | - | - | - | - | 1 |
| Contact input | 043 | S2 | Cumulative deviation reset switch | 0, 1 | 0 | Yes | R/W(O) | R/W | - | R/W | S/R | 1 |
| Analog output | 044 | DVQ | Cumulative deviation output | ±32000 | 0 | Yes | r/w | - | - | - | S | 2 |

Control

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------|------|--------|--|---------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 052 | | Control action 0: Reverse (MV decreases by PV increase.), 1: Direct (MV increases by PV increase.) | 0, 1 | 0 | - | R/W(S) | - | - | - | - | 1 |
| | 054 | | Proportional band | 0.1 to 999.9% | 100.0 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 055 | | Integral time (0: No integral action) | 0 to 9999s | 0 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 056 | | Differential time (0: No differential action) | 0 to 9999s | 0 | - | R/W(O) | R/W | W | - | S/R | 2 |

2 Control blocks

<013> Blended PID 001 to 032

MV

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------------------------------|------|--------|--|------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 076 | | High MV limit | ±320.00% | 105.00 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 077 | | Low MV limit | ±320.00% | -5.00 | - | R/W(O) | R/W | W | - | S/R | 2 |
| Contact output | 078 | U1 | High MV limit output 1: High limit or higher, 0: Lower than limit Valid only for AUTO mode; always 0 for Manual mode. | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 079 | U2 | Low MV limit output 1: Low limit or lower, 0: Higher than limit Valid only for AUTO mode; always 0 for Manual mode. | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| Contact input/parameter | 086 | A/M | Auto/Manual switch 0: Manual, 1: Auto | 0, 1 | 0 | Yes | R/W(O) | R/W | - | R/W | S/R | 1 |
| Analog output | 087 | MV | MV output | ±320.00% | 0.00 | Yes | r/w | - | - | - | - | 2 |
| Parameter | 088 | | Inversion of host display of MV 0: Not used, 1: Used Note: "Inversion" changes 0 to 100% range to 100 to 0%. | 0, 1 | 0 | - | R/W(S) | - | - | - | - | 1 |
| | 089 | | Host display of MV (Auto/Manual switch : Auto, Manual) or Manual MV (Auto/Manual switch : Manual) | ±320.00% | 0.00 | Yes | R/W(O) | R/W | W | - | S/R | 2 |
| Connection terminal contact input | 090 | | MV error contact source designation | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Contact output | 091 | MVE | MV error display 0: Normal, 1: Error | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |

Data for host display

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------|------|--------|-------------------|--------------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 098 | | MV index position | -15.00 to +115.00% | 0.00 | Yes | R/W(O) | R/W | W | - | S/R | 2 |
| | 099 | | Label | 0 to 15 | 0 | Yes | R/W(O) | R/W | W | - | S/R | 2 |

Note To send data of the Blended PID block to CX-Process Monitor by the Block Send Terminal to Computer blocks (Block Models 403 and 404), set the operation cycle of the Send to Computer blocks to the same or longer than that of the Blended PID block at ITEM004. If the operation cycle of Send to Computer blocks is set to a shorter value, the Set Point momentarily becomes 0 when a cold start is performed.

Bumpless output of MV functions when PID constants are changed in the Blended PID block (Block Model 013).

For this reason, MV is no longer updated and PID control is not executed correctly if variables are written to PID constants at each operation cycle by the Variable ITEM Setting block (Block Model 172).

If this happens, use the Step Ladder Program block (Block Model 301) to provide a time interval for writing by the ITEM Setting block.

List of tag ITEMS on CX-Process Monitor or SCADA software

The following tag ITEMS are used to specify ITEMS with either 1) Monitor tags when sending function blocks to the CX-Process Monitor from 1-Block/4-Block Send Terminal to Computer (Block Model 403/404) or 2) CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (Block Model 461)/Send All Blocks (Block Model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in CX-Process Monitor | CSV Tags in SCADA Software |
|------|---|--------------------------------|----------------------------|
| | | Tag ITEM (fixed) | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST | MT_ST |
| 003 | Execution error display | None | ERR |
| 007 | PV input | PV | PV |
| 012 | Accumulated value Q1 | Q1 | Q1 |
| 013 | Accumulated value Q2 | Q2 | Q2 |
| 014 | Accumulation counter reset switch | S1 | S1 |
| 015 | Pulse rate | PR | None |
| 016 | Instantaneous value output | Y1 | Y1 |
| 017 | Alarm stop switch | ALM_OFF | AOF |
| 027 | Ratio | K1 | K1 |
| 029 | Current SP instantaneous value output | Y2 | Y2 |
| 036 | Cumulative deviation High/high alarm output | DHH | DHH |
| 037 | Cumulative deviation High alarm output | DH | DH |
| 038 | Cumulative deviation Low alarm output | DL | DL |
| 039 | Cumulative deviation Low/low alarm output | DLL | DLL |
| 043 | Cumulative deviation reset switch | S2 | S2 |
| 044 | Cumulative deviation output | DEV_Q | DEV_Q |
| 054 | Proportional band | P | P |
| 055 | Integral time (0: No integral action) | I | I |
| 056 | Differential times (0: No differential action) | D | D |
| 076 | High MV limit | MH_LMT | MH_LMT |
| 077 | Low MV limit | ML_LMT | ML_LMT |
| 078 | High MV limit output | MHA | MHA |
| 079 | Low MV limit output | MLA | MLA |
| 086 | Auto/Manual switch | A/M_SW | A/M_SW |
| 089 | Host display of MV (Auto/Manual switch : Auto, Manual) or Manual MV (Auto/Manual switch : Manual) | MV | MV |
| 091 | MV error display | MV_ABN | MV_ABN |
| 098 | MV index position | MV_IDX | MV_IDX |
| 099 | Label | OP_MK | OP_MK |

2 Control blocks

<014> Batch Flowrate Capture 001 to 032

| Block Model | Block Name | Block Address |
|-------------|------------------------|---------------|
| <014> | Batch Flowrate Capture | 001 to 032 |

Outline

This function block functions to open the valve at a fixed opening until a fixed batch accumulated value is reached in batch capture processing to a tank, for example. 4-digit accumulated value signals (batch accumulated values) are input as the PV, and the analog signal (MV value) to the valve controlling the capture volume is gradually increased proportionately to the accumulated value to maintain MV at a fixed value (regular setting). When the fixed value reaches the fixed capture volume (that is, when the accumulated value signals reach the "regular setting - pre-batch setting"), the analog signals (MV value) to the valve controlling the capture volume are gradually decreased to 0% so that the batch accumulated value finally matches the fixed value.

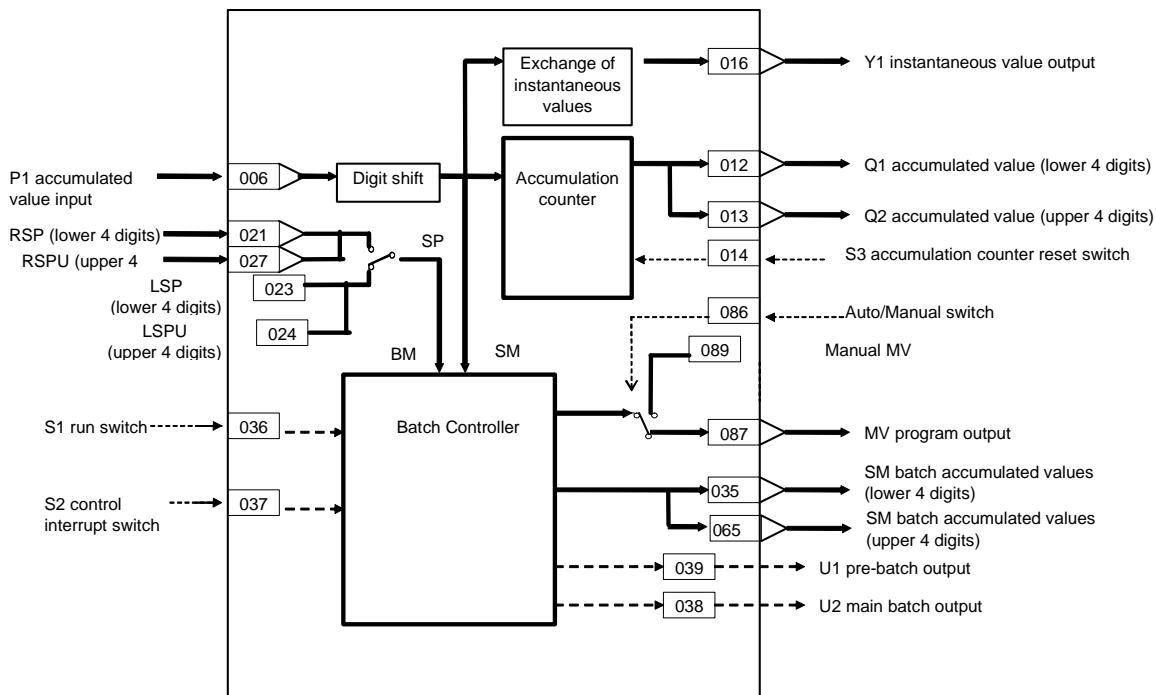
- This function block is provided with a pre-batch function.
- It is also provided with a program MV output function exclusively for batch capture processing.
- It is also provided with a contact output for action timing notification.
- The local SP and remote SP can be set to a fixed preset value (BM).
- The local SP, remote SP, preset value (BM), and batch accumulated value can be set to 8 digits (supported from Loop Control Unit version 2.50).

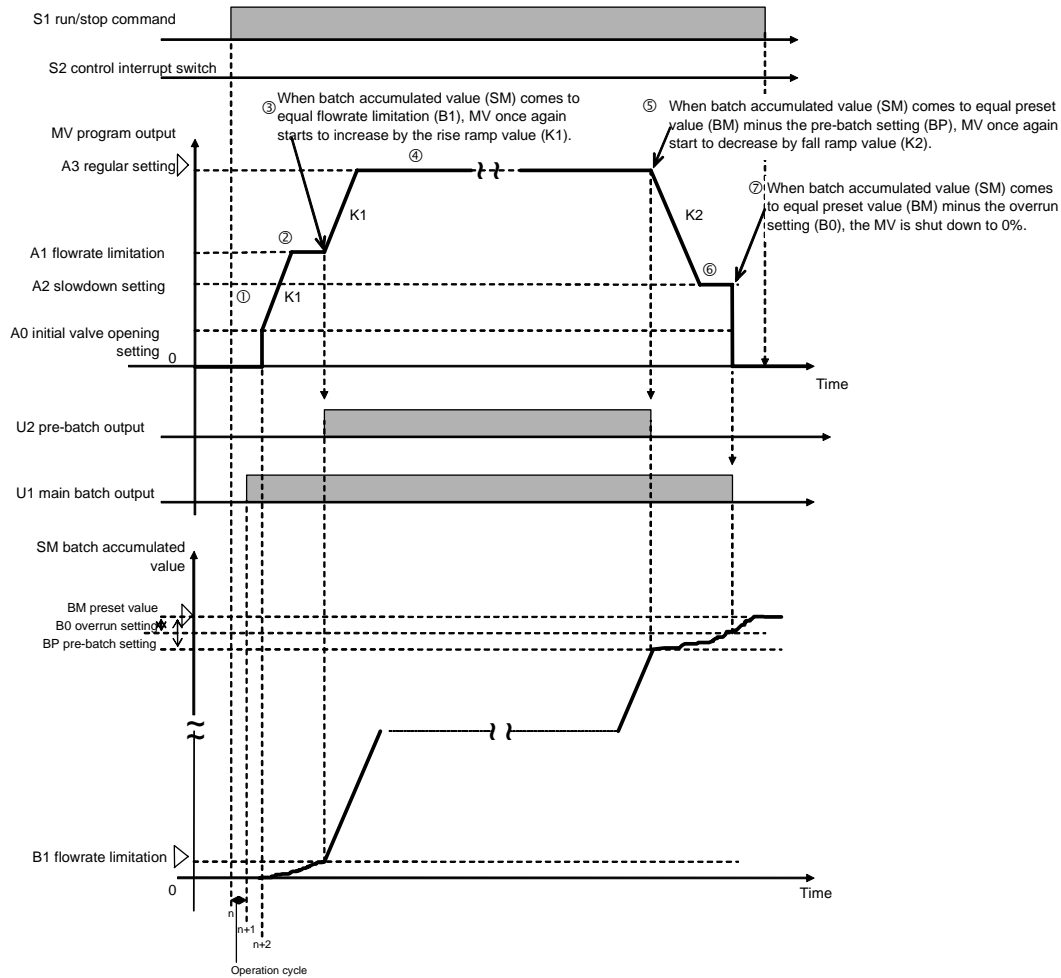
Note: When a cold start is performed, the accumulated values of operation results that were held before output OFF or before running was stopped are cleared from memory. These values are held when a hot start is performed.

Function block applications

Valve operation in batch capture processing in a tank

Block diagram





- ① When S1 run/stop command is set to 1 (ON), capture operation is started. At next operation cycle, U1 contact (main batch output) is set to 1 (ON). At the following operation cycle, the MV value is made to increase from A0 (initial valve opening setting) to K1 (rise rate).
- ② When MV value reaches A1 (flowrate limitation setting), MV is maintained at that value (opening).
- ③ When SM (batch accumulated value) reaches B1 (flowrate limitation setting), U2 contact (pre-batch output) is set to 1 (ON), and the MV value is made to increase by K1 (rise ramp rate) again.
- ④ When the MV value reaches A3 (regular setting), MV is maintained at that value (opening), and accumulation (capture) operation is performed.
- ⑤ When SM (batch accumulated value) reaches "BM (regular setting) - BP (pre-batch setting)", the MV value is made to decrease at K2 (fall ramp rate). At this time, the setting of U2 contact (pre-batch output) changes from 1 (ON) to 0 (OFF).
- ⑥ When the MV value reaches A2 (slowdown setting), MV is maintained at that value (opening).
- ⑦ When SM (batch accumulated value) reaches "BM (regular setting) - B0 (overrun setting)", MV is set to 0%. At this time, the setting of U1 contact (main batch output) changes from 1 (ON) to 0 (OFF).

Note: When S2 control interrupt switch is set to 1 (ON) during accumulation (capture) operation, the MV value decreases by K2 (fall ramp rate) until A0 (initial valve setting) until it reaches 0%. At this time, U1 contact (main batch output) and U2 contact (pre-batch output) are set to 0 (OFF). When S2 control interrupt switch is reset to 0 (OFF), the MV value is made to increase from A0 (initial valve setting) by K1 (rise ramp rate), and the state that was active before the interruption is returned to when the MV value reaches A3 (regular setting). At this time, the settings of U1 contact (main batch output) and U2 contact (pre-batch output) return to 1 (ON).

2 Control blocks

<014> Batch Flowrate Capture 001 to 032

ITEM list

Note When decimal point shift is set to -3 to -1, only integer pulses are used for instantaneous value calculation. Digits past the decimal point are added to the next calculation.

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|---------------|------|--------|--|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | R/W | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Batch Flowrate Capture | 014 | 014 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |

Accumulated value input P1

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|--|------|--------|--|-----------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Accumulated value input connection information | 006 | | P1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Accumulated value input | 007 | P1 | Input | 0 to 9999 | 0 | Yes | - | - | - | - | S | 2 |
| Parameter | 009 | | Digit shift (10 x, -3: x0.001, -2: x0.01, -1: x0.1, 0: x1, 1: x10) (Note 1) | -3 to +1 | 0 | - | R/W(S) | - | - | - | - | 1 |
| | 010 | | Instantaneous value conversion coefficient (number of pulses per second at instantaneous value output 100% is set) | 0 to 99999.9999 | 1.0000 | - | R/W(S) | - | - | - | - | 4 |
| | 011 | | Number of moving average data at instantaneous value conversion | 1 to 16 | 16 | - | R/W(S) | - | - | - | - | 1 |
| Accumulated value output | 012 | Q1 | Accumulated value (lower 4 digits) | 0000 to 9999 | 0 | Yes | r/w | R | - | - | S | 2 |
| | 013 | Q2 | Accumulated value (upper 4 digits) | 0000 to 9999 | 0 | Yes | r/w | R | - | - | S | 2 |
| Contact input | 014 | S3 | Accumulation counter reset switch (1: Reset) | 0, 1 | 0 | Yes | R/W(O) | R/W | - | R/W | S/R | 1 |
| Analog output | 016 | Y1 | Instantaneous value output | 0 to 320.00% | 0.00 | Yes | r/w | R | - | - | S | 2 |
| Parameter | 017 | | Pulse rate (for host display: scale unit/pulse) | 0 to 10.000 | 1.000 | - | R/W(S) | - | - | - | S/R | 2 |

Setting Value Set Point

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|-------------------|--------|---|------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Analog input connection information | 021 | | Remote SP source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 022 | RSP | Remote SP input (lower 4 digits) | 0 to 9999 | 0 | Yes | - | - | - | - | - | 2 |
| Parameter | 023 | | Local SP setting (lower 4 digits) | 0 to 9999 | 0 | - | R/W(O) | W | W | - | R | 1 |
| | 024 ^{*2} | | Local SP setting (upper 4 digits) | 0 to 9999 | 0 | - | R/W (O) | W | W | - | R | 2 |
| Contact input/parameter | 026 | R/L | Remote/Local switching 0: Local, 1: Remote | 0, 1 | 0 | Yes | R/W(O) | R/W | - | R/W | S/R | 1 |
| Analog input connection information | 027 ^{*2} | | Remote SP source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W (S) | - | - | - | - | 4 |
| Analog input | 028 ^{*2} | RSP U | Remote SP input (upper 4 digits) | 0 to 9999 | 0 | Yes | - | - | - | - | - | 2 |
| Accumulated value output | 029 | CSP | Current SP output (lower 4 digits) | 0 to 9999 | 0 | Yes | r/w | R | - | - | S | 2 |
| Parameter | 030 ^{*2} | CSP U | Current SP output (upper 4 digits) | 0 to 9999 | 0 | Yes | r/w | R | - | - | S | 2 |

*2: These ITEMS were added in Loop Control Unit Ver. 2.50.

Batch controller (lower 4 digits)

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|----------------|------|--------|--|--------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 031 | | Preset value (lower 4 digits, current SP is entered) | 0 to 9999 | 9999 | Yes | Yes | Yes | - | - | S | 2 |
| | 032 | | Overrun setting (value subtracted from BM) | 0 to 9999 | 0 | - | - | - | W | - | S/R | 2 |
| | 033 | | Pre-batch setting (value subtracted from BM) | 0 to 9999 | 0 | - | - | - | W | - | S/R | 2 |
| | 034 | | Flowrate limitation | 0 to 9999 | 0 | - | - | - | W | - | S/R | 2 |
| Analog output | 035 | SM | Batch accumulated value (lower 4 digits) | 0000 to 9999 | 0 | Yes | Yes | Yes | W | - | S | 2 |
| Contact input | 036 | S1 | Run/stop command (0: Reset, 1: Run) | 0, 1 | 0 | Yes | Yes | Yes | - | R/W | S/R | 1 |
| | 037 | S2 | Control interrupt switch (1: Interrupt) | 0, 1 | 0 | Yes | Yes | Yes | - | R/W | S/R | 1 |
| Contact output | 038 | U1 | Main batch output | 0, 1 | 0 | Yes | Yes | Yes | - | R | S | 1 |
| | 039 | U2 | Pre-batch output | 0, 1 | 0 | Yes | Yes | Yes | - | R | S | 1 |

2 Control blocks

<014> Batch Flowrate Capture 001 to 032

Program output

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------|------|--------|-------------------------------|-----------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 041 | A0 | Initial valve opening setting | 0 to 320.00 % | 0.00 | - | R/W(O) | - | - | - | - | 2 |
| | 042 | A1 | Flowrate limitation setting | 0 to 320.00 % | 10.00 | - | R/W(O) | - | - | - | - | 2 |
| | 043 | A2 | Slowdown setting | 0 to 320.00 % | 10.00 | - | R/W(O) | - | - | - | - | 2 |
| | 044 | A3 | Regular setting | 0 to 320.00 % | 30.00 | - | R/W(O) | - | - | - | - | 2 |
| | 045 | K1 | Rise ramp value | 0 to 320.00 %/s | 1.00 | - | R/W(O) | - | - | - | - | 2 |
| | 046 | K2 | Fall ramp value | 0 to 320.00 %/s | 1.00 | - | R/W(S) | - | - | - | - | 2 |

Batch controller (upper 4 digits)

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|----------------------------------|------------------|--------|--|------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 061 ³ | | Preset value (upper 4 digits, current SP is entered) | 0 to 9999 | 0 | Yes | R | - | - | - | S | 2 |
| Analog output | 065 ³ | SMU | Batch accumulated value (upper 4 digits) | 0 to 9999 | 0 | Yes | r/w | R | W | - | S | 2 |
| Contact input/parameter | 086 | A/M | Auto/Manual switch 0:Manual, 1:Auto | 0, 1 | 0 | Yes | R/W(O) | R/W | - | R/W | S/R | 1 |
| Analog output | 087 | MV | Program output | ±320.00 % | 0 | Yes | r/w | - | - | - | - | 2 |
| Parameter | 088 | | Inversion of host display of MV 0: Not used, 1: Used Note: "Inversion" changes 0 to 100% range to 100 to 0%. | 0, 1 | 0 | - | R/W(S) | - | - | - | - | 1 |
| | 089 | | Host display of MV | ±320.00 % | 0.00 | Yes | R/W(O) | R/W | - | - | S/R | 2 |
| Source designation/contact input | 090 ² | | MV error contact source designation | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Contact output | 091 ² | MVE | MV Error Display 0: Normal, 1: Error | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |

*2: These ITEMS were added in Loop Control Unit Ver. 2.00.

*3: These ITEMS were added in Loop Control Unit Ver. 2.50.

Data for host display

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------|------|--------|-------------------|--------------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 098 | | MV index position | -15.00 to 115.00 % | 0.00 | Yes | R/W(O) | R/W | - | - | S/R | 2 |
| | 099 | | Label | 0 to 15 | 0 | Yes | R/W(O) | R/W | - | - | S/R | 2 |

List of tag ITEMS on CX-Process Monitor or SCADA software

The following tag ITEMS are used to specify ITEMS with either 1) Monitor tags when sending function blocks to the CX-Process Monitor from 1-Block/4-Block Send Terminal to Computer (Block Model 403/404) or 2) CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (Block Model 461)/Send All Blocks (Block Model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in CX-Process Monitor | CSV Tags in SCADA Software |
|------|---|--------------------------------|----------------------------|
| | | Tag ITEM (fixed) | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST | MT_ST |
| 003 | Execution error display | None | ERR |
| 007 | Input | P1 | P1 |
| 012 | Accumulated value (lower 4 digits) | Q1 | Q1 |
| 013 | Accumulated value (upper 4 digits) | Q2 | Q2 |
| 014 | Accumulation counter reset switch | S3 | S3 |
| 016 | Instantaneous value output | Y1 | Y1 |
| 017 | Pulse rate (for host display: scale unit/pulse) | PR | PR |
| 023 | Local Set Point setting (lower 4 digits) | None | SP |
| 024 | Local Set Point setting (upper 4 digits) | None | SPU_W |
| 026 | Remote/Local switch | R/L_SW | R/L_SW |
| 029 | Current Set Point output (lower 4 digits) | SP | SP |
| 030 | Current Set Point output (upper 4 digits) | SPU | SPU |
| 031 | Preset value (lower 4 digits) | None | BM |
| 032 | Overrun setting (value subtracted from BM) | B0 | B0 |
| 033 | Pre-batch setting (value subtracted from BM) | BP | BP |
| 034 | Flowrate limitation | B1 | B1 |
| 035 | Batch accumulated value (lower 4 digits) | SM | SM |
| 036 | Run/stop command | S1 | S1 |
| 037 | Control interrupt switch | S2 | S2 |
| 038 | Main batch output | U1 | U1 |
| 039 | Pre-batch output | U2 | U2 |
| 061 | Preset value (upper 4 digits) | None | BMU |
| 065 | Batch accumulated value (upper 4 digits) | SMU | SMU |
| 086 | Auto/Manual switch | A/M_SW | A/M_SW |
| 089 | Host display of MV | MV | MV |
| 091 | MV error display | MV_ABN | MV_ABN |
| 098 | MV index position | MV_IDX | MV_IDX |
| 099 | Label | OP_MK | OP_MK |

Note Note that this function block cannot be sent by the 4-Block Send Terminal to Computer block (Block Model 404).

2 Control blocks

<016> Fuzzy Logic 001 to 032

| Block Model | Block Name | Block Address |
|-------------|-------------|---------------|
| <016> | Fuzzy Logic | 001 to 032 |

Outline

This function block outputs up to two analog outputs based on fuzzy logic performed on up to 8 analog inputs, X1 to X8.

Using fuzzy logic enables applying the Loop Control Unit to control applications using the knowledge of experienced workers expressed as ambiguous expressions, such as "a little" or "quite a lot."

The membership functions of a Fuzzy Logic block can be displayed as graphs on version 2.50 or later of the CX-Process Tool.

The specifications of the Fuzzy Logic block are as follows:

- I/O: 8 inputs and 2 outputs
- Rule format: 8 conditions and 2 conclusions
- Number of rules: 64 max.
- Five labels (NL, NS, ZR, PS, and PL)
- Inference method: Max.-Min. logical ANDs
- Deterministic output calculations: Center of gravity
- Output when rules not fulfilled: Constant or previous value (selectable)

The specifications for the membership functions are as follows:

Conditions

- Resolution: 64, 000 max.
- Continuous functions: 4 inflection points max. (S, Z, \wedge , and Π)
- Height: 0 or 10, 000

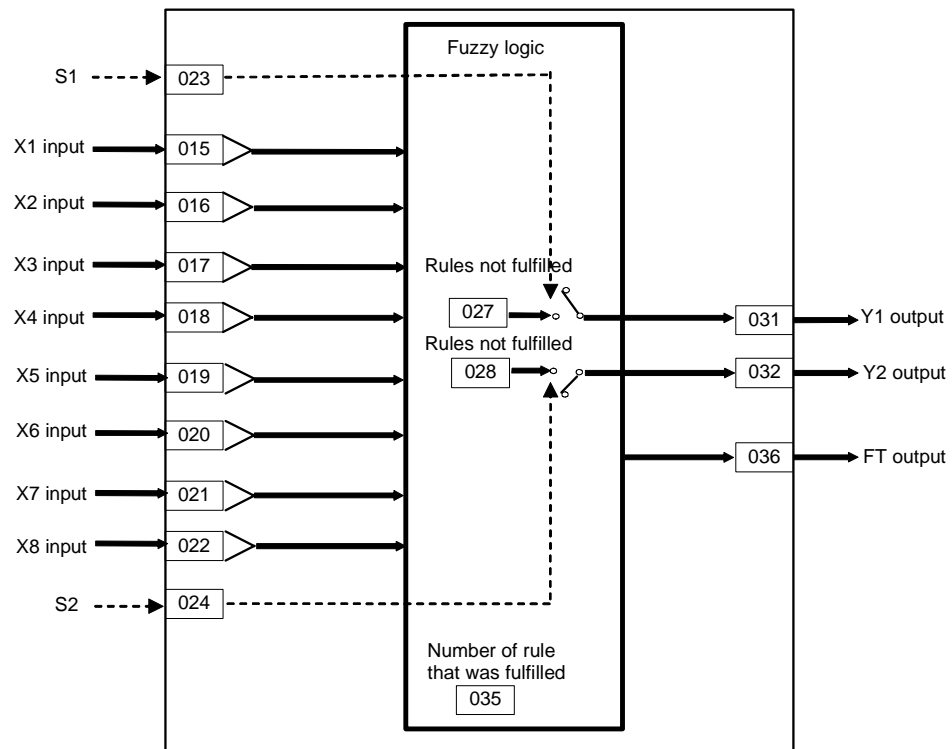
Conclusions

- Resolution: 64, 000 max.
- Height: Always 10, 000

Function block applications

- Controlling systems with excessive external interference.
- Replacing an OMRON C200H-FZ001 Fuzzy Logic Unit.

Block Diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|---------------|------|--------|---|------------------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | |
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | R/W | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W (S) | - | - | - | - | 24 |
| | 002 | | Block Model: Fuzzy Logic | 016 | 016 | - | R/W (S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W (S) | - | - | - | - | 2 |
| Special | 006 | | Operation error details Indicates the ITEM number when execution error 19 occurs. | 41 to 90 101 to 164 | 0 | Yes | - | - | - | - | - | 2 |

2 Control blocks

<016> Fuzzy Logic 001 to 032

Measured PVs

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|---------------------------------|------|--------|--|------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Analog input wiring information | 007 | | X1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W (S) | - | - | - | - | 4 |
| | 008 | | X2 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W (S) | - | - | - | - | 4 |
| | 009 | | X3 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W (S) | - | - | - | - | 4 |
| | 010 | | X4 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W (S) | - | - | - | - | 4 |
| | 011 | | X5 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W (S) | - | - | - | - | 4 |
| | 012 | | X6 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W (S) | - | - | - | - | 4 |
| | 013 | | X7 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W (S) | - | - | - | - | 4 |
| | 014 | | X8 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W (S) | - | - | - | - | 4 |
| Analog inputs | 015 | X1 | X1 input value | ±32000 | 0 | Yes | r | R | - | - | S | 2 |
| | 016 | X2 | X2 input value | ±32000 | 0 | - | r | R | - | - | S | 2 |
| | 017 | X3 | X3 input value | ±32000 | 0 | - | r | R | - | - | S | 2 |
| | 018 | X4 | X4 input value | ±32000 | 0 | - | r | R | - | - | S | 2 |
| | 019 | X5 | X5 input value | ±32000 | 0 | - | r | R | - | - | S | 2 |
| | 020 | X6 | X6 input value | ±32000 | 0 | - | r | R | - | - | S | 2 |
| | 021 | X7 | X7 input value | ±32000 | 0 | - | r | R | - | - | S | 2 |
| | 022 | X8 | X8 input value | ±32000 | 0 | Yes | r | R | - | - | S | 2 |

Outputs when rules are not fulfilled

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------|------|--------|---|------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input parameter | 023 | S1 | Output value selection switch for output 1 when rules are not fulfilled 0: Maintain previous, 1: Fixed value | 0, 1 | 0 | - | R/W (O) | - | W | R/W | S/R | 1 |
| | 024 | S2 | Output value selection switch for output 2 when rules are not fulfilled 0: Maintain previous, 1: Fixed value | 0, 1 | 0 | - | R/W (O) | - | W | R/W | S/R | 1 |
| Parameter | 027 | A1 | Fixed value for output 1 when rules are not fulfilled | ±32000 | 0 | - | R/W (O) | - | W | - | S/R | 2 |
| | 028 | A2 | Fixed value for output 2 when rules are not fulfilled | ±32000 | 0 | - | R/W (O) | - | W | - | S/R | 2 |

Output values: MV

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|----------------|------|--------|--|------------|---------|---------------------------|------------------------------|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Analog outputs | 031 | Y1 | Y1 output value | ±32000 | 0 | Yes | r | R | W | - | S | 2 |
| | 032 | Y2 | Y2 output value | ±32000 | 0 | Yes | r | R | W | - | S | 2 |
| Parameter | 035 | FN | Read rule numbers for fulfilled rules | 1 to 64 | 1 | | R/W (O) | - | W | - | S/R | 2 |
| Analog outputs | 036 | FT | Applicability for each rule Applicability for rules specified in ITEM 035 | 0 to 10000 | 0 | Yes | - | - | W | - | S | 2 |

Condition membership functions

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | R/W Mode | | | | | Data Length (bytes) | |
|------------|--|--|------------------|--------------------|--------------------|------------------------------|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|----|
| | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | | |
| Parameters | *Input 1, Separate horizontal coordinates with colon to specify. | | | | | | | | | | | |
| | 041 | | Input 1 NL | 20 characters max. | - | R/W (O) | - | - | - | - | 21 | |
| | 042 | | Input 1 NS | 27 characters max. | - | R/W (O) | - | - | - | - | 28 | |
| | 043 | | Input 1 ZR | 27 characters max. | - | R/W (O) | - | - | - | - | 28 | |
| | 044 | | Input 1 PS | 27 characters max. | - | R/W (O) | - | - | - | - | 28 | |
| | 045 | | Input 1 PL | 20 characters max. | - | R/W (O) | - | - | - | - | 21 | |
| | *Input 2, Separate horizontal coordinates with colon to specify. | | | | | | | | | | | |
| | 046 | | Input 2 NL | 20 characters max. | - | R/W (O) | - | - | - | - | 21 | |
| | 047 | | Input 2 NS | 27 characters max. | - | R/W (O) | - | - | - | - | 28 | |
| | 048 | | Input 2 ZR | 27 characters max. | - | R/W (O) | - | - | - | - | 28 | |
| | 049 | | Input 2 PS | 27 characters max. | - | R/W (O) | - | - | - | - | 28 | |
| | 050 | | Input 2 PL | 20 characters max. | - | R/W (O) | - | - | - | - | 21 | |
| | *Input 3, Separate horizontal coordinates with colon to specify. | | | | | | | | | | | |
| | 051 | | Input 3 NL | 20 characters max. | - | R/W (O) | - | - | - | - | 21 | |
| | 052 | | Input 3 NS | 27 characters max. | - | R/W (O) | - | - | - | - | 28 | |
| | 053 | | Input 3 ZR | 27 characters max. | - | R/W (O) | - | - | - | - | 28 | |
| | 054 | | Input 3 PS | 27 characters max. | - | R/W (O) | - | - | - | - | 28 | |
| | 055 | | Input 3 PL | 20 characters max. | - | R/W (O) | - | - | - | - | 21 | |
| | *Input 4, Separate horizontal coordinates with colon to specify. | | | | | | | | | | | |
| | 056 | | Input 4 NL | 20 characters max. | - | R/W (O) | - | - | - | - | 21 | |
| | 057 | | Input 4 NS | 27 characters max. | - | R/W (O) | - | - | - | - | 28 | |
| | 058 | | Input 4 ZR | 27 characters max. | - | R/W (O) | - | - | - | - | 28 | |
| | 059 | | Input 4 PS | 27 characters max. | - | R/W (O) | - | - | - | - | 28 | |
| | 060 | | Input 4 PL | 20 characters max. | - | R/W (O) | - | - | - | - | 21 | |
| | *Input 5, Separate horizontal coordinates with colon to specify. | | | | | | | | | | | |
| | 061 | | Output 5 NL | 20 characters max. | - | R/W (O) | - | - | - | - | 21 | |
| | 062 | | Output 5 NS | 27 characters max. | - | R/W (O) | - | - | - | - | 28 | |
| | 063 | | Output 5 ZR | 27 characters max. | - | R/W (O) | - | - | - | - | 28 | |
| | 064 | | Output 5 PS | 27 characters max. | - | R/W (O) | - | - | - | - | 28 | |
| | 065 | | Output 5 PL | 20 characters max. | - | R/W (O) | - | - | - | - | 21 | |
| | *Input 6, Separate horizontal coordinates with colon to specify. | | | | | | | | | | | |
| | 066 | | Output 6 NL | 20 characters max. | - | R/W (O) | - | - | - | - | 21 | |
| | 067 | | Output 6 NS | 27 characters max. | - | R/W (O) | - | - | - | - | 28 | |
| | 068 | | Output 6 ZR | 27 characters max. | - | R/W (O) | - | - | - | - | 28 | |
| | 069 | | Output 6 PS | 27 characters max. | - | R/W (O) | - | - | - | - | 28 | |
| | 070 | | Output 6 PL | 20 characters max. | - | R/W (O) | - | - | - | - | 21 | |
| | Parameters | *Input 7, Separate horizontal coordinates with colon to specify. | | | | | | | | | | |
| | | 071 | | Output 7 NL | 20 characters max. | - | R/W (O) | - | - | - | - | 21 |
| | | 072 | | Output 7 NS | 27 characters max. | - | R/W (O) | - | - | - | - | 28 |
| | | 073 | | Output 7 ZR | 27 characters max. | - | R/W (O) | - | - | - | - | 28 |

2 Control blocks

<016> Fuzzy Logic 001 to 032

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S) : Initial setting data, (O) : Operation data | | | | | Data Length (bytes) |
|-----------|--|--------|------------------|--------------------|---------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|------------------------|
| | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| | 074 | | Output 7 PS | 27 characters max. | - | R/W (O) | - | - | - | - | 28 |
| | 075 | | Output 7 PL | 20 characters max. | - | R/W (O) | - | - | - | - | 21 |
| | *Input 8, Separate horizontal coordinates with colon to specify. | | | | | | | | | | |
| | 076 | | Output 8 NL | 20 characters max. | - | R/W (O) | - | - | - | - | 21 |
| | 077 | | Output 8 NS | 27 characters max. | - | R/W (O) | - | - | - | - | 28 |
| | 078 | | Output 8 ZR | 27 characters max. | - | R/W (O) | - | - | - | - | 28 |
| | 079 | | Output 8 PS | 27 characters max. | - | R/W (O) | - | - | - | - | 28 |
| | 080 | | Output 8 PL | 20 characters max. | - | R/W (O) | - | - | - | - | 21 |

Conclusion membership functions

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S) : Initial setting data, (O) : Operation data | | | | | Data Length (bytes) |
|------------|-------------------------------------|--------|------------------|-------------------|---------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|------------------------|
| | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameters | *Output 1, Specify horizontal axis. | | | | | | | | | | |
| | 081 | | Output 1 NL | 6 characters max. | - | R/W (O) | - | - | - | - | 7 |
| | 082 | | Output 1 NS | 6 characters max. | - | R/W (O) | - | - | - | - | 7 |
| | 083 | | Output 1 ZR | 6 characters max. | - | R/W (O) | - | - | - | - | 7 |
| | 084 | | Output 1 PS | 6 characters max. | - | R/W (O) | - | - | - | - | 7 |
| | 085 | | Output 1 PL | 6 characters max. | - | R/W (O) | - | - | - | - | 7 |
| | *Output 2, Specify horizontal axis. | | | | | | | | | | |
| | 086 | | Output 2 NL | 6 characters max. | - | R/W (O) | - | - | - | - | 7 |
| | 087 | | Output 2 NS | 6 characters max. | - | R/W (O) | - | - | - | - | 7 |
| | 088 | | Output 2 ZR | 6 characters max. | - | R/W (O) | - | - | - | - | 7 |
| | 089 | | Output 2 PS | 6 characters max. | - | R/W (O) | - | - | - | - | 7 |
| | 090 | | Output 2 PL | 6 characters max. | - | R/W (O) | - | - | - | - | 7 |

Rules:

IF Input 1=**: Input 2=**: Input 3=**: Input 4=**: Input 5=**: Input 6=**: Input 7=**: Input 8=** THEN Output 1=**: Output 2=**

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O) : Operation data | | | | | Data Length (bytes) |
|------------|------|--------|------------------|--------------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|------------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameters | 101 | | Rule 1 | 29 characters max. | - | - | R/W (O) | - | - | - | - | 30 |
| | 102 | | Rule 2 | 29 characters max. | - | - | R/W (O) | - | - | - | - | 30 |
| | to | | to | | - | - | | | | | | |
| | 164 | | Rule 64 | 29 characters max. | - | - | R/W (O) | - | - | - | - | 30 |

List of tag ITEMS on CX-Process Monitor or SCADA software

The following tag ITEMS are used to specify ITEMS with either 1) Monitor tags when sending function blocks to the CX-Process Monitor from 1-Block/4-Block Send Terminal to Computer (Block Model 403/404) or 2) CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (Block Model 461) /Send All Blocks (Block Model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in CX-Process Monitor | CSV Tags in SCADA Software |
|------|---|--------------------------------|----------------------------|
| | | Tag ITEM (fixed) | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST | MT_ST |
| 003 | Execution error display | | ERR |
| 015 | X1 input value | X1 | X1 |
| 016 | X2 input value | X2 | X2 |
| 017 | X3 input value | X3 | X3 |
| 018 | X4 input value | X4 | X4 |
| 019 | X5 input value | X5 | X5 |
| 020 | X6 input value | X6 | X6 |
| 021 | X7 input value | X7 | X7 |
| 022 | X8 input value | X8 | X8 |
| 023 | Output value selection switch for output 1 when rules are not fulfilled | | S1 |
| 024 | Output value selection switch for output 2 when rules are not fulfilled | | S2 |
| 027 | Fixed value for output 1 when rules are not fulfilled | | A1 |
| 028 | Fixed value for output 2 when rules are not fulfilled | | A2 |
| 031 | Y1Output value | Y1 | Y1 |
| 032 | Y2Output value | Y2 | Y2 |
| 035 | Read rule numbers for fulfilled rules | FN | FN |
| 036 | Applicability for each rule | FT | FT |

Setting fuzzy logic parameters

Rules

Rules express experience and know-how in IF-THEN statements. For example, IF (you're close to the car in front of you) & (you're going very fast) THEN (you have to step on the brake very hard).

Up to 8 conditions can be set for inputs X1 to X8, and up to two conclusions can be set for outputs Y1 and Y2.

Rules 1 to 64 can be set for ITEM 101 to ITEM 164. The following elements are specified for each rule.

1. Conditions

The labels that will be used for inputs X1 to X8 are listed in order separated by colons. For example, if label NS is used for input X1 and labels ZR, PL, PL, NS, ZR, PL, and PL are likewise used for inputs X2, X3, X4, X5, X6, X7, and X8, then NS:ZR:PL:PL:NS:ZR:PL:PL is specified.

Note: Labels are used to express conditions for the above rules for some applications, for example "close, " "very fast, " and "very hard" in the above example. The following 5 labels can be used in a Fuzzy Logic block.

NL: Negative Large

NS: Negative Small

ZR: Approximately Zero

PS: Positive Small

PL: Positive Large

2. Conclusions

The labels that will be used for outputs Y1 and Y2 are listed in order separated by colons. For example, if ZR is used for output Y1 and PL is used for output Y2, then ZR:PL is specified

•A slash is placed between the conditions and conclusions. For example, the above rule would be specified as follows:

NS:ZR:PL:PL:NS:ZR:PL:PL/ZR:PL

Set a hyphen for inputs or outputs for which labels are not set. For example, to set ZR for input X2, ZR and input X4, and PL for output Y2, then the rule "IF (Input X1 is NL and Input X2 is PL), THEN (Output Y1 is ZR)" would be specified as follows for ITEM 101:

NL:PL:-:-:-:-/ZR:-

Execution error 19 will occur if this standard is not followed.

Membership functions

Membership function must be set for each rule that is being used. Membership functions determine the applicability of a status to the labels set for inputs and outputs. There are membership functions for both conditions and for conclusions. There are four typical membership functions for conditions: S, Z, Λ, and Π. These are specified by the inflection points for the labels.



Membership functions are set as follows:

1. Membership functions for conditions

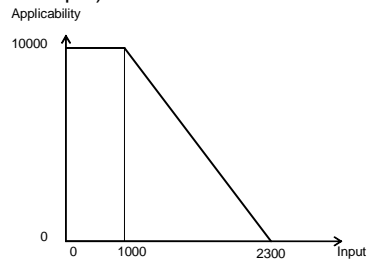
Condition membership functions can be set for up to 5 labels for inputs X1 to X8. The inflection points for each input, X1 to X8, for the labels NL, NS, ZR, PS, and PL are set in ITEM 041 to ITEM 080 as values along the X axis. (Up to 40 settings are possible, i.e., 8 inputs x 5 labels.)

Note1: There can be two or three inflection points for the membership functions for labels NL and PL. For labels NS, ZR, and PS, there can be three or four inflection points. Execution error 19 will occur if more than two values are the same.

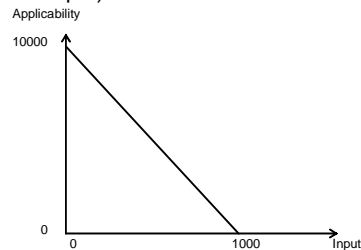
Note 2: Values along the X axis have 1 sign character and up to 5 numeric characters. (Execution error 19 will occur if a + sign is attached.) Leading zeros may be entered or omitted (e.g., either 50 or 050 is acceptable.) Values are separated by colons.

NL

Three X coordinates
 Example) 0:1000:2300



Two X coordinates
 Example) 0:1000

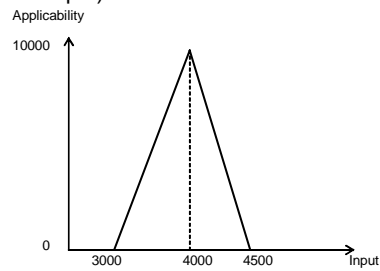


2 Control blocks

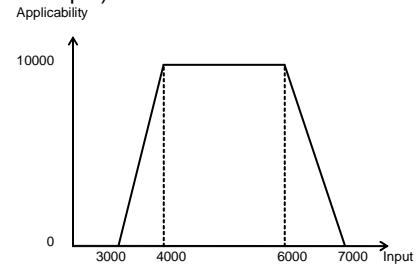
<016> Fuzzy Logic 001 to 032

NS, ZR, and PS

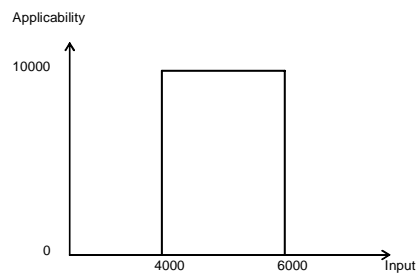
Three X coordinates
Example) 3000:4000:4500



Four X coordinates
Example) 3000:4000:6000:7000

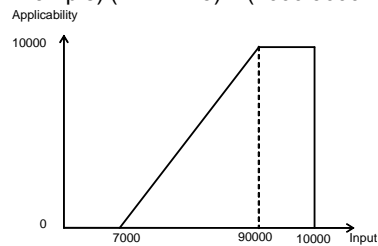


Example) 4000:4000:6000:6000

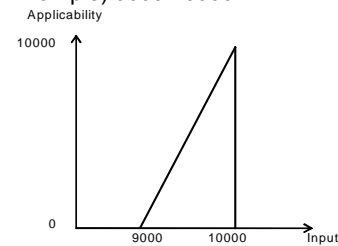


PL

Three X coordinates
Example) (X1:X2:X3) = (7000:9000:10000)

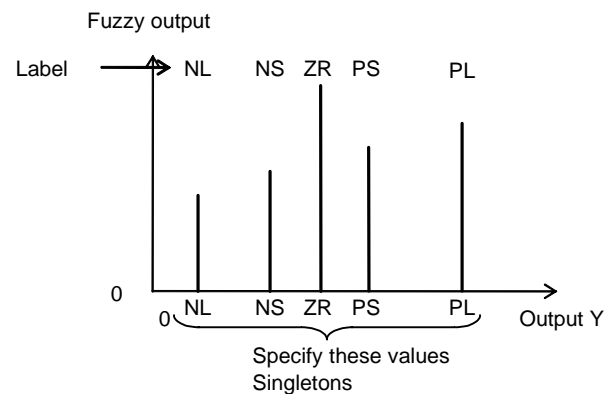


Two X coordinates
Example) 9000:10000



2. Membership functions for conclusions

Conclusion membership functions can be set for up to 5 labels for outputs Y1 and Y2. Singletons for labels NL, NS, ZR, PS, and PL are set in ITEM 081 to ITEM 090 as values along the Y axis. (Up to 10 settings are possible, i.e., 2 outputs x 5 labels.)



Outline of fuzzy logic processing

Inferences are processes as follows: 1) Conditions, 2) Conclusions, 3) Deterministic output calculations.

1. Conditions

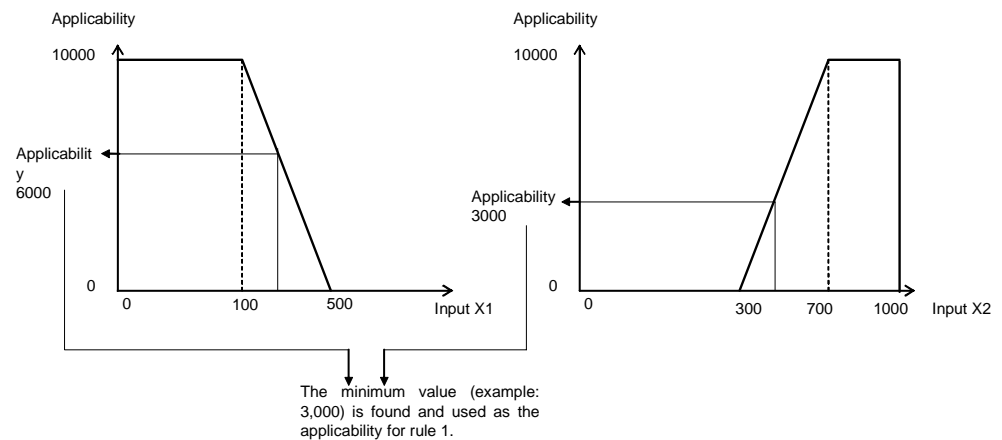
Inputs X1 to X8 and the condition membership functions are used to find the applicability for each label for each input. Although there are from 1 to 8 conditions for inputs X1 to X8, the minimum applicability for all conditions for each is found and used as the applicability for the rule.

Example)

Condition membership functions:

Setting NL for input X1) 0:100:500 is specified for ITEM 041.

Setting PL for input X2) 300:700:1000 is specified for ITEM 050.



The applicability is thus found for all rules for use in the conclusions.

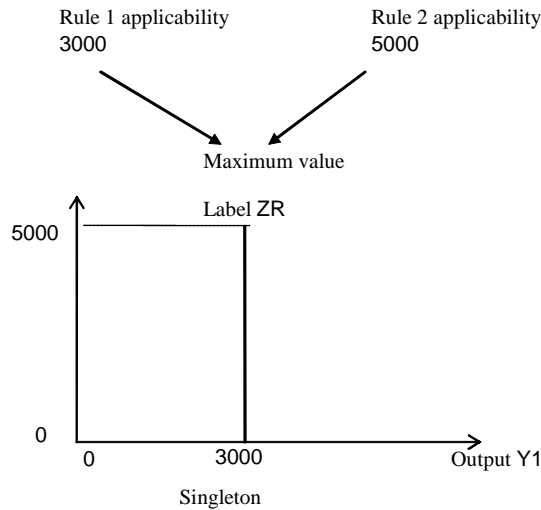
2. Conclusions

The applicability found for each rule in the conditions is compared to the labels for the conclusions, and the maximum value is found for each label. The maximum value is used as the fuzzy output for that label.

For these, the horizontal singletons for outputs Y1 and Y2 are specified on the horizontal axis as values Y1 and Y2 as specified by the conclusion membership functions. The results are shown for the following conclusion membership functions.

ZR singleton for output Y1 is set to 3000 by setting ITEM 083 to 3, 000.

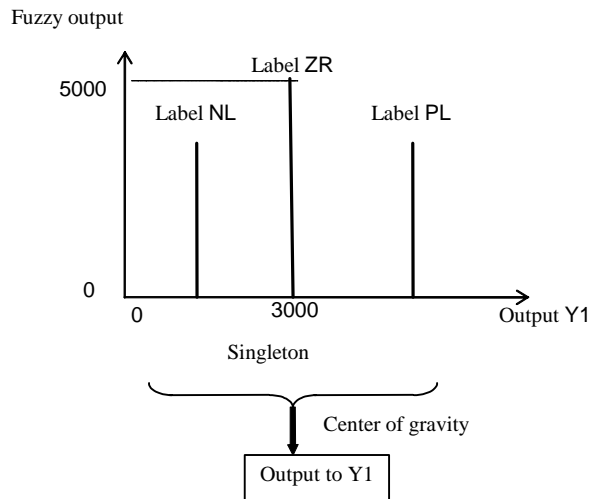
If label ZR is used in the conclusions for other rules, the maximum value is used as the fuzzy output value for ZR. Here, the singleton for ZR is 3, 000.



3. Deterministic output calculations

The center of gravities of up to five labels is found for outputs 1 and 2 and these are output as analog values Y1 and Y2.

Example) As shown below, the maximum value is found for other conclusion membership functions, the center of gravity of the fuzzy outputs for a maximum of five labels is found, and it is output to Y1 as the deterministic output value.



Note: The center of gravity method adds the coordinates for the labels for each membership function weighted by the applicability of each and then divides the total by the total sum of the applicabilities to find the deterministic output. The results corresponds to the center of gravity when the membership functions are thought of as graphic figures, using this center of gravity as the final output.

Execution error codes

When an execution error occurs, outputs 1 and 2 will be controlled by the setting of ITEM 023 and ITEM 024 (Output value selection switch for output 1/2 when rules are not fulfilled).

| Code | Meaning | Description | Operation when error occurs | Countermeasure |
|------|----------------------------------|--|---|---|
| 1 | Source/destination not specified | Connection is not possible as specified. | Execution of Fuzzy Logic block will stop. | Check the block address or ITEM number of sources. |
| 19 | Inappropriate operation | There is a syntax error in a Fuzzy Logic block (Block Model 016) that prevents operation. 1) There is not one sign character and 5 numeric characters maximum (e.g., a + sign is specified). 2) Values are not separated by colons. 3) The values that are set are not sufficient. 4) More than two inflection points in membership functions are the same. 5) Inflection points in membership functions do not increase to the right. 6) A membership function used in a rule has not been defined. | | Check the membership functions and rules. The number of the ITEM causing the problem will be provided in ITEM 006 (operation error details). |

2 Control blocks

<031> Indication and Setting 001 to 032

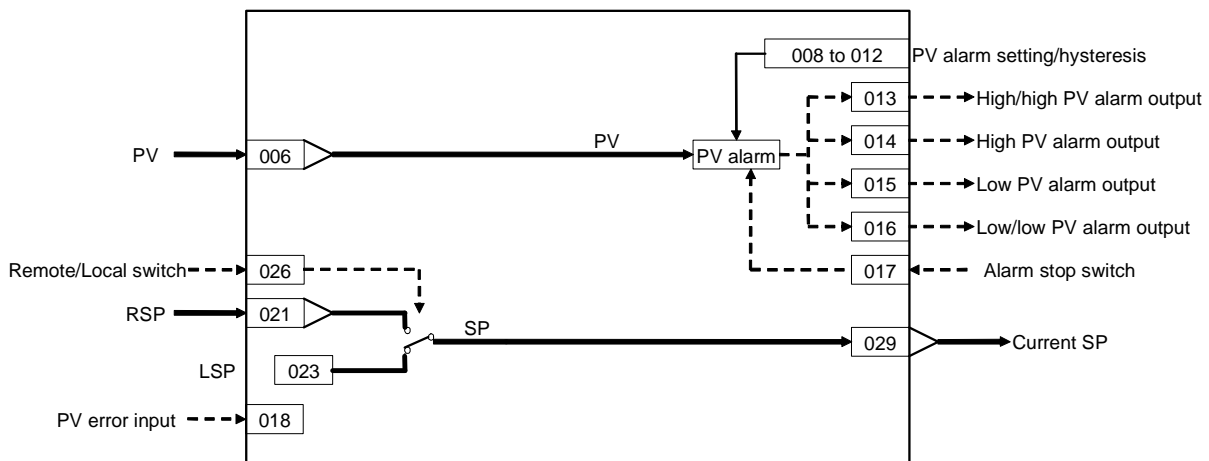
| Block Model | Block Name | Block Address |
|-------------|------------------------|---------------|
| <031> | Indication and Setting | 001 to 032 |

Outline

This function block is the manual setter with PV indication and Set Point setting functions.

- This function block is provided with four PV alarms (high/high, high, low and low/low).
- It is also provided with a remote setting function that allow Remote/Local switching.

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|------------------|--------|---|--------------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | R/W | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Indication and Setting | 031 | 031 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Analog input connection information | 006 | | PV source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 007 | PV | PV input | -15.00 to +115.00% | 0.00 | Yes | r | R | - | - | S | 2 |
| Parameter | 008 | | High/high alarm setting | -15.00 to +115.00% | 115.00 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 009 | | High alarm setting | -15.00 to +115.00% | 100.00 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 010 | | Low alarm setting | -15.00 to +115.00% | 0.00 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 011 | | Low/low alarm setting | -15.00 to +115.00% | -15.00 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 012 | | Hysteresis setting | 0 to 115.00% | 1.00 | - | R/W(S) | - | W | - | - | 2 |
| Contact output | 013 | HH | High/high alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 014 | H | High alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 015 | L | Low/low alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 016 | LL | Low alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| Contact input | 017 | S1 | Alarm stop switch 0: Alarm, 1: Stop | 0, 1 | 0 | - | R/W(O) | R/W | - | R/W | S/R | 1 |
| Connection terminal contact input | 018 ² | | PV error contact source designation | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Contact output | 019 ² | PVE | PV error indication 0: Normal, 1: Error → MANUAL mode | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| Parameter | 020 | | Alarm limit ³ 0: No, 1: Yes Note: Limits the alarm set value to between 0.00% and 100.00%. | 0, 1 | 0 | - | R/W(S) | - | - | - | - | 1 |

*2: These ITEMS were added in Loop Control Unit Ver. 2.00.

*3: If ITEM 020 (alarm limit) is set to 1 (ON), the alarm set range will be limited to between 0.00% and 100.00% as follows (supported by Loop Control Unit version 2.50 or later):

- If the high/high alarm setting (ITEM 008) or the high alarm set value (ITEM 009) is set to a value over 100.00%, the alarm output will not turn ON even if the PV exceeds the alarm set value.
- If the low/low alarm setting (ITEM 011) or the low alarm set value (ITEM 010) is set to a value below 00.00%, the alarm output will not turn ON even if the PV exceeds the alarm set value.

2 Control blocks

<031> Indication and Setting 001 to 032

Setting Value Set Point

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|--|--------------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Analog input connection information | 021 | | Remote Set Point source designation | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 022 | RSP | Remote Set Point input | -15.00 to +115.00% | 0.00 | Yes | r | - | - | - | - | 2 |
| Parameter | 023 | | Local Set Point setting | -15.00 to +115.00% | 0.00 | - | R/W(O) | W | W | - | R | 2 |
| | 024 | | SP setting mode (default) 0: Local only, 1: Remote/Local Note: Setting to 0 invalidates ITEM026. | 0, 1 | 0 | - | R/W(S) | R | - | - | S/R | 1 |
| Contact input/parameter | 026 | R/L | Remote/Local switch 0: Local, 1: Remote Note: Valid only when ITEM024 is 1 | 0, 1 | 0 | Yes | R/W(O) | R/W | - | R/W | S/R | 1 |
| Analog output | 029 | CSP | Current SP setting | -15.00 to +115.00% | 0.00 | Yes | r/w | R | - | - | S | 2 |

Data for host display

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------|------|--------|------------------|------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 099 | | Label | 0 to 15 | 0 | Yes | R/W(O) | R/W | W | - | S/R | 2 |

List of tag ITEMS on CX-Process Monitor or SCADA software

The following tag ITEMS are used to specify ITEMS with either 1) Monitor tags when sending function blocks to the CX-Process Monitor from 1-Block/4-Block Send Terminal to Computer (Block Model 403/404) or 2) CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (Block Model 461)/Send All Blocks (Block Model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in CX-Process Monitor | CSV Tags in SCADA Software |
|------|----------------------------------|--------------------------------|----------------------------|
| | | Tag ITEM (fixed) | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST | MT_ST |
| 003 | Execution error display | None | ERR |
| 007 | PV input | PV | PV |
| 008 | High/high alarm setting | HH_SP | HH_SP |
| 009 | High alarm setting | H_SP | H_SP |
| 010 | Low alarm setting | L_SP | L_SP |
| 011 | Low/low alarm setting | LL_SP | LL_SP |
| 013 | High/high alarm output | HH | HH |
| 014 | High alarm output | H | H |
| 015 | Low alarm output | L | L |
| 016 | Low/low alarm output | LL | LL |
| 017 | Alarm stop switch | ALM_OFF | AOF |
| 019 | PV error display | PV_ABN | PV_ABN |
| 023 | Local Set Point setting | None | SP |
| 024 | Set Point setting mode (default) | CAS_SET | CAS_SET |
| 026 | Remote/Local switch | R/L_SW | R/L_SW |
| 029 | Current Set Point output | SP | SP |
| 099 | Label | OP_MK | OP_MK |

2 Control blocks

<032> Indication and Operation 001 to 032

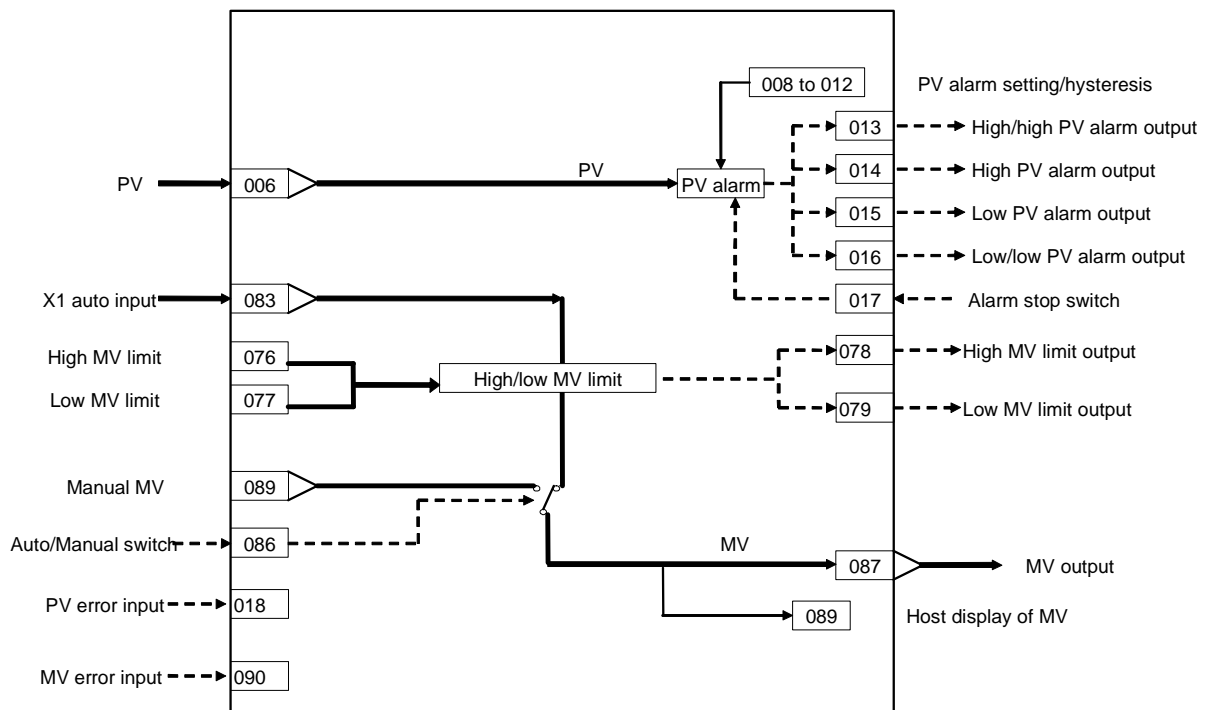
| Block Model | Block Name | Block Address |
|-------------|--------------------------|---------------|
| <032> | Indication and Operation | 001 to 032 |

Outline

This function block is the manual setter with PV indication and MV operation functions.

- This function block is provided with four PV alarm outputs (high/high, high, low and low/low).
- It is also provided with a remote setting function that allows Remote/Local switching.

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|-------------------|--------|---|--------------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | R/W | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Indication and Operation | 032 | 032 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Analog input connection information | 006 | | PV source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 007 | PV | PV input | -15.00 to +115.00% | 0.00 | Yes | r | R | - | - | S | 2 |
| Parameter | 008 | | High/high alarm setting | -15.00 to +115.00% | 115.00 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 009 | | High alarm setting | -15.00 to +115.00% | 100.00 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 010 | | Low alarm setting | -15.00 to +115.00% | 0.00 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 011 | | Low/low alarm setting | -15.00 to +115.00% | -15.00 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 012 | | Hysteresis setting | 0 to 115.00% | 1.00 | - | R/W(S) | - | W | - | - | 2 |
| Contact output | 013 | HH | High/high alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 014 | H | High alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 015 | L | Low alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 016 | LL | Low/low alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| Contact input | 017 | S1 | Alarm stop switch 0: Alarm, 1: Stop | 0, 1 | 0 | - | R/W(O) | R/W | - | R/W | S/R | 1 |
| Connection terminal contact input | 018 ^{*2} | | PV error contact source designation | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Contact output | 019 ^{*2} | PVE | PV error indication 0: Normal, 1: Error → MANUAL mode | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| Parameter | 020 | | Alarm limit*3 0: No, 1: Yes Note: Limits the alarm set value to between 0.00% and 100.00%. | 0, 1 | 0 | - | R/W (S) | - | - | - | - | 1 |

*2: These ITEMS were added in Loop Control Unit Ver. 2.00.

- *3: If ITEM 020 (alarm limit) it set to 1 (ON), the alarm set range will be limited to between 0.00% and 100.00% as follows (supported by Loop Control Unit version 2.50 or later):
- if the high/high alarm setting (ITEM 008) or the high alarm set value (ITEM 009) is set to a value over 100.00%, the alarm output will not turn ON even if the PV exceeds the alarm set value
 - if the low/low alarm setting (ITEM 011) or the low alarm set value (ITEM 010) is set to a value below 0.00%, the alarm output will not turn ON even if the PV exceeds the alarm set value.
 - if the high MV limit (ITEM 076) is set to a value over 100.00%, the high MV limit output will not turn ON even if the high limit is reached. The high limit function, however, will work.
 - if the low MV limit (ITEM 077) is set to a value below 0.00%, the low MV limit output will not turn ON even if the low limit is reached. The low limit function, however, will work.

2 Control blocks

<032> Indication and Operation 001 to 032

MV

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|-------------------|--------|---|------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 076 | | High MV limit | ±320.00% | 105.00 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 077 | | Low MV limit | ±320.00% | -5.00 | - | R/W(O) | R/W | W | - | S/R | 2 |
| Contact output | 078 ^{*2} | U1 | High MV limit output 1: High limit or higher, 0: Lower than limit Valid only for AUTO mode; always 0 for Manual mode. | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 079 ^{*1} | U2 | Low MV limit output 1: Low limit or lower, 0: Higher than limit Valid only for AUTO mode; always 0 for Manual mode. | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| Analog input connection information | 083 | | Auto input source designation | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 084 | X1 | Auto input | ±320.00% | 0.00 | Yes | r | R | - | - | S | 2 |
| Contact input/parameter | 086 | A/M | Auto/Manual switch 0: Manual, 1: Auto | 0, 1 | 0 | Yes | R/W(O) | R/W | - | R/W | S/R | 1 |
| Analog output | 087 | MV | MV output | ±320.00% | 0.00 | Yes | r/w | - | - | - | - | 2 |

*2: These ITEMS were added in Loop Control Unit Ver. 2.00.

Data for host display

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------------------------------|-------------------|--------|--|--------------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 088 | | Inversion of host display of MV 0: Not used, 1: Used Note: "Inversion" changes 0 to 100% range to 100 to 0%. | 0, 1 | 0 | - | R/W(S) | - | - | - | - | 1 |
| | 089 | | Host display of MV | ±320.00% | 0.00 | Yes | R/W(O) | R/W | W | - | S/R | 2 |
| Connection terminal contact input | 090 ^{*2} | | MV error contact source designation | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Contact output | 091 ^{*2} | MVE | MV error display 0: Normal, 1: Error | 0, 1 | 0 | - | - | R | - | R | S | 1 |
| Parameter | 098 | | MV index position | -15.00 to +115.00% | 0.00 | Yes | R/W(O) | R/W | W | - | S/R | 2 |
| | 099 | | Label | 0 to 15 | 0 | Yes | R/W(O) | R/W | W | - | S/R | 2 |

*2: These ITEMS were added in Loop Control Unit Ver. 2.00.

List of tag ITEMS on CX-Process Monitor or SCADA software

The following tag ITEMS are used to specify ITEMS with either 1) Monitor tags when sending function blocks to the CX-Process Monitor from 1-Block/4-Block Send Terminal to Computer (Block Model 403/404) or 2) CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (Block Model 461)/Send All Blocks (Block Model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in CX-Process Monitor | CSV Tags in SCADA Software |
|------|------------------------------|--------------------------------|----------------------------|
| | | Tag ITEM (fixed) | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST | MT_ST |
| 003 | Execution error display | None | ERR |
| 007 | PV input | PV | PV |
| 008 | High/high alarm setting | HH_SP | HH_SP |
| 009 | High alarm setting | H_SP | H_SP |
| 010 | Low alarm setting | L_SP | L_SP |
| 011 | Low/low alarm setting | LL_SP | LL_SP |
| 013 | High/high alarm output | HH | HH |
| 014 | High alarm output | H | H |
| 015 | Low alarm output | L | L |
| 016 | Low/low alarm output | LL | LL |
| 017 | Alarm stop switch | ALM_OFF | AOF |
| 019 | PV error display | PV_ABN | PV_ABN |
| 076 | High MV limit | MH_LMT | MH_LMT |
| 077 | Low MV limit | ML_LMT | ML_LMT |
| 078 | High MV limit output | MHA | MHA |
| 079 | Low MV limit output | MLA | MLA |
| 084 | Auto input | X1 | X1 |
| 086 | Auto/Manual switch | A/M_SW | A/M_SW |
| 089 | Data for host display | MV | MV |
| 091 | MV error display | MV_ABN | MV_ABN |
| 098 | MV index position | MV_IDX | MV_IDX |
| 099 | Label | OP_MK | OP_MK |

2 Control blocks

<033> Ratio Setting 001 to 032

| Block Model | Block Name | Block Address |
|-------------|---------------|---------------|
| <033> | Ratio Setting | 001 to 032 |

Outline

This function block is the ratio and bias setter with PV indication and ratio setting function.

- Ratio can be set externally.
- Input bias and output bias can be set.
- This function block is provided with engineering unit setting data for ratio and engineering unit setting data for PV for display on the host.

Ratio calculation formula

where

$$MV = K1 \frac{SP}{100} (PV - A1) - B1$$

MV:Output (-320.00 to +320.00%)

SP:Ratio setting (-15 to +115.00%)

PV:Reference input (%)

K1:Ratio gain (± 10.000) Set the ratio to SP=100%.

Example) Set "3.000" when the ratio range is 0 to 3 times.

A1:Input bias ($\pm 320.00\%$)

B1:Output bias ($\pm 320.00\%$)

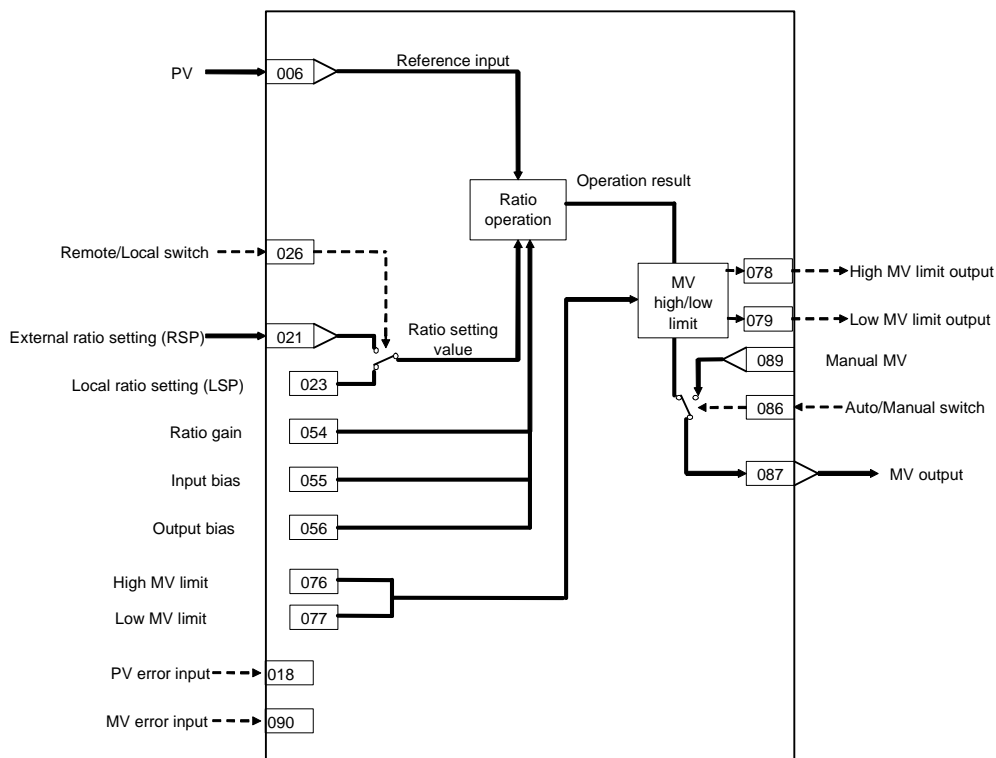
External setting of ratio

Use external ratio setting source designation (ITEM021).

Actual graduation of ratio

To set the Set Point scale displayed on the host to the actual scale, set the range corresponding to SP in the above ratio calculation formula on the host computer.

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|------------------|--------|---|--------------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | R/W | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Ratio Setting | 033 | 033 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2, | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Analog input connection information | 006 | | Reference input source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 007 | PV | Reference input | -15.00 to +115.00% | 0.00 | Yes | r | R | - | - | S | 2 |
| Connection terminal contact input | 018 ² | | PV error contact source designation | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Contact output | 019 ² | PVE | PV error indication 0: Normal, 1: Error → MANUAL mode | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| Parameter | 020 | | Alarm limit ³ 0: No, 1: Yes Note: Limits the alarm set value to between 0.00% and 100.00%. | 0, 1 | 0 | - | R/W (S) | - | - | - | - | 1 |
| Analog input connection information | 021 | | External ratio setting source designation | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 022 | RSP | External ratio setting | -15.00 to +115.00% | 0.00 | Yes | r | R | - | - | - | 2 |
| Parameter | 023 | LSP | Local ratio setting | -15.00 to +115.00% | 0.00 | - | R/W(O) | R/W | W | - | R | 2 |
| | 024 | | Ratio setting mode (default) 0: Local only, 1: Remote/Local Note: Setting to 0 invalidates ITEM026. | 0, 1 | 0 | - | R/W(S) | - | - | - | S/R | 1 |
| Contact input/parameter | 026 | R/L | Remote/Local switch 0: Local, 1: Remote Note: Valid only when ITEM024 is 1 | 0, 1 | 0 | Yes | R/W(O) | R/W | - | R/W | S/R | 1 |
| Analog output | 029 | SP | Current SP output | -15.00 to +15.00% | 0.00 | Yes | r/w | - | - | - | S | 2 |

*2: These ITEMS were added in Loop Control Unit Ver. 2.00.

*3: If ITEM 020 (alarm limit) it set to 1 (ON), the alarm set range will be limited to between 0.00% and 100.00% as follows (supported by Loop Control Unit version 2.50 or later):

- If the high MV limit (ITEM 076) is set to a value over 100.00%, the high MV limit output will not turn ON even if the high limit is reached. The high limit function, however, will work.
- If the low MV limit (ITEM 077) is set to a value below 0.00%, the low MV limit output will not turn ON even if the low limit is reached. The low limit function, however, will work.

2 Control blocks

<033> Ratio Setting 001 to 032

Ratio operation

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------|------|--------|--|------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 054 | K1 | Ratio range (sets signal ratio range corresponding to SP=100%) | ±10.000 | 1.000 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 055 | A1 | Input bias | ±320.00% | 0.00 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 056 | B1 | Output bias | ±320.00% | 0.00 | - | R/W(O) | R/W | W | - | S/R | 2 |

MV

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------|------------------|--------|---|------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 076 | MH | High MV limit | ±320.00% | 105.00 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 077 | ML | Low MV limit | ±320.00% | -5.00 | - | R/W(O) | R/W | W | - | S/R | 2 |
| Contact output | 078 ² | U1 | High MV limit output 1: High limit or higher, 0: Lower than limit Valid only for AUTO mode; always 0 for Manual mode. | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 079 ² | U2 | Low MV limit output 1: Low limit or lower, 0: Higher than limit Valid only for AUTO mode; always 0 for Manual mode. | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| Contact input/parameter | 086 | A/M | Auto/Manual switch 0: Manual, 1: Auto | 0, 1 | 0 | Yes | R/W(O) | R/W | - | R/W | S/R | 1 |
| Analog output | 087 | MV | Output | ±320.00% | 0.00 | Yes | r/w | - | - | - | - | 2 |

*2: These ITEMS were added in Loop Control Unit Ver. 2.00.

Data for host display

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------------------------------|------------------|--------|--|------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 088 | | Inversion of host display of MV 0: Not used, 1: Used Note: "Inversion" changes 0 to 100% range to 100 to 0%. | 0, 1 | 0 | - | R/W(S) | - | - | - | - | 1 |
| | 089 | | Host display of MV | ±320.00% | 0.00 | Yes | R/W(O) | R/W | W | - | S/R | 2 |
| Connection terminal contact input | 090 ² | | MV error contact source designation | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|----------------|------------------|--------|---|--------------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | |
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact output | 091 ^z | MVE | MV error display 0: Normal, 1: Error | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| Parameter | 098 | | MV index position | -15.00 to +115.00% | 0.00 | Yes | R/W(O) | R/W | W | - | S/R | 2 |
| | 099 | | Label | 0 to 15 | 0 | Yes | R/W(O) | R/W | W | - | S/R | 2 |

*2: These ITEMS were added in Loop Control Unit Ver. 2.00.

*3: If ITEM 020 (alarm limit) is set to 1 (ON), the alarm set range will be limited to between 0.00% and 100.00% as follows (supported by Loop Control Unit version 2.50 or later):

- If the high MV limit (ITEM 076) is set to a value over 100.00%, the high MV limit output will not turn ON even if the high limit is reached. The high limit function, however, will work.
- If the low MV limit (ITEM 077) is set to a value below 0.00%, the low MV limit output will not turn ON even if the low limit is reached. The low limit function, however, will work.

List of tag ITEMS on CX-Process Monitor or SCADA software

The following tag ITEMS are used to specify ITEMS with either 1) Monitor tags when sending function blocks to the CX-Process Monitor from 1-Block/4-Block Send Terminal to Computer (Block Model 403/404) or 2) CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (Block Model 461)/Send All Blocks (Block Model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in CX-Process Monitor | CSV Tags in SCADA Software |
|------|------------------------------|--------------------------------|----------------------------|
| | | Tag ITEM (fixed) | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST | MT_ST |
| 003 | Execution error display | None | ERR |
| 007 | Reference input | PV | PV |
| 019 | PV error display | PV_ABN | PV_ABN |
| 023 | Local ratio setting | SP | SP |
| 024 | Ratio setting mode (default) | CAS_SET | CAS_SET |
| 026 | Remote/Local switch | R/L_SW | R/L_SW |
| 029 | Current SP output | None | SP |
| 054 | Ratio range | K1 | K1 |
| 055 | Input bias | A1 | A1 |
| 056 | Output bias | B1 | B1 |
| 076 | High MV limit | MH_LMT | MH_LMT |
| 077 | Low MV limit | ML_LMT | ML_LMT |
| 078 | High MV limit output | MHA | MHA |
| 079 | Low MV limit output | MLA | MLA |
| 086 | Auto/Manual switch | A/M_SW | A/M_SW |
| 089 | Data for host display | MV | MV |
| 091 | MV error display | MV_ABN | MV_ABN |
| 098 | MV index position | MV_IDX | MV_IDX |
| 099 | Label | OP_MK | OP_MK |

2 Control blocks

<034> Indicator 001 to 032

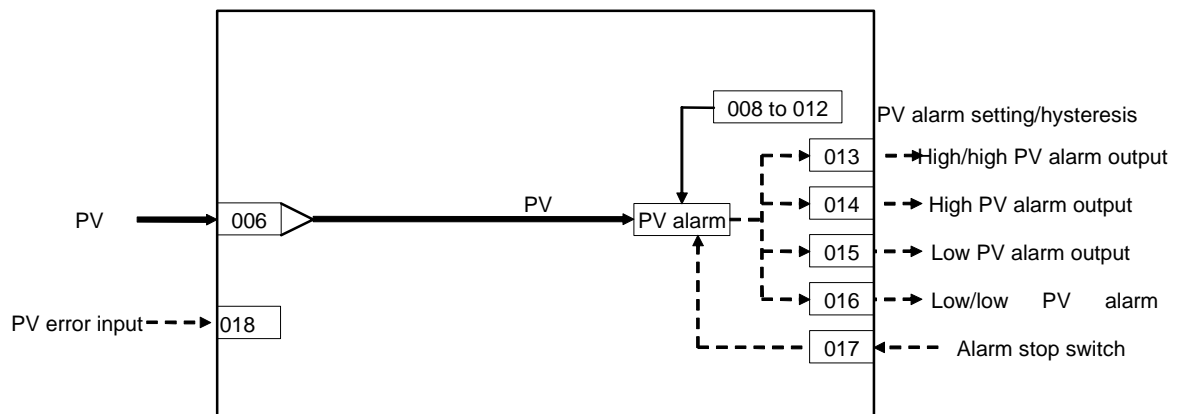
| Block Model | Block Name | Block Address |
|-------------|------------|---------------|
| <034> | Indicator | 001 to 032 |

Outline

This function block is the PV indicator.

- This function block is provided with four PV alarm outputs (high/high, high, low and low/low).

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|------------------|--------|---|--------------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | R/W | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Indicator | 034 | 034 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Analog input connection information | 006 | | PV source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 007 | PV | PV input | -15.00 to +115.00% | 0.00 | Yes | r | R | - | - | S | 2 |
| Parameter | 008 | | High/high alarm setting | -15.00 to +115.00% | 115.00 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 009 | | High alarm setting | -15.00 to +115.00% | 100.00 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 010 | | Low alarm setting | -15.00 to +115.00% | 0.00 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 011 | | Low/low alarm setting | -15.00 to +115.00% | -15.00 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 012 | | Hysteresis setting | 0 to 115.00% | 1.00 | - | R/W(S) | - | W | - | - | 2 |
| Contact output | 013 | HH | High/high alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 014 | H | High alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 015 | L | Low/low alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 016 | LL | Low alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| Contact input parameter | 017 | S1 | Alarm stop switch 0: Alarm, 1: Stop | 0, 1 | 0 | Yes | R/W(O) | R/W | - | R/W | S/R | 1 |
| Connection terminal contact input | 018 ² | | PV error contact source designation | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Contact output | 019 ² | PVE | PV error indication 0: Normal, 1: Error MANUAL mode | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| Parameter | 020 | | Alarm limit ³ 0: No, 1: Yes Note: Limits the alarm set value to between 0.00% and 100.00%. | 0, 1 | 0 | - | R/W (S) | - | - | - | - | 1 |

*2: These ITEMS were added in Loop Control Unit Ver. 2.00.

*3: If ITEM 020 (alarm limit) is set to 1 (ON), the alarm set range will be limited to between 0.00% and 100.00% as follows (supported by Loop Control Unit version 2.50 or later):

- If the high/high alarm setting (ITEM 008) or the high alarm set value (ITEM 009) is set to a value over 100.00%, the alarm output will not turn ON even if the PV exceeds the alarm set value.
- If the low/low alarm setting (ITEM 011) or the low alarm set value (ITEM 010) is set to a value below 0.00%, the alarm output will not turn ON even if the PV exceeds the alarm set value.

2 Control blocks

<034> Indicator 001 to 032

Data for host display

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------|------|--------|------------------|------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 099 | | Label | 0 to 15 | 0 | Yes | R/W(O) | R/W | W | - | S/R | 2 |

List of tag ITEMS on CX-Process Monitor or SCADA software

The following tag ITEMS are used to specify ITEMS with either 1) Monitor tags when sending function blocks to the CX-Process Monitor from 1-Block/4-Block Send Terminal to Computer (Block Model 403/404) or 2) CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (Block Model 461)/Send All Blocks (Block Model 462). All tag ITEMS are fixed and cannot be changed.

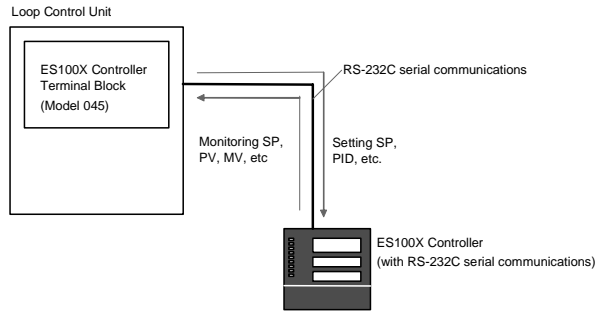
| ITEM | Data Name | CSV Tags in CX-Process Monitor | CSV Tags in SCADA Software |
|------|------------------------------|--------------------------------|----------------------------|
| | | Tag ITEM (fixed) | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST | MT_ST |
| 003 | Execution error display | None | ERR |
| 007 | PV input | PV | PV |
| 008 | High/high alarm setting | HH_SP | HH_SP |
| 009 | High alarm setting | H_SP | H_SP |
| 010 | Low alarm setting | L_SP | L_SP |
| 011 | Low/low alarm setting | LL_SP | LL_SP |
| 013 | High/high alarm output | HH | HH |
| 014 | High alarm output | H | H |
| 015 | Low alarm output | L | L |
| 016 | Low/low alarm output | LL | LL |
| 017 | Alarm stop switch | ALM_OFF | AOF |
| 019 | PV error display | PV_ABN | PV_ABN |
| 099 | Label | OP_MK | OP_MK |

| Block Model | Block Name | Block Address |
|-------------|----------------------------|---------------|
| <045> | ES100X Controller Terminal | 065 to 096 |

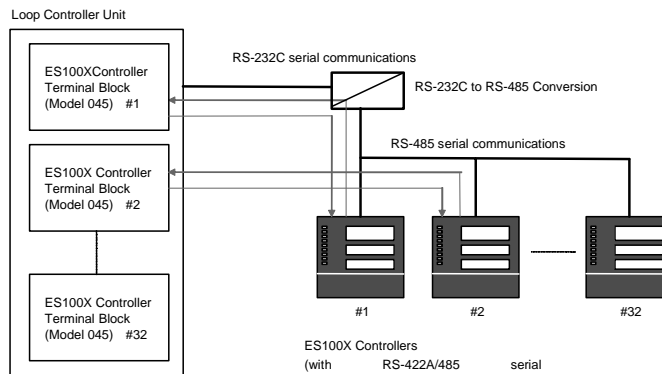
Outline

This function block is used to monitor values such as the SP, PV, and MV and set values such as the SP and PID constants for an ES100X Controller (a digital set-value controller) connected to the Loop Control Unit via serial communications.

One ES100X Controller



More than One ES100X Controller



Applicable Controllers

The following digital set-value controllers are supported: ES100X-□□□01□ (RS-232C serial communications) and ES100X-□□□04□ (RS-422A/485 serial communications).

Number of ES100X Controllers per Function Block

Each ES100X Controller Terminal Block can monitor or set one ES100X Controller.

Number of ES100X Controllers per Loop Control Unit

- With ES100X Controllers supporting RS-232C connections, only one ES100X Controller can be connected to each Loop Control Unit.
- With ES100X Controllers supporting RS-422A/485 connections, each Loop Control Unit can be connected to up to 32 ES100X Controller. The ES100X unit number set in ITEM 006 is used to differentiate the ES100X Controller with which to communicate.

Connecting the Loop Control Unit to ES100X Controllers

The RS-232C port on the Loop Control Unit is connected to the RS-232C terminals or RS-422A/485 terminals on the ES100X Controllers.

Data Transfer Contents

Operating the Controller (Function Block to ES100X)

Switching between RUN and STOP, switching between automatic and manual operation, executing autotuning, and switch ES100X parameter setting modes.

Setting the Controller (Function Block to ES100X)

Setting the local SP, PID constants, MV (manipulated variable) upper/lower limits, manual mode MV, and inputting a remote SP within this function block to output to the ES100X.

Monitoring the Controller (ES100X to Function Block)

Monitoring the PV, current SP, MV, RUN/STOP status, automatic/manual status, remote/local parameter setting mode (serial communications/front panel keys), autotuning status, scaling settings (upper/lower limits and decimal point location). You can also create outputs from within the function block, such as alarm outputs based on the PV (deviation, HH, H, L, and LL) or based on the MV upper/lower limits.

Data Update Cycle for Setting and Monitoring

Data will be updated every second for each ES100X Controller when the execution cycle of the function block is 0.1 second.

When more than one ES100X Controller Terminal Block is used, multiply 1 second by the number of ES100X Controllers connected.

It is possible, however, to use an interrupt transfer function to write to an ES100X Controller even when a different ES100X Controller Terminal Block is being executed.

ES100X Requirements

- Normal control must be set (set specifications setting mode C033 to 0).

Note: Cascade control can be set as long as primary loop PID is set for communications.

- The local SP mode must be set (set operation mode P008 in the ES100X to 0 for a local SP).

Note 1: Even if the ES100X is set for a remote SP (RSP), the ES100X will be force-set to a local SP (LSP) by this function block the first time it is executed.

Note 2: If a remote SP is set, the remote SP can be read.

- Remote parameter setting mode must be set (enabling setting parameters via serial communications).

(Set operation mode P007 to 1 for remote setting.)

Note 1: The ES100X must be set to the remote parameter setting mode (in P007) to change the following parameters:

Set point (ITEM 029), MV output for host display (ITEM 089), MV upper limit (ITEM 052), MV lower limit (ITEM 053), proportional band (ITEM 056), integral time (ITEM 057), and differential time (ITEM 058).

Note 2: The following specifications can be changed regardless of the ES100X parameter setting mode: ES100X operation command (ITEM 080), A/M switch (ITEM 081), EX100 parameter setting method switch (ITEM 082) and AT command (ITEM 083).

- The bank number must be 0 (set operation mode P006 in the ES100X to 0).

Note: Data in bank 0 will be read and written even if a different bank number is specified.

- The PID group number must be 1 (set the PID group number in bank number 0 in the ES100X to 1).

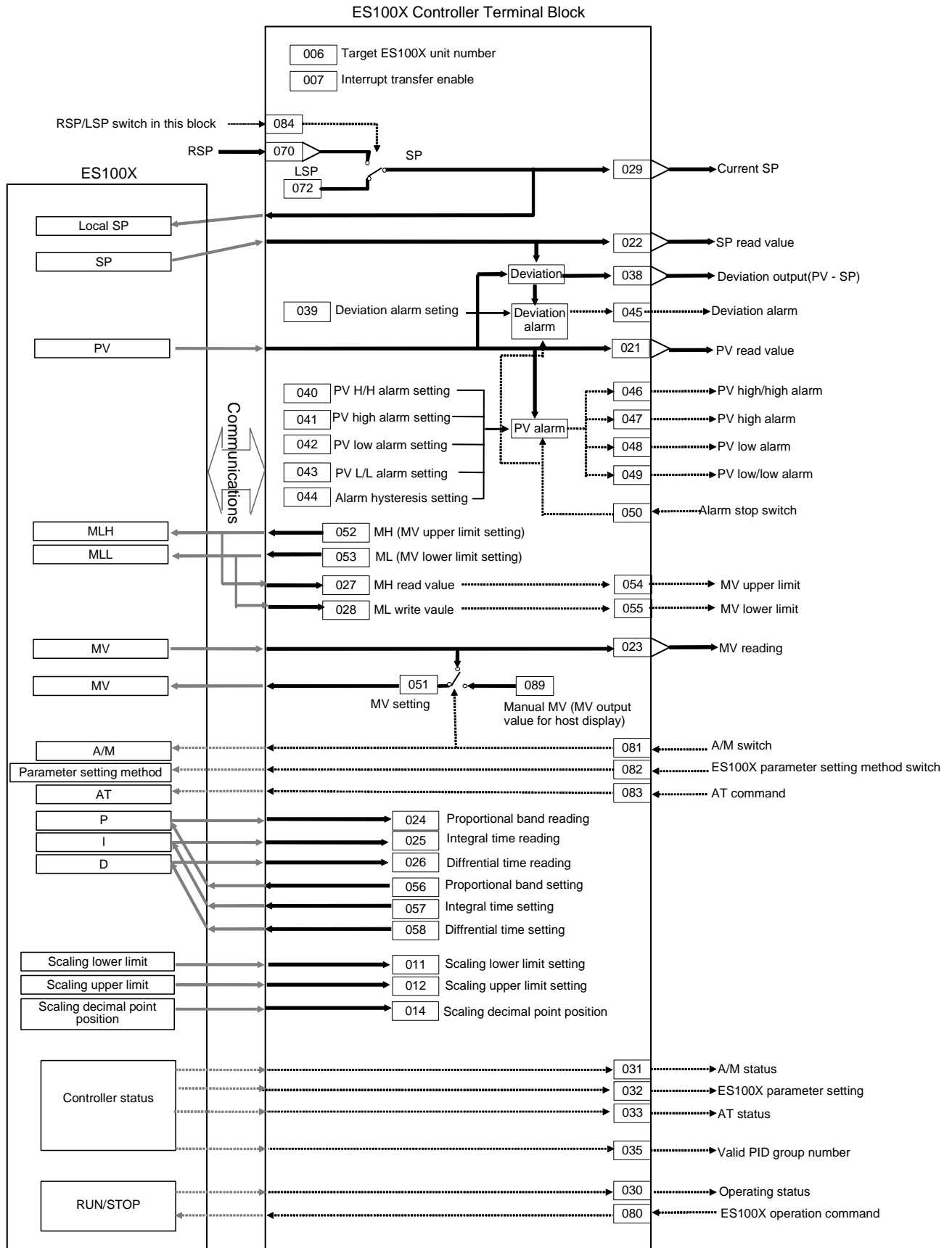
Note: If the PID group number is not 1, the following cannot be set: P, I, D, and MV limits.

- Communications must be set to a data length of 7 bits, even parity, and two stop bits.

Note: Communications will not be possible unless the above communications settings are made.

- Communications with the ES100X will be stopped when downloading the initial setting data from the CX-Process Tool (i.e., when the ITEM list read/write method is set to RW(S) data from the CX-Process Tool). (Cold starts are automatically used for other function blocks.) Execute a hot or cold start to start the communications.

Block diagram



3 External Controller block

<045> ES100X Controller Terminal 065 to 096

ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|---------------|------|--------|--|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command 0: Cancel stop, 1: Stop | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: ES100X Controller Terminal | 045 | 045 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (seconds) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 1 | - | R/W(S) | - | - | - | - | 2 |

Communications between Controllers

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------|------|--------|---|------------------|-----------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 006 | | Target ES100X unit number (0 to 99, connection possible to 32 Controllers) | 0 to 99 | 0 | - | R/W(S) | - | - | - | - | 2 |
| | 007 | | Interrupt transfer enable 0: Disable, 1: Enable | 0, 1 | 0 | - | R/W(S) | - | - | - | - | 1 |
| | 008 | | Baud rate (kbits/s) (0: 1.2, 1:2.4, 2: 4.8, 3: 9.6, 4: 19.2) | 0 to 4 | 3 | - | R/W(S) | - | - | - | - | 2 |
| Special | 009 | | Controller error level display | 0 to 3 | See note. | Yes | - | - | - | - | S | 2 |
| | 010 | | Response code (response code for commands addressed to ES100X) | 0000 to 2714 Hex | See note. | Yes | - | - | - | - | S | 2 |

Data

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) | | |
|----------------|------|--------------------|--|---------------------------------|--------------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|-----|---|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | | | |
| Parameter | 011 | | Scaling lower limit | Read value from the ES100X | -1999 to 9998 | See note. | Yes | - | - | - | - | 2 | | |
| | 012 | | Scaling upper limit | | -1998 to 9999 | See note. | Yes | - | - | - | - | 2 | | |
| | 014 | | Scaling decimal point position | | 0 to 3 | See note. | Yes | - | - | - | - | 2 | | |
| | 021 | PV | Process variable | | -10.00% to 110.00% | See note. | Yes | r | - | - | - | S | 2 | |
| | 022 | SP | Set point | | 0.00% to 100.00% | See note. | Yes | r | - | - | - | - | 2 | |
| | 023 | MV | Manipulated variable | | -5.00% to 105.00% | See note. | Yes | r | - | - | - | - | 2 | |
| | 024 | | Proportional band | | 0.0% to 999.9% | See note. | Yes | - | - | - | - | S | 2 | |
| | 025 | | Integral (reset) time | | 0 to 9999 s | See note. | Yes | - | - | - | - | S | 2 | |
| | 026 | | Differential (rate) time | | 0 to 9999 s | See note. | Yes | - | - | - | - | S | 2 | |
| | 027 | | MV upper limit | | -4.90% to 105.00% | See note. | Yes | - | - | - | - | S | 2 | |
| | 028 | | MV lower limit | | -5.00% to 104.90% | See note. | Yes | - | - | - | - | S | 2 | |
| 029 | CSP | Current SP setting | LSP or RSP in this block | 0.00% to 100.00% | See note. | Yes | r | - | - | - | - | S | 2 | |
| Contact output | 030 | RUN | Operating status display 0: STOP, 1: RUN | Value read from ES100X | 0, 1 | See note. | Yes | - | - | - | R | S | 1 | |
| | 031 | A/M | Auto/manual status display 0: Manual, 1: Auto | | 0, 1 | See note. | Yes | - | - | - | R | S | 1 | |
| | 032 | RMT | EX100 parameter setting method 0: Local (front panel keys), 1: Remote (serial communications) | | 0, 1 | See note. | Yes | - | - | - | R | S | 1 | |
| | 033 | AT | AT status 0: AT not being executed (including normal end) 1: AT being executed | | 0, 1 | See note. | Yes | - | - | - | R | S | 1 | |
| Parameter | 035 | | Valid PID group number | | 1 to 8 | See note. | Yes | - | - | - | - | - | 2 | |
| | 038 | | Deviation output (deviation = PV - SP) | Result calculated in this block | ±110.00% | 0.00 | Yes | - | - | - | - | - | 2 | |
| | 039 | | Deviation alarm setting | Value set in this block | 0% to 110.00% | 110.00 | - | R/W(O) | - | W | - | - | S/R | 2 |
| | 040 | | PV high/high alarm setting | | -10.00% to 110.00% | 110.00 | - | R/W(O) | - | W | - | - | S/R | 2 |
| | 041 | | PV high alarm setting | | -10.00% to 110.00% | 100.00 | - | R/W(O) | - | W | - | - | S/R | 2 |
| | 042 | | PV low alarm setting | | -10.00% to 110.00% | 0.00 | - | R/W(O) | - | W | - | - | S/R | 2 |
| | 043 | | PV low/low alarm setting | | -10.00% to 110.00% | -10.00 | - | R/W(O) | - | W | - | - | S/R | 2 |
| 044 | | Hysteresis setting | | 0.00% to 110.00% | 1.00 | - | R/W(S) | - | W | - | - | - | 2 | |
| Contact output | 045 | DVA | Deviation alarm value | Result calculated in this | 0, 1 | 0 | Yes | - | - | - | R | S | 1 | |
| | 046 | HH | PV high/high alarm value | | 0, 1 | 0 | Yes | - | - | - | R | S | 1 | |

3 External Controller block

<045> ES100X Controller Terminal 065 to 096

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) | |
|-------------------------------------|------|--------|---|----------------------------------|-------------------|---------------------------|--|-----------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|---|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor*1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | | |
| | 047 | H | PV high alarm value | block | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| | 048 | L | PV low alarm value | | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| | 049 | LL | PV low/low alarm value | | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| Contact input | 050 | AS | Alarm stop switch 0: Alarm, 1: Stop | Value written to ES100X | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| Analog output | 051 | | MV setting | Value written to ES100X | -5.00% to 105.00% | See note. | Yes | r/w | - | - | - | - | 2 |
| Parameter | 052 | | MV upper limit setting | | -4.90% to 105.00% | See note. | Yes | R/W(O) | - | W | - | R | 2 |
| | 053 | | MV lower limit setting | | -5.00% to 104.90% | See note. | Yes | R/W(O) | - | W | - | R | 2 |
| Contact output | 054 | MHA | MV upper limit output 1: Above upper limit Valid only for auto mode (always 0 for manual mode). | Results calculated in this block | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| | 055 | MLA | MV lower limit output 1: Below lower limit Valid only for auto mode (always 0 for manual mode). | | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| Parameter | 056 | | P (proportional band) setting | Value written to ES100X | 0.0% to 999.9% | See note. | Yes | R/W(O) | - | W | - | R | 2 |
| | 057 | | I (integral time) setting 0: No integral control | Value written to ES100X | 0 to 9999 s | See note. | Yes | R/W(O) | - | W | - | R | 2 |
| | 058 | | D (differential time) setting 0: No differential control | | 0 to 9999 s | See note. | Yes | R/W(O) | - | W | - | R | 2 |
| Analog input connection information | 070 | | Remote SP source designation | Value set in this block | BBB or III | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 071 | | Remote SP input value | Value written to ES100X | 0.00% to 100.00% | 0.00 | Yes | - | - | - | - | - | 2 |
| Parameter | 072 | | Local SP setting | | 0.00% to 100.00% | See note. | Yes | R/W(O) | - | W | - | R | 2 |
| Contact input | 080 | RUN | ES100X operation command 0: Stop, 1: Run | Value written to ES100X | 0, 1 | See note. | Yes | R/W(O) | - | - | R/W | R | 1 |
| | 081 | A/M | A/M switch 0: Manual, 1: Auto | | 0, 1 | See note. | Yes | R/W(O) | - | - | R/W | R | 1 |
| | 082 | RMT | EX100 parameter setting method switch 0: Local (front panel keys), 1: Remote (serial communications) | | 0, 1 | See note. | Yes | R/W(O) | - | - | R/W | R | 1 |
| | 083 | AT | AT command 0: Stop AT, 1: Execute AT | | 0, 1 | See note. | Yes | R/W(O) | - | - | R/W | R | 1 |
| Contact input parameter | 084 | R/L | RSP/LSP switch in this block 0: Local SP, 1: Remote SP Note: Valid only when ITEM 085 is 1 (RSP/LSP switching enabled). | In this block | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |

3 External Controller block <045> ES100X Controller Terminal 065 to 096

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) | |
|-----------|------|--------|--|-----------------------|-------------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|---|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | | |
| Parameter | 085 | | SP setting method (default) 0: LSP only, 1: RSP/LSP switching enabled (ITEM 084 will be disabled if "LSP only" is set.) | In this block 0, 1 | 0 | - | R/W(S) | - | - | - | S/R | 1 | |
| | 088 | | Inverted MV display at host 0: No, 1: Yes Note: Inversion means to take 0% to 100% and convert it to 100% to 0%. | | 0 | - | R/W(S) | - | - | - | - | - | 1 |
| | 089 | MV | MV output for host display | | -5.00% to 105.00% | See note. | Yes | R/W(O) | - | W | - | S/R | 2 |
| | 098 | | MV manual pointer position | | -5.00% to 105.00% | 0.00 | Yes | R/W(O) | - | W | - | S/R | 2 |
| | 099 | | Label | | 0 to 15 | 0 | Yes | R/W(O) | - | W | - | S/R | 2 |

Note:

- If more than one ES100X Controller is used, only the baud rate (ITEM 008) set in the block with the lowest block address is used. If the baud rate is changed, the new setting will become effective the next time the Loop Controller Unit is restarted.
- When reading the PV or SP from the ES100X, the scaling lower limit (ITEM 011) and scaling upper limit (ITEM 012) will be used to convert the data to between 0.00% and 100.00% in the Loop Control Unit.
When writing data to the ES100X, the scaling lower limit (ITEM 011) and scaling upper limit (ITEM 012) will be used to convert the data from between 0.00% and 100.00% before writing to the ES100X.
When the Loop Controller Unit is started (hot or cold), data is read from the ES100X and used for the initial ITEM settings in the function block instead of using the ITEM settings originally in the function block. This is done for safety. The ITEMS to which this applies are listed as "See note." in the default column in the ITEM table given above.
- ES100X Data Read/Write Timing
Only one ES100X Controller Terminal Block is executed each cycle.
If there are n ES100X Controller Terminal Blocks, each block will be executed only once every n cycles.
 - 1)Reading Data from the ES100X to the Loop Control Unit
Data is read when the ES100X Controller Terminal Block is executed.
 - 2)Writing Data from the Loop Control Unit to the ES100X
 - When Interrupt Transfer Enable (ITEM 007) is OFF
Data is written when the ES100X Controller Terminal Block is executed.
 - When Interrupt Transfer Enable (ITEM 007) is ON
The ES100X Controller Terminal Block with interrupt transfer enabled will be executed even if another ES100X Controller Terminal Block is scheduled to be executed that cycle. For remote SP setting (with ITEM 084 and ITEM 085 both set to 1), the SP is written to the ES100X only when the ES100X Controller Terminal Block is executed.

3 External Controller block

<045> ES100X Controller Terminal 065 to 096

- ES100X Data Update Cycle

The ES100X Controller Terminal Block must be executed more than once to read and write all the data for the ES100X.

Approximately one second will be required to update the data for one ES100X Controller when the execution cycle of the function block is 0.1 second. If the execution cycle increases, the update cycle will increase as a multiple of the execution cycle.

If n ES100X Controllers are connected, the time required for each Controller will be approximately n seconds.

- Response Code (ITEM 010)

If communications with the ES100X are normal, a communications command will be sent to the ES100X and the response code that is returned will be indicated.

Refer to the ES100X user's manual for communications for details.

- Controller Error Level Display (Levels 0 to 3, ITEM 009)

The error level of the ES100X classifies errors groups into error levels 0 to 3 for errors read by sending the variable read command to the ES100X.

0: No error

1: Group 0 or 1 (calibration data error, internal voltage error, etc.)

2: Groups 2 and 3 (PV errors, etc.)

3: Group 9 (motor calibration setting error, etc.)

Refer to the ES100X user's communications manual for details.

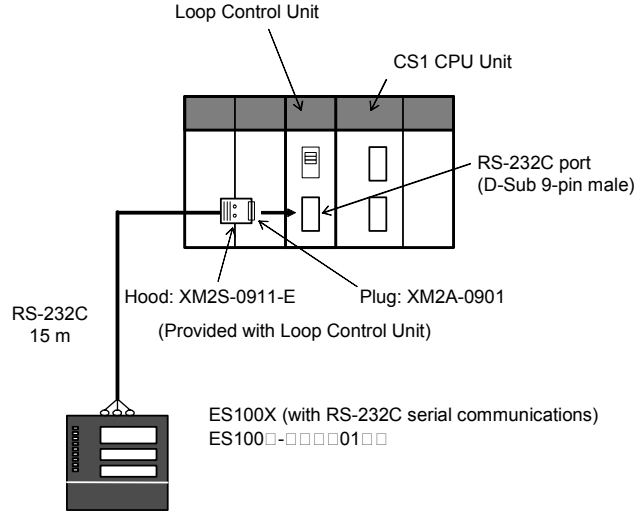
Execution Error Table

| Code | Name | Description | Action when error occurs | Measure to be taken |
|------|------------------------------------|---|--|--|
| 29 | External device reception error | A communications frame error has occurred in the data received from the ES100X for the ES100X Controller Terminal Block. (Either an FCS check error or frame error occurred three times in a row.) | Communications with the ES100X stopped and communications with another ES100X attempted. | Check the communications path. Check the communications settings: Data length of 7 bits, even parity, and two stop bits. |
| 30 | Response timeout | A response is not returned for data sent to the Controller for an ES100X Controller Terminal Block. (A response was not received for 5 seconds three times.) | Communications with the ES100X stopped and communications with another ES100X attempted. | Check the communications path. Check the communications settings: Data length of 7 bits, even parity, and two stop bits. Check the restrictions for the ES100X (e.g., parameter setting mode). |
| 31 | Controller unit number duplication | The unit number (ITEM 006) of the Controller to communicate with in the ES100X Controller Terminal Block is the same as the unit number in another ES100X Controller Terminal Block. A timeout error (30) will occur if the specified unit number is not set for any ES100X Controller. | Communications with the ES100X are stopped. | Set the unit numbers (ITEM 006) so that each number is set for only one ES100X Controller. |

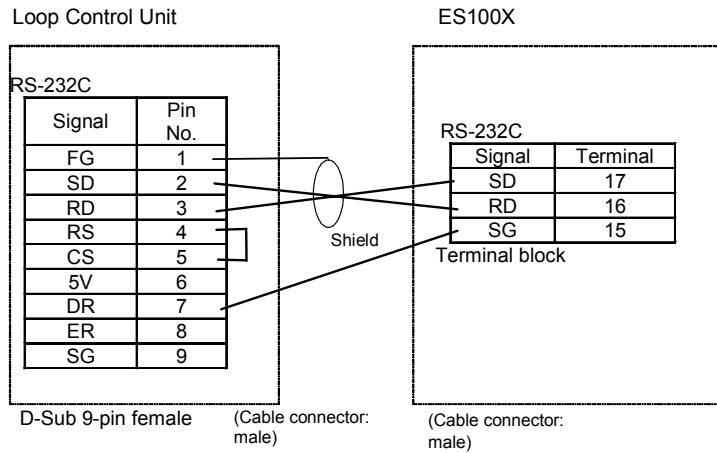
Hardware Connections to ES100X Controllers

1:1 Connections between Loop Control Unit and ES100X via RS-232C

System Configuration



Wiring



Recommended RS-232C Cables

- UL2464 AWG28 x 5P IFS-RVV-SB (UL-conforming product) (Fujikura)
- AWG28x5P IFVV-SB (not UL-conforming product)
- UL2464-SB(MA)5Px28AWG(7/0.127) (UL-conforming product) (Hitachi)
- CO-MA-VV-SB 5Px28AWG(7/0.127) (not UL-conforming product)

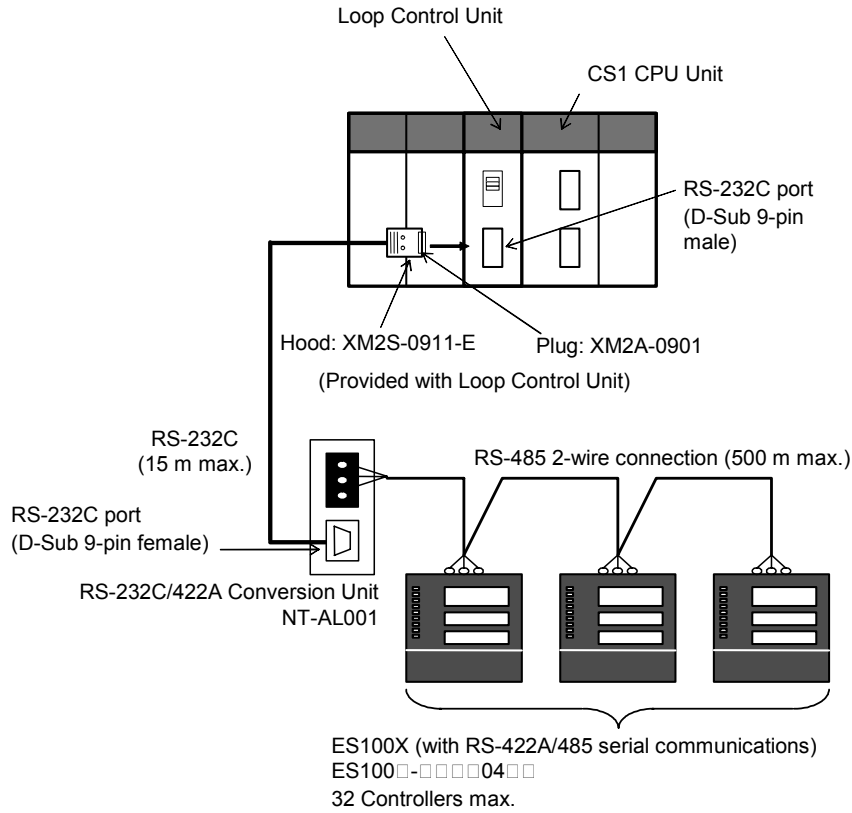
Applicable Connectors

RS-232C 9-pin Connector for Loop Control Unit

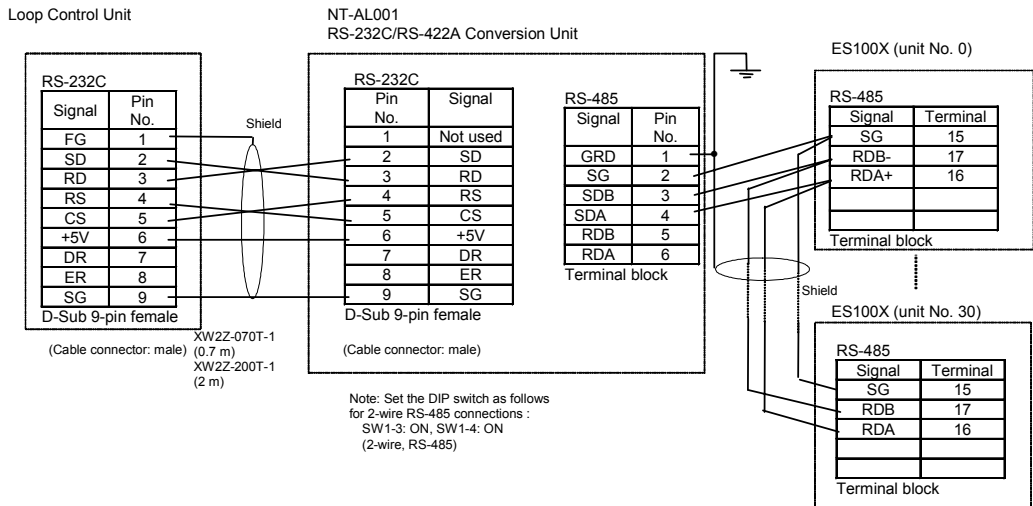
| Name | Model number | Specifications | |
|------|--------------|----------------------------------|---|
| Plug | XM2A-0901 | 9-pin, male | Used together. (One connector included with Loop Control Unit) |
| Hood | XM2S-0911-E | For 9-pin connector, mini screws | |

1:N Connections between Loop Control Unit and ES100X Controllers via RS-232C/RS-485 Conversion (N = 1 to 31)

System Configuration



Wiring



Note:

Do not connect pin 6 (+5 V) on the RS-232C port on the Loop Control Unit to any device other than the NT-AL001. The external device or the Loop Control Unit may be damaged. Set the 2-wire/4-wire setting on the NT-AL001 to a 2-wire connection (RS-485). Set the DIP switch as shown below. SW1-3: ON, SW1-4: ON (2-wire, RS-485)

Recommended RS-232C Cables between Loop Control Unit and NT-AL001

| Name | Model number | Length |
|----------------------------|--------------|--------|
| NT-AL001 Connecting Cables | XW2Z-070T-1 | 0.7 m |
| | XW2Z-200T-1 | 2.0 m |

Applicable Connector

The RS-232C 9-pin Connector on the Loop Control and the NT-AL001 is listed in the following table.

| Name | Model number | Specifications | |
|------|--------------|----------------------------------|---|
| Plug | XM2A-0901 | 9-pin, male | Used together. (One connector included with Loop Control Unit) |
| Hood | XM2S-0911-E | For 9-pin connector, mini screws | |

Recommended RS-485 Cable

CO-HC-ESV-3Px7/0.2(Hirakawa-Huddic)

3 External Controller block

<045> ES100X Controller Terminal 065 to 096

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|--------------------------------|----------------------------|
| | | Tag ITEM (Fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 009 | Controller error level display | ERR1 |
| 010 | Response code | RES |
| 021 | PV measured value | PV |
| 024 | P (proportional band) | P |
| 025 | I (integral time) | I |
| 026 | D (differential time) | D |
| 027 | MV upper limit | MH |
| 028 | MV lower limit | ML |
| 029 | SP (setting) | SP |
| 030 | Operating status display | RUN |
| 031 | A/M status display | A/M_SW |
| 032 | ES100X parameter setting mode | RMT |
| 033 | AT status | AT |
| 039 | Deviation alarm setting | DVA_SP |
| 040 | PV high/high alarm setting | HH_SP |
| 041 | PV high alarm setting | H_SP |
| 042 | PV high alarm setting | L_SP |
| 043 | PV low/low alarm setting | LL_SP |
| 045 | Deviation alarm setting | DVA |
| 046 | PV high/high alarm value | HH |
| 047 | PV high alarm value | H |
| 048 | PV low alarm value | L |
| 049 | PV low/low alarm value | LL |
| 050 | Alarm stop switch | AOF |
| 052 | MV upper limit | MH |
| 053 | MV lower limit | ML |
| 054 | MV upper limit output | MHA |
| 055 | MV lower limit output | MLA |
| 056 | P (proportional band) | P |
| 057 | I (integral time) | I |
| 058 | D (differential time) | D |
| 072 | SP (setting) | SP |
| 080 | ES100X operation command | RUN |
| 081 | A/M switch | A/M_SW |
| 082 | ES100X parameter setting mode | RMT |
| 083 | AT command | AT |
| 084 | RSP/LSP switch in this block | R/L_SW |
| 085 | SP setting method | CAS_SET |
| 089 | Manipulated output value | MV |
| 098 | MV manual pointer position | MV_IDX |
| 099 | Label | OP_MK |

| Block Model | Block Name | Block Address |
|-------------|---------------------------|---------------|
| <110> | 4-Point Warning Indicator | 100 to 349 |

Outline

This function block is a PV indicator with four alarm points.

- This function is provided with four PV alarm outputs (high/high, high, low, and low/low).
- This function block provides the same function as the Indicator block (model 034).

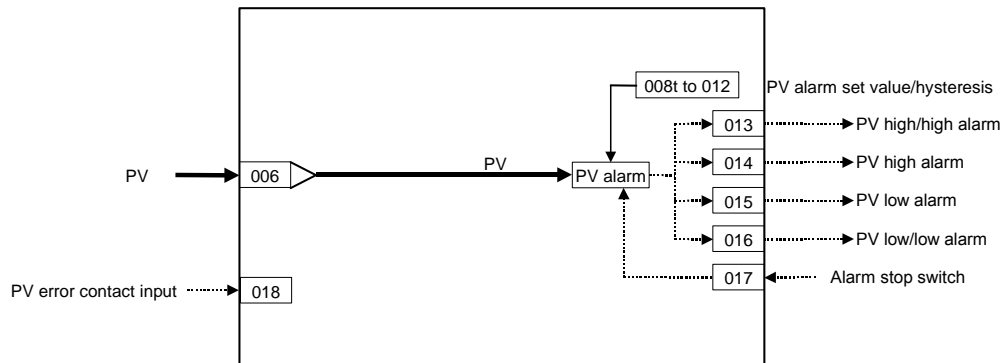
Function block applications

This function block is allocated to block addresses 100 to 349 as an Operation Block. The Indicator block (model 034) is allocated to block addresses 001 to 032 as a Control Block.)

Block model 110 can be used when reading/writing using standard SCADA software when the maximum number of Control Blocks (32) have already been used.

Note: This function block cannot be used as the destination of 1-Block Send Terminal to Computer (model 403) or 4-Block Send Terminal to Computer (model 404). Use the Indicator block (model 034) when the block is going to be used in the CX-Process Monitor software.

Block diagram



4 Alarm/Signal restriction/Hold blocks

<110> 4-Point Warning Indicator 100 to 349

ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|---|--------------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command 0: Cancel stop, 1: Stop | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block model: 4-Point Warning Indicator | 110 | 110 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (seconds) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Analog input connection information | 006 | | PV source designation BBB: Block address, III: ITEM number | BBB or III | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 007 | PV | PV input | -15.00% to 115.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| Parameter | 008 | | High/high alarm setting | -15.00% to 115.00% | 115.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 009 | | High alarm setting | -15.00% to 115.00% | 100.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 010 | | Low alarm setting | -15.00% to 115.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 011 | | Low/low alarm setting | -15.00% to 115.00% | -15.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 012 | | Hysteresis setting | 0% to 115.00% | 1.00 | - | R/W(S) | - | W | - | - | 2 |
| Contact output | 013 | HH | High/high alarm output | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| | 014 | H | High alarm output | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| | 015 | L | Low alarm output | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| | 016 | LL | Low/low alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| Contact input Parameter | 017 | S1 | Alarm stop switch 0: Alarm, 1: Stop | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| Source designation contact input | 018 | | PV error contact source designation | BBB or III | 000000 | - | - | - | - | - | - | 4 |
| Contact output | 019 | | PV error display 0: Normal, 1: Error | 0, 1 | 0 | Yes | - | - | - | - | S | 1 |
| Parameter | 020 | | Alarm limit ² 0: No, 1: Yes Note: Limits the alarm set value to between 0.00% and 100.00%. | 0, 1 | 0 | - | R/W(S) | - | - | - | - | 1 |

*1: If ITEM 020 (alarm limit) is set to 1 (ON), the alarm set range will be limited to between 0.00% and 100.00% as follows (supported by Loop Control Unit version 2.50 or later):

- If the high/high alarm setting (ITEM 008) or the high alarm set value (ITEM 009) is set to a value over 100.00%, the alarm output will not turn ON even if the PV exceeds the alarm set value.
- If the low/low alarm setting (ITEM 011) or the low alarm set value (ITEM 010) is set to a value below 0.00%, the alarm output will not turn ON even if the PV exceeds the alarm set value.

Data for host display

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|-----------|------|--------|------------------|------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | |
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 099 | | Label | 0 to 15 | 0 | Yes | R/W(O) | - | W | - | S/R | 2 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software Tag ITEM (Fixed) |
|------|------------------------------|---|
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 007 | PV input | PV |
| 008 | High/high alarm setting | HH_SP |
| 009 | High alarm setting | H_SP |
| 010 | Low alarm setting | L_SP |
| 011 | Low/low alarm setting | LL_SP |
| 013 | High/high alarm output | HH |
| 014 | High alarm output | H |
| 015 | Low alarm output | L |
| 016 | Low/low alarm output | LL |
| 017 | Alarm stop switch | AOF |
| 019 | PV error display | PV_ABN |
| 099 | Label | OP_MK |

4 Alarm/Signal restriction/Hold blocks

<111> High/Low Alarm 100 to 349

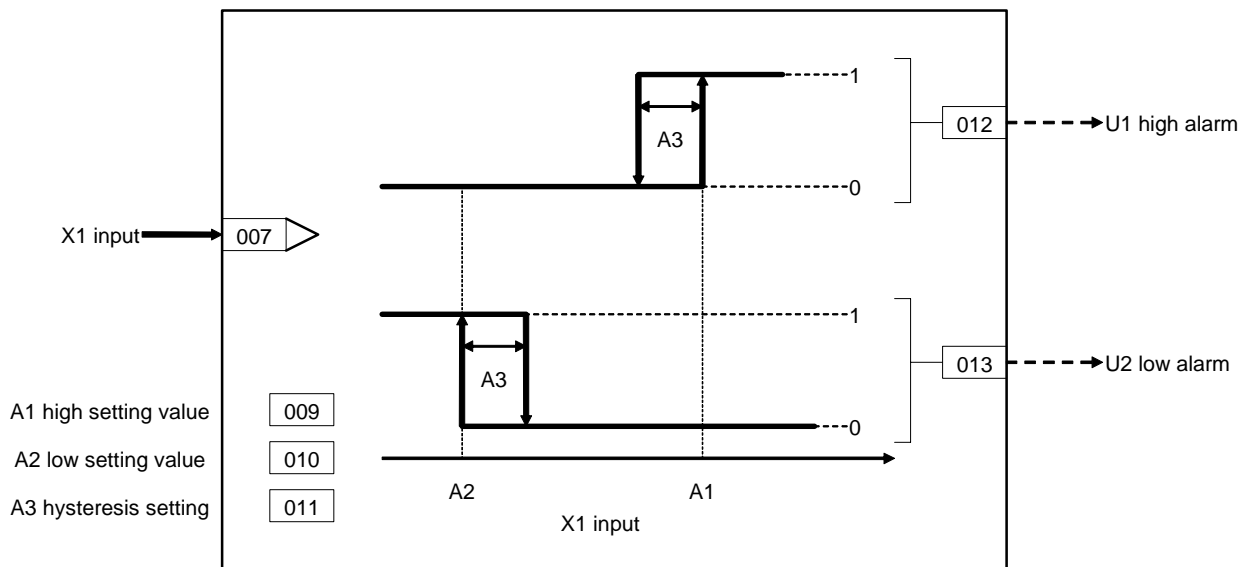
| Block Model | Block Name | Block Address |
|-------------|----------------|---------------|
| <111> | High/Low Alarm | 100 to 349 |

Outline

This function block provides the alarm contact outputs for the high and low limits of single analog outputs.

- High and low limits have hysteresis.
- The high limit can be set to a value lower than the low limit.

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|---|---------------|------------|---------------------------|------------------------------|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: High/Low alarm | 111 | 111 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code Tables.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Analog input connection information | 007 | | X1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 008 | X1 | Input | ±320.00% | | Yes | r | R | - | - | S | 2 |
| Parameter | 009 | A1 | High setting | ±320.00% | 320.00 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 010 | A2 | Low setting | ±320.00% | -320.00 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 011 | A3 | Hysteresis setting | 0 to 320.00% | 1.00 | - | R/W(S) | - | W | - | S/R | 2 |
| Contact output | 012 | U1 | High alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 013 | U2 | Low alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |

List of tag ITEMS on CX-Process Monitor or SCADA software

The following tag ITEMS are used to specify ITEMS with either 1) Monitor tags when sending function blocks to the CX-Process Monitor from 4-Block Send Terminal to Computer (Block Model 404) or 2) CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (Block Model 461)/Send All Blocks (Block Model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in CX-Process Monitor | CSV Tags in SCADA Software |
|------|------------------------------|--------------------------------|----------------------------|
| | | Tag ITEM (fixed) | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST | MT_ST |
| 003 | Execution error display | None | ERR |
| 008 | Input | PV | PV |
| 009 | High setting | H_SP | H_SP |
| 010 | Low setting | L_SP | L_SP |
| 011 | Hysteresis setting | None | A3 |
| 012 | High alarm output | H | H |
| 013 | Low alarm output | L | L |

Note This function block cannot be sent using 1-Block Send Terminal to Computer (Block Model 403).

4 Alarm/Signal restriction/Hold blocks

<112> Deviation Alarm 100 to 349

| Block Model | Block Name | Block Address |
|-------------|-----------------|---------------|
| <112> | Deviation Alarm | 100 to 349 |

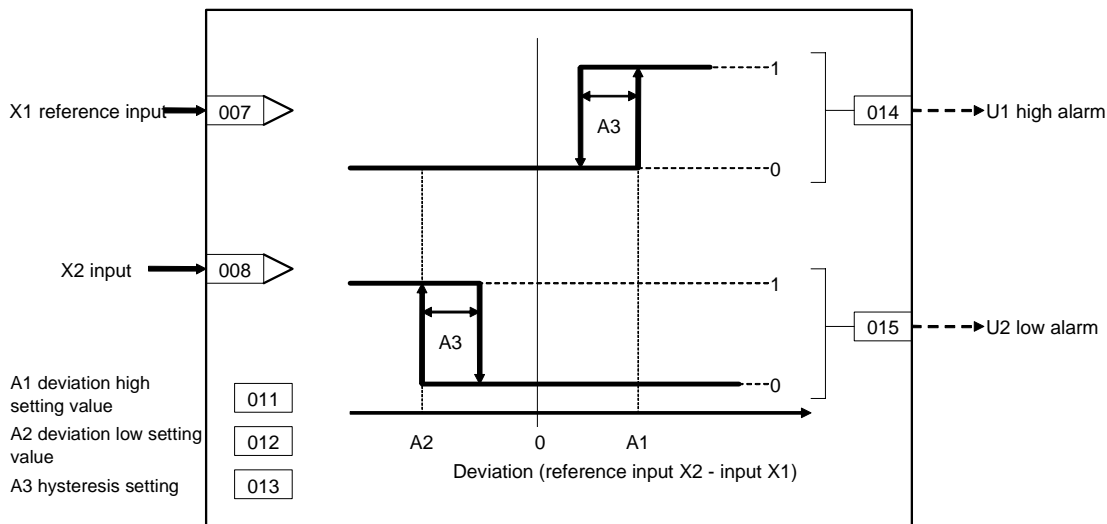
Outline

This function block provides the alarm contact outputs for the deviation of two analog signals.

The deviation high alarm output changes to 1 (turns ON) when "X2 input - X1 reference input" is at or higher than the deviation high setting. The deviation low alarm output changes to 1 (turns ON) when "X1 input - X2 reference input" is at or lower than the deviation low setting.

- The deviation high and low limits have hysteresis.
- The deviation high limit can be set to a value lower than the deviation low limit.

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|---|---------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | |
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Deviation Alarm | 112 | 112 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code Tables.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Analog input connection information | 007 | | X1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 008 | | X2 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 009 | X1 | Reference input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 010 | X2 | Input | ±320.00% | 0.00 | Yes | r | - | W | - | S | 2 |
| Parameter | 011 | A1 | Deviation high setting | ±320.00% | 320.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 012 | A2 | Deviation low setting | ±320.00% | -320.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 013 | A3 | Hysteresis setting | 0 to 320.00% | 1.00 | - | R/W(S) | - | W | - | S/R | 2 |
| Contact output | 014 | U1 | Deviation high alarm output | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| | 015 | U2 | Deviation low alarm output | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|------------------------------|----------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 009 | Reference input | X1 |
| 010 | Input | X2 |
| 011 | Deviation high setting | A1 |
| 012 | Deviation low setting | A2 |
| 013 | Hysteresis setting | A3 |
| 014 | Deviation high alarm output | U1 |
| 015 | Deviation low alarm output | U2 |

4 Alarm/Signal restriction/Hold blocks

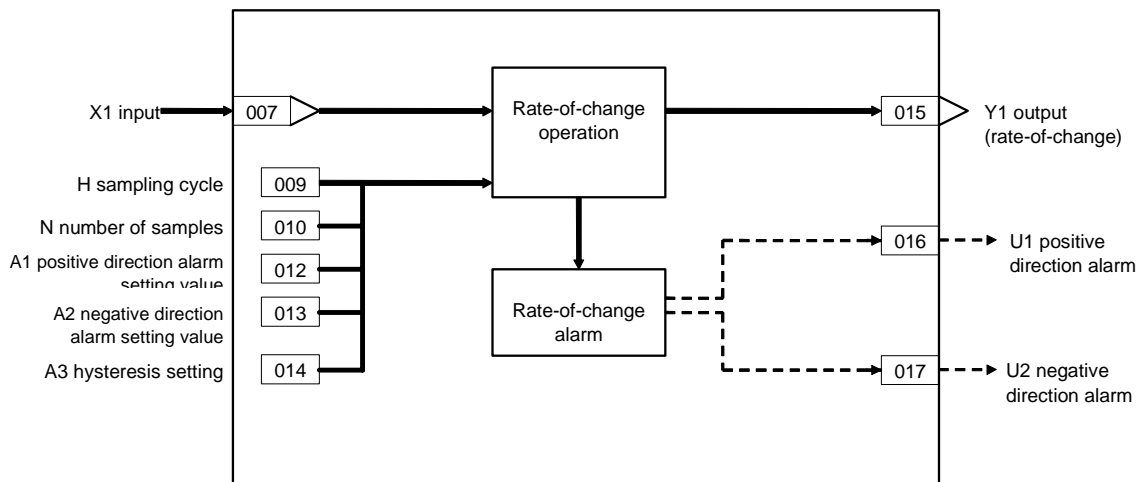
<113> Rate-of-change Operation and Alarm 100 to 349

| Block Model | Block Name | Block Address |
|-------------|------------------------------------|---------------|
| <113> | Rate-of-change Operation and Alarm | 100 to 349 |

Outline

This function block provides the alarm contact outputs for the high and low limits of rate-of-change operation when the analog signal rate-of-change is output. By how many percent (%) X1 input changes per second, minute or hour is output as the rate-of-change. Judgment of the change in alarm signal is performed by comparing the value of X1 input with the data of H x N seconds previous currently held in memory. U1 output changes to 1 (turns ON) if X1 is greater than A1 positive direction alarm setting. U2 output changes to 1 (turns ON) if X1 is greater than A2 negative direction alarm setting. Each of the alarm settings has A3 hysteresis.

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|---|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Rate-of-change Operation and Alarm | 113 | 113 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code Tables.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 1: 0.1, 2: 0.2, 3: 0.5, 4: 1 | 0 to 4 | 4 | - | R/W(S) | - | - | - | - | 2 |
| Analog input connection information | 007 | | X1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input Parameter | 008 | X1 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 009 | H | Sampling cycle (0: Operation cycle) | 0 to 320s | 0 | - | R/W(S) | - | W | - | S/R | 2 |
| | 010 | N | Number of samples | 1 to 8 | 8 | - | R/W(S) | - | W | - | S/R | 1 |
| | 011 | | Unit (0:%/s, 1:%/min, 2:%/h) | 0 to 2 | 0 | - | R/W(S) | - | - | - | S/R | 1 |
| | 012 | A1 | Positive direction alarm setting | 0 to 320.00 | 320.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 013 | A2 | Negative direction alarm setting | 0 to 320.00 | 320.00 | - | R/W(O) | - | W | - | S/R | 2 |
| Analog output | 014 | A3 | Hysteresis setting | 0 to 320.00 | 1.00 | - | R/W(S) | - | W | - | S/R | 2 |
| | 015 | Y1 | Output rate-of-change | ±320.00% | 0.00 | Yes | r/w | - | - | - | S | 2 |
| Contact output | 016 | U1 | Positive direction alarm output | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| | 017 | U2 | Negative direction alarm output | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software Tag ITEM (fixed) |
|------|----------------------------------|--|
| 000 | Stop block operation command | MT ST |
| 003 | Execution error display | ERR |
| 008 | Input | X1 |
| 009 | Sampling cycle | H |
| 010 | Number of samples | N |
| 011 | Unit | TM |
| 012 | Positive direction alarm setting | A1 |
| 013 | Negative direction alarm setting | A2 |
| 014 | Hysteresis setting | A3 |
| 015 | Output rate-of-change | Y1 |
| 016 | Positive direction alarm output | U1 |
| 017 | Negative direction alarm output | U2 |

4 Alarm/Signal restriction/Hold blocks

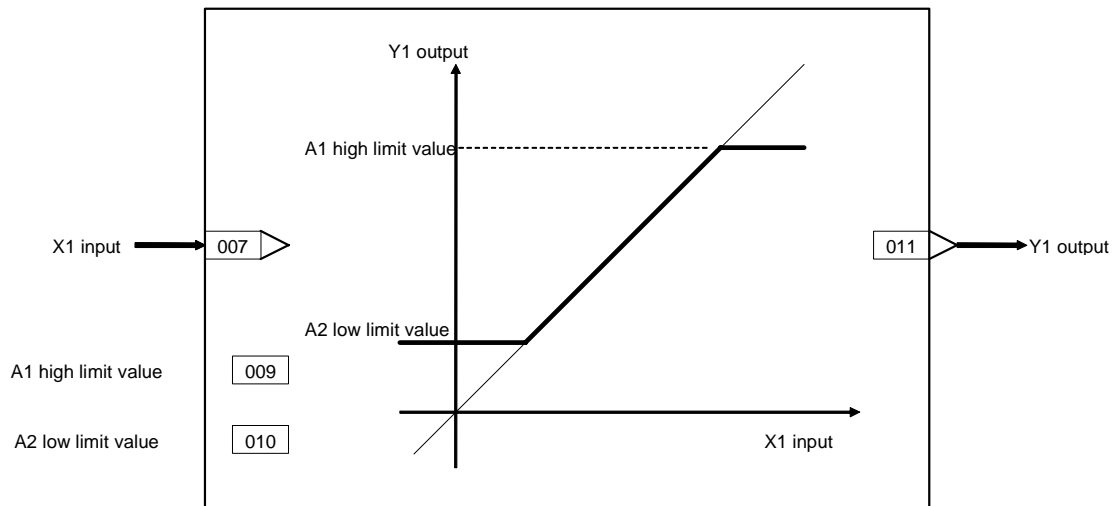
<115> High/Low Limit 100 to 349

| Block Model | Block Name | Block Address |
|-------------|----------------|---------------|
| <115> | High/Low Limit | 100 to 349 |

Outline

This function block limits the high and low limits of single analog signals.

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|---|---------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | |
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Model name: High/Low Limit | 115 | 115 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code Tables.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Analog input connection information | 007 | | X1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 008 | X1 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| Parameter | 009 | A1 | High limit | ±320.00% | 320.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 010 | A2 | Low limit | ±320.00% | -320.00 | - | R/W(O) | - | W | - | S/R | 2 |
| Analog output | 011 | Y1 | Output | ±320.00% | 0.00 | Yes | r/w | - | - | - | S | 2 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software Tag ITEM (fixed) |
|------|------------------------------|---|
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 008 | Input | X1 |
| 009 | High limit | A1 |
| 010 | Low limit | A2 |
| 011 | Output | Y1 |

4 Alarm/Signal restriction/Hold blocks

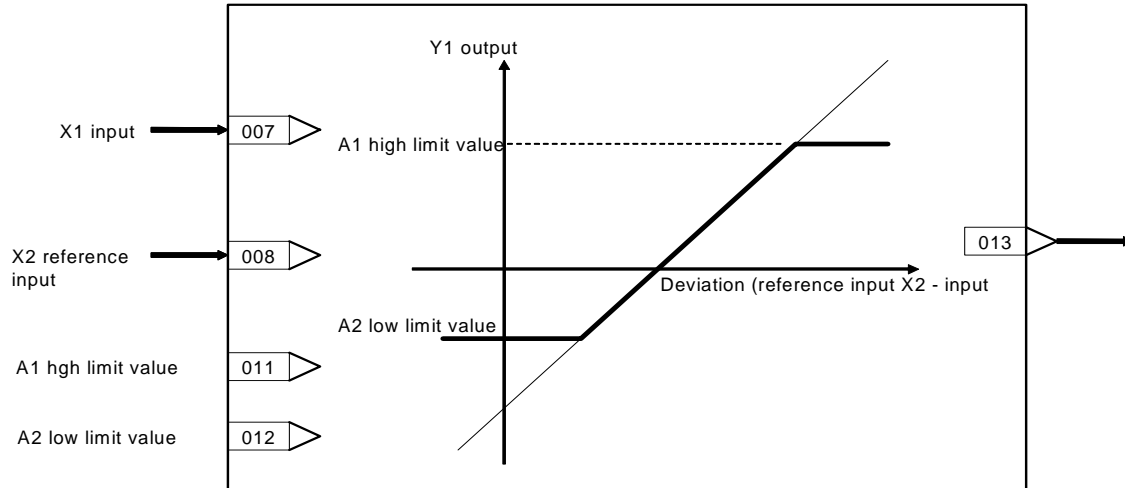
<116> Deviation Limit 100 to 349

| Block Model | Block Name | Block Address |
|-------------|-----------------|---------------|
| <116> | Deviation Limit | 100 to 349 |

Outline

This function block calculates the deviation ($X2 - X1$) between two analog signals, limits the deviation within than range, and outputs that value.

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|---|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Deviation Limit | 116 | 116 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code Tables.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Analog input connection information | 007 | | X1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 008 | | X2 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 009 | X1 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 010 | X2 | Reference input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| Parameter | 011 | A1 | High deviation limit | ±320.00% | 320.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 012 | A2 | Low deviation limit | ±320.00% | -320.00 | - | R/W(O) | - | W | - | S/R | 2 |
| Analog output | 013 | Y1 | Output | ±320.00% | 0.00 | Yes | r/w | - | - | - | S | 2 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|------------------------------|----------------------------|
| | | Tag ITEM (Fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 009 | Input | X1 |
| 010 | Reference input | X2 |
| 011 | High deviation limit | A1 |
| 012 | Low deviation limit | A2 |
| 013 | Output | Y1 |

4 Alarm/Signal restriction/Hold blocks

<118> Analog Signal Hold 100 to 349

| Block Model | Block Name | Block Address |
|-------------|--------------------|---------------|
| <118> | Analog Signal Hold | 100 to 349 |

Outline

This function block holds the maximum, minimum or instantaneous value of single analog signals, and outputs that value.

- The maximum value is held and output.
- The minimum value is held and output.
- The instantaneous value is held and output.
- This function block has a reset switch for resetting held values.

When the hold mode is set to instantaneous value, the instantaneous value when S1 reset switch changes from 1 (ON) to 0 (OFF) is held and output to Y1.

When the hold mode is set to either maximum value or minimum value, the maximum value or minimum value is held and output to Y1 when S1 reset switch is 0 (OFF).

When S1 is set to 1 (ON), the value is not held.

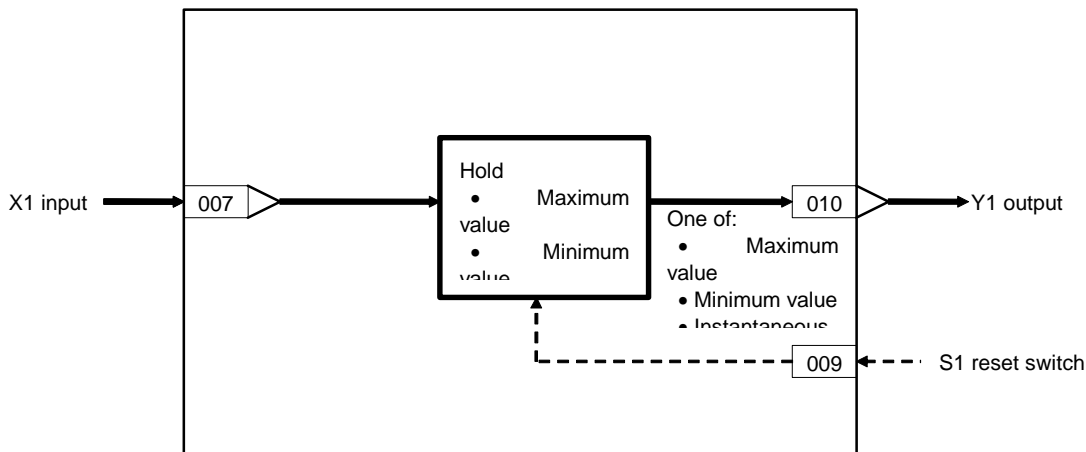
When S1 reset switch is set to 1 (ON), X1 input equals Y1 output.

Note: When a cold start is performed, the values that were held before CPU Unit output OFF or before running of the Loop Control Unit was stopped are cleared from memory. These values are held when a hot start is performed.

Function block applications

Peak hold or hold at fall of contact state

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|---|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Analog Signal Hold | 118 | 118 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code Tables.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 1: 0.1, 2: 0.2, 3: 0.5, 4: 1 | 1 to 4 | 4 | - | R/W(S) | - | - | - | - | 2 |
| | 006 | | Hold mode (1: Maximum value, 2: Instantaneous value, 3: Minimum value) | 1 to 3 | 2 | - | R/W(S) | - | - | - | S/R | 1 |
| Analog input connection information | 007 | | X1 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 008 | X1 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| Contact input/parameter | 009 | S1 | Reset switch Contact inputs and parameters are reset when set to 1. When the switch setting changes to 0 from 1 when ITEM006 is set to 2, inputs and parameters are held. When ITEM006 is set to either 1 or 3, contacts and parameters are held when the switch setting is 1 and are not held when the switch setting is 0. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| Analog output | 010 | Y1 | Output | ±320.00% | 0.00 | Yes | r/w | - | - | - | S | 2 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|------------------------------|----------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 006 | Hold mode | KN |
| 008 | Input | X1 |
| 009 | Reset switch | S1 |
| 010 | Output | Y1 |

5 Arithmetic blocks

<121> Addition or Subtraction 100 to 349

| Block Model | Block Name | Block Address |
|-------------|-------------------------|---------------|
| <121> | Addition or Subtraction | 100 to 349 |

Outline

This function block performs addition/subtraction with gain and bias on up to four analog signals.

$$Y1 = K1 \times X1 + K2 \times X2 + K3 \times X3 + K4 \times X4 + A1$$

•Internal operation is executed at double precision (32 bits).

Note: Calculate 100% in the calculation formula as 1.0.

Example: If X1 = 20%, X2 = -10%, X3 = 70%, X4 = -30%, K1 = 1.0,

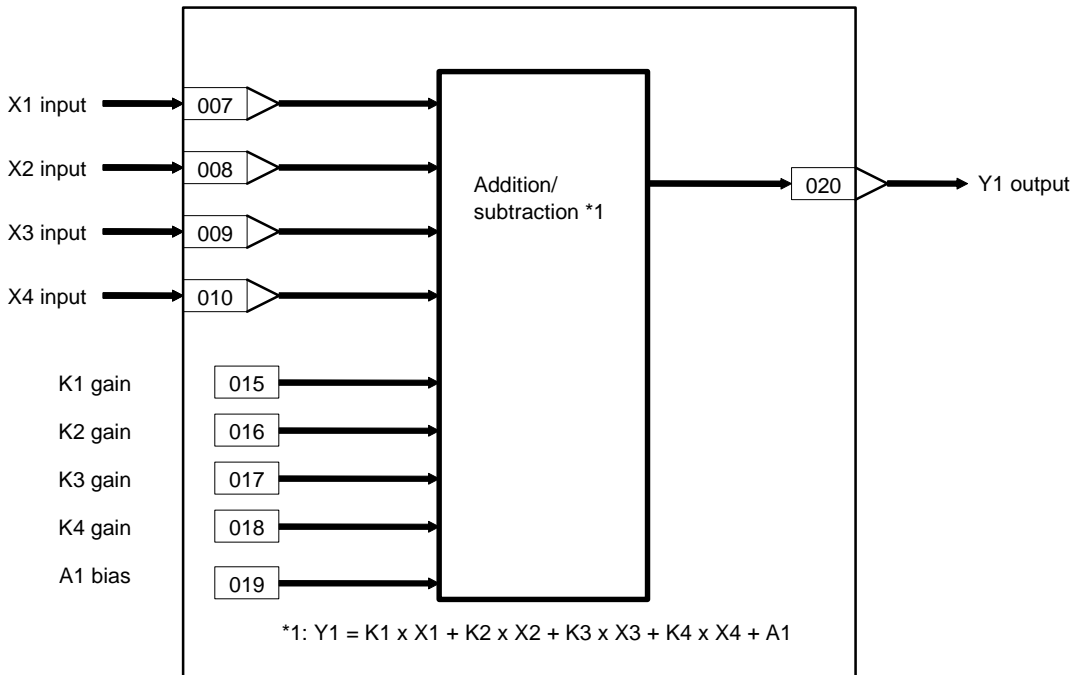
K2 = 5.0, K3 = 0.5, K4 = -0.5, and A1 = -40%,

$$Y1 = \{1.0 \times 0.2 + 5.0 \times (-0.1) + 0.5 \times 0.7 + (-0.5) \times (-0.3) - 0.4\} \times 100\%$$

$$= \{0.2 - 0.5 + 0.35 + 0.15 - 0.4\} \times 100\%$$

$$= -20\%$$

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|---|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Addition or Subtraction | 121 | 121 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Analog input connection information | 007 | | X1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 008 | | X2 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 009 | | X3 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 010 | | X4 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 011 | X1 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 012 | X2 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 013 | X3 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 014 | X4 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| Parameter | 015 | K1 | K1 gain | ±10.000 | 1.000 | - | R/W(O) | - | W | - | S/R | 2 |
| | 016 | K2 | K2 gain | ±10.000 | 1.000 | - | R/W(O) | - | W | - | S/R | 2 |
| | 017 | K3 | K3 gain | ±10.000 | 1.000 | - | R/W(O) | - | W | - | S/R | 2 |
| | 018 | K4 | K4 gain | ±10.000 | 1.000 | - | R/W(O) | - | W | - | S/R | 2 |
| | 019 | A1 | A1 bias | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| Analog output | 020 | Y1 | Output | ±320.00% | 0.00 | Yes | r/w | - | - | - | S | 2 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software Tag ITEM (fixed) |
|------|------------------------------|---|
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 011 | X1 Input | X1 |
| 012 | X2 Input | X2 |
| 013 | X3 Input | X3 |
| 014 | X4 Input | X4 |
| 015 | K1 gain | K1 |
| 016 | K2 gain | K2 |
| 017 | K3 gain | K3 |
| 018 | K4 gain | K4 |
| 019 | A1 bias | A1 |
| 020 | Output | Y1 |

5 Arithmetic blocks

<122> Multiplication 100 to 349

| Block Model | Block Name | Block Address |
|-------------|----------------|---------------|
| <122> | Multiplication | 100 to 349 |

Outline

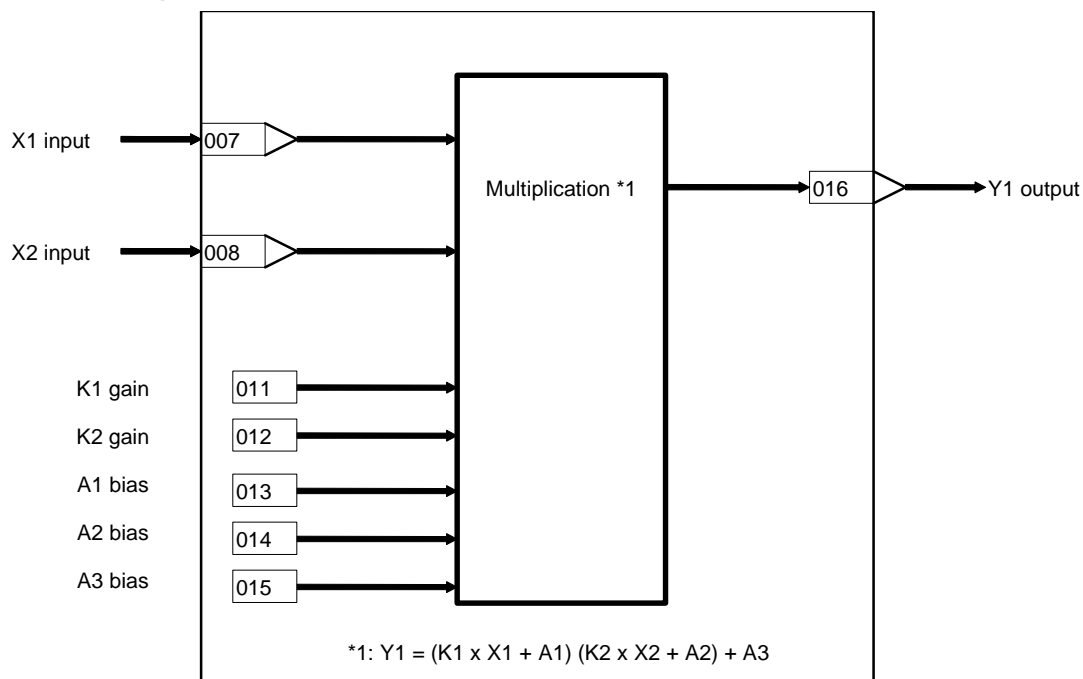
This function block performs multiplication with gain and bias on up to two analog signals.

$$Y1 = (K1 \times X1 + A1) (K2 \times X2 + A2) + A3$$

- Internal operation is executed at double precision (32 bits).

Note: Calculate 100% in the calculation formula as 1.0. When there is no X2 input, take A2 to be 100.00%.

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|---|---------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | |
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Multiplication | 122 | 122 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display (0: Normal, Other: Error (See Appendix "Execution Error Code List.")) | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) (0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2) | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Analog input connection information | 007 | | X1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 008 | | X2 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 009 | X1 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 010 | X2 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| Parameter | 011 | K1 | K1 gain | ±10.000 | 1.000 | - | R/W(O) | - | W | - | S/R | 2 |
| | 012 | K2 | K2 gain | ±10.000 | 1.000 | - | R/W(O) | - | W | - | S/R | 2 |
| | 013 | A1 | A1 bias | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 014 | A2 | A2 bias | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 015 | A3 | A3 bias | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| Analog output | 016 | Y1 | Output | ±320.00% | 0.00 | Yes | r/w | - | - | - | S | 2 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|------------------------------|----------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 009 | X1 Input | X1 |
| 010 | X2 Input | X2 |
| 011 | K1 gain | K1 |
| 012 | K2 gain | K2 |
| 013 | A1 bias | A1 |
| 014 | A2 bias | A2 |
| 015 | A3 bias | A3 |
| 016 | Output | Y1 |

5 Arithmetic blocks
<123> Division 100 to 349

| Block Model | Block Name | Block Address |
|-------------|------------|---------------|
| <123> | Division | 100 to 349 |

Outline

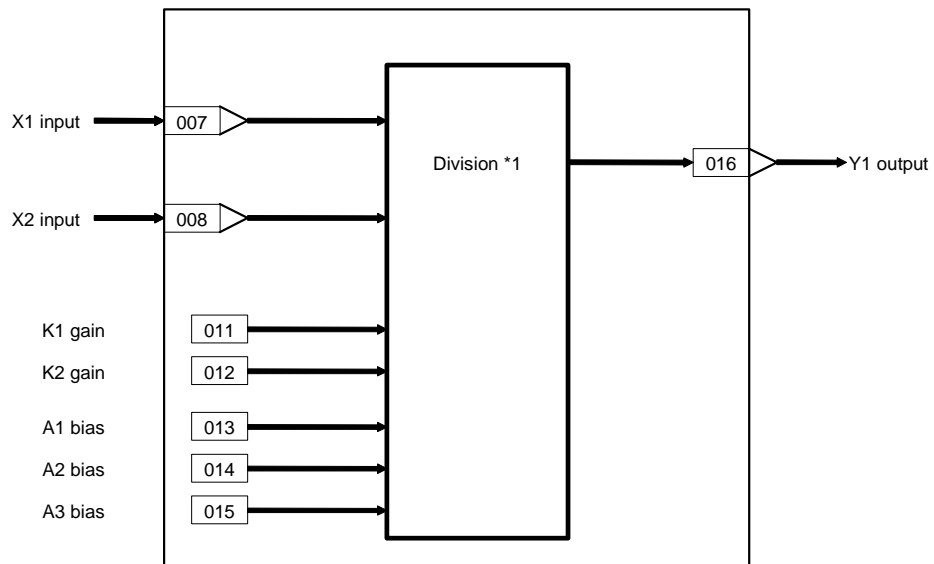
This function block performs division with gain and bias on up to two analog signals

$$Y1 = \frac{K1 \times X1 + A1}{K2 \times X2 + A2}$$

•Internal operation is executed at double precision (32 bits).

Note: Calculate 100% in the calculation formula as 1.0. When there is no X2 input, take A2 to be 100.00%.

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|---|---------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Division | 123 | 123 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Analog input connection information | 007 | | X1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 008 | | X2 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 009 | X1 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 010 | X2 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| Parameter | 011 | K1 | K1 gain | ±10.000 | 1.000 | - | R/W(O) | - | W | - | S/R | 2 |
| | 012 | K2 | K2 gain | ±10.000 | 1.000 | - | R/W(O) | - | W | - | S/R | 2 |
| | 013 | A1 | A1 bias | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 014 | A2 | A2 bias | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 015 | A3 | A3 bias | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| Analog output | 016 | Y1 | Output | ±320.00% | 0.00 | Yes | r/w | - | - | - | S | 2 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|------------------------------|----------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 009 | X1 Input | X1 |
| 010 | X2 Input | X2 |
| 011 | K1 gain | K1 |
| 012 | K2 gain | K2 |
| 013 | A1 bias | A1 |
| 014 | A2 bias | A2 |
| 015 | A3 bias | A3 |
| 016 | Output | Y1 |

5 Arithmetic blocks

<126> Arithmetic Operation 100 to 349

| Block Model | Block Name | Block Address |
|-------------|----------------------|---------------|
| <126> | Arithmetic Operation | 100 to 349 |

Outline

This function performs various math operations using industrial units. Not only basic arithmetic, but also special math, such as trigonometric functions, exponent functions, and logarithmic operations, is possible.

Note: The arithmetic functions blocks (Addition or Subtraction, Multiplication, and Division) operated on percentage units from 0% to 100%. The Arithmetic Operation block first scales input values X1 to X8 to real numbers and operates on industrial units.

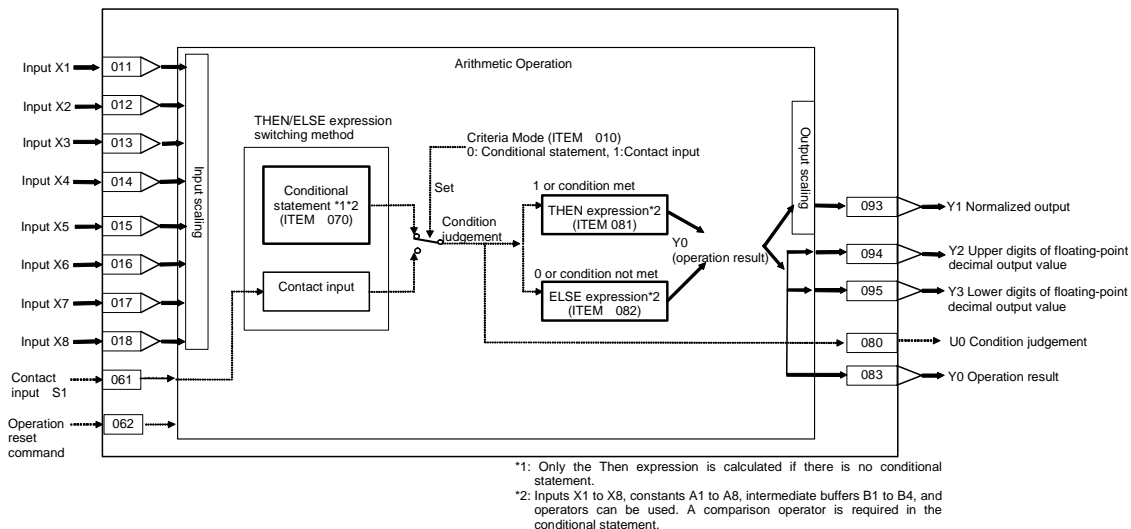
The result of a conditional statement or the status of a contact input (S1) can be used to switch between two expressions (THEN/ELSE expressions) to calculate and output the operation results Y0.

It is also possible to set just one expression (the THEN expression) and use it unconditionally.

- Up to eight analog input values, X1 to X8, can be scaled to floating-point numbers and then used in the conditional statement or calculation expressions.
- The operators (arithmetic, trigonometric, etc), floating-point values A1 to A8, and the B1 to B4 intermediate buffers can be used in the conditional statement or calculation expressions. The conditional statement and calculation expressions must each be 32 characters or less.
- A comparison operator (<, >, etc.) must be used in the conditional statement.
- The specified calculation results can also be stored in the B1 to B4 intermediate buffers.
- The source data for inputs X1 to X8 is automatically detected inside the Loop Control Unit as normalized data or floating point data. (If floating point data is detected, scaling is disabled.) This enables specification of floating point data as the source data. (Supported from version 2.50 of the Loop Control Unit.)
If floating point data is detected for inputs X1 to X8, X1 to X8 input values (ITEM 021 to ITEM 028) will always be 0.

Note: The operation result Y0 is output in both normalized form as Y1 for use in the Loop Control Unit (0.00% to 100.00% fixed decimal point data) and as floating-point data (Y2 and Y3).

Block diagram



Description

The criteria mode set in ITEM 010 is used to designate the method for switching between the THEN and ELSE expressions.

1) Criteria Mode Set to Conditional Statement

The THEN expression is used when the conditional statement is satisfied (i.e., the judgement is 1).

The ELSE expression is used when the conditional statement is not satisfied (i.e., the judgement is 0).

The conditional statement is an expression using a comparison operator. It must consist of 32 characters max.

The left side of the THEN expression must consist of 32 characters max. (i.e., not including the operation results Y0=).

The left side of the ELSE expression must consist of 32 characters max. (i.e., not including the operation results Y0=).

Note: The THEN expression will be used if there is no conditional statement or there is no comparison operator in the conditional expression.

2) Criteria Mode set to Contact Input S1

The THEN expression is used when contact input S1 is 1 (i.e., the judgement is 1).

The ELSE expression is used when contact input S1 is 0 (i.e., the judgement is 0).

The left side of the THEN expression must consist of 32 characters max. (i.e., not including the operation results Y0=).

The left side of the ELSE expression must consist of 32 characters max. (i.e., not including the operation results Y0=).

The comparison operators that can be used in the conditional statement are as follows:
 =, >, <, <>, >=, <=

Note: Using Equals (=) in the Conditional Statement

Internal calculations are performed using signal precision floating-point decimal.

Floating-point error will result from division for scaling, division, numeric functions, etc. The possibility of error must be considered when using the equals operator (=). A <= or >= operator should be used whenever the size relationship can be expressed in the conditional statement.

The operators that can be used in the conditional statement and calculation expressions are as follows:

| Symbol | Operator |
|---------|----------------|
| + | Addition |
| - | Subtraction |
| * | Multiplication |
| / | Division |
| ABS(x) | Absolute value |
| ACOS(x) | Arccosine |
| ASIN(x) | Arcsine |
| ATAN(x) | Arctangent |
| COS(x) | Cosine |
| SIN(x) | Sine |
| TAN(x) | Tangent |

| Symbol | Operator |
|---------|--------------------|
| EXP(x) | Exponent |
| LN(x) | Natural log |
| LOG(x) | Common log (log10) |
| P10(x) | Exponent of 10 |
| SQRT(x) | Square root |

Note: The analog input signals (X1 to X8), constants (A1 to A8), intermediate buffers (B1 to B4), and operation results (Y0) can be used for the argument (x).

Setting Examples

| ITEM | Name | Data |
|------|-------------------------|----------------------------------|
| 010 | Criteria mode | 0 (conditional expression) |
| 070 | Conditional statement | (X1+X2+X3+X4+A5+A6+A7+A8)/A1>=A2 |
| 071 | Intermediate buffer B1= | LN(X1)+EXP(X2) |
| 072 | Intermediate buffer B2= | B2+SQRT(Y0) |
| 073 | Intermediate buffer B3= | B2+X1*(-1.2345E-9) |
| 074 | Intermediate buffer B4= | SQRT(A8*(X1+X2)+A7) |
| 081 | THEN expression Y0= | X1+B3+B4 |
| 082 | ELSE expression Y0= | X2+B3-B4 |

5 Arithmetic blocks

<126> Arithmetic Operation 100 to 349

ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|---|--------------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command 0: Cancel stop, 1: Stop | 0, 1 | 0 | | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Arithmetic Operation | 126 | 126 | | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: error (See Appendix "Execution Error Code List.") | | 0000 | | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (seconds) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 4 | | R/W(S) | - | - | - | - | 2 |
| Contact input | 010 | | Criteria mode 0: Conditional statement (If ITEM 070 is blank, a THEN statement will be executed.) 1: Contact input (ITEM 061) | 0, 1 | 0 | | R/W(S) | - | - | - | S/R | 1 |
| Analog input connection information | 011 | | X1 source designation (BBB: Block address, III: ITEM number) | BBB or III | 000000 | | R/W(S) | - | - | - | - | 4 |
| | 012 | | X2 source designation (BBB: Block address, III: ITEM number) | BBB or III | 000000 | | R/W(S) | - | - | - | - | 4 |
| | 013 | | X3 source designation (BBB: Block address, III: ITEM number) | BBB or III | 000000 | | R/W(S) | - | - | - | - | 4 |
| | 014 | | X4 source designation (BBB: Block address, III: ITEM number) | BBB or III | 000000 | | R/W(S) | - | - | - | - | 4 |
| | 015 | | X5 source designation (BBB: Block address, III: ITEM number) | BBB or III | 000000 | | R/W(S) | - | - | - | - | 4 |
| | 016 | | X6 source designation (BBB: Block address, III: ITEM number) | BBB or III | 000000 | | R/W(S) | - | - | - | - | 4 |
| | 017 | | X7 source designation (BBB: Block address, III: ITEM number) | BBB or III | 000000 | | R/W(S) | - | - | - | - | 4 |
| | 018 | | X8 source designation (BBB: Block address, III: ITEM number) | BBB or III | 000000 | | R/W(S) | - | - | - | - | 4 |
| Analog input | 021 | X1 | X1 input value | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| | 022 | X2 | X2 input value | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| | 023 | X3 | X3 input value | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| | 024 | X4 | X4 input value | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| Analog input | 025 | X5 | X5 input value | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| | 026 | X6 | X6 input value | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| | 027 | X7 | X7 input value | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| | 028 | X8 | X8 input value | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| Parameter | 031 | | X1 scaling upper limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 1 numeric digit | 10 characters max. | | | R/W(S) | - | - | - | - | 12 |
| | 032 | | X1 scaling lower limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 1 numeric digit | 10 characters max. | | | R/W(S) | - | - | - | - | 12 |
| | 033 | | X2 scaling upper limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 1 numeric digit | 10 characters max. | | | R/W(S) | - | - | - | - | 12 |
| | 034 | | X2 scaling lower limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 1 numeric digit | 10 characters max. | | | R/W(S) | - | - | - | - | 12 |

5 Arithmetic blocks
<126> Arithmetic Operation 100 to 349

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|-----------|------|--------|---|--------------------|---------|---------------------------|--|------------------------------|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| | 035 | | X3 scaling upper limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 1 numeric digit | 10 characters max. | | | R/W(S) | - | - | - | - | 12 |
| | 036 | | X3 scaling lower limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 1 numeric digit | 10 characters max. | | | R/W(S) | - | - | - | - | 12 |
| | 037 | | X4 scaling upper limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 1 numeric digit | 10 characters max. | | | R/W(S) | - | - | - | - | 12 |
| | 038 | | X4 scaling lower limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 1 numeric digit | 10 characters max. | | | R/W(S) | - | - | - | - | 12 |
| | 039 | | X5 scaling upper limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 1 numeric digit | 10 characters max. | | | R/W(S) | - | - | - | - | 12 |
| | 040 | | X5 scaling lower limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 1 numeric digit | 10 characters max. | | | R/W(S) | - | - | - | - | 12 |
| | 041 | | X6 scaling upper limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 1 numeric digit | 10 characters max. | | | R/W(S) | - | - | - | - | 12 |
| | 042 | | X6 scaling lower limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 1 numeric digit | 10 characters max. | | | R/W(S) | - | - | - | - | 12 |
| | 043 | | X7 scaling upper limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 1 numeric digit | 10 characters max. | | | R/W(S) | - | - | - | - | 12 |
| | 044 | | X7 scaling lower limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 1 numeric digit | 10 characters max. | | | R/W(S) | - | - | - | - | 12 |
| | 045 | | X8 scaling upper limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 1 numeric digit | 10 characters max. | | | R/W(S) | - | - | - | - | 12 |
| | 046 | | X8 scaling lower limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 1 numeric digit | 10 characters max. | | | R/W(S) | - | - | - | - | 12 |
| | 051 | | A1 Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 1 numeric digit | 10 characters max. | | | R/W(O) | - | - | - | - | 12 |
| | 052 | | A2 Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 1 numeric digit | 10 characters max. | | | R/W(O) | - | - | - | - | 12 |
| | 053 | | A3 Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 1 numeric digit | 10 characters max. | | | R/W(O) | - | - | - | - | 12 |
| | 054 | | A4 Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 1 numeric digit | 10 characters max. | | | R/W(O) | - | - | - | - | 12 |
| | 055 | | A5 Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 1 numeric digit | 10 characters max. | | | R/W(O) | - | - | - | - | 12 |
| | 056 | | A6 Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 1 numeric digit | 10 characters max. | | | R/W(O) | - | - | - | - | 12 |

5 Arithmetic blocks

<126> Arithmetic Operation 100 to 349

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|----------------|------|--------|---|----------------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| | 057 | | A7 Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 1 numeric digit | 10 characters max. | | | R/W(O) | - | - | - | - | 12 |
| | 058 | | A8 Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 1 numeric digit | 10 characters max. | | | R/W(O) | - | - | - | - | 12 |
| Contact input | 061 | S1 | Contact input | 0, 1 | | | - | - | - | R/W | S/R | 1 |
| | 062 | S2 | Operation reset command | 0, 1 | 0 | | R/W(O) | - | - | R/W | S/R | 1 |
| Parameter | 070 | | Conditional statement | 32 characters max. | | | R/W(S) | - | - | - | - | 34 |
| | 071 | | B1 intermediate buffer | 32 characters max. | | | R/W(S) | - | - | - | - | 34 |
| | 072 | | B2 intermediate buffer | 32 characters max. | | | R/W(S) | - | - | - | - | 34 |
| | 073 | | B3 intermediate buffer | 32 characters max. | | | R/W(S) | - | - | - | - | 34 |
| | 074 | | B4 intermediate buffer | 32 characters max. | | | R/W(S) | - | - | - | - | 34 |
| Contact output | 080 | U0 | Condition judgement 0: Criteria not met or contact input OFF, 1: Criteria met or contact input ON | 0, 1 | | | - | - | - | R | S | 1 |
| Parameter | 081 | | THEN expression | 32 characters max. | | | R/W(S) | - | - | - | - | 34 |
| | 082 | | ELSE expression | 32 characters max. | | | R/W(S) | - | - | - | - | 34 |
| Analog output | 083 | Y0 | Operation result (result of THEN expression or result of ELSE expression) | Floating-point value | | | r | - | - | - | - | 4 |
| Parameter | 091 | | Output reverse scaling upper limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 1 numeric digit | 10 characters max. | | | R/W(S) | - | - | - | - | 12 |
| | 092 | | Output reverse scaling lower limit Floating point decimal: Sign + 5 numeric digits + Decimal point, + E + Sign + 1 numeric digit | 10 characters max. | | | R/W(S) | - | - | - | - | 12 |
| Analog output | 093 | Y1 | Normalized output value (value after reverse scaling for Y0) | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| | 094 | Y2 | Floating-point decimal output value (upper digits of Y0) | 0 to 65535 | 0 | | r | - | - | - | S | 2 |
| | 095 | Y3 | Floating-point decimal output value (lower digits of Y0) | 0 to 65535 | 0 | | r | - | - | - | S | 2 |

Note:

- The normalized output (Y1, ITEM 093) is the operation result (Y0, ITEM 083) scaled back to between 0% and 100% (fixed floating-point value) using the output reverse scaling upper and lower limits (ITEM 091 and ITEM 092). Y1 is rounded to two decimal places.
- The upper and lower digits of the floating-point decimal output value (Y2 and Y3, ITEM 094 and ITEM 095) use the IEEE754 format (bits 00 to 22: mantissa, bits 23 to 30: exponent, bit 31: sign). This enables outputting the results to I/O memory in the CPU Unit using an AO Terminal to CPU Unit Block for application in floating-point data conversion and math instructions in the CPU Unit ladder program. It also enables monitoring the data as floating-point decimal data on the CX-Programmer's I/O memory editing window.
- Turning ON the operation reset command (S2, ITEM 062) will clear the operation result (Y0), normalized output value (Y1), and the floating-point output value (Y2 and Y3) to zero before processing calculations. (From version 2.50 of the Loop Control Unit, the operation result Y0 will be 0 as long as the operation reset command S2 is 1 (ON).)
For example, this can be used to reset a total when inputting Y0 in accumulative calculations for the THEN or ELSE expression.
- Floating-point decimal data must be within the following ranges as well as within the range specified for each ITEM.
This applies to the scaling upper and lower limits for X1 to X8, constants A1 to A8, the conditional statement, intermediate buffers B1 to B4, the THEN expression, the ELSE expression, and the output reverse scaling upper and lower limits.
Range: -3.402823×10^{38} to $-1.401298 \times 10^{-45}$, $+1.401298 \times 10^{-45}$ to $+3.402823 \times 10^{38}$

•Floating-point decimal data can be given in any of the following formats (x = 0 to 9):
xxx, x.x, xxxxx.xxxxx, +x.xxxxEx, x.xxxx+Ex. +x.xxxxExx, x.xxxx+Exx, x.xxxxE-x, x.xxxxE-xx,
-x.xxxxE-x, -x.xxxxE-xx

In all of these formats, the mantissa is to the left of E and the exponent is to the right of E.

Example: +1.2345E7 would be 1.2345×10^7

•The order of calculations of the ITEMS is as follows:

B1, B2, B3, B4, conditional statement, THEN expression, ELSE expression.

•When the Loop Control Unit is cold-started, B1 to B4, the condition judgement (U0), and the operation result (Y0) are cleared to 0. If an intermediate buffer is used as the denominator in a division operation without placing a suitable value in the buffer, a division by 0 error (execution error 10) will occur.

• When the source data for input Xn is the Loop Control Unit's internal data (0.00% to 100.00%: fixed decimal point), always set the Xn scaling value (ITEM 031 to 046) to lower limit 0.00 and upper limit 100.00.

If the Xn scaling value is blank, operations will be performed using the lower limit 0 and upper limit 10,000. Therefore, if the Xn scaling value is left blank, Xn = 30.00% will be arithmetically converted to 3,000.0.

If the source data for input Xn is a cumulative value or other integer, however, and using the lower limit 0 and upper limit 10,000 are not a problem, the Xn scaling value can be left blank.

For example, Xn = 3,000 will be treated arithmetically as 3,000.

•Execution Errors

If an execution error occurs, execution of the Arithmetic Operation block will be stopped. If this occurs, check all operators, arguments, and the operation result and correct the conditional statement or calculation expressions as necessary. The execution errors that can occur for this block are described below.

Execution error 3 will occur if constants A1 to A8 or the intermediate buffers (B1 to B4) are used in the conditional statement or calculation expressions but not defined. (Definition is not required for ITEMS that are not used.)

•Execution error 19 (unsuitable operation) will occur if there is a syntax error in the conditional statement or a calculation expression or if the THEN expression, ELSE expression, or output reverse scaling upper/lower limits are not defined.

The execution errors that can occur for this operators are listed in the following table.

| Symbol | Operator | Execution error |
|---------|--------------------|--|
| + | Addition | None |
| - | Subtration | None |
| * | Multiplication | None |
| / | Division | Execution error 10 (division by 0) will occur if an attempt is made to divide by 0. |
| ABS(x) | Absolute value | Execution error 11 (operation exceeded) will occur if x is negative and the result exeeded the range of numbers for single-percision floating-point. |
| ACOS(x) | Arccosine | Execution error 12 (augment beyond definition) will occur if the arugment is not between -1.0 and 1.0. |
| ASIN(x) | Arcsine | Execution error 12 (augment beyond definition) will occur if the arugment is not between -1.0 and 1.0. |
| ATAN(x) | Arctangent | None |
| COS(x) | Cosine | None |
| SIN(x) | Sine | None |
| TAN(x) | Tangent | None |
| EXP(x) | Exponent | Execution error 11 (operation exceeded) will occur the result exeeded the range of numbers for single-percision floating-point. |
| LN(x) | Natural log | Execution error 11 (operation exceeded) will occur if x is 0.0. Execution error 12 (augment beyond definition) will occur if x is negative. |
| LOG(x) | Common log (log10) | Execution error 11 (operation exceeded) will occur if x is 0.0. Execution error 12 (augment beyond definition) will occur if x is negative. |
| P10(x) | Exponent of 10 | None |
| SQRT(x) | Square root | Execution error 12 (augment beyond definition) will occur if x is negative. |

5 Arithmetic blocks

<126> Arithmetic Operation 100 to 349

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM <0> | Data Name | CSV Tags in SCADA Software |
|----------|---|-------------------------------|
| | | Tag ITEM (Fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 010 | Criteria mode | S0 |
| 021 | Input | X1 |
| 022 | Input | X2 |
| 023 | Input | X3 |
| 024 | Input | X4 |
| 025 | Input | X5 |
| 026 | Input | X6 |
| 027 | Input | X7 |
| 028 | Input | X8 |
| 061 | Contact input | S1 |
| 062 | Operation reset command | S2 |
| 080 | Judgement | U0 |
| 093 | Normalized output value | Y1 |
| 094 | Floating-point decimal output value (upper digits of Y0) | Y2 |
| 095 | Floating-point decimal output value (lower digits of Y0) | Y3 |

| Block Model | Block Name | Block Address |
|-------------|------------------|---------------|
| <127> | Range Conversion | 100 to 349 |

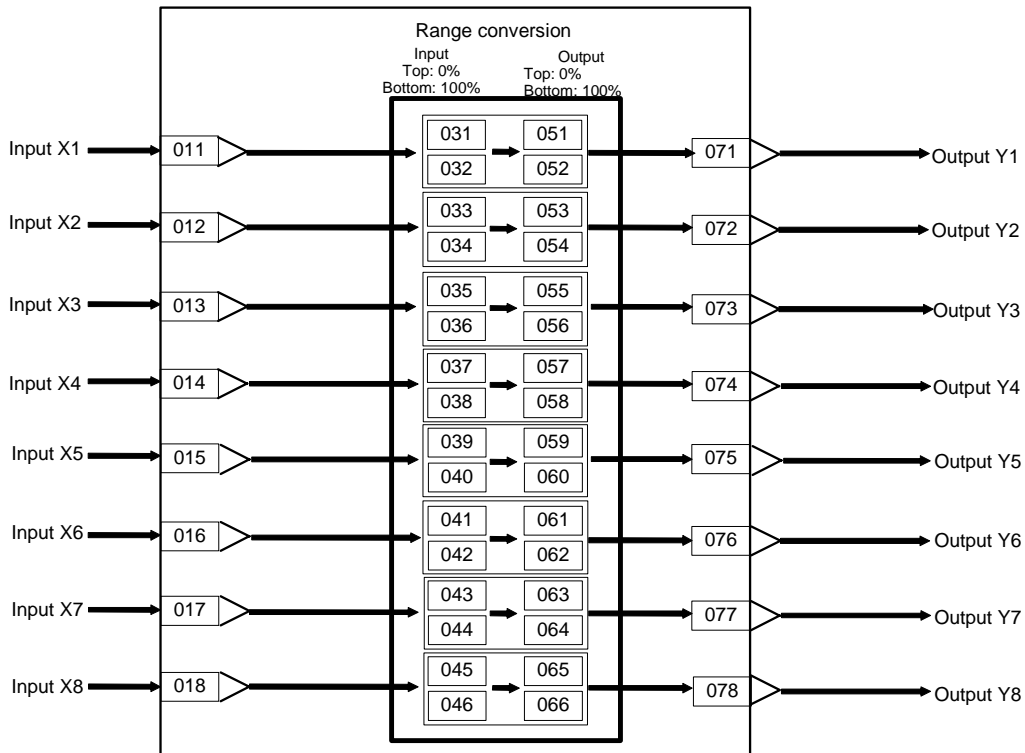
Outline

This function block converts ranges for analog signals simply by setting the values for 0% and 100% inputs and 0% and 100% outputs. Range conversions are possible for up to eight analog inputs.

Applications

Used between function blocks. Using a range conversion eliminates the need to calculate coefficients and biases.

Block diagram



5 Arithmetic blocks

<127> Range Conversion 100 to 349

ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|---|---------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | | - | R/W | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Range Conversion | 127 | 127 | | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | | R/W(S) | - | - | - | - | 2 |
| Analog input connection information | 011 | | X1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | | R/W(S) | - | - | - | - | 4 |
| | 012 | | X2 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | | R/W(S) | - | - | - | - | 4 |
| | 013 | | X3 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | | R/W(S) | - | - | - | - | 4 |
| | 014 | | X4 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | | R/W(S) | - | - | - | - | 4 |
| | 015 | | X5 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | | R/W(S) | - | - | - | - | 4 |
| | 016 | | X6 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | | R/W(S) | - | - | - | - | 4 |
| | 017 | | X7 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | | R/W(S) | - | - | - | - | 4 |
| | 018 | | X8 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | | R/W(S) | - | - | - | - | 4 |
| Analog inputs | 021 | X1 | Input value | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| | 022 | X2 | Input value | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| | 023 | X3 | Input value | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| | 024 | X4 | Input value | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| | 025 | X5 | Input value | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| | 026 | X6 | Input value | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| | 027 | X7 | Input value | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| | 028 | X8 | Input value | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| Parameters | 031 | | Input range 0% (Input value X1) | ±320.00% | 0.00 | | R/W(S) | - | - | - | - | 2 |
| | 032 | | Input range 100% (Input value X1) | ±320.00% | 100.00 | | R/W(S) | - | - | - | - | 2 |
| | 033 | | Input range 0% (Input value X2) | ±320.00% | 0.00 | | R/W(S) | - | - | - | - | 2 |
| | 034 | | Input range 100% (Input value X2) | ±320.00% | 100.00 | | R/W(S) | - | - | - | - | 2 |
| | 035 | | Input range 0% (Input value X3) | ±320.00% | 0.00 | | R/W(S) | - | - | - | - | 2 |
| | 036 | | Input range 100% (Input value X3) | ±320.00% | 100.00 | | R/W(S) | - | - | - | - | 2 |
| | 037 | | Input range 0% (Input value X4) | ±320.00% | 0.00 | | R/W(S) | - | - | - | - | 2 |
| | 038 | | Input range 100% (Input value X4) | ±320.00% | 100.00 | | R/W(S) | - | - | - | - | 2 |
| | 039 | | Input range 0% (Input value X5) | ±320.00% | 0.00 | | R/W(S) | - | - | - | - | 2 |
| | 040 | | Input range 100% (Input value X5) | ±320.00% | 100.00 | | R/W(S) | - | - | - | - | 2 |
| | 041 | | Input range 0% (Input value X6) | ±320.00% | 0.00 | | R/W(S) | - | - | - | - | 2 |
| | 042 | | Input range 100% (Input value X6) | ±320.00% | 100.00 | | R/W(S) | - | - | - | - | 2 |
| | 043 | | Input range 0% (Input value X7) | ±320.00% | 0.00 | | R/W(S) | - | - | - | - | 2 |
| | 044 | | Input range 100% (Input value X7) | ±320.00% | 100.00 | | R/W(S) | - | - | - | - | 2 |
| | 045 | | Input range 0% (Input value X8) | ±320.00% | 0.00 | | R/W(S) | - | - | - | - | 2 |
| | 046 | | Input range 100% (Input value X8) | ±320.00% | 100.00 | | R/W(S) | - | - | - | - | 2 |
| | 051 | | Output range 0% (Output value Y1) | ±320.00% | 0.00 | | R/W(S) | - | - | - | - | 2 |
| | 052 | | Output range 100% (Output value Y1) | ±320.00% | 100.00 | | R/W(S) | - | - | - | - | 2 |
| | 053 | | Output range 0% (Output value Y2) | ±320.00% | 0.00 | | R/W(S) | - | - | - | - | 2 |
| | 054 | | Output range 100% (Output value Y2) | ±320.00% | 100.00 | | R/W(S) | - | - | - | - | 2 |
| | 055 | | Output range 0% (Output value Y3) | ±320.00% | 0.00 | | R/W(S) | - | - | - | - | 2 |
| | 056 | | Output range 100% (Output value Y3) | ±320.00% | 100.00 | | R/W(S) | - | - | - | - | 2 |
| | 057 | | Output range 0% (Output value Y4) | ±320.00% | 0.00 | | R/W(S) | - | - | - | - | 2 |
| | 058 | | Output range 100% (Output value Y4) | ±320.00% | 100.00 | | R/W(S) | - | - | - | - | 2 |
| | 059 | | Output range 0% (Output value Y5) | ±320.00% | 0.00 | | R/W(S) | - | - | - | - | 2 |
| | 060 | | Output range 100% (Output value Y5) | ±320.00% | 100.00 | | R/W(S) | - | - | - | - | 2 |
| | 061 | | Output range 0% (Output value Y6) | ±320.00% | 0.00 | | R/W(S) | - | - | - | - | 2 |
| | 062 | | Output range 100% (Output value Y6) | ±320.00% | 100.00 | | R/W(S) | - | - | - | - | 2 |
| | 063 | | Output range 0% (Output value Y7) | ±320.00% | 0.00 | | R/W(S) | - | - | - | - | 2 |

5 Arithmetic blocks
<127> Range Conversion 100 to 349

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|----------------|------|--------|-------------------------------------|------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | |
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| | 064 | | Output range 100% (Output value Y7) | ±320.00% | 100.00 | | R/W(S) | - | - | - | - | 2 |
| | 065 | | Output range 0% (Output value Y8) | ±320.00% | 0.00 | | R/W(S) | - | - | - | - | 2 |
| | 066 | | Output range 100% (Output value Y8) | ±320.00% | 100.00 | | R/W(S) | - | - | - | - | 2 |
| Analog outputs | 071 | Y1 | Output value | ±320.00% | 0.00 | | r/w | - | - | - | S | 2 |
| | 072 | Y2 | Output value | ±320.00% | 0.00 | | r/w | - | - | - | S | 2 |
| | 073 | Y3 | Output value | ±320.00% | 0.00 | | r/w | - | - | - | S | 2 |
| | 074 | Y4 | Output value | ±320.00% | 0.00 | | r/w | - | - | - | S | 2 |
| | 075 | Y5 | Output value | ±320.00% | 0.00 | | r/w | - | - | - | S | 2 |
| | 076 | Y6 | Output value | ±320.00% | 0.00 | | r/w | - | - | - | S | 2 |
| | 077 | Y7 | Output value | ±320.00% | 0.00 | | r/w | - | - | - | S | 2 |
| | 078 | Y8 | Output value | ±320.00% | 0.00 | | r/w | - | - | - | S | 2 |

List of tag ITEMS on CX-Process Monitor or SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (Block Model 461)/Send All Blocks (Block Model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|------------------------------|----------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block execution command | MT_ST |
| 003 | Execution error display | ERR |
| 021 | Input value | X1 |
| 022 | Input value | X2 |
| 023 | Input value | X3 |
| 024 | Input value | X4 |
| 025 | Input value | X5 |
| 026 | Input value | X6 |
| 027 | Input value | X7 |
| 028 | Input value | X8 |
| 071 | Output value | Y1 |
| 072 | Output value | Y2 |
| 073 | Output value | Y3 |
| 074 | Output value | Y4 |
| 075 | Output value | Y5 |
| 076 | Output value | Y6 |
| 077 | Output value | Y7 |
| 078 | Output value | Y8 |

6 Function blocks

<131> Square Root 100 to 349

| Block Model | Block Name | Block Address |
|-------------|-------------|---------------|
| <131> | Square Root | 100 to 349 |

Outline

This function block performs square root extraction (with low-end cutout) on single analog signals.

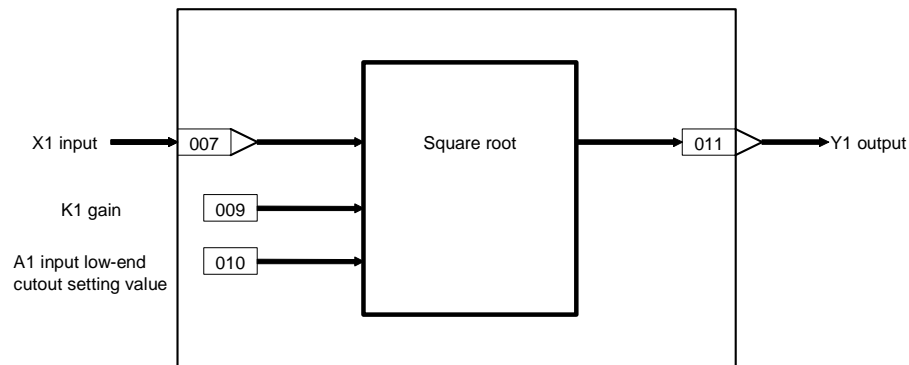
$$Y1 = K1 \sqrt{X1}$$

$Y1 = K1 \times X1$ when $X1$ is at the input low-end cutout setting or a minus value.

- Provided with input dropout function
- Method of use: To extract the square root signal from a differential pressure flowmeter, set $K1$ to equal 1. To change the span, change the value of $K1$.

Note: Calculate 100% in the calculation formula as 1.0.

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|---|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Square Root | 131 | 131 | | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | | R/W(S) | - | - | - | - | 2 |
| Analog input connection information | 007 | | X1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | | R/W(S) | - | - | - | - | 4 |
| Analog input | 008 | X1 | Input | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| Parameter | 009 | K1 | Gain | ±10.000 | 1.000 | | R/W(O) | - | W | - | S/R | 2 |
| | 010 | A1 | Input low-end cutout setting | 0 to 320.00% | 0.00 | | R/W(O) | - | W | - | S/R | 2 |
| Analog output | 011 | Y1 | Output | ±320.00% | 0.00 | | r/w | - | - | - | S | 2 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software Tag ITEM (fixed) |
|------|------------------------------|---|
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 008 | X1 Input | X1 |
| 009 | Gain | K1 |
| 010 | Input low-end cutout setting | A1 |
| 011 | Output | Y1 |

6 Function blocks

<132> Absolute Value 100 to 349

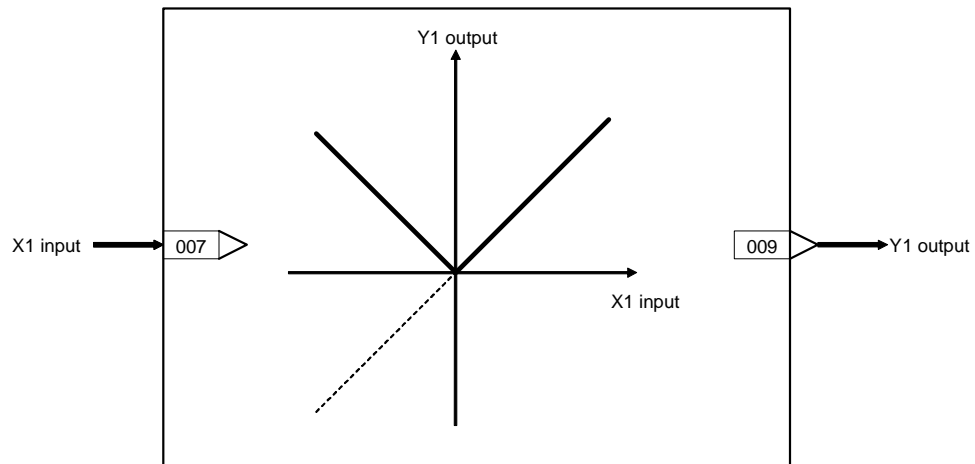
| Block Model | Block Name | Block Address |
|-------------|----------------|---------------|
| <132> | Absolute Value | 100 to 349 |

Outline

This function block outputs the absolute value of single analog signals.

$$Y1 = |X1|$$

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|---|---------------|------------|---------------------------|------------------------------|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Absolute Value | 132 | 132 | | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | | R/W(S) | - | - | - | - | 2 |
| Analog input connection information | 007 | | X1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | | R/W(S) | - | - | - | - | 4 |
| Analog input | 008 | X1 | Input | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| Analog output | 009 | Y1 | Output | ±320.00% | 0.00 | | r/w | - | - | - | S | 2 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|------------------------------|-------------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 008 | X1 input | X1 |
| 009 | Output | Y1 |

6 Function blocks

<133> Non-linear Gain (Dead Band) 100 to 349

| Block Model | Block Name | Block Address |
|-------------|-----------------------------|---------------|
| <133> | Non-linear Gain (Dead Band) | 100 to 349 |

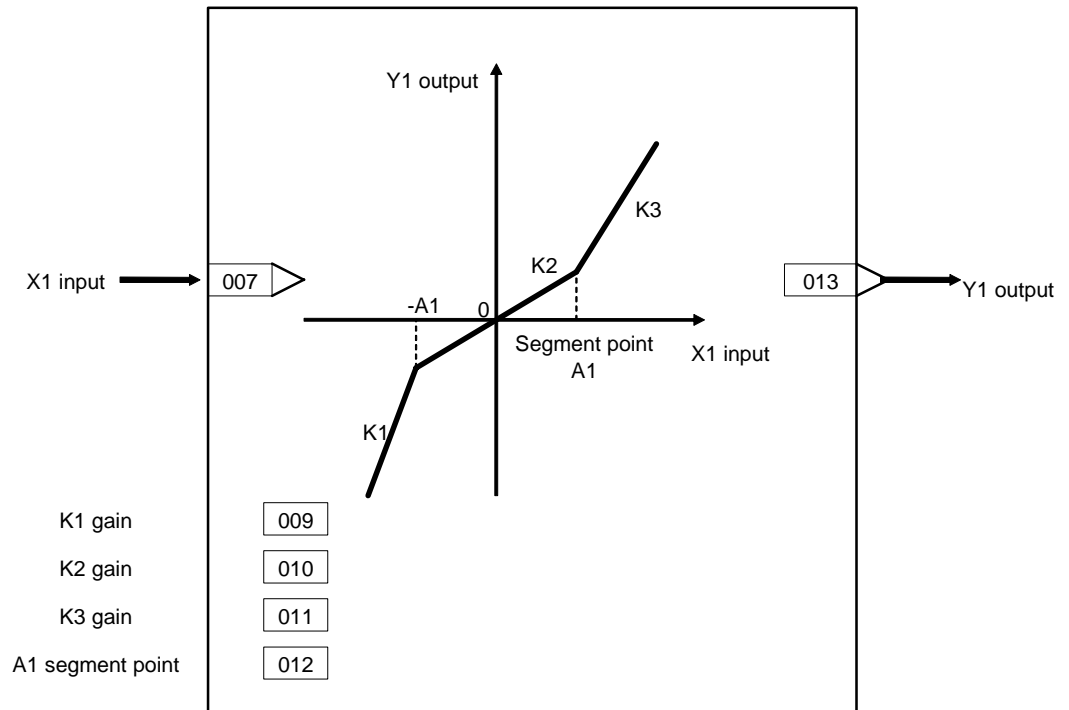
Outline

This function block performs non-linear (three gain values K1, K2, K3) operation on single analog signals. Analog signals can also be set as a dead band (with differential gap) by setting K2 to equal 0.

Function block applications

Non-linear control.

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|--|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | | R/W(S) | - | - | - | - | 24 |
| | 002 | | Model name: Non-linear Gain (Dead Band) | 133 | 133 | | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | | R/W(S) | - | - | - | - | 2 |
| Analog input connection information | 007 | | X1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | | R/W(S) | - | - | - | - | 4 |
| Analog input | 008 | X1 | Input | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| Parameter | 009 | K1 | K1 gain | ±10.000 | 1.000 | | R/W(O) | - | W | - | S/R | 2 |
| | 010 | K2 | K2 gain | ±10.000 | 1.000 | | R/W(O) | - | W | - | S/R | 2 |
| | 011 | K3 | K3 gain | ±10.000 | 1.000 | | R/W(O) | - | W | - | S/R | 2 |
| | 012 | A1 | Segment point | 0 to 320.00% | 0.00 | | R/W(O) | - | W | - | S/R | 2 |
| Analog output | 013 | Y1 | Output | ±320.00% | 0.00 | | r/w | - | - | - | S | 2 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software Tag ITEM (fixed) |
|------|------------------------------|---|
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 008 | X1 input | X1 |
| 009 | K1 gain | K1 |
| 010 | K2 gain | K2 |
| 011 | K3 gain | K3 |
| 012 | Segment point | A1 |
| 013 | Output | Y1 |

6 Function blocks

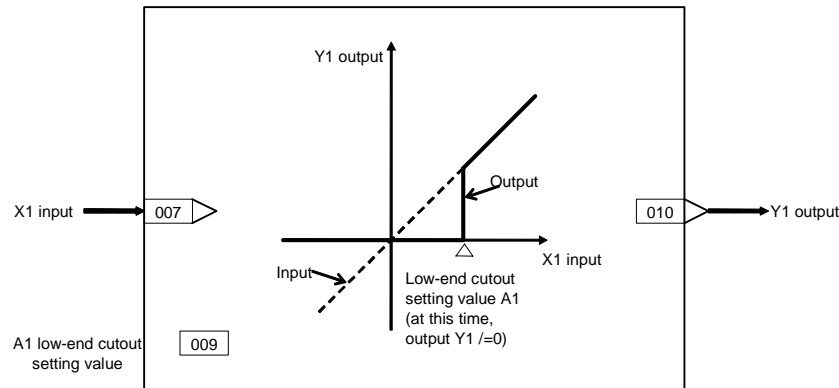
<134> Low-end Cutout 100 to 349

| Block Model | Block Name | Block Address |
|-------------|----------------|---------------|
| <134> | Low-end Cutout | 100 to 349 |

Outline

This function block sets output to zero close to the zero point of single analog signals.

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|---|---------------|------------|---------------------------|--|-------|------------------------------|---------------------------------|---------------------------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled | Note: | According to CX-Process Tool | According to CX-Process Monitor | According to ITEM Setting block | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Low-end Cutout | 134 | 134 | | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | | R | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | | R/W(S) | - | - | - | - | 2 |
| Analog input connection information | 007 | X1 | X1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | | R/W(S) | - | - | - | - | 4 |
| Analog input | 008 | X1 | Input | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| Parameter | 009 | A1 | Low-end cutout setting | 0 to 320.00% | 0.00 | | R/W(O) | - | W | - | S/R | 2 |
| Analog output | 010 | Y1 | Output | ±320.00% | 0.00 | | r/w | - | - | - | S | 2 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software Tag ITEM (fixed) |
|------|------------------------------|---|
| 000 | Stop block operation command | MT ST |
| 003 | Execution error display | ERR |
| 008 | X1 input | X1 |
| 009 | Low-end cutout setting | A1 |
| 010 | Output | Y1 |

| Block Model | Block Name | Block Address |
|-------------|--------------------|---------------|
| <135> | Segment Linearizer | 100 to 349 |

Outline

This function block converts single analog signals to 15 segments before the signal is output.

- 15 segments (16 segment points) are possible.
- When the input signal value is out of the setting range, Y1 output becomes the value of B0 or final Bn, and can be used jointly with the high/low limit function.
- Set so that the following input condition is satisfied:

$A1 < A2 < A3 < \dots < A_n$

For example, if input is set as follows:

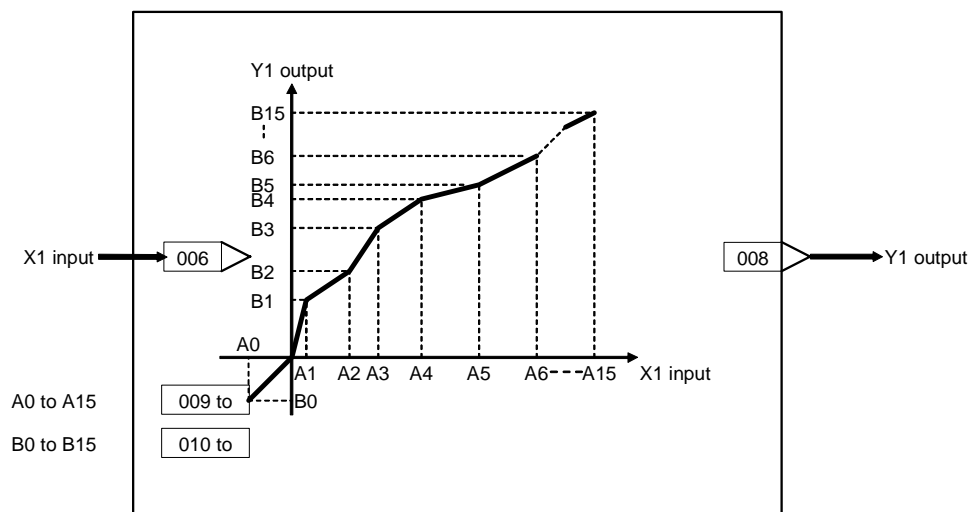
$A1 < A2 < A3 > A4 \dots > A_n$

Then, input A4 onwards up to A_n becomes a fixed output value.

Function block applications

- Control of control targets having non-linear static characteristics (e.g. variable gain control)
- Compensation of control targets having non-linear characteristics

Block diagram



6 Function blocks

<135> Segment Linearizer 100 to 349

ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|---|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Segment Linearizer | 135 | 135 | | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | | R/W(S) | - | - | - | - | 2 |
| Analog input connection information | 006 | | X1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | | R/W(S) | - | - | - | - | 4 |
| Analog input | 007 | X1 | Input | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| Analog output | 008 | Y1 | Output | ±320.00% | 0.00 | | r/w | - | - | - | S | 2 |
| Parameter | 009 | A0 | A0 input | ±320.00% | -320.00 | | R/W(O) | - | W | - | - | 2 |
| | 010 | B0 | B0 | ±320.00% | 0.00 | | R/W(O) | - | W | - | - | 2 |
| | 011 | A1 | A1 input | ±320.00% | -280.00 | | R/W(O) | - | W | - | - | 2 |
| | 012 | B1 | B1 output | ±320.00% | 80.00 | | R/W(O) | - | W | - | - | 2 |
| | 013 | A2 | A2 input | ±320.00% | -240.00 | | R/W(O) | - | W | - | - | 2 |
| | 014 | B2 | B2 output | ±320.00% | 0.00 | | R/W(O) | - | W | - | - | 2 |
| | 015 | A3 | A3 input | ±320.00% | -200.00 | | R/W(O) | - | W | - | - | 2 |
| | 016 | B3 | B3 output | ±320.00% | 80.00 | | R/W(O) | - | W | - | - | 2 |
| | 017 | A4 | A4 input | ±320.00% | -160.00 | | R/W(O) | - | W | - | - | 2 |
| | 018 | B4 | B4 output | ±320.00% | 0.00 | | R/W(O) | - | W | - | - | 2 |
| | 019 | A5 | A5 input | ±320.00% | -120.00 | | R/W(O) | - | W | - | - | 2 |
| | 020 | B5 | B5 output | ±320.00% | 80.00 | | R/W(O) | - | W | - | - | 2 |
| | 021 | A6 | A6 input | ±320.00% | -80.00 | | R/W(O) | - | W | - | - | 2 |
| | 022 | B6 | B6 output | ±320.00% | 0.00 | | R/W(O) | - | W | - | - | 2 |
| | 023 | A7 | A7 input | ±320.00% | -40.00 | | R/W(O) | - | W | - | - | 2 |
| | 024 | B7 | B7 output | ±320.00% | 80.00 | | R/W(O) | - | W | - | - | 2 |
| | 025 | A8 | A8 input | ±320.00% | 40.00 | | R/W(O) | - | W | - | - | 2 |
| | 026 | B8 | B8 output | ±320.00% | 0.00 | | R/W(O) | - | W | - | - | 2 |
| | 027 | A9 | A9 input | ±320.00% | 80.00 | | R/W(O) | - | W | - | - | 2 |
| | 028 | B9 | B9 output | ±320.00% | 80.00 | | R/W(O) | - | W | - | - | 2 |
| | 029 | A10 | A10 input | ±320.00% | 120.00 | | R/W(O) | - | W | - | - | 2 |
| | 030 | B10 | B10 output | ±320.00% | 0.00 | | R/W(O) | - | W | - | - | 2 |
| | 031 | A11 | A11 input | ±320.00% | 160.00 | | R/W(O) | - | W | - | - | 2 |
| | 032 | B11 | B11 output | ±320.00% | 80.00 | | R/W(O) | - | W | - | - | 2 |
| | 033 | A12 | A12 input | ±320.00% | 200.00 | | R/W(O) | - | W | - | - | 2 |
| | 034 | B12 | B12 output | ±320.00% | 0.00 | | R/W(O) | - | W | - | - | 2 |
| | 035 | A13 | A13 input | ±320.00% | 240.00 | | R/W(O) | - | W | - | - | 2 |
| | 036 | B13 | B13 output | ±320.00% | 80.00 | | R/W(O) | - | W | - | - | 2 |
| | 037 | A14 | A14 input | ±320.00% | 280.00 | | R/W(O) | - | W | - | - | 2 |
| | 038 | B14 | B14 output | ±320.00% | 0.00 | | R/W(O) | - | W | - | - | 2 |
| | 039 | A15 | A15 input | ±320.00% | 320.00 | | R/W(O) | - | W | - | - | 2 |
| | 040 | B15 | B15 output | ±320.00% | 80.00 | | R/W(O) | - | W | - | - | 2 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|------------------------------|-------------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 007 | X1 input | X1 |
| 008 | Output | Y1 |

6 Function blocks

<136> Temperature and Pressure Correction 100 to 349

| Block Model | Block Name | Block Address |
|-------------|-------------------------------------|---------------|
| <136> | Temperature and Pressure Correction | 100 to 349 |

Outline

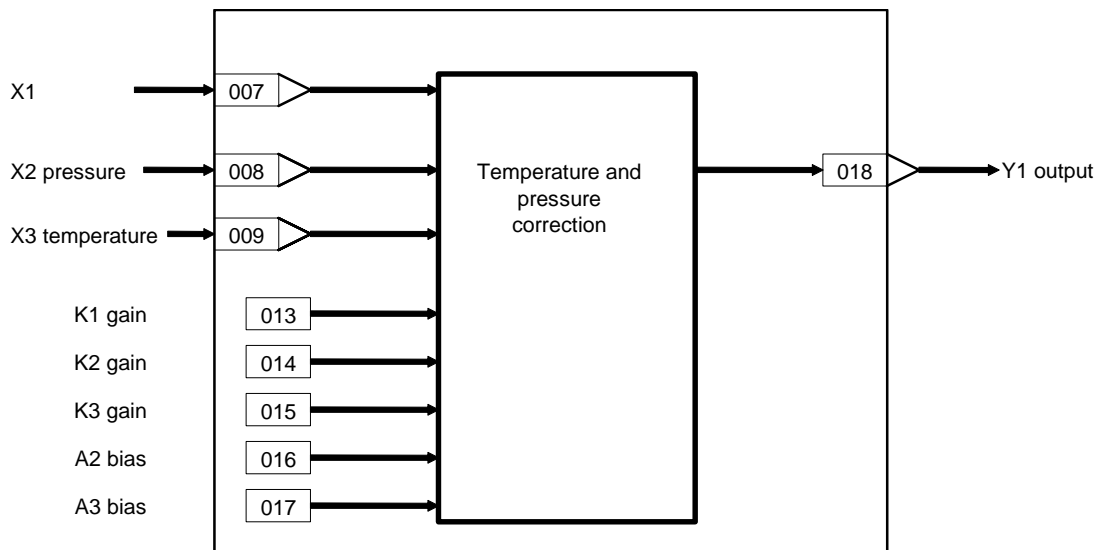
This function block corrects for the influence of temperature and pressure differences in measuring a gaseous flow by a differential pressure flowmeter.

$$Y1 = K1 \times X1 \sqrt{\frac{K2 \times X2 + A2}{K3 \times X3 + A3}}$$

- Internal operation is executed at double precision (32 bits).
- Temperature or pressure can also be corrected individually.
- X1 flow signal must be converted to a linear signal by extracting the square root before input.

Note: Calculate 100% in the calculation formula as 1.0. Output becomes 0 when the result in □ becomes a minus number.

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|--|---------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Temperature and Pressure Correction | 136 | 136 | | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | | R/W(S) | - | - | - | - | 2 |
| Analog input connection information | 007 | | X1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | | R/W(S) | - | - | - | - | 4 |
| | 008 | | X2 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | | R/W(S) | - | - | - | - | 4 |
| | 009 | | X3 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | | R/W(S) | - | - | - | - | 4 |
| Analog input | 010 | X1 | Flow input | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| | 011 | X2 | Pressure input | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| | 012 | X3 | Temperature input | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| Parameter | 013 | K1 | K1 gain | ±10.000 | 1.000 | | R/W(O) | - | W | - | S/R | 2 |
| | 014 | K2 | K2 gain | ±10.000 | 1.000 | | R/W(O) | - | W | - | S/R | 2 |
| | 015 | K3 | K3 gain | ±10.000 | 1.000 | | R/W(O) | - | W | - | S/R | 2 |
| | 016 | A2 | A2 bias | ±320.00% | 0.00 | | R/W(O) | - | W | - | S/R | 2 |
| | 017 | A3 | A3 bias | ±320.00% | 0.00 | | R/W(O) | - | W | - | S/R | 2 |
| Analog output | 018 | Y1 | Output | ±320.00% | 0.00 | | r/w | - | - | - | S | 2 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|------------------------------|----------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 010 | X1 flow input | X1 |
| 011 | X2 pressure input | X2 |
| 012 | X3 temperature input | X3 |
| 013 | K1 gain | K1 |
| 014 | K2 gain | K2 |
| 015 | K3 gain | K3 |
| 016 | A2 bias | A2 |
| 017 | A3 bias | A3 |
| 018 | Output | Y1 |

7 Time Function blocks

<141> First-order Lag 100 to 349

| Block Model | Block Name | Block Address |
|-------------|-----------------|---------------|
| <141> | First-order Lag | 100 to 349 |

Outline

This function block performs first-order lag operation on single analog signals that is required for reducing pulsation in the input signal.

•When S1 reset switch is set to 1 (ON), the output equals input.

$$Y1(s) = \frac{X1(s)}{1 + T \cdot s}$$

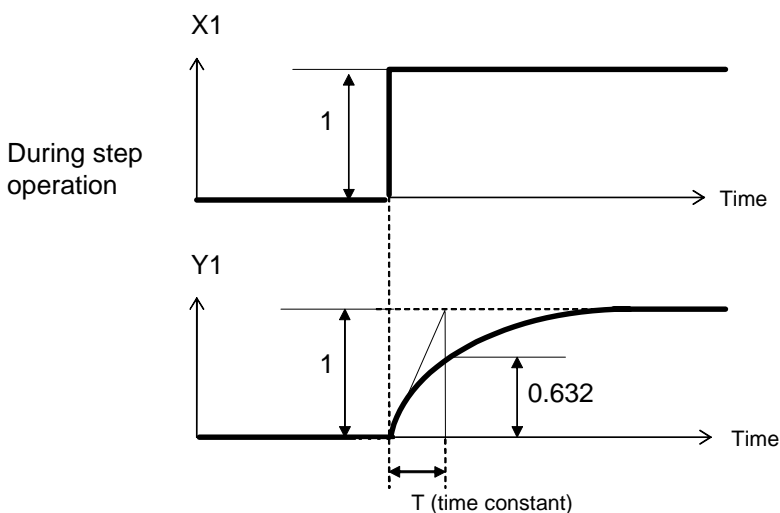
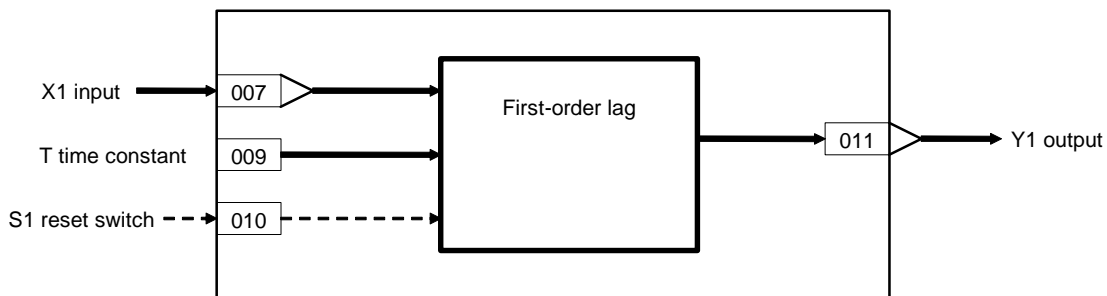
Note: Calculate 100% in the calculation formula as 1.0.

Note: When a cold start is performed, the values that were held before output OFF or before running was stopped are cleared from memory. These values are held when a hot start is performed.

Function block applications

Filtering of PV input (elimination of noise or pulsation)

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|--|---------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: First-order Lag | 141 | 141 | | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | | R/W(S) | - | - | - | - | 2 |
| Analog input connection information | 007 | | X1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | | R/W(S) | - | - | - | - | 4 |
| Analog input | 008 | X1 | Input | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| Parameter | 009 | T | Time constant (0: No delay) | 0 to 999.9s | 0.0 | | R/W(O) | - | W | - | S/R | 2 |
| Contact input | 010 | S1 | Reset switch (1: Y1=X1) | 0, 1 | 0 | | R/W(O) | - | - | R/W | S/R | 1 |
| Analog output | 011 | Y1 | Output | ±320.00% | 0.00 | | r/w | - | - | - | S | 2 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|------------------------------|----------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 008 | Input | X1 |
| 009 | Time constant | T |
| 010 | Reset switch | S1 |
| 011 | Output | Y1 |

7 Time Function blocks

<143> Rate-of-change Limit 100 to 349

| Block Model | Block Name | Block Address |
|-------------|----------------------|---------------|
| <143> | Rate-of-change Limit | 100 to 349 |

Outline

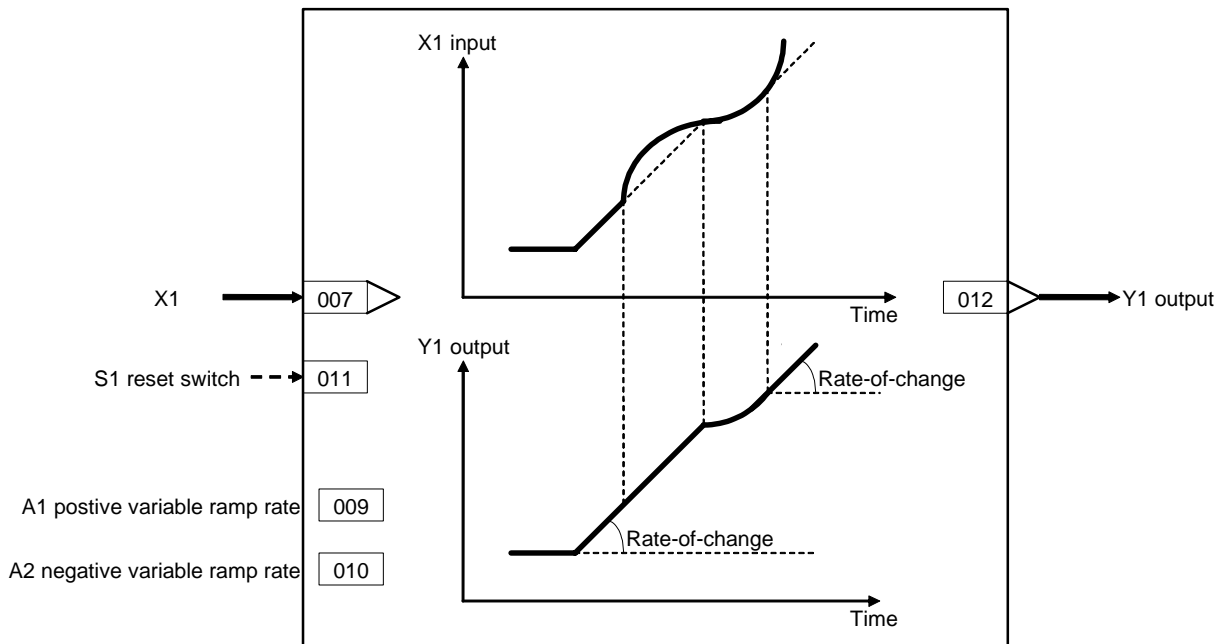
This function block performs rate-of-change limiting on single analog signals to reduce pulsation in the input signal.

When S1 reset switch is set to 1 (ON), the output equals input.

The time unit for the rate-of-change setting can be set to seconds, minutes, or hours. (Supported from version 2.50 of the Loop Control Unit.)

Note: When a cold start is performed, the values that were held before output OFF or before running was stopped are cleared from memory. These values are held when a hot start is performed.

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|-------|--------|---|---------------------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Rate-of-change Limit | 143 | 143 | | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | | R/W(S) | - | - | - | - | 2 |
| Analog input connection information | 007 | | X1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | | R/W(S) | - | - | - | - | 4 |
| Analog input | 008 | X1 | Input | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| Parameter | 009 | A1 | Positive ramp rate Note: Time unit set in ITEM 013. (Rate-of-change limit OFF when 0.00) | 0.00 to 320.00%/time unit | 320.00 | | R/W(O) | - | W | - | S/R | 2 |
| | 010 | A2 | Negative ramp rate Note: Time unit set in ITEM 013. (Rate-of-change limit OFF when 0.00) | 0.00 to 320.00%/time unit | 320.00 | | R/W(O) | - | W | - | S/R | 2 |
| Contact input/parameter | 011 | S1 | Reset Switch (1: Y1=X1) | 0, 1 | 0 | | R/W(O) | - | - | R/W | S/R | 1 |
| Analog output | 012 | Y1 | Output | ±320.00% | 0.00 | | - | - | - | - | S | 2 |
| Parameter | 013*2 | TMU | Time unit 0: sec, 1: min, 2: hr | 0 to 2 | 0 | | R/W (S) | - | - | - | S/R | 1 |

*2: This ITEM was added in Loop Control Unit Ver.2.50.

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|------------------------------|----------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 008 | Input | X1 |
| 009 | Positive ramp rate | A1 |
| 010 | Negative ramp rate | A2 |
| 011 | Reset Switch | S1 |
| 012 | Output | Y1 |
| 013 | Time unit | TMU |

7 Time Function blocks
<145> Moving Average 100 to 349

| Block Model | Block Name | Block Address |
|-------------|----------------|---------------|
| <145> | Moving Average | 100 to 349 |

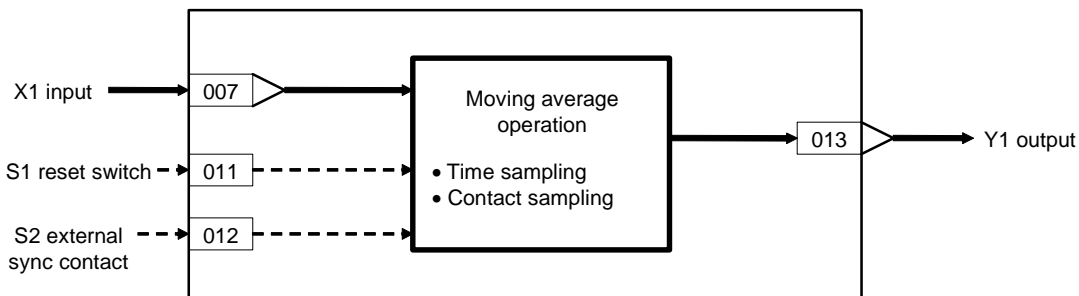
Outline

This function block performs moving average operation on single analog signals.

- There are two data sampling modes: sampling at fixed time intervals, and sampling of individual data items each time that an external contact turns ON. Selective use of these modes allows you to easily execute moving average operation on signals outputs from a batch type analyzer, for example.

Note: When a cold start is performed, the values that were held before output OFF or before running was stopped are cleared from memory. These values are held when a hot start is performed.

Block diagram



Supplementary note

By the moving average operation, the average value of n number of samples is taken and output with the oldest item of data discarded when a new item of data is added.

ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|--|---------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Moving Average | 145 | 145 | | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 1: 0.1, 2: 0.2, 3: 0.5, 4: 1 | 1 to 4 | 4 | | R/W(S) | - | - | - | - | 2 |
| | 006 | M | Sampling mode 0: Time, 1: Sync with external contact S2 | 0, 1 | 0 | | R/W(S) | - | - | - | - | 1 |
| Analog input connection information | 007 | | X1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | | R/W(S) | - | - | - | - | 4 |
| Analog input | 008 | X1 | Input | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| Parameter | 009 | H | Sampling cycle 0: Sample on operating cycle, 1 to 9999: Sample every 1 to 9999 s Note: This setting is ignored if the sampling mode is set to 1 (sync with external contact S2) | 0, 1 to 9999s | 0 | | R/W(S) | - | W | - | S/R | 2 |
| | 010 | N | Number of samples | 1 to 20 | 16 | | W(S) | - | - | - | S/R | 1 |
| Contact input | 011 | S1 | Reset switch (1: Y1=X1) | 0, 1 | 0 | | R/W(O) | - | - | R/W | S/R | 1 |
| | 012 | S2 | External sync contact (DIFU/DIFD commands used) | 0, 1 | 0 | | R/W(O) | - | - | R/W | S/R | 1 |
| Analog output | 013 | Y1 | Output | ±320.00% | 0.00 | | r/w | - | - | - | S | 2 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software Tag ITEM (fixed) |
|------|------------------------------|---|
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 008 | Input | X1 |
| 009 | Sampling cycle | H |
| 010 | Number of samples | N |
| 011 | Reset switch | S1 |
| 012 | External sync contact | S2 |
| 013 | Output | Y1 |

7 Time Function blocks
<147> Lead/Delay 100 to 349

| Block Model | Block Name | Block Address |
|-------------|------------|---------------|
| <147> | Lead/Delay | 100 to 349 |

Outline

This function block performs lead/delay operation of control signals on single analog signals.

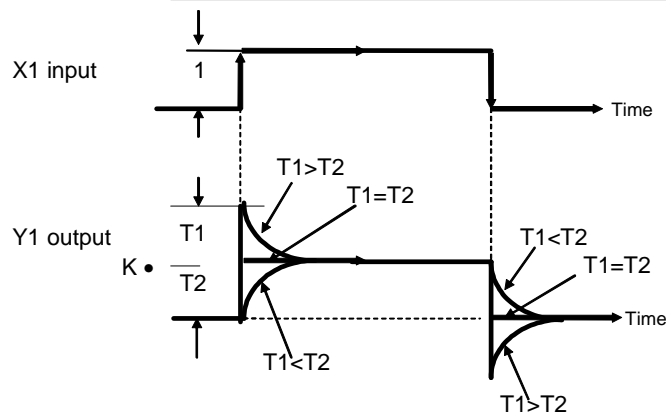
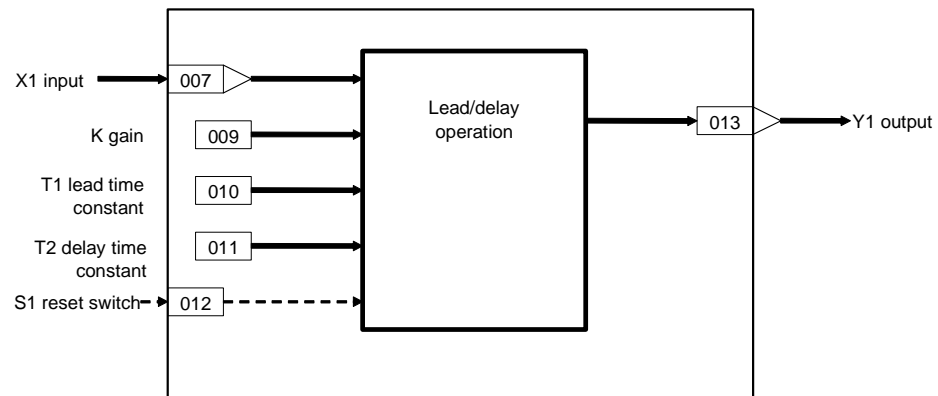
$$Y1(s) = K \frac{1 + T1 \cdot s}{1 + T2 \cdot s}$$

Note: When a cold start is performed, the values that were held before output OFF or before running was stopped are cleared from memory. These values are held when a hot start is performed.

Function block applications

Feedforward control, non-interacting control (e.g. used when counteracting the influence of disturbance)

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|---|---------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Lead/Delay | 147 | 147 | | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cyce (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | | R/W(S) | - | - | - | - | 2 |
| Analog input connection information | 007 | | X1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | | R/W(S) | - | - | - | - | 4 |
| Analog input | 008 | X1 | Input | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| Parameter | 009 | K | Gain | ±10.000 | 1.000 | | R/W(O) | - | W | - | S/R | 2 |
| | 0010 | T1 | Time constant (0: No Lead) | 0 to 999.9s | 1.0 | | R/W(O) | - | W | - | S/R | 2 |
| | 0011 | T2 | Time constant (0: No delay) | 0 to 999.9s | 10.0 | | R/W(O) | - | W | - | S/R | 2 |
| Contact input | 012 | S1 | Reset switch (1:Y1=X1) | 0, 1 | 0 | | R/W(O) | - | - | R/W | S/R | 1 |
| Analog output | 013 | Y1 | Output | ±320.00% | 0.00 | | r/w | - | - | - | S | 2 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|------------------------------|----------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 008 | Input | X1 |
| 009 | Gain | K |
| 010 | Time constant (No Lead) | T1 |
| 011 | Time constant (No delay) | T2 |
| 012 | Reset switch | S1 |
| 013 | Output | Y1 |

7 Time Function blocks
<148> Dead Time 001 to 032

| Block Model | Block Name | Block Address |
|-------------|------------|---------------|
| <148> | Dead Time | 001 to 032 |

Outline

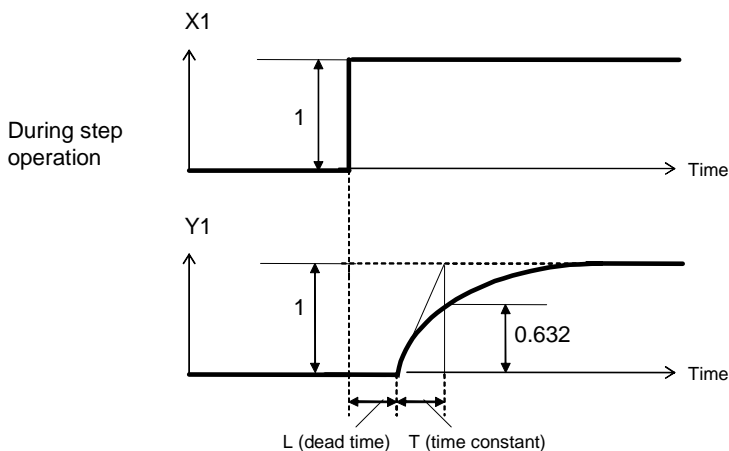
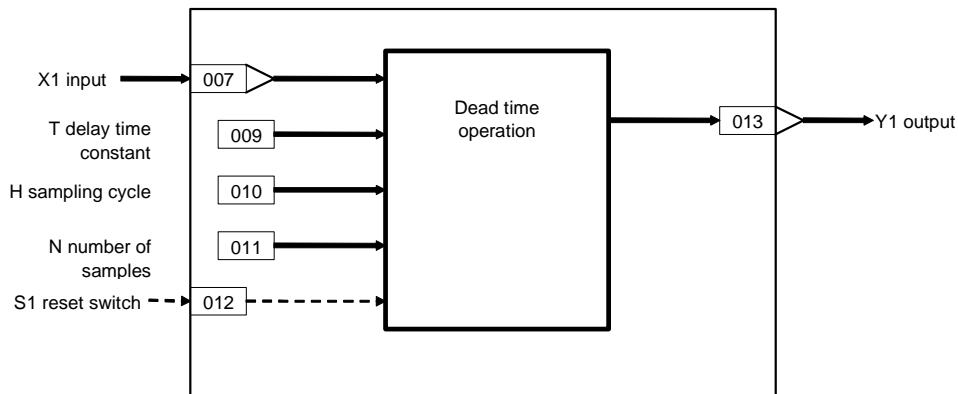
This function block performs dead time and first-order lag operations on single analog signals.

$$Y1(s) = \frac{e^{-Ls}}{1 + T \cdot s} X1(s)$$

- New data is sampled at each sampling cycle H (seconds) for number of samples (N) on the data to be held. The data previous to dead time L seconds (= H x N seconds) is output as the output signal. In other words, the output is delayed by L seconds after the input.
- When the lag time constant is set, the first-order lag operation is performed after time L (dead time) has elapsed.

Note: •The sampling cycle (ITEM010) takes priority over operation cycle (ITEM004).
 •When a cold start is performed, the values that were held before output OFF or before running was stopped are cleared from memory. These values are held when a hot start is performed.

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|---|---------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Dead Time | 148 | 148 | | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | | R/W(S) | - | - | - | - | 2 |
| Analog input connection information | 007 | | X1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | | R/W(S) | - | - | - | - | 4 |
| Analog input | 008 | X1 | Input | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| Parameter | 009 | T | Time constant (0: No delay) | 0 to 999.9s | 0.0 | | R/W(O) | - | W | - | S/R | 2 |
| | 010 | H | Sampling cycle (0: Operation cycle) | 0 to 9999s | 0 | | R/W(S) | - | W | - | S/R | 2 |
| | 011 | N | Number of samples (0: No dead time) | 0 to 20 | 20 | | R/W(S) | - | - | - | S/R | 1 |
| Contact input | 012 | S1 | Reset switch (1:Y1=X1) | 0, 1 | 0 | | R/W(O) | - | - | R/W | S/R | 1 |
| Analog output | 013 | Y1 | Output | ±320.00% | 0.00 | | r/w | - | - | - | S | 2 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|------------------------------|----------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 008 | Input | X1 |
| 009 | Time constant (0: No delay) | T |
| 010 | Sampling cycle | H |
| 011 | Number of samples | N |
| 012 | Reset switch | S1 |
| 013 | Output | Y1 |

7 Time Function blocks

<149> Dead Time Compensation 100 to 349

| Block Model | Block Name | Block Address |
|-------------|------------------------|---------------|
| <149> | Dead Time Compensation | 100 to 349 |

Outline

This function block performs PID control using the Smith predictor.

$$Y1(s) = K \frac{1 - e^{-Ls}}{1 + T \cdot S} X1(s)$$

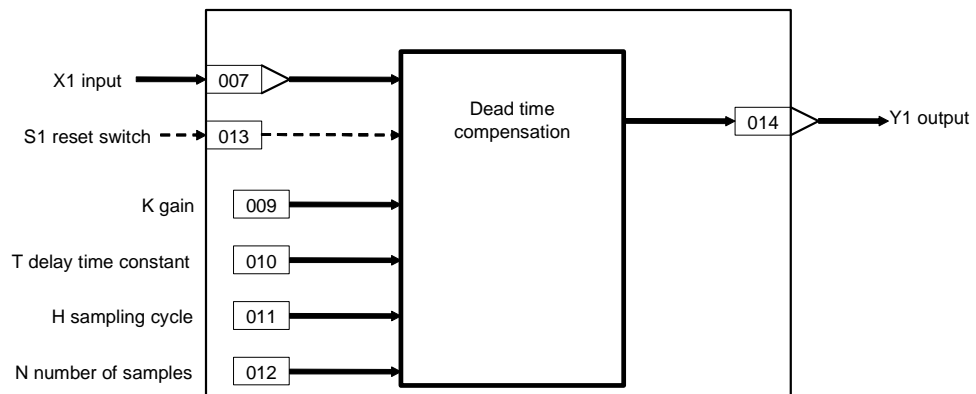
- This function block is applied to processes with long dead time and processes whose dead time does not change much.
- Set dead time (L) and time constant (T) to the same values as the dead time and time constant of the process (control target).

Note: When a cold start is performed, the values that were held before output OFF or before running was stopped are cleared from memory. These values are held when a hot start is performed.

Function block applications

Control using the Smith predictor

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|--|---------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Dead Time Compensation | 149 | 149 | | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | | R/W(S) | - | - | - | - | 2 |
| Analog input connection information | 007 | | X1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | | R/W(S) | - | - | - | - | 4 |
| Analog input | 008 | X1 | Input | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| Parameter | 009 | K | Gain | ±10.000 | 1.000 | | R/W(O) | - | W | - | S/R | 2 |
| | 010 | T | Time constant (0: No delay) | 0 to 999.9s | 0.0 | | R/W(O) | - | W | - | S/R | 2 |
| | 011 | H | Sampling cycle (0: Operation cycle) | 0 to 9999s | 0 | | R/W(S) | - | W | - | S/R | 2 |
| | 012 | N | Number of samples (0: No dead time) | 0 to 20 | 20 | | R/W(S) | - | W | - | S/R | 1 |
| Contact input | 013 | S1 | Reset switch (1:Y1=X1) | 0, 1 | 0 | | R/W(O) | - | - | R/W | S/R | 1 |
| Analog output | 014 | Y1 | Output | ±320.00% | 0.00 | | r/w | - | - | - | S | 2 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|------------------------------|----------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 008 | Input | X1 |
| 009 | Gain | K |
| 010 | Time constant | T |
| 011 | Sampling cycle | H |
| 012 | Number of samples | N |
| 013 | Reset switch | S1 |
| 014 | Output | Y1 |

7 Time Function blocks

<150> Accumulator for instantaneous value input 100 to 349

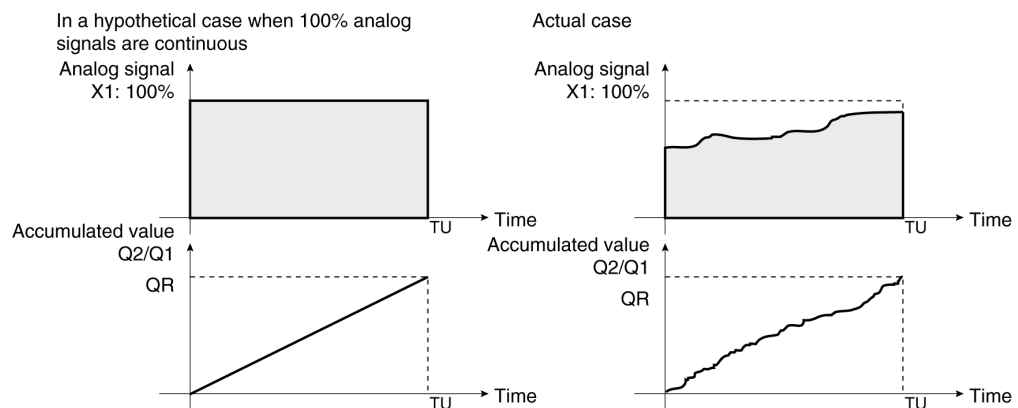
| Block Model | Block Name | Block Address |
|-------------|--|---------------|
| <150> | Accumulator for instantaneous value input | 100 to 349 |

Outline

This function block accumulates (totalizes) instantaneous analog signals (e.g. flowrate signals) and outputs 8-digit accumulated value signals within the range 00000000 to 99999999. This function block can also be used for batch control.

•Q2 and Q1 accumulated values become QR preset value (counter rate) assuming that 100% values are continuous as analog signal inputs for the preset time unit (TU: one of seconds, minutes, hours or days).

By accumulation (totalization), analog signals are totalized according to the 0 to 100% range of the actual analog signal input, and accumulated values Q2 and Q1 proportional to these inputs are output at all times.



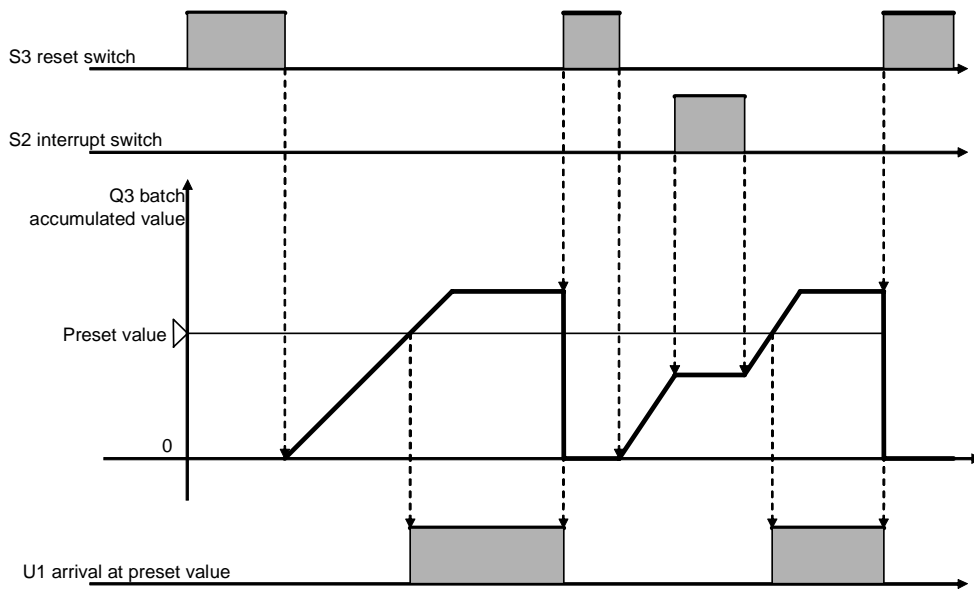
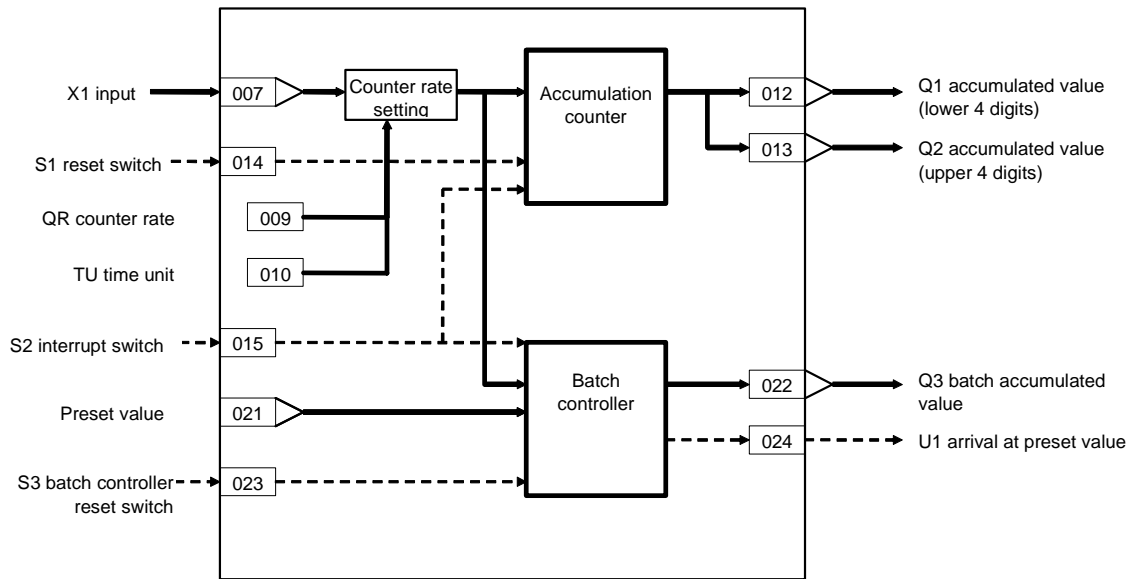
- Accumulated values are divided into upper four digits and lower four digits before they are output. If necessary, join these two sets of digits together for display on a host computer.
- When Qn accumulated value output is used as analog input for other function blocks, the count 9999 is processed as 99.99%.
- When S1 reset switch is set to 1 (ON), the accumulated values Q1 and Q2 are returned to count 0.
- When S3 batch controller reset switch is input, Q3 batch accumulated value becomes count 0, and U1 arrival at preset value is reset to 0 (OFF).
- S2 interrupt switch stops all count operations.
- Minus inputs are regarded as 0% input.

Note: Internally held accumulated values are cleared when a cold start is performed, and are held when a hot start is performed.

Function block applications

Accumulation (totalization) of instantaneous flowrate signals that have been converted to analog values

Block diagram



7 Time Function blocks

<150> Accumulator for instantaneous value input 100 to 349

ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|---------------|------|--------|---|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Accumulator for instantaneous value input | 150 | 150 | | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | | R/W(S) | - | - | - | - | 2 |

Instantaneous value input X1

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|--|---------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Analog input connection information | 007 | | X1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | | R/W(S) | - | - | - | - | 4 |
| Analog input | 008 | X1 | Input | ±320.00% | 0.00 | | r | - | - | - | S | 2 |
| Parameter | 009 | QR | Counter rate Assuming that input is 100% for time unit setting TU, set the accumulated value to be displayed. Example) Set TU: 2 and QR: 1500 for 0 to 1500 m ³ . | 0 to 10000.00 | 100.00 | | R/W(O) | - | W | - | - | 2 |
| | 010 | TU | Time unit (0:S, 1:min, 2:hr, 3:day) | 0 to 3 | 0 | | R/W(S) | - | - | - | S/R | 1 |
| Accumulated value output | 012 | Q1 | Accumulated value (lower 4 digits) | 0 to 9999 | 0 | | r/w | - | - | - | S | 2 |
| | 013 | Q2 | Accumulated value (upper 4 digits) | 0 to 9999 | 0 | | r/w | - | - | - | S | 2 |
| Contact input | 014 | S1 | Reset switch (1: Reset) | 0, 1 | 0 | | R/W(O) | - | - | R/W | S/R | 1 |
| | 015 | S2 | Interrupt switch (1: Interrupt) | 0, 1 | 0 | | R/W(O) | - | - | R/W | S/R | 1 |

Batch controller

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|--------------------------|------|--------|--|--------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 021 | | Preset value | 0000 to 9999 | 9999 | | R/W(O) | - | W | - | S/R | 2 |
| Accumulated value output | 022 | Q3 | Batch accumulated value | 0000 to 9999 | 0 | | r/w | - | - | - | S | 2 |
| Contact input | 023 | S3 | Batch controller reset switch (1: Reset) | 0, 1 | 0 | | R/W(O) | - | - | R/W | S/R | 1 |
| Contact output | 024 | U1 | Arrival at preset value | 0, 1 | 0 | | - | - | - | R | S | 1 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software Tag ITEM (fixed) |
|------|-------------------------------|---|
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 008 | Input | X1 |
| 010 | Time unit | TU |
| 012 | Accumulated value | Q1 |
| 013 | Accumulated value | Q2 |
| 014 | Reset switch | S1 |
| 015 | Interrupt switch | S2 |
| 021 | Preset value | BM |
| 022 | Batch accumulated value | Q3 |
| 023 | Batch controller reset switch | S3 |
| 024 | Arrival at preset value | U1 |

7 Time Function blocks

<151> Run Time Accumulator 100 to 349

| Block Model | Block Name | Block Address |
|-------------|----------------------|---------------|
| <151> | Run Time Accumulator | 100 to 349 |

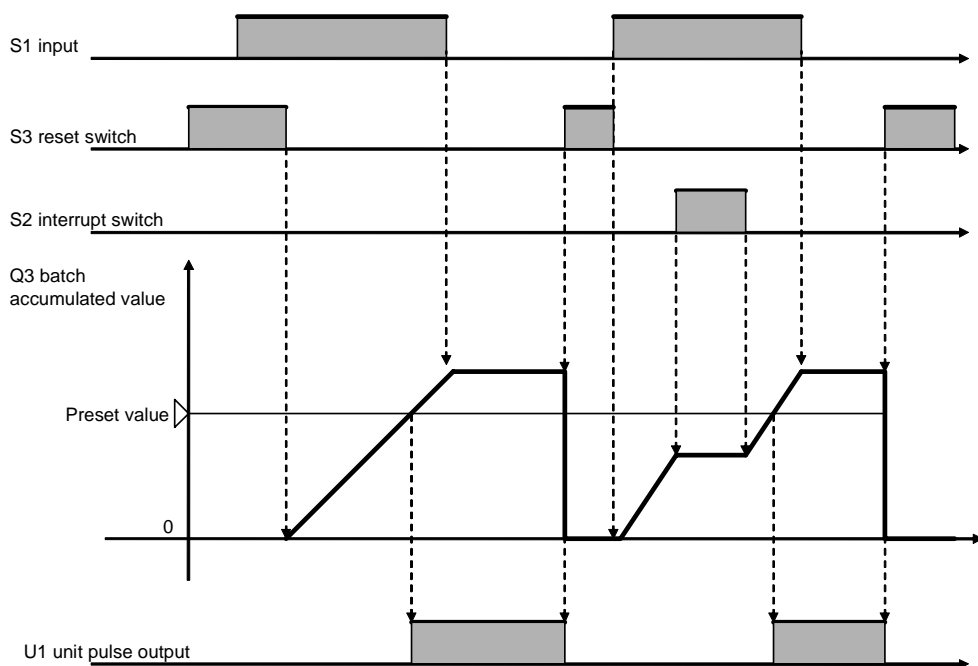
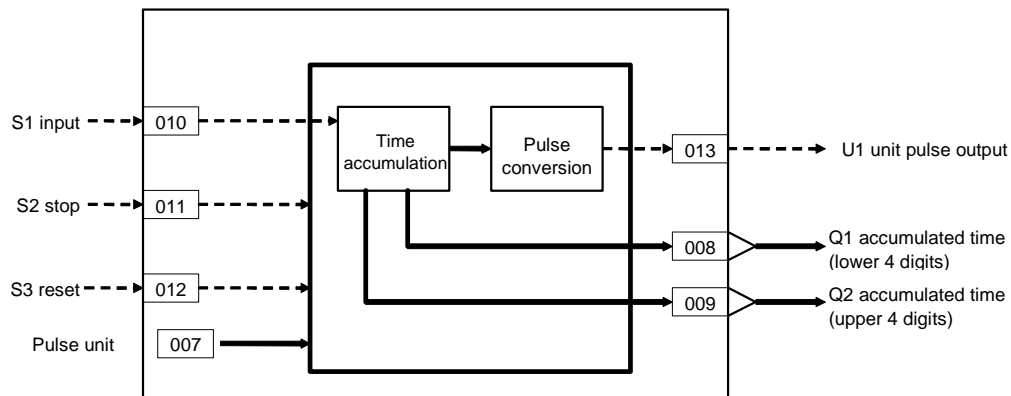
Outline

This function block accumulates the running time of machinery such as pumps, and outputs the accumulated running time as a number of pulses.

- The accumulated running time is expressed as number of pulses per unit time.
- Counting of time accumulated values is performed each pulse unit when S1 input is set to 1 (ON). Counting is not dependent on the operation cycle.

Note: •Set the operation cycle of ITEM004 to a value shorter than the pulse unit of ITEM007.
 •Internally held accumulated values are cleared when a cold start is performed, and are held when a hot start is performed.

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|--------------------------|------|--------|--|---------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Run time accumulator | 151 | 151 | | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | | R/W(S) | - | - | - | - | 2 |
| | 007 | | Pulse unit (0: s, 1: 10s, 2: min, 3: 10min, 4: h) | 0 to 4 | 0 | | R/W(S) | - | - | - | S/R | 1 |
| Accumulated value output | 008 | Q1 | Accumulated time (lower 4 digits) | 0000 to 9999 | 0 | | r/w | - | - | - | S | 2 |
| | 009 | Q2 | Accumulated time (upper 4 digits) | 0000 to 9999 | 0 | | r/w | - | - | - | S | 2 |
| Contact input | 010 | S1 | Input | 0, 1 | 0 | | R/W(O) | - | - | R/W | S/R | 1 |
| | 011 | S2 | Stop | 0, 1 | 0 | | R/W(O) | - | - | R/W | S/R | 1 |
| | 012 | S3 | Reset | 0, 1 | 0 | | R/W(O) | - | - | R/W | S/R | 1 |
| Contact output | 013 | U1 | Unit pulse output (1: ON during operation cycle) | 0, 1 | 0 | | - | - | - | R | S | 1 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software Tag ITEM (fixed) |
|------|-----------------------------------|---|
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 007 | Pulse unit | PT |
| 008 | Accumulated time (lower 4 digits) | Q1 |
| 009 | Accumulated time (upper 4 digits) | Q2 |
| 010 | Input | S1 |
| 011 | Stop | S2 |
| 012 | Reset | S3 |
| 013 | Unit pulse output | U1 |

7 Time Function blocks

<153> Time Sequence Data Statistics 100 to 349

| Block Model | Block Name | Block Address |
|-------------|-------------------------------|---------------|
| <153> | Time Sequence Data Statistics | 100 to 349 |

Outline

This function block records up to 400 time sequence values from analog signals and calculates statistics, such as the average and standard deviation.

Supported Statistical Calculations

Average value $Y1 = X1(k)/N$

Smallest value Smallest value of $Y2 = X1(k)$

Largest value Largest value of $Y3 = X1(k)$

Range $Y5$ (upper), $Y4$ (lower) = $Y3 - Y2$

Standard deviation Square root of ($Y9 = Y8$ (upper), $Y7$ (lower))

Average deviation $Y6 = |Y1 - X1(k)| / N$

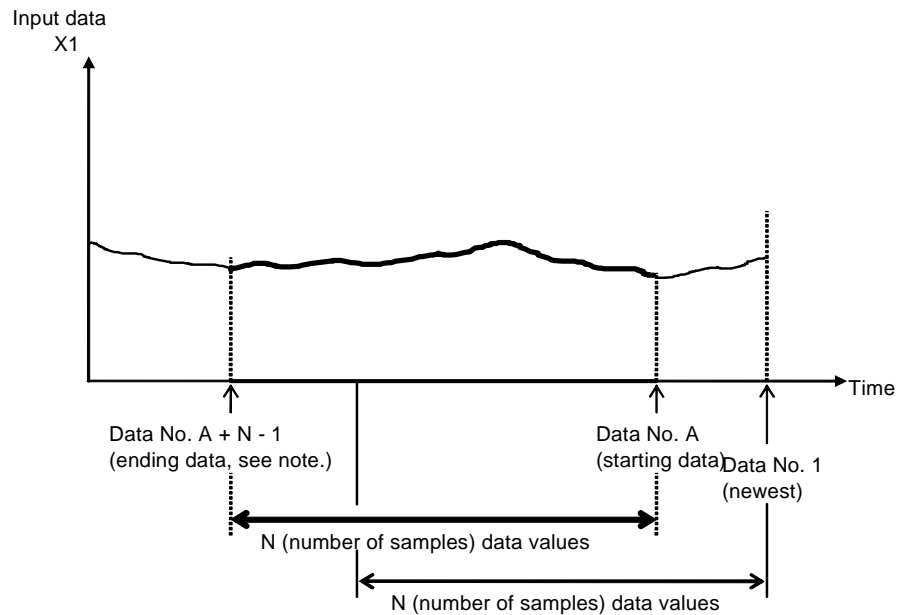
Distribution $Y8$ (upper), $Y7$ (lower) = $\{Y1 - X1(k)\}^2 / N$

Note: $X1(k)$ denotes the time sequence values input for statistical calculations.

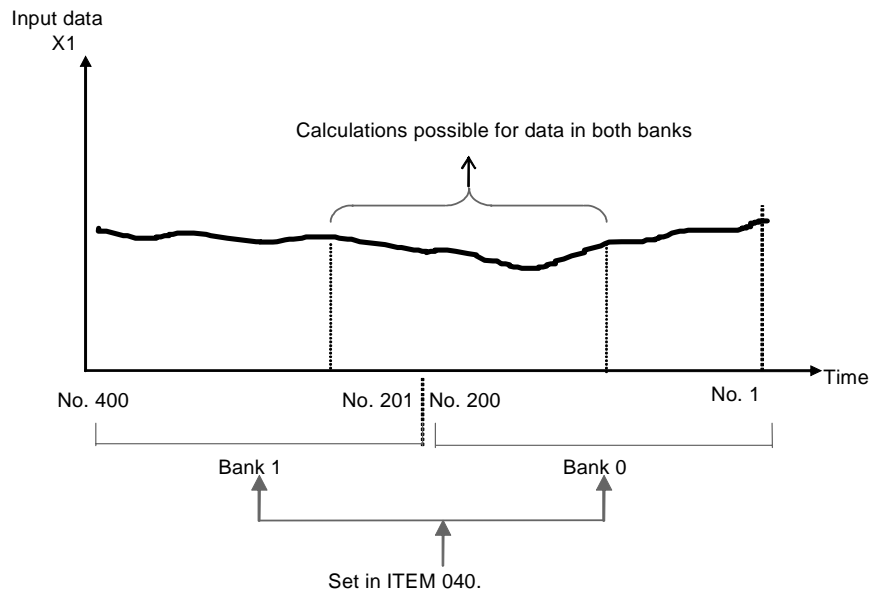
$k = A$ to $A+N-1$ (A : Number of first data in range, N : Number of samples)

The number of samples, N , is specified between 1 and 400 in ITEM 011. When N samples have been collected, the oldest sample is discarded each time a new sample is taken before making statistical calculations.

It is also possible to use previous data as the starting point for statistical calculations rather than the most recent data. The starting data number is specified in ITEM 010.



The function block internally stores data samples 1 to 400 as shown above. When monitoring data samples using ITEM 041 to ITEM 240 or when inputting data number 1 to 400 directly into the buffers, the bank must be set. Switching between bank 0 and 1 can be executed using FINS commands or by using the Expanded AI Terminal from CPU Unit block to change ITEM 040. Calculations can also be performed on data in both banks, as shown below.



Note: A = Number of first data in range, N = Number of samples. $A + N - 1$ must be less than or equal to 400. If $A + N - 1$ is greater than 400, a parameter error (execution error code 71) will occur.

Any of the following three methods can be used to sample data. The sampling method is set in ITEM 006.

Each cycle (1 to 9, 999 s) (set ITEM 006 to 0).

Sync on external sync contact (sample on OFF to ON transition) (set ITEM 006 to 1).

Direct buffer input using values set in ITEMS 041 to 204 as sampling data (set ITEM 006 to 2).

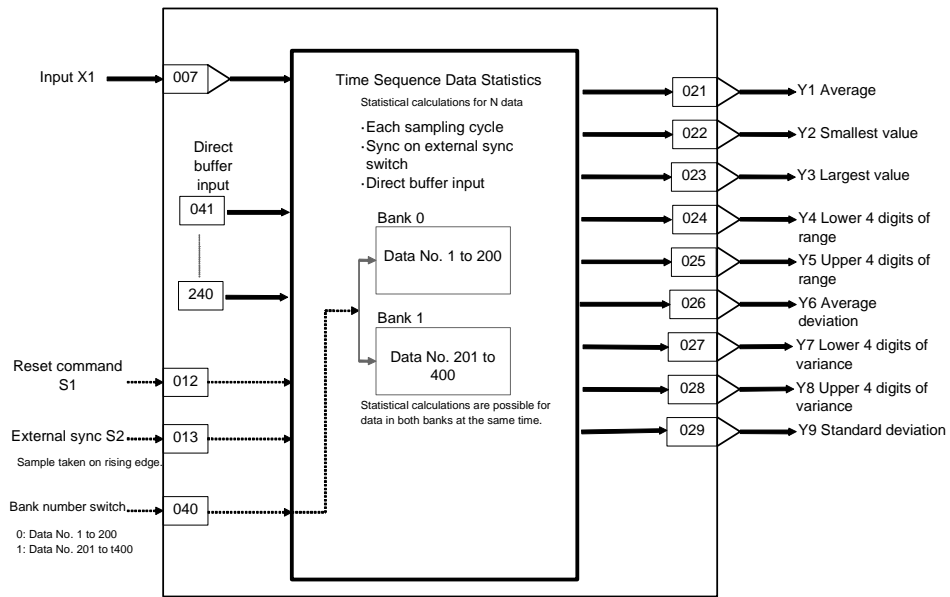
Function block applications

Analyzing inconsistency in a process value that should be constant, such as a temperature or flow rate.

7 Time Function blocks

<153> Time Sequence Data Statistics 100 to 349

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|--|------------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command 0: Cancel stop, 1: Stop | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Time Sequence Data Statistics | 153 | 153 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (seconds) 1: 0.1, 2: 0.2, 3: 0.5, 4: 1 | 1 to 4 | 4 | - | R/W(S) | - | - | - | - | 2 |
| | 006 | | Sampling method 0: Each sampling cycle 1: Sync on external sync switch (Sample when ITEM 013 goes from 0 to 1.) 2: Direct buffer input (Use values set in ITEMS 041 to 204 as sampling data.) | 0 to 2 | 0 | - | R/W(S) | - | - | - | - | 1 |
| Analog input connection information | 007 | X1 | X1 source designation (BBB: Block address, III: ITEM number) | BBB or III | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 008 | X1 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| Parameter | 009 | | Sampling cycle 0: Sampling on operation cycle 1 to 9999: Sample every 1 to 9,999 s. Note: This setting is ignored if ITEM 006 (sampling method) is set to 1 (sync on external sync contact) or 2 (direct buffer input). | 0 or 1 to 9999 s | 0 | - | R/W(S) | - | - | - | S/R | 2 |
| | 010 | | First data number in range | 1 to 400 | 1 | - | R/W(S) | - | - | - | S/R | 2 |
| | 011 | | Number of samples | 1 to 400 | 100 | - | R/W(S) | - | - | - | S/R | 2 |
| Contact input | 012 | S1 | Reset command 1: Set all ITEMS from 041 to 240 to X1 value. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 013 | S2 | External sync switch 0 to 1: Take sample (Valid only when ITEM 006 is set to 1.) | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| Parameter | 021 | Y1 | Average | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 022 | Y2 | Smallest value | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|-----------|------|--------|---|---------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | |
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| | 023 | Y3 | Largest value | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 024 | Y4 | Lower 4 digits of range (= Largest value - smallest value) | 0% to 99.99% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 025 | Y5 | Upper 4 digits of range (= Largest value - smallest value) | 0% to 9999% | 0 | Yes | r | - | - | - | S | 2 |
| | 026 | Y6 | Average deviation | 0% to 320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 027 | | Lower 4 digits of variance | 0% to 99.99% | 0.00 | Yes | - | - | - | - | S | 2 |
| | 028 | | Upper 4 digits of variance | 0% to 9999% | 0 | Yes | - | - | - | - | S | 2 |
| | 029 | Y9 | Standard deviation | 0% to 320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 040 | | Bank number 0: Data number 1 to 200 1: Data number 201 to 400 | 0, 1 | 0 | Yes | R/W(O) | - | - | - | - | 2 |
| | 041 | | Newest data Bank SW = 0: Number 1 Bank SW = 1: Number 201 | ±320.00% | 0.00 | Yes | - | - | R/W | - | - | 2 |
| | to | | to | | | | | | | | | |
| | 240 | | Oldest data Bank SW = 0: Number 200 Bank SW = 1: Number 400 | ±320.00% | 0.00 | - | - | - | R/W | - | - | 2 |

Note: The contents of buffers for ITEMS 041 to 220 will not be initialized when the sampling method (ITEM 006) is changed from direct buffer input to a sampling cycle or external switch sync, and sampling will be started with the data currently in the buffers. To initialize the buffers, turn ON the reset command in ITEM 012.

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software Tag ITEM (Fixed) |
|------|------------------------------|--|
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 008 | Input | X1 |
| 009 | Sampling cycle | H |
| 010 | First data number in range | A |
| 011 | Number of samples | N |
| 012 | Reset command | S1 |
| 013 | External sync switch | S2 |
| 021 | Average value | Y1 |
| 022 | Smallest value | Y2 |
| 023 | Largest value | Y3 |
| 024 | Lower 4 digits of range | Y4 |
| 025 | Upper 4 digits of range | Y5 |
| 026 | Average deviation | Y6 |
| 027 | Lower 4 digits of variance | Y7 |
| 028 | Upper 4 digits of variance | Y8 |
| 029 | Standard deviation | Y9 |

7 Time Function blocks

<155> Ramp Program 100 to 349

| Block Model | Block Name | Block Address |
|-------------|--------------|---------------|
| <155> | Ramp Program | 100 to 349 |

Outline

This function block is a ramp program setter for combining ramp and soak values.

Provided with a wait function

When X1 reference input has not arrived at A soak value±wait width value, measurement of the soak time is stopped regardless of Y1 output having moved to the soak process from the ramp process. At the same time, the value of Y1 output is held at A soak value. When X1 reference input is in Y1 output±wait width, program execution moves to the soak process, and measurement of the soak time is started. When X1 reference input does not fall within Y1 output±wait width even though the maximum wait time has elapsed, program execution moves to the soak process and measurement of the soak time is started.

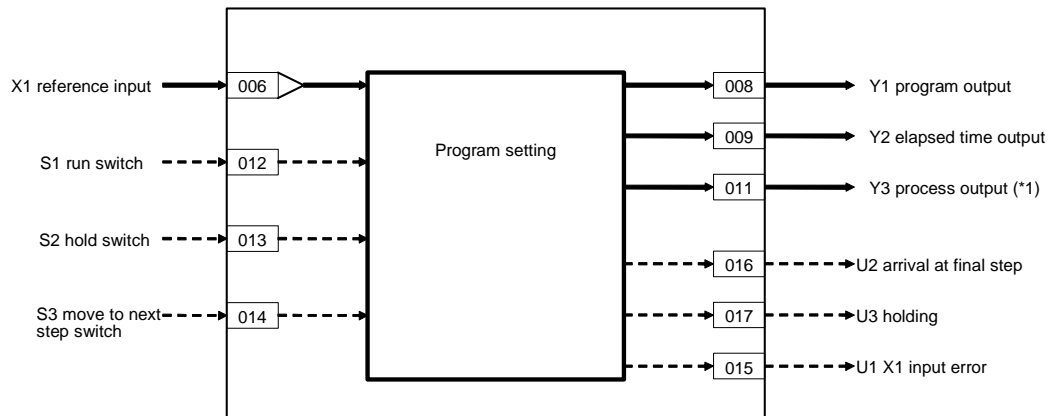
When the state of S3 move to next step command changes from 0 (OFF) to 1 (ON) during a wait, the wait operation is canceled, program execution moves to the soak process, and measurement of the soak time is started.

- The wait width and maximum wait time can be set common to all steps in the ramp program.
- Provided with a function for matching the setting value to X1 reference input at the start of the ramp program
- Provided with process output ("Process output" here refers to state that makes a distinction between ramp and soak.)
- Provided with elapsed time output for the entire program
- The desired process can be moved to when data is set by ITEM Setting blocks to process output (ITEM011). (Setting by ITEM Setting blocks is valid only when S1 run/stop command is 1 (ON).)

The ramp program can also be returned to a process smaller than the current process. (Note, however, that when the ramp program is started from the reference input, the ramp program cannot return to a point before the point where the ramp program is started by the reference input.)

When S1 run/stop command is 0 (OFF), Y1 output equals 0. When the setting of S1 run/stop command changes from 0 (OFF) to 1 (ON), the ramp program starts with the value of Y1 output at A0 default. (When X1 reference input is designated as the source, and there is a point where X1 reference input matches the rise ramp rate or soak value, the program starts from that point.) The ramp program outputs up to 15 steps, each step comprising a ramp and soak value, to Y1 output for the duration that the S1 run/stop command is 1 (ON).

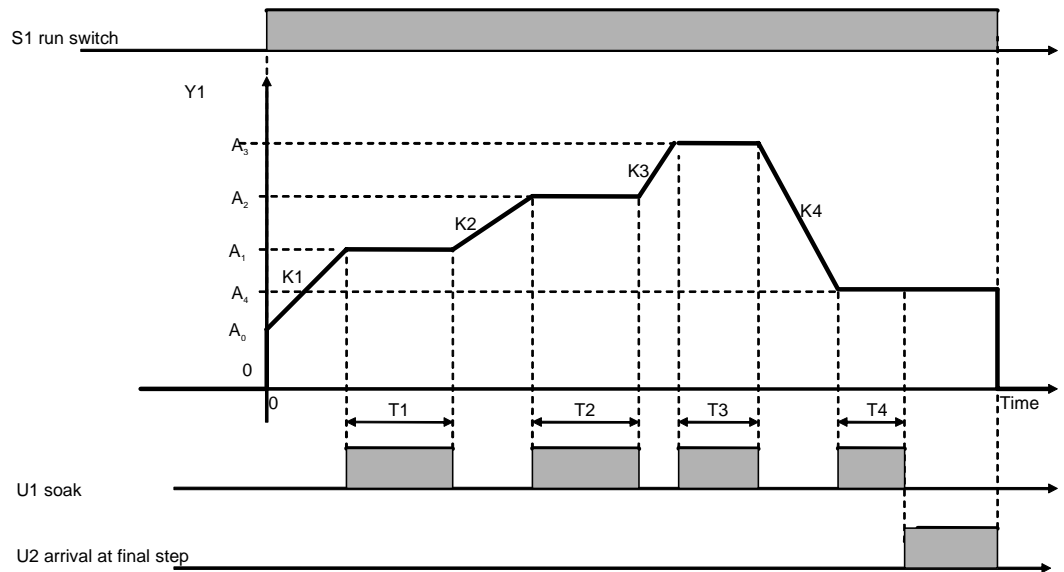
Block diagram



*1: Value of Y3 process output ("Process" here refers to state that makes a distinction between ramp and soak.)

| Process | Y3 | Process | Y3 |
|---------|----|---------|----|
| Stop | 0 | K5 | 9 |
| K1 | 1 | T5 | 10 |
| T1 | 2 | K6 | 11 |
| K2 | 3 | T6 | 12 |
| T2 | 4 | K7 | 13 |
| K3 | 5 | T7 | 14 |
| T3 | 6 | K8 | 15 |
| K4 | 7 | T8 | 16 |
| T4 | 8 | to | to |
| | | K15 | 29 |
| | | T15 | 30 |

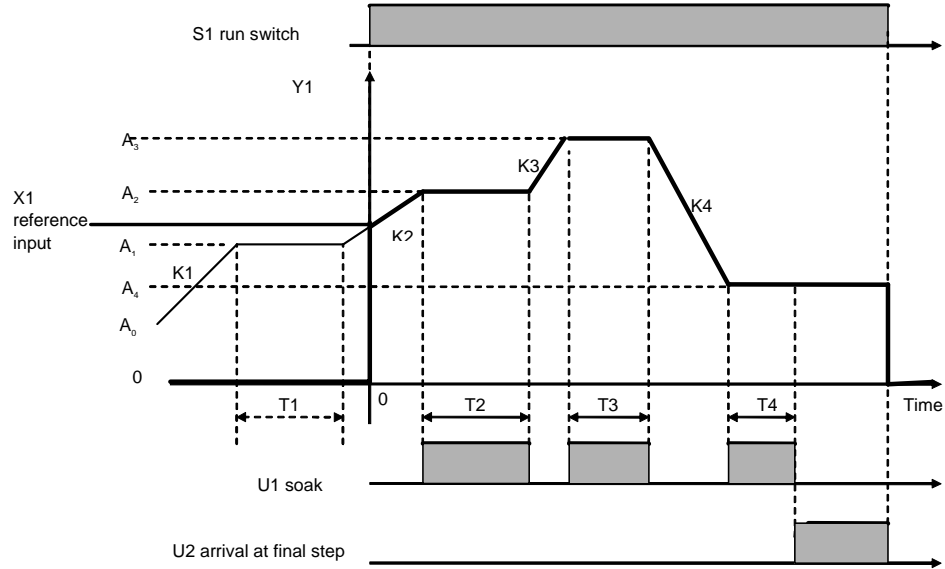
When the ramp program is started from A0 default:



When the ramp program is started from X1 reference input:

The ramp program is started from a point where X1 reference input and rise ramp match.

Note: The condition for start of the ramp program from X1 reference input is as follows: X1 reference input must match the first rise ramp (before ramp falls) or soak value. However, a ramp that has risen after a fall is not accepted in this condition. In this case, Y1 output remains at 0 (OFF).



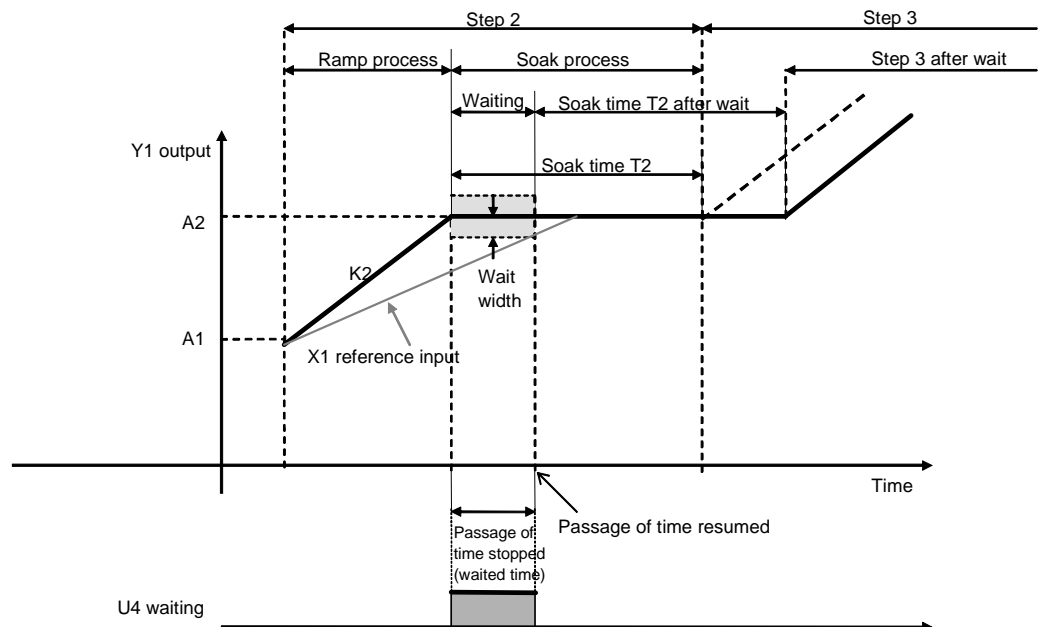
When wait operation is performed based on X1 reference input

When X1 reference input has not arrived at Y1 output±wait width value, program execution does not move to the soak process and measurement of the soak time is stopped regardless of Y1 output having moved to the soak process from the ramp process. When X1 reference input arrives at Y1 output±wait width value, program execution moves to the soak process and measurement of the soak width is started. To cancel a wait operation midway, change the state of S3 move to next step command from 0 (OFF) to 1 (ON).

Note 1: Setting the wait width to 0.00% disables the wait operation. So, the wait width is actually set within the range 0.01 to 320.00%.

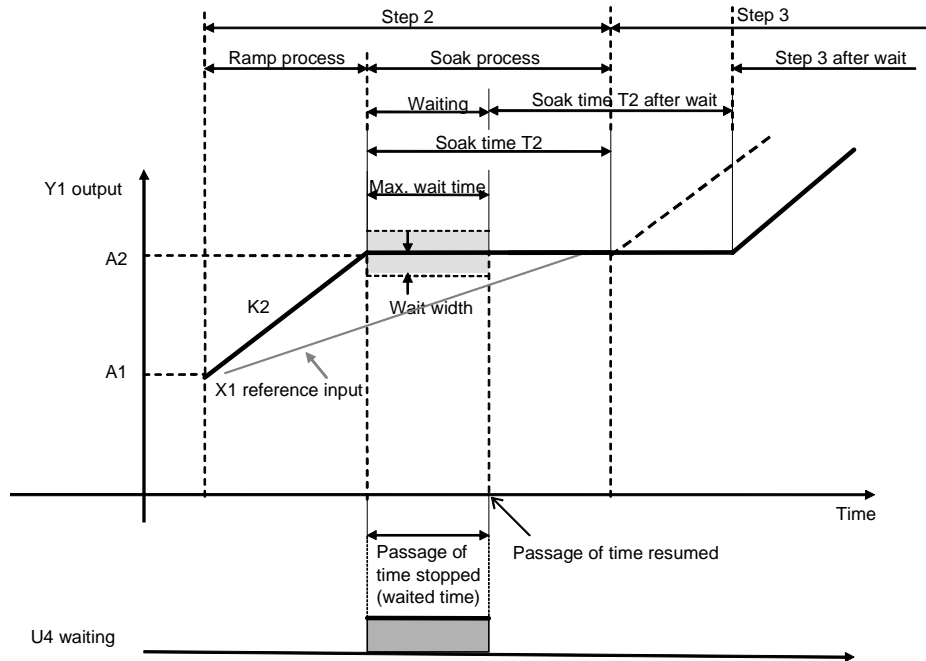
Note 2: Even during a wait, Y2 elapsed time output continues and increases. Y2 stops only when S2 hold switch is 1 (ON).

Y1 output does not move to the soak process and time measurement stops until X1 reference input falls in Y1±wait width. After the wait, T2 soak time in step 2 is secured.



When X1 reference input does not fall within $Y1 \pm \text{wait}$ width even if the maximum wait time is exceeded

When X1 reference input does not fall within $Y1 \pm \text{wait}$ width even if the maximum wait time is exceeded, the wait operation is forcibly stopped, program execution moves to the soak process, and time measurement starts.



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|----------------------------|------------------|--------|--|---------------|------------|---------------------------|--|-----------------|---------------|----------------|--------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled | Note: | Accordi | Accordi | Accordi | |
| | | | | | | | r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | |
| | | | | | | | Accordi | Accordi | Accordi | Accordi | Send/Receive | |
| | | | | | | | ing to CX-Pro | ing to CX-Pro | ing to ITEM | ing to Step | Receive | |
| | | | | | | | cess Tool | cess Monitor *1 | Setting block | Ladder Program | All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block model: Ramp Program | 155 | 155 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 1: 0.1, 2: 0.2, 3: 0.5, 4: 1 | 1 to 4 | 4 | - | R/W(S) | - | - | - | - | 2 |
| Analog contact information | 006 | | X1 source designation (BBB: Block address, III: ITEM No.) X1 equals Y1 at start when X1 is connected. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 007 | X1 | Reference input (input for external setting of start point) | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| Analog output | 008 | Y1 | Program output | ±320.00% | 0.00 | Yes | r/w | - | - | - | S | 2 |
| | 009 | Y2 | Elapsed time output | 0 to 3200.0 | 0.0 | Yes | r/w | - | - | - | S | 2 |
| Parameter | 010 | | Elapsed time unit (0: sec, 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(S) | - | - | - | S/R | 1 |
| Analog output | 011 | Y3 | Process output (Process distinguishes between ramp and soak.) | 0 to 30 | 0 | Yes | r/w | - | W | - | S/R | 2 |
| Contact input | 012 | S1 | Run/stop command (0: Reset, 1: Run) | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 013 | S2 | Hold switch (1: Hold) | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 014 | S3 | Move to next step command (When the command state changes from 0 to 1, program execution jumps to the start of the ramp process of the next step. This command is automatically reset by the system after the jump ends.) Note: When the command state changes from 0 to 1 during a wait, wait is canceled, and program execution moves to the soak process. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| Contact output | 015 | U1 | X1 input error (1: Error. Output is 0 when reference input X1 does not match the ramp rate and soak value of the rise ramp.) | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| | 016 | U2 | Arrival at final step | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| | 017 | U3 | Holding | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| | 019 ² | U4 | Waiting (0: Not waiting, 1: Waiting) | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| Start step | | | | | | | | | | | | |
| Parameter | 020 | A0 | Default (Note, however, that reference input X1 is given priority and this value is invalid when the source designation of X1 is specified.) | ±320.00% | 0.00 | - | R/W(O) | - | - | - | - | 1 |
| No.1 step | | | | | | | | | | | | |
| Parameter | 021 | K1 | Ramp rate | ±115.00%/H1 | 1.00 | - | R/W(O) | - | W | - | - | 2 |
| | 022 | H1 | Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(O) | - | - | - | - | 1 |
| | 023 | A1 | Soak value | ±320.00% | 100.00 | - | R/W(O) | - | W | - | - | 2 |
| | 024 | T1 | Soak time | 0 to 3200.0 | 100.0 | - | R/W(O) | - | W | - | - | 2 |
| | 025 | J1 | Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(O) | - | - | - | - | 1 |
| No.2 step | | | | | | | | | | | | |
| Parameter | 026 | K2 | Ramp rate | ±115.00%/H2 | 1.00 | - | R/W(O) | - | W | - | - | 2 |
| | 027 | H2 | Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(O) | - | - | - | - | 1 |
| | 028 | A2 | Soak value | ±320.00% | 200.00 | - | R/W(O) | - | W | - | - | 2 |
| | 029 | T2 | Soak time | 0 to 3200.0 | 100.0 | - | R/W(O) | - | W | - | - | 2 |
| | 030 | J2 | Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(O) | - | - | - | - | 1 |

7 Time Function blocks

<155> Ramp Program 100 to 349

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|-----------|------------------|--------|---|-------------|---------|---------------------------|--|---|---|---|---|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data According to CX-Process Tool According to CX-Process Monitor *1 According to ITEM Setting block According to Step Ladder Program Send/Receive All Blocks | | | | | |
| No.3 step | | | | | | | | | | | | |
| Parameter | 031 | K3 | Ramp rate | ±115.00%/H3 | 1.00 | - | R/W(O) | - | W | - | - | 2 |
| | 032 | H3 | Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(O) | - | - | - | - | 1 |
| | 033 | A3 | Soak value | ±320.00% | 300.00 | - | R/W(O) | - | W | - | - | 2 |
| | 034 | T3 | Soak time | 0 to 3200.0 | 100.0 | - | R/W(O) | - | W | - | - | 2 |
| | 035 | J3 | Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(O) | - | - | - | - | 1 |
| No.4 step | | | | | | | | | | | | |
| Parameter | 036 | K4 | Ramp rate | ±115.00%/H4 | -1.00 | - | R/W(O) | - | W | - | - | 2 |
| | 037 | H4 | Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(O) | - | - | - | - | 1 |
| | 038 | A4 | Soak value | ±320.00% | 150.00 | - | R/W(O) | - | W | - | - | 2 |
| | 039 | T4 | Soak time | 0 to 3200.0 | 100.0 | - | R/W(O) | - | W | - | - | 2 |
| | 040 | J4 | Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(O) | - | - | - | - | 1 |
| No.5 step | | | | | | | | | | | | |
| Parameter | 041 | K5 | Ramp rate | ±115.00%/H5 | -1.00 | - | R/W(O) | - | W | - | - | 2 |
| | 042 | H5 | Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(O) | - | - | - | - | 1 |
| | 043 | A5 | Soak value | ±320.00% | 0.00 | - | R/W(O) | - | W | - | - | 2 |
| | 044 | T5 | Soak time | 0 to 3200.0 | 10.0 | - | R/W(O) | - | W | - | - | 2 |
| | 045 | J5 | Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(O) | - | - | - | - | 1 |
| No.6 step | | | | | | | | | | | | |
| Parameter | 046 | K6 | Ramp rate | ±115.00%/H6 | -1.00 | - | R/W(O) | - | W | - | - | 2 |
| | 047 | H6 | Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(O) | - | - | - | - | 1 |
| | 048 | A6 | Soak value | ±320.00% | -150.00 | - | R/W(O) | - | W | - | - | 2 |
| | 049 | T6 | Soak time | 0 to 3200.0 | 10.0 | - | R/W(O) | - | W | - | - | 2 |
| | 050 | J6 | Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(O) | - | - | - | - | 1 |
| No.7 step | | | | | | | | | | | | |
| Parameter | 051 | K7 | Ramp rate | ±115.00%/H7 | -1.00 | - | R/W(O) | - | W | - | - | 2 |
| | 052 | H7 | Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(O) | - | - | - | - | 1 |
| | 053 | A7 | Soak value | ±320.00% | -300.00 | - | R/W(O) | - | W | - | - | 2 |
| | 054 | T7 | Soak time | 0 to 3200.0 | 10.0 | - | R/W(O) | - | W | - | - | 2 |
| | 055 | J7 | Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(O) | - | - | - | - | 1 |
| No.8 step | | | | | | | | | | | | |
| Parameter | 056 ² | K8 | Ramp rate | ±115.00%/H8 | 0 | - | R/W(O) | - | W | - | - | 2 |
| | 057 ² | H8 | Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(O) | - | - | - | - | 1 |
| | 058 ² | A8 | Soak value | ±320.00% | -300.00 | - | R/W(O) | - | W | - | - | 2 |
| | 059 ² | T8 | Soak time | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 |
| | 060 ² | J8 | Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(O) | - | - | - | - | 1 |
| No.9 step | | | | | | | | | | | | |
| Parameter | 061 ² | K9 | Ramp rate | ±115.00%/H9 | 0 | - | R/W(O) | - | W | - | - | 2 |
| | 062 ² | H9 | Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(O) | - | - | - | - | 1 |
| | 063 ² | A9 | Soak value | ±320.00% | -300.00 | - | R/W(O) | - | W | - | - | 2 |
| | 064 ² | T9 | Soak time | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 |
| | 065 ² | J9 | Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(O) | - | - | - | - | 1 |

7 Time Function blocks
<155> Ramp Program 100 to 349

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|--------------|------------------|--------|--|--------------|---------|---------------------------|--|---------------------|-------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | |
| | | | | | | | According to CX-Pro | According to CX-Pro | According to ITEM | According to Step Ladder Program | Send/Receive All Blocks | |
| | | | | | | | Tool | Monitor *1 | Setting block | | | |
| No.10 step | | | | | | | | | | | | |
| Parameter | 066 ² | K10 | Ramp rate | ±115.00%/H10 | 0 | - | R/W(O) | - | W | - | - | 2 |
| | 067 ² | H10 | Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(O) | - | - | - | - | 1 |
| | 068 ² | A10 | Soak value | ±320.00% | -300.00 | - | R/W(O) | - | W | - | - | 2 |
| | 069 ² | T10 | Soak time | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 |
| | 070 ² | J10 | Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(O) | - | - | - | - | 1 |
| No.11 step | | | | | | | | | | | | |
| Parameter | 071 ² | K11 | Ramp rate | ±115.00%/H11 | 0 | - | R/W(O) | - | W | - | - | 2 |
| | 072 ² | H11 | Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(O) | - | - | - | - | 1 |
| | 073 ² | A11 | Soak value | ±320.00% | -300.00 | - | R/W(O) | - | W | - | - | 2 |
| | 074 ² | T11 | Soak time | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 |
| | 075 ² | J11 | Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(O) | - | - | - | - | 1 |
| No.12 step | | | | | | | | | | | | |
| Parameter | 076 ² | K12 | Ramp rate | ±115.00%/H12 | 0 | - | R/W(O) | - | W | - | - | 2 |
| | 077 ² | H12 | Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(O) | - | - | - | - | 1 |
| | 078 ² | A12 | Soak value | ±320.00% | -300.00 | - | R/W(O) | - | W | - | - | 2 |
| | 079 ² | T12 | Soak time | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 |
| | 080 ² | J12 | Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(O) | - | - | - | - | 1 |
| No.13 step | | | | | | | | | | | | |
| Parameter | 081 ² | K13 | Ramp rate | ±115.00%/H13 | 0 | - | R/W(O) | - | W | - | - | 2 |
| | 082 ² | H13 | Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(O) | - | - | - | - | 1 |
| | 083 ² | A13 | Soak value | ±320.00% | -300.00 | - | R/W(O) | - | W | - | - | 2 |
| | 084 ² | T13 | Soak time | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 |
| | 085 ² | J13 | Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(O) | - | - | - | - | 1 |
| No.14 step | | | | | | | | | | | | |
| Parameter | 086 ² | K14 | Ramp rate | ±115.00%/H14 | 0 | - | R/W(O) | - | W | - | - | 2 |
| | 087 ² | H14 | Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(O) | - | - | - | - | 1 |
| | 088 ² | A14 | Soak value | ±320.00% | -300.00 | - | R/W(O) | - | W | - | - | 2 |
| | 089 ² | T14 | Soak time | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 |
| | 090 ² | J14 | Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(O) | - | - | - | - | 1 |
| No.15 step | | | | | | | | | | | | |
| Parameter | 091 ² | K15 | Ramp rate | ±115.00%/H15 | 0 | - | R/W(O) | - | W | - | - | 2 |
| | 092 ² | H15 | Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(O) | - | - | - | - | 1 |
| | 093 ² | A15 | Soak value | ±320.00% | -300.00 | - | R/W(O) | - | W | - | - | 2 |
| | 094 ² | T15 | Soak time | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 |
| | 095 ² | J15 | Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(O) | - | - | - | - | 1 |
| Wait setting | | | | | | | | | | | | |
| Parameter | 096 ² | | Wait width (0: No wait operation) | 0 to 320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 097 ² | | Max. wait time (0.0: Unlimited) Note: The time unit of this setting is the same as that of the ramp in each step. | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | S/R | 2 |

*2: These ITEMS were added in Loop Control Unit Ver.1.50.

Note 1

- The S3 move to next step command is enabled only during the soak process, and is invalid during ramp processes.
 When the S3 move to next step command changes state from 0 to 1 during the soak process, program execution moves to the start of the ramp process of the next step. Even if the S3 move to next step command changes state from 0 to 1 during the ramp process, program execution does not move to the next step. Program execution moves to the next step when execution arrives at the final value of that ramp process.
- When "+" (plus number) data and not "-" (minus number) data is set to Kx (any ramp rate) regardless of a fall ramp (soak value lower than previous value), U2 arrival at final step becomes 1 (ON) at that step. The same also applies to rise ramps.
- To stop execution of the ramp program, set Kn final ramp rate to 0.00%/Hn.
- When a hot start is performed, the ramp program starts midway through the process immediately before the instantaneous power interruption occurred or immediately before the program was stopped according to the elapsed time.

Note 2:ITEMs ITEM020 to ITEM097 can be changed while the ramp program is running (for the duration that S1 run/stop command is 1). Any changes made are immediately reflected in program execution.

A0 initial value, K ramp rate for each step, H ramp time unit for each step, A soak value for each step, T soak time for each step, J soak time unit for each step, wait width common to all steps and maximum wait time common to all steps

Note 3:Do not change the following ITEMs while the ramp program is running (for the duration that S1 run/stop command is 1).

ITEM004 (operation cycle), ITEM010 (elapsed time unit)

Before you change the values of these ITEMs, temporarily set S1 run/stop command to 0 (OFF). After you have changed the values, set S1 run/stop command to 1 (ON) and restart the program.

List of tag ITEMs on SCADA software

The following tag ITEMs are used to specify ITEMs with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMs are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|------------------------------|----------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 007 | Reference input | X1 |
| 008 | Program output | Y1 |
| 009 | Elapsed time output | Y2 |
| 010 | Elapsed time unit | H0 |
| 011 | Process output | Y3 |
| 012 | Run/stop command | S1 |
| 013 | Hold switch | S2 |
| 014 | Move to next step command | S3 |
| 015 | X1 input error | U1 |
| 016 | Arrival at final step | U2 |
| 017 | Holding | U3 |
| 019 | Waiting | U4 |
| 020 | Default | A0 |
| 096 | Wait width | WB |
| 097 | Max. wait time | WT |

| Block Model | Block Name | Block Address |
|-------------|-----------------|---------------|
| <156> | Segment Program | 100 to 349 |

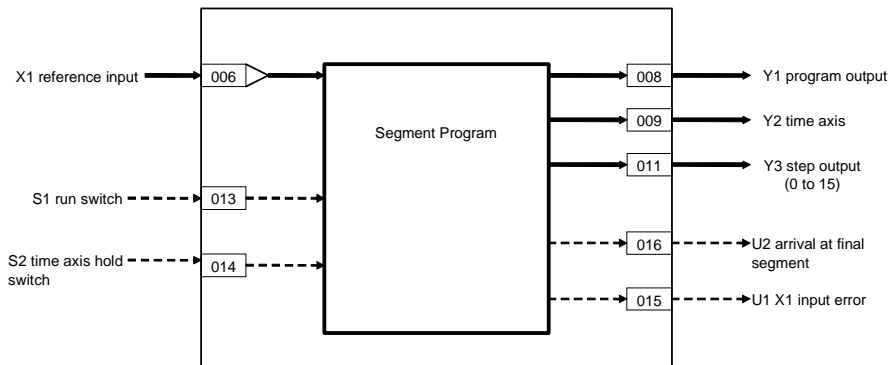
Outline

This function block is the segment program setter for setting time and output as segments.

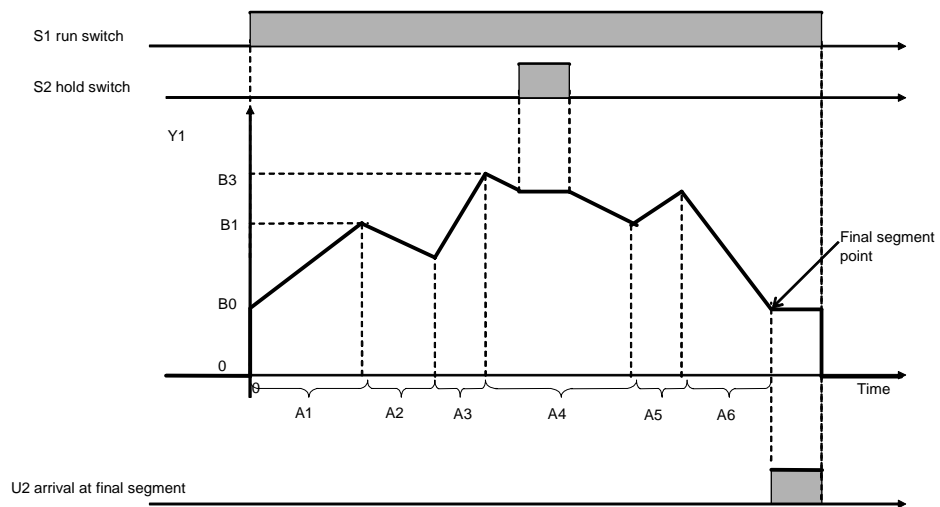
- Provided with a function for matching the setting value to X1 reference input at the start of the segment program
- Provided with step output
- Provided with time axis output for the entire program
- The desired step (segment point) or point on the time axis can be moved when data is set by ITEM Setting blocks to step output (ITEM011) or time axis output (ITEM009). (Setting by ITEM Setting blocks is valid only when S1 run/stop command is 1 (ON).) The segment program can also be returned to a step smaller than the current step. (Note, however, that when the segment program is started from the reference input, the segment program cannot return to a point before the point where the segment program is started by the reference input.)

When S1 run/stop command is 0 (OFF), Y1 output equals 0. When the setting of S1 run/stop command changes from 0 (OFF) to 1 (ON), the segment program starts with the value of Y1 output at B0 default. (When X1 reference input is designated as the source, and there is a point where X1 reference input matches the first segment point, the program starts from that point.)

Block diagram



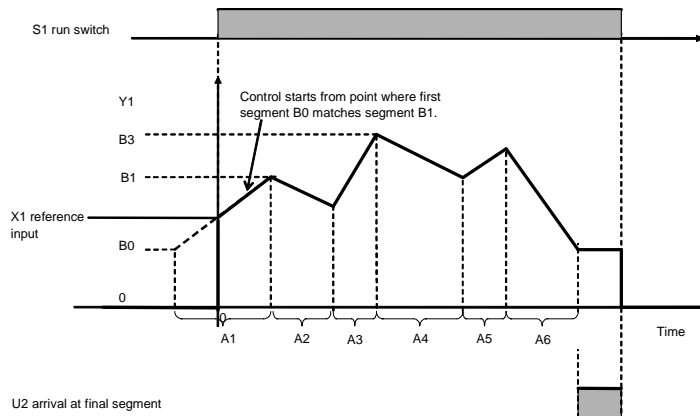
When the segment program is started from B0 default:



When the segment program is started from X1 reference input:

The segment program is started from a point where X1 reference input and the first segment (B0 to B1) match.

Note: The condition for start of the segment program from X1 reference input is as follows: X1 reference input must match the first segment (B0 to B1). However, a match with the second segment onwards is not accepted in this condition. In this case, Y1 output remains at 0 (OFF).



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|----------------------------|------|------------|--|---------------|------------|---------------------------|--|--|------------------------------|------------------------------------|---------------------------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled | Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Segment Program | 156 | 156 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 1: 0.1, 2: 0.2, 3: 0.5, 4: 1 | 1 to 4 | 4 | - | R/W(S) | - | - | - | - | 2 |
| Analog contact information | 006 | | X1 source designation (BBB: Block address, III: ITEM No.) X1 equals Y1 at start when X1 is connected. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 007 | X1 | Reference input (input for external setting of start point) | ±320.00% | 0 | Yes | r | - | - | - | S | 2 |
| Analog output | 008 | Y1 | Program output | ±320.00% | 0 | Yes | r/w | - | - | - | S | 2 |
| | 009 | Y2 | Time axis output | 0 to 3200.0 | 0.0 | Yes | r/w | - | - | - | S/R | 2 |
| Analog output | 011 | Y3 | Step output (0: Display only at end.) | 0 to 15 | 0 | Yes | r/w | - | W | - | S/R | 2 |
| Parameter | 012 | H1 | Time axis unit (0: sec, 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(S) | - | - | - | S/R | 1 |
| Contact input | 013 | S1 | Run/stop command (0: Reset, 1: Run) | 0, 1 | 0 | Yes | R/W(O) | - | - | - | S/R | 1 |
| | 014 | S2 | Hold switch (1: Stop) | 0, 1 | 0 | Yes | R/W(O) | - | - | - | S/R | 1 |
| Contact output | 015 | U1 | X1 input (1: Error. Output is 0 when reference input X1 is not matching between No. 1 segment B0 and B1.) | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| | 016 | U2 | Arrival at final segment (final arrival of entered segments) | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| Parameter | 022 | B0 | Default (Note, however, that reference input X1 is given priority and this value is invalid when the source designation of X1 is specified.) | ±320.00% | -320.00 | - | R/W(O) | - | W | - | - | 2 |
| | 023 | A1 | A1 time | 0 to 320.0 | 200.0 | - | R/W(O) | - | W | - | - | 2 |
| | 024 | B1 | B1 output | ±320.00% | 320.00 | - | R/W(O) | - | W | - | - | 2 |
| | 025 | A2 | A2 time | 0 to 320.0 | 200.0 | - | R/W(O) | - | W | - | - | 2 |
| | 026 | B2 | B2 output | ±320.00% | -320.00 | - | R/W(O) | - | W | - | - | 2 |
| | 027 | A3 | A3 time | 0 to 320.0 | 200.0 | - | R/W(O) | - | W | - | - | 2 |
| | 028 | B3 | B3 output | ±320.00% | 320.00 | - | R/W(O) | - | W | - | - | 2 |
| | 029 | A4 | A4 time | 0 to 320.0 | 200.0 | - | R/W(O) | - | W | - | - | 2 |
| | 030 | B4 | B4 output | ±320.00% | -320.00 | - | R/W(O) | - | W | - | - | 2 |
| | 031 | A5 | A5 time | 0 to 320.0 | 200.0 | - | R/W(O) | - | W | - | - | 2 |
| | 032 | B5 | B5 output | ±320.00% | 320.00 | - | R/W(O) | - | W | - | - | 2 |
| | 033 | A6 | A6 time | 0 to 320.0 | 200.0 | - | R/W(O) | - | W | - | - | 2 |
| | 034 | B6 | B6 output | ±320.00% | -320.00 | - | R/W(O) | - | W | - | - | 2 |
| | 035 | A7 | A7 time | 0 to 320.0 | 200.0 | - | R/W(O) | - | W | - | - | 2 |
| | 036 | B7 | B7 output | ±320.00% | 320.00 | - | R/W(O) | - | W | - | - | 2 |
| | 037 | A8 | A8 time | 0 to 320.0 | 200.0 | - | R/W(O) | - | W | - | - | 2 |
| | 038 | B8 | B8 output | ±320.00% | -320.00 | - | R/W(O) | - | W | - | - | 2 |
| | 039 | A9 | A9 time | 0 to 320.0 | 200.0 | - | R/W(O) | - | W | - | - | 2 |
| | 040 | B9 | B9 output | ±320.00% | 320.00 | - | R/W(O) | - | W | - | - | 2 |
| | 041 | A10 | A10 time | 0 to 320.0 | 200.0 | - | R/W(O) | - | W | - | - | 2 |
| | 042 | B10 | B10 output | ±320.00% | -320.00 | - | R/W(O) | - | W | - | - | 2 |
| | 043 | A11 | A11 time | 0 to 320.0 | 200.0 | - | R/W(O) | - | W | - | - | 2 |
| | 044 | B11 | B11 output | ±320.00% | 320.00 | - | R/W(O) | - | W | - | - | 2 |
| 045 | A12 | A12 time | 0 to 320.0 | 200.0 | - | R/W(O) | - | W | - | - | 2 | |
| 046 | B12 | B12 output | ±320.00% | -320.00 | - | R/W(O) | - | W | - | - | 2 | |
| 047 | A13 | A13 time | 0 to 320.0 | 200.0 | - | R/W(O) | - | W | - | - | 2 | |
| Parameter | 048 | B13 | B13 output | ±320.00% | 320.00 | - | R/W(O) | - | W | - | - | 2 |
| | 049 | A14 | A14 time | 0 to 320.0 | 200.0 | - | R/W(O) | - | W | - | - | 2 |
| | 050 | B14 | B14 output | ±320.00% | -320.00 | - | R/W(O) | - | W | - | - | 2 |
| | 051 | A15 | A15 time | 0 to 320.0 | 200.0 | - | R/W(O) | - | W | - | - | 2 |
| | 052 | B15 | B15 output | ±320.00% | 320.00 | - | R/W(O) | - | W | - | - | 2 |

7 Time Function blocks

<156> Segment Program 100 to 349

Note: •To stop execution of the segment program, set An final time to "0". (U2 arrival at final segment (ITEM016) turns ON.)

Execution ends when Y2 time axis output (ITEM009) reaches 3200.0.

•When a hot start is performed, the segment program starts midway through the segment immediately before the instantaneous power interruption occurred or immediately before the program was stopped according to the elapsed time.

Note Do not change the following ITEMS while the segment program is running (for the duration that S1 run/stop command is 1).
ITEM004 (operation cycle), ITEM012 (time axis unit), ITEM022 to ITEM052 (segment pattern setting values, and values of currently executing or previous steps in segment program)
Before you change the values of these ITEMS, temporarily set S1 run/stop command to 0 (OFF). After you have changed the values, set S1 run/stop command to 1 (ON) and restart the program.
Note that in the case of ITEM022 to ITEM055 (segment pattern setting values), the setting values of steps ahead of the currently executing step can be changed while the segment program is running (for the duration that S1 run/stop command is 1).

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|------------------------------|----------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 007 | Reference input | X1 |
| 008 | Program output | Y1 |
| 009 | Time axis output | H1 |
| 011 | Step output | Y3 |
| 012 | Time axis unit | H1 |
| 013 | Run/stop command | S1 |
| 014 | Hold switch | S2 |
| 015 | X1 input | U1 |
| 016 | Arrival at final segment | U2 |

| Block Model | Block Name | Block Address |
|-------------|-------------------|---------------|
| <157> | Segment Program 2 | 100 to 349 |

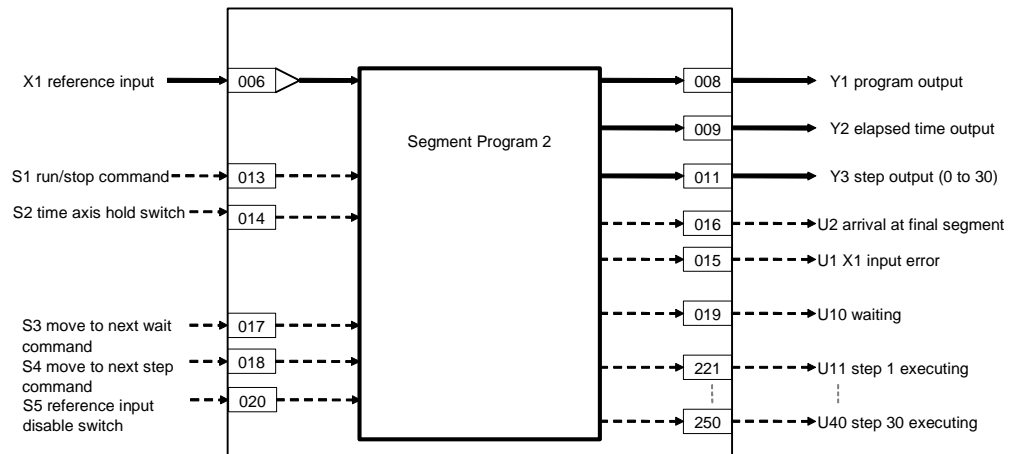
Outline

This function block is segment program setting with wait function for setting the output values with respect to time.

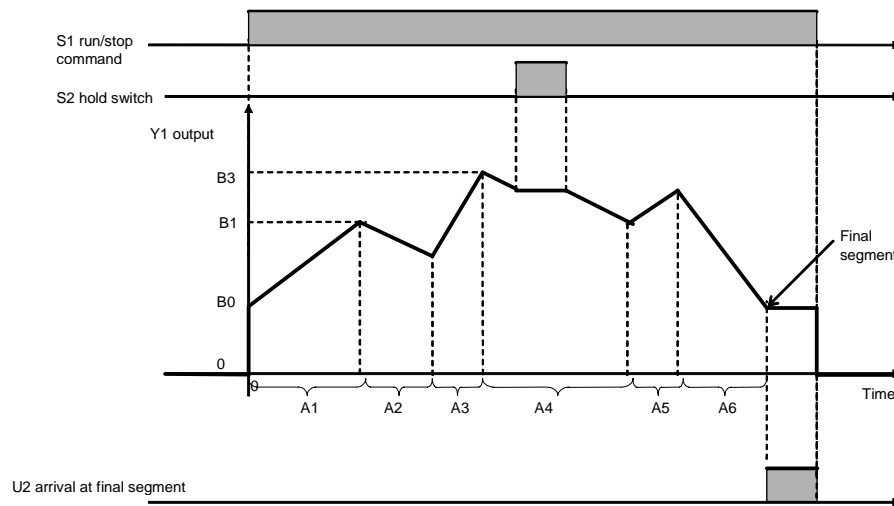
- Provided with a wait function
 - In the case of wait operation ON steps, program execution does not move to the next step and time measurement stops if X1 reference input has not arrived at Y1 output±wait width (of current step) value. At the same time, the value of Y1 output is held at the final value of the current step. When X1 reference input is in Y1 output±wait width, program execution moves to the next step, and time measurement and changing of the Y1 output segment are started. When X1 reference input is not in Y1 output±wait width even though the maximum wait time has elapsed, time measurement and changing of the Y1 output segment are started.
 - When the state of S4 move to next step command changes from 0 (OFF) to 1 (ON) during a wait, the wait operation is canceled, program execution moves to the next step, and time measurement is started.
 - When the state of S3 move to next wait changes from 0 (OFF) to 1 (ON) during execution of a certain step, program execution jumps to the final value of the current step. If the current steps is a wait operation ON step, program execution enters wait operation.
 - The wait width and maximum wait time can be set common to all steps in the ramp program.
 - The time width can be set to each step.
 - The time unit (seconds, minutes, hours) can be specified to all steps in the ramp program.
 - Provided with a function for matching the setting value to X1 reference input at the start of the segment program
 - Provided with step output
 - Provided with elapsed time output for the entire program
 - The desired step can be moved to when data is set by ITEM Setting block to step output (ITEM011). (Setting by ITEM Setting blocks is valid only when S1 run/stop command is 1 (ON).)
- The segment program can also be returned to a step smaller than the current step. (Note, however, that when the segment program is started from the reference input, the segment program cannot return to a point before the point where the segment program is started by the reference input.)
- Even if reference input X1 is specified as the source, the program can be started from the default B0 instead of X1 by setting the reference input disable switch. (Supported from version 2.50 of the Loop Control Unit.)
- The soak value can be changed even after completing a step. If the soak value is changed before the first step for reference input x1, however, it will be ignored. (Supported from version 2.50 of the Loop Control Unit.)

- 1) When the Run/stop command (S1) is 0 (OFF), output Y1 will be 0.
- 2) The following will take place then the Run/stop command (S1) is changed from 0 to 1 (OFF to ON).
 - If reference input X1 is not specified as the source, output Y1 will start from B0.
 - If reference input X1 is specified as the source but the reference input disable switch is 1 (ON), output Y1 will start from B0.
 - If reference input X1 is specified as the source, the reference input disable switch is 0 (OFF), and reference input X1 coincides with the rising step, output Y1 will start from reference input X1.

Block diagram



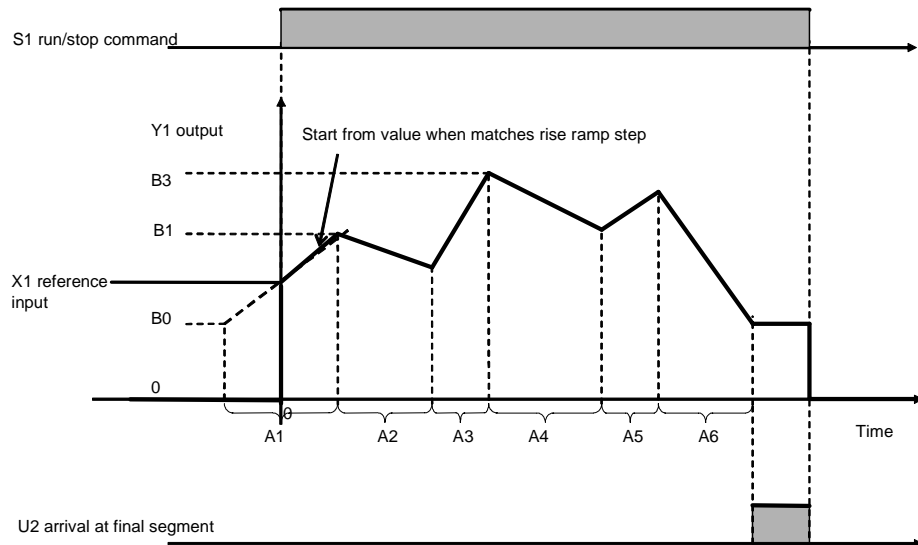
When the segment program is started from B0 default:



When the segment program is started from X1 reference input:

The segment program is started from a point where X1 reference input matches the start of the up ramp.

Note: The condition for start of the segment program from X1 reference input is as follows: X1 reference input must match the initial up ramp (before the down ramp). However, matches are not accepted from a down ramp, and from an up ramp after a momentary down ramp. In this case, Y1 output remains at 0 (OFF).



When a wait operation is performed based on X1 reference input

When X1 reference input has not arrived Y1 output±wait width (of current step) value at the final point of each step, program execution does not move to the next step, and Y1 output is held. Program execution moves to the next step when X1 reference input arrives at Y1 output±wait width (of current step) value.

To cancel a wait operation midway, change the state of S4 move to next step command from 0 (OFF) to 1 (ON).

Note1: The wait operation functions to hold output at the final value of the current step if wait operation is set to ON for that step. For this reason, to enable wait operation when moving from a ramp step to a soak step, wait operation is set not to the soak step but to the ramp step.

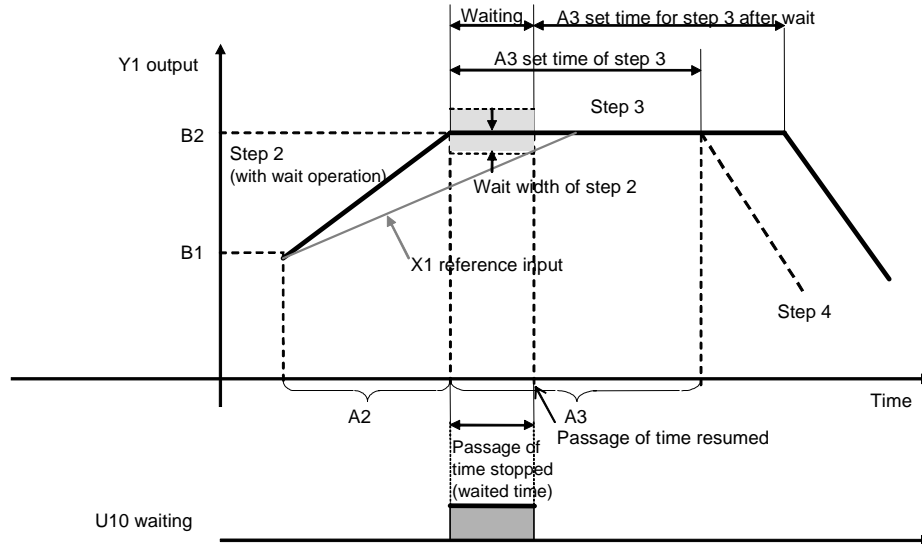
Note2: Setting the wait width to 0.00% disables the wait operation. So, the wait width is actually set within the range 0.01 to 320.00%.

Note3: Wait operation is canceled when the S4 move to next step command changes state from 0 (OFF) to 1 (ON).

Note4: Even during a wait, Y2 elapsed time output continues and increases. Y2 stops only when S2 hold switch is 1 (ON).

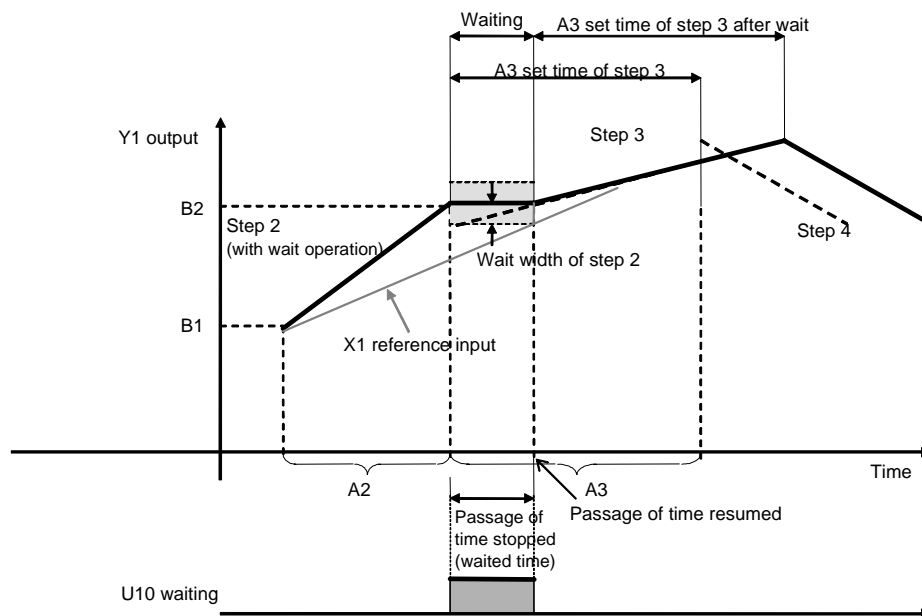
When program execution moves from the ramp step (wait operation ON) to the soak step

Y1 output does not move to step 3 and the program execution waits at the final value of step 2 until X1 reference input falls in $Y1 \pm \text{wait width}$. After the wait, A3 set time of step 3 is secured.



When program execution moves from the ramp step (wait operation ON) to another ramp step

Y1 output does not move to step 3 and program execution waits (value is held) at the final value of step 2 until X1 reference input X1 falls in $Y1 \pm \text{wait width}$ (of step 2). After the wait, the ramp of step 3 is started, and A3 set time is secured. Subsequent program operation shifts by the time that wait operation was performed.



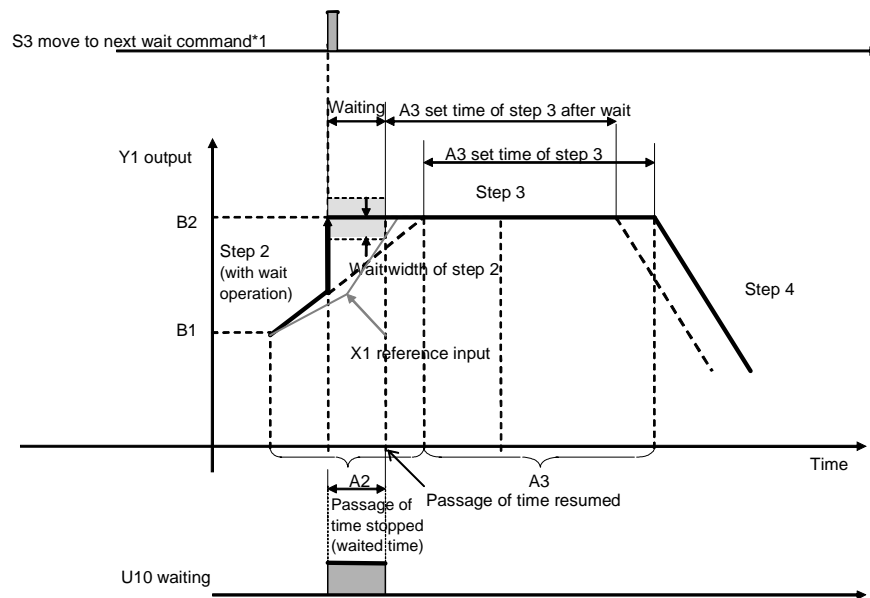
When program execution jumps to wait operation in the current step by S3 move to next wait command

To disable waiting for the set time of the step until wait operation is entered though the wait width must be entered, change the state of the S3 move to next wait command from 0 (OFF) to 1 (ON). When the state of the S3 move to next wait command changes from 0 (OFF) to 1 (ON), program execution jumps to the final value of the current step. (This brings X1 reference input closer to the wait width more quickly.) Wait operation is started from the current step if wait operation is set to ON for that step.

Note: The S3 move to next wait command functions to cause program execution to jump to the final value of the current step. For this reason, if wait operation is set to OFF for the current step, program execution moves to the next step as it is.

If S3 move to next wait command turns 0 (OFF) during execution of step 2, the program jumps to B2 the final value of that step.

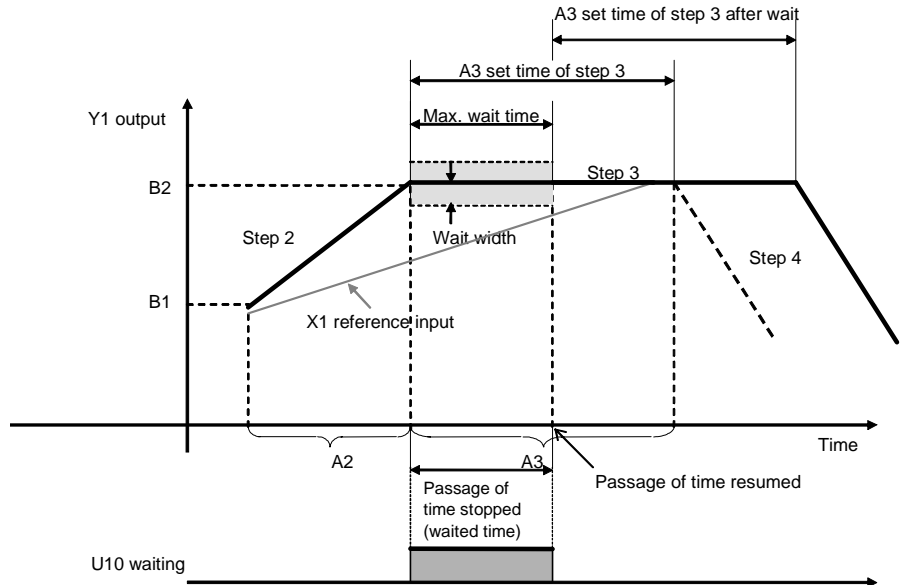
- (1) If wait operation is set to ON at step 2, B2 remains at it is, and program execution waits for X1 reference input to approach. When X1 reference input is in $Y1 \pm \text{wait width}$, program execution moves to step 3.
- (2) If wait operation is set to OFF at step 2, program execution moves to step 3 as it is.



*1: When S3 move to next wait command changes to 1 (ON), program execution jumps to the final value of the current step, and the system automatically turns S3 to 0 (OFF) immediately after the jump.

When X1 reference input is not in Y1 output±wait width even though the maximum wait time has elapsed

When X1 reference input is not in Y1 output±wait width even though the maximum wait time has elapsed, the wait operation is forcibly quit, program execution moves to the next step, and time measurement is started.



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|----------------------------|------|--------|---|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | S/R | 1 | |
| Parameter | 001 | | Comment | 23 characters | Block name | R/W(S) | - | - | - | - | 24 | |
| | 002 | | Block Model: Segment Program 2 | 157 | 157 | R/W(S) | - | - | - | - | 2 | |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | r | - | - | - | S | 2 | |
| Parameter | 004 | | Operation cycle (sec) 1: 0.1, 2: 0.2, 3: 0.5, 4: 1 | 1 to 4 | 4 | R/W(S) | - | - | - | - | 2 | |
| Analog contact information | 006 | | X1 source designation (BBB: Block address, III: ITEM No.) X1 equals Y1 at start when X1 is connected. | BBBIII | 000000 | R/W(S) | - | - | - | - | 4 | |
| Analog input | 007 | X1 | Reference input (input for external setting of start point) | ±320.00% | 0 | r | - | - | - | S | 2 | |
| Analog output | 008 | Y1 | Program output | ±320.00% | 0 | r/w | - | - | - | S | 2 | |
| | 009 | Y2 | Elapsed time output | 0 to 3200.0 | 0.0 | r/w | - | - | - | S | 2 | |
| Analog output | 011 | Y3 | Step output (0: Display only at end.) | 0 to 30 | 0 | r/w | - | W | - | S/R | 2 | |
| Parameter | 012 | H1 | Elapsed time unit (0: sec, 1: min, 2: hr) | 0 to 2 | 0 | R/W(S) | - | - | - | S/R | 1 | |
| Contact input | 013 | S1 | Run/stop command (0: Reset, 1: Run) | 0, 1 | 0 | R/W(O) | - | - | R/W | S/R | 1 | |
| | 014 | S2 | Hold switch (1: Stop) | 0, 1 | 0 | R/W(O) | - | - | R/W | S/R | 1 | |
| Contact output | 015 | U1 | X1 input error (1: Error. Output is 0 when X1 reference input does not match the first up ramp.) | 0, 1 | 0 | - | - | - | R | S | 1 | |
| | 016 | U2 | Arrival at final segment (final arrival of entered segments) | 0, 1 | 0 | - | - | - | R | S | 1 | |
| Contact input | 017 | S3 | Move to next wait command (When the command state changes from 0 to 1, program execution jumps to the final output value of the current step. This command is automatically reset by the system after the jump ends. After this jump, program execution enters the wait operation when wait operation is set to ON for the current step.) Note: This command is invalid during a wait operation. (Note, however, that this command is accepted after a wait ends if it is left set to 1.) | 0, 1 | 0 | R/W(O) | - | - | R/W | S/R | 1 | |
| | 018 | S4 | Move to next step command (When the command state changes from 0 to 1, program execution jumps to the start of the next step. This command is automatically reset by the system after the jump ends.) Note: When the command state changes from 0 to 1 during a wait, wait is canceled, and program execution moves to the next step. | 0, 1 | 0 | R/W(O) | - | - | R/W | S/R | 1 | |
| Contact input | 019 | U10 | Waiting (0: Not waiting, 1: Waiting) | 0, 1 | 0 | - | - | - | R | S | 1 | |
| | 020* | S5 | Reference input disable switch (0: Enabled, 1: Disabled) | 0, 1 | 0 | R/W(O) | - | - | R/W | S/R | 1 | |
| Parameter | 022 | B0 | Default (Note, however, that reference input X1 is given priority and this value is invalid when the source designation of X1 is specified.) | ±320.00% | 0.00 | R/W(O) | - | W | - | - | 2 | |
| | 023 | A1 | Step 1 A1 time width, 0.0: End | 0 to 3200.0 | 200.0 | R/W(O) | - | W | - | - | 2 | |
| | 024 | B1 | Step 1 B1 output value | ±320.00% | 10.00 | R/W(O) | - | W | - | - | 2 | |
| | 025 | J1 | Step 1 Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | R/W(O) | - | W | - | - | 1 | |
| | 026 | A2 | Step 2 A2 time width, 0.0: End | 0 to 3200.0 | 200.0 | R/W(O) | - | W | - | - | 2 | |

7 Time Function blocks

<157> Segment Program 2 100 to 349

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------|------|--------|---|-------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| | 027 | B2 | Step 2 B2 output value | ±320.00% | 20.00 | | R/W(O) | - | W | - | - | 2 |
| | 028 | J2 | Step 2 Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | | R/W(O) | - | W | - | - | 1 |
| | 029 | A3 | Step 3 A3 time width, 0.0: End | 0 to 3200.0 | 200.0 | | R/W(O) | - | W | - | - | 2 |
| | 030 | B3 | Step 3 B3 output value | ±320.00% | 30.00 | | R/W(O) | - | W | - | - | 2 |
| | 031 | J3 | Step 3 Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | | R/W(O) | - | W | - | - | 1 |
| | 032 | A4 | Step 4 A4 time width, 0.0: End | 0 to 3200.0 | 200.0 | | R/W(O) | - | W | - | - | 2 |
| | 033 | B4 | Step 4 B4 output value | ±320.00% | 40.00 | | R/W(O) | - | W | - | - | 2 |
| | 034 | J4 | Step 4 Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | | R/W(O) | - | W | - | - | 1 |
| | 035 | A5 | Step 5 A5 time width, 0.0: End | 0 to 3200.0 | 200.0 | | R/W(O) | - | W | - | - | 2 |
| | 036 | B5 | Step 5 B5 output value | ±320.00% | 50.00 | | R/W(O) | - | W | - | - | 2 |
| | 037 | J5 | Step 5 Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | | R/W(O) | - | W | - | - | 1 |
| | 038 | A6 | Step 6 A6 time width, 0.0: End | 0 to 3200.0 | 200.0 | | R/W(O) | - | W | - | - | 2 |
| | 039 | B6 | Step 6 B6 output value | ±320.00% | 60.00 | | R/W(O) | - | W | - | - | 2 |
| | 040 | J6 | Step 6 Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | | R/W(O) | - | W | - | - | 1 |
| | 041 | A7 | Step 7 A7 time width, 0.0: End | 0 to 3200.0 | 200.0 | | R/W(O) | - | W | - | - | 2 |
| | 042 | B7 | Step 7 B7 output value | ±320.00% | 70.00 | | R/W(O) | - | W | - | - | 2 |
| | 043 | J7 | Step 7 Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | | R/W(O) | - | W | - | - | 1 |
| | 044 | A8 | Step 8 A8 time width, 0.0: End | 0 to 3200.0 | 200.0 | | R/W(O) | - | W | - | - | 2 |
| | 045 | B8 | Step 8 B8 output value | ±320.00% | 80.00 | | R/W(O) | - | W | - | - | 2 |
| | 046 | J8 | Step 8 Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | | R/W(O) | - | W | - | - | 1 |
| | 047 | A9 | Step 9 A9 time width, 0.0: End | 0 to 3200.0 | 200.0 | | R/W(O) | - | W | - | - | 2 |
| | 048 | B9 | Step 9 B9 output value | ±320.00% | 90.00 | | R/W(O) | - | W | - | - | 2 |
| | 049 | J9 | Step 9 Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | | R/W(O) | - | W | - | - | 1 |
| | 050 | A10 | Step 10 A10 time width, 0.0: End | 0 to 3200.0 | 200.0 | | R/W(O) | - | W | - | - | 2 |
| | 051 | B10 | Step 10 B10 output value | ±320.00% | 100.00 | | R/W(O) | - | W | - | - | 2 |
| | 052 | J10 | Step 10 Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | | R/W(O) | - | W | - | - | 1 |
| | 053 | A11 | Step 11 A11 time width, 0.0: End | 0 to 3200.0 | 200.0 | | R/W(O) | - | W | - | - | 2 |
| | 054 | B11 | Step 11 B11 output value | ±320.00% | 90.00 | | R/W(O) | - | W | - | - | 2 |
| | 055 | J11 | Step 11 Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | | R/W(O) | - | W | - | - | 1 |
| | 056 | A12 | Step 12 A12 time width, 0.0: End | 0 to 3200.0 | 200.0 | | R/W(O) | - | W | - | - | 2 |
| | 057 | B12 | Step 12 B12 output value | ±320.00% | 80.00 | | R/W(O) | - | W | - | - | 2 |
| | 058 | J12 | Step 12 Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | | R/W(O) | - | W | - | - | 1 |
| | 059 | A13 | Step 13 A13 time width, 0.0: End | 0 to 3200.0 | 200.0 | | R/W(O) | - | W | - | - | 2 |
| | 060 | B13 | Step 13 B13 output value | ±320.00% | 70.00 | | R/W(O) | - | W | - | - | 2 |
| | 061 | J13 | Step 13 Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | | R/W(O) | - | W | - | - | 1 |
| | 062 | A14 | Step 14 A14 time width, 0.0: End | 0 to 3200.0 | 200.0 | | R/W(O) | - | W | - | - | 2 |
| | 063 | B14 | Step 14 B14 output value | ±320.00% | 60.00 | | R/W(O) | - | W | - | - | 2 |
| | 064 | J14 | Step 14 Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | | R/W(O) | - | W | - | - | 1 |
| | 065 | A15 | Step 15 A15 time width, 0.0: End | 0 to 3200.0 | 200.0 | | R/W(O) | - | W | - | - | 2 |
| | 066 | B15 | Step 15 B15 output value | ±320.00% | 50.00 | | R/W(O) | - | W | - | - | 2 |
| | 067 | J15 | Step 15 Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | | R/W(O) | - | W | - | - | 1 |
| | 068 | A16 | Step 16 A16 time width, 0.0: End | 0 to 3200.0 | 200.0 | | R/W(O) | - | W | - | - | 2 |
| | 069 | B16 | Step 16 B16 output value | ±320.00% | 40.00 | | R/W(O) | - | W | - | - | 2 |
| | 070 | J16 | Step 16 Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | | R/W(O) | - | W | - | - | 1 |
| | 071 | A17 | Step 17 A17 time width, 0.0: End | 0 to 3200.0 | 200.0 | | R/W(O) | - | W | - | - | 2 |
| | 072 | B17 | Step 17 B17 output value | ±320.00% | 30.00 | | R/W(O) | - | W | - | - | 2 |
| | 073 | J17 | Step 17 Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | | R/W(O) | - | W | - | - | 1 |
| | 074 | A18 | Step 18 A18 time width, 0.0: End | 0 to 3200.0 | 200.0 | | R/W(O) | - | W | - | - | 2 |
| | 075 | B18 | Step 18 B18 output value | ±320.00% | 20.00 | | R/W(O) | - | W | - | - | 2 |
| | 076 | J18 | Step 18 Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | | R/W(O) | - | W | - | - | 1 |
| | 077 | A19 | Step 19 A19 time width, 0.0: End | 0 to 3200.0 | 200.0 | | R/W(O) | - | W | - | - | 2 |
| | 078 | B19 | Step 19 B19 output value | ±320.00% | 10.00 | | R/W(O) | - | W | - | - | 2 |

7 Time Function blocks
<157> Segment Program 2 100 to 349

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------|------|--------|---|-------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| | 079 | J19 | Step 19 Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | | R/W(O) | - | W | - | - | 1 |
| | 080 | A20 | Step 20 A20 time width, 0.0: End | 0 to 3200.0 | 200.0 | | R/W(O) | - | W | - | - | 2 |
| | 081 | B20 | Step 20 B20 output value | ±320.00% | 0.00 | | R/W(O) | - | W | - | - | 2 |
| | 082 | J20 | Step 20 Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | | R/W(O) | - | W | - | - | 1 |
| | 083 | A21 | Step 21 A21 time width, 0.0: End | 0 to 3200.0 | 200.0 | | R/W(O) | - | W | - | - | 2 |
| | 084 | B21 | Step 21 B21 output value | ±320.00% | 10.00 | | R/W(O) | - | W | - | - | 2 |
| | 085 | J21 | Step 21 Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | | R/W(O) | - | W | - | - | 1 |
| | 086 | A22 | Step 22 A22 time width, 0.0: End | 0 to 3200.0 | 200.0 | | R/W(O) | - | W | - | - | 2 |
| | 087 | B22 | Step 22 B22 output value | ±320.00% | 20.00 | | R/W(O) | - | W | - | - | 2 |
| | 088 | J22 | Step 22 Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | | R/W(O) | - | W | - | - | 1 |
| | 089 | A23 | Step 23 A23 time width, 0.0: End | 0 to 3200.0 | 200.0 | | R/W(O) | - | W | - | - | 2 |
| | 090 | B23 | Step 23 B23 output value | ±320.00% | 30.00 | | R/W(O) | - | W | - | - | 2 |
| | 091 | J23 | Step 23 Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | | R/W(O) | - | W | - | - | 1 |
| | 092 | A24 | Step 24 A24 time width, 0.0: End | 0 to 3200.0 | 200.0 | | R/W(O) | - | W | - | - | 2 |
| | 093 | B24 | Step 24 B24 output value | ±320.00% | 40.00 | | R/W(O) | - | W | - | - | 2 |
| | 094 | J24 | Step 24 Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | | R/W(O) | - | W | - | - | 1 |
| | 095 | A25 | Step 25 A25 time width, 0.0: End | 0 to 3200.0 | 200.0 | | R/W(O) | - | W | - | - | 2 |
| | 096 | B25 | Step 25 B25 output value | ±320.00% | 50.00 | | R/W(O) | - | W | - | - | 2 |
| | 097 | J25 | Step 25 Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | | R/W(O) | - | W | - | - | 1 |
| | 098 | A26 | Step 26 A26 time width, 0.0: End | 0 to 3200.0 | 200.0 | | R/W(O) | - | W | - | - | 2 |
| | 099 | B26 | Step 26 B26 output value | ±320.00% | 60.00 | | R/W(O) | - | W | - | - | 2 |
| | 100 | J26 | Step 26 Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | | R/W(O) | - | W | - | - | 1 |
| | 101 | A27 | Step 27 A27 time width, 0.0: End | 0 to 3200.0 | 200.0 | | R/W(O) | - | W | - | - | 2 |
| | 102 | B27 | Step 27 B27 output value | ±320.00% | 70.00 | | R/W(O) | - | W | - | - | 2 |
| | 103 | J27 | Step 27 Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | | R/W(O) | - | W | - | - | 1 |
| | 104 | A28 | Step 28 A28 time width, 0.0: End | 0 to 3200.0 | 200.0 | | R/W(O) | - | W | - | - | 2 |
| | 105 | B28 | Step 28 B28 output value | ±320.00% | 80.00 | | R/W(O) | - | W | - | - | 2 |
| | 106 | J28 | Step 28 Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | | R/W(O) | - | W | - | - | 1 |
| | 107 | A29 | Step 29 A29 time width, 0.0: End | 0 to 3200.0 | 200.0 | | R/W(O) | - | W | - | - | 2 |
| | 108 | B29 | Step 29 B29 output value | ±320.00% | 90.00 | | R/W(O) | - | W | - | - | 2 |
| | 109 | J29 | Step 29 Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | | R/W(O) | - | W | - | - | 1 |
| | 110 | A30 | Step 30 A30 time width, 0.0: End | 0 to 3200.0 | 200.0 | | R/W(O) | - | W | - | - | 2 |
| | 111 | B30 | Step 30 B30 output value | ±320.00% | 100.00 | | R/W(O) | - | W | - | - | 2 |
| | 112 | J30 | Step 30 Time unit (0: sec [digits past decimal point ignored], 1: min, 2: hr) | 0 to 2 | 0 | | R/W(O) | - | W | - | - | 1 |

7 Time Function blocks

<157> Segment Program 2 100 to 349

Wait setting

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------|------|--|--|--------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 121 | | Step 1 Wait width (0.00: No wait operation) | 0 to 320.00% | 0.00 | - | R/W(O) | - | W | - | - | 2 |
| | 122 | | Step 1 Max. wait time (0.0: Unlimited) | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 |
| | 123 | | Step 2 Wait width (0.00: No wait operation) | 0 to 320.00% | 0.00 | - | R/W(O) | - | W | - | - | 2 |
| | 124 | | Step 2 Max. wait time (0.0: Unlimited) | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 |
| | 125 | | Step 3 Wait width (0.00: No wait operation) | 0 to 320.00% | 0.00 | - | R/W(O) | - | W | - | - | 2 |
| | 126 | | Step 3 Max. wait time (0.0: Unlimited) | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 |
| | 127 | | Step 4 Wait width (0.00: No wait operation) | 0 to 320.00% | 0.00 | Yes | R/W(O) | - | W | - | - | 2 |
| | 128 | | Step 4 Max. wait time (0.0: Unlimited) | 0 to 3200.0 | 0.0 | Yes | R/W(O) | - | W | - | - | 2 |
| | 129 | | Step 5 Wait width (0.00: No wait operation) | 0 to 320.00% | 0.00 | Yes | R/W(O) | - | W | - | - | 2 |
| | 130 | | Step 5 Max. wait time (0.0: Unlimited) | 0 to 3200.0 | 0.0 | Yes | R/W(O) | - | W | - | - | 2 |
| | 131 | | Step 6 Wait width (0.00: No wait operation) | 0 to 320.00% | 0.00 | - | R/W(O) | - | W | - | - | 2 |
| | 132 | | Step 6 Max. wait time (0.0: Unlimited) | 0 to 3200.0 | 0.0 | Yes | R/W(O) | - | W | - | - | 2 |
| | 133 | | Step 7 Wait width (0.00: No wait operation) | 0 to 320.00% | 0.00 | Yes | R/W(O) | - | W | - | - | 2 |
| | 134 | | Step 7 Max. wait time (0.0: Unlimited) | 0 to 3200.0 | 0.0 | Yes | R/W(O) | - | W | - | - | 2 |
| | 135 | | Step 8 Wait width (0.00: No wait operation) | 0 to 320.00% | 0.00 | Yes | R/W(O) | - | W | - | - | 2 |
| | 136 | | Step 8 Max. wait time (0.0: Unlimited) | 0 to 3200.0 | 0.0 | Yes | R/W(O) | - | W | - | - | 2 |
| | 137 | | Step 9 Wait width (0.00: No wait operation) | 0 to 320.00% | 0.00 | Yes | R/W(O) | - | W | - | - | 2 |
| | 138 | | Step 9 Max. wait time (0.0: Unlimited) | 0 to 3200.0 | 0.0 | Yes | R/W(O) | - | W | - | - | 2 |
| | 139 | | Step 10 Wait width (0.00: No wait operation) | 0 to 320.00% | 0.00 | Yes | R/W(O) | - | W | - | - | 2 |
| | 140 | | Step 10 Max. wait time (0.0: Unlimited) | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 |
| 141 | | Step 11 Wait width (0.00: No wait operation) | 0 to 320.00% | 0.00 | - | R/W(O) | - | W | - | - | 2 | |
| 142 | | Step 11 Max. wait time (0.0: Unlimited) | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 | |
| 143 | | Step 12 Wait width (0.00: No wait operation) | 0 to 320.00% | 0.00 | - | R/W(O) | - | W | - | - | 2 | |
| 144 | | Step 12 Max. wait time (0.0: Unlimited) | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 | |
| 145 | | Step 13 Wait width (0.00: No wait operation) | 0 to 320.00% | 0.00 | - | R/W(O) | - | W | - | - | 2 | |
| 146 | | Step 13 Max. wait time (0.0: Unlimited) | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 | |
| 147 | | Step 14 Wait width (0.00: No wait operation) | 0 to 320.00% | 0.00 | - | R/W(O) | - | W | - | - | 2 | |
| 148 | | Step 14 Max. wait time (0.0: Unlimited) | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 | |
| 149 | | Step 15 Wait width (0.00: No wait operation) | 0 to 320.00% | 0.00 | - | R/W(O) | - | W | - | - | 2 | |
| Parameter | 150 | | Step 15 Max. wait time (0.0: Unlimited) | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 |
| | 151 | | Step 16 Wait width (0.00: No wait operation) | 0 to 320.00% | 0.00 | - | R/W(O) | - | W | - | - | 2 |
| | 152 | | Step 16 Max. wait time (0.0: Unlimited) | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 |
| | 153 | | Step 17 Wait width (0.00: No wait operation) | 0 to 320.00% | 0.00 | - | R/W(O) | - | W | - | - | 2 |
| | 154 | | Step 17 Max. wait time (0.0: Unlimited) | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 |

7 Time Function blocks
<157> Segment Program 2 100 to 349

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------|------|--------|--|--------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| | 155 | | Step 18 Wait width (0.00: No wait operation) | 0 to 320.00% | 0.00 | - | R/W(O) | - | W | - | - | 2 |
| | 156 | | Step 18 Max. wait time (0.0: Unlimited) | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 |
| | 157 | | Step 19 Wait width (0.00: No wait operation) | 0 to 320.00% | 0.00 | - | R/W(O) | - | W | - | - | 2 |
| | 158 | | Step 19 Max. wait time (0.0: Unlimited) | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 |
| | 159 | | Step 20 Wait width (0.00: No wait operation) | 0 to 320.00% | 0.00 | - | R/W(O) | - | W | - | - | 2 |
| | 160 | | Step 20 Max. wait time (0.0: Unlimited) | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 |
| | 161 | | Step 21 Wait width (0.00: No wait operation) | 0 to 320.00% | 0.00 | - | R/W(O) | - | W | - | - | 2 |
| | 162 | | Step 21 Max. wait time (0.0: Unlimited) | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 |
| | 163 | | Step 22 Wait width (0.00: No wait operation) | 0 to 320.00% | 0.00 | - | R/W(O) | - | W | - | - | 2 |
| | 164 | | Step 22 Max. wait time (0.0: Unlimited) | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 |
| | 165 | | Step 23 Wait width (0.00: No wait operation) | 0 to 320.00% | 0.00 | - | R/W(O) | - | W | - | - | 2 |
| | 166 | | Step 23 Max. wait time (0.0: Unlimited) | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 |
| | 167 | | Step 24 Wait width (0.00: No wait operation) | 0 to 320.00% | 0.00 | - | R/W(O) | - | W | - | - | 2 |
| | 168 | | Step 24 Max. wait time (0.0: Unlimited) | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 |
| | 169 | | Step 25 Wait width (0.00: No wait operation) | 0 to 320.00% | 0.00 | - | R/W(O) | - | W | - | - | 2 |
| | 170 | | Step 25 Max. wait time (0.0: Unlimited) | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 |
| | 171 | | Step 26 Wait width (0.00: No wait operation) | 0 to 320.00% | 0.00 | - | R/W(O) | - | W | - | - | 2 |
| | 172 | | Step 26 Max. wait time (0.0: Unlimited) | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 |
| | 173 | | Step 27 Wait width (0.00: No wait operation) | 0 to 320.00% | 0.00 | - | R/W(O) | - | W | - | - | 2 |
| | 174 | | Step 27 Max. wait time (0.0: Unlimited) | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 |
| | 175 | | Step 28 Wait width (0.00: No wait operation) | 0 to 320.00% | 0.00 | - | R/W(O) | - | W | - | - | 2 |
| | 176 | | Step 28 Max. wait time (0.0: Unlimited) | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 |
| | 177 | | Step 29 Wait width (0.00: No wait operation) | 0 to 320.00% | 0.00 | - | R/W(O) | - | W | - | - | 2 |
| | 178 | | Step 29 Max. wait time (0.0: Unlimited) | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 |
| | 179 | | Step 30 Wait width (0.00: No wait operation) | 0 to 320.00% | 0.00 | - | R/W(O) | - | W | - | - | 2 |
| | 180 | | Step 30 Max. wait time (0.0: Unlimited) | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | - | 2 |

*1: These ITEMS were added in Loop Control Unit Ver.2.50.

7 Time Function blocks

<157> Segment Program 2 100 to 349

Step Executing flag

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|----------------|------|--------|------------------------|------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact output | 221 | U11 | Step 1 Executing flag | 0, 1 | 0 | - | - | - | - | R | - | 1 |
| | 222 | U12 | Step 2 Executing flag | 0, 1 | 0 | - | - | - | - | R | - | 1 |
| Contact output | 223 | U13 | Step 3 Executing flag | 0, 1 | 0 | - | - | - | - | R | - | 1 |
| | 224 | U14 | Step 4 Executing flag | 0, 1 | 0 | - | - | - | - | R | - | 1 |
| | 225 | U15 | Step 5 Executing flag | 0, 1 | 0 | - | - | - | - | R | - | 1 |
| | 226 | U16 | Step 6 Executing flag | 0, 1 | 0 | - | - | - | - | R | - | 1 |
| | 227 | U17 | Step 7 Executing flag | 0, 1 | 0 | - | - | - | - | R | - | 1 |
| | 228 | U18 | Step 8 Executing flag | 0, 1 | 0 | - | - | - | - | R | - | 1 |
| | 229 | U19 | Step 9 Executing flag | 0, 1 | 0 | - | - | - | - | R | - | 1 |
| | 230 | U20 | Step 10 Executing flag | 0, 1 | 0 | - | - | - | - | R | - | 1 |
| | 231 | U21 | Step 11 Executing flag | 0, 1 | 0 | - | - | - | - | R | - | 1 |
| | 232 | U22 | Step 12 Executing flag | 0, 1 | 0 | - | - | - | - | R | - | 1 |
| | 233 | U23 | Step 13 Executing flag | 0, 1 | 0 | - | - | - | - | R | - | 1 |
| | 234 | U24 | Step 14 Executing flag | 0, 1 | 0 | - | - | - | - | R | - | 1 |
| | 235 | U25 | Step 15 Executing flag | 0, 1 | 0 | - | - | - | - | R | - | 1 |
| | 236 | U26 | Step 16 Executing flag | 0, 1 | 0 | - | - | - | - | R | - | 1 |
| | 237 | U27 | Step 17 Executing flag | 0, 1 | 0 | - | - | - | - | R | - | 1 |
| | 238 | U28 | Step 18 Executing flag | 0, 1 | 0 | - | - | - | - | R | - | 1 |
| | 239 | U29 | Step 19 Executing flag | 0, 1 | 0 | - | - | - | - | R | - | 1 |
| | 240 | U30 | Step 20 Executing flag | 0, 1 | 0 | - | - | - | - | R | - | 1 |
| | 241 | U31 | Step 21 Executing flag | 0, 1 | 0 | - | - | - | - | R | - | 1 |
| | 242 | U32 | Step 22 Executing flag | 0, 1 | 0 | - | - | - | - | R | - | 1 |
| | 243 | U33 | Step 23 Executing flag | 0, 1 | 0 | - | - | - | - | R | - | 1 |
| | 244 | U34 | Step 24 Executing flag | 0, 1 | 0 | - | - | - | - | R | - | 1 |
| | 245 | U35 | Step 25 Executing flag | 0, 1 | 0 | - | - | - | - | R | - | 1 |
| | 246 | U36 | Step 26 Executing flag | 0, 1 | 0 | - | - | - | - | R | - | 1 |
| | 247 | U37 | Step 27 Executing flag | 0, 1 | 0 | - | - | - | - | R | - | 1 |
| | 248 | U38 | Step 28 Executing flag | 0, 1 | 0 | - | - | - | - | R | - | 1 |
| | 249 | U39 | Step 29 Executing flag | 0, 1 | 0 | - | - | - | - | R | - | 1 |
| | 250 | U40 | Step 30 Executing flag | 0, 1 | 0 | - | - | - | - | R | - | 1 |

Note: •To stop execution of the segment program, set An time width to "0". (U2 arrival at final segment (ITEM016) turns to ON.)

Execution ends when Y2 elapsed time output (ITEM009) reaches 3200.0.

•When a hot start is performed, the segment program starts midway through the segment immediately before the instantaneous power interruption occurred or immediately before the program was stopped according to the elapsed time.

Note ITEMS ITEM022 to ITEM180 can be changed while the segment program is running (for the duration that S1 run/stop command is 1). Any changes made are immediately reflected in program execution.

B0 initial value, A□ time width for each step, B□ final output for each step, J□ time unit for each step, wait width for each step, and maximum wait time for each step

Note Do not change the following ITEMS while the segment program is running (for the duration that S1 run/stop command is 1).

ITEM004 (operation cycle), ITEM012 (elapsed time unit)

Before you change the values of these ITEMS, temporarily set S1 run/stop command to 0 (OFF). After you have changed the values, set S1 run/stop command to 1 (ON) and restart the program.

List of tag ITEMS on CX-Process Monitor or SCADA software

The following tag ITEMS are used to specify ITEMS with either 1) Monitor tags when sending function blocks to the CX-Process Monitor from 1-Block/4-Block Send Terminal to Computer (Block Model 403/404) or 2) CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (Block Model 461)/Send All Blocks (Block Model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in CX-Process Monitor | CSV Tags in SCADA Software |
|------|--------------------------------|--------------------------------------|----------------------------------|
| | | Tag ITEM(fixed) | Tag ITEM(fixed) |
| 000 | Stop block operation command | MT_ST | MT_ST |
| 003 | Execution error display | None | ERR |
| 007 | Reference input | X1 | X1 |
| 008 | Program output | None | Y1 |
| 009 | Elapsed time output | None | Y2 |
| 011 | Step output | None | Y3 |
| 012 | Elapsed time unit | None | H1 |
| 013 | Run/stop command | S1 | S1 |
| 014 | Hold switch | S2 | S2 |
| 015 | X1 input error | U1 | U1 |
| 016 | Arrival at final segment | U2 | U2 |
| 017 | Move to next wait command | S3 | S3 |
| 018 | Move to next step command | S4 | S4 |
| 019 | Waiting | U10 | U10 |
| 020 | Reference input disable switch | S5 | S5 |

Note Note that this function block cannot be sent by the 1-Block Send Terminal to Computer block (Block Model 403).

8 Signal Selection/Switching blocks

<161> Rank Selector 100 to 349

| Block Model | Block Name | Block Address |
|-------------|---------------|---------------|
| <161> | Rank Selector | 100 to 349 |

Outline

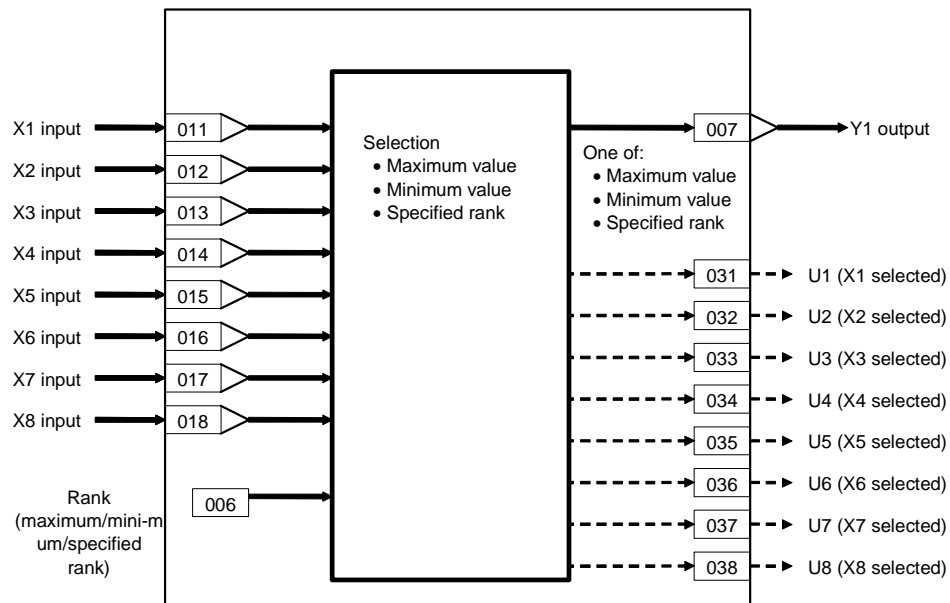
This function block specifies the rank of up to eight analog signals, and selects the data of the specified rank.

The rank within analog signals having the same value is not specified.

Function block applications

High selector, low selector, specific rank selector control

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|---|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Rank Selector | 161 | 161 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| | 006 | | X rank (1: Maximum value, 8: Minimum value, 2 to 7: Specified rank [in order of highest rank]) | 1 to 8 | 8 | - | R/W(O) | - | W | - | - | 1 |
| Analog output | 007 | Y1 | Output | ±320.00% | 0.00 | Yes | r/w | - | - | - | S | 2 |
| Analog input connection information | 011 | | X1 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 012 | | X2 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 013 | | X3 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 014 | | X4 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 015 | | X5 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 016 | | X6 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 017 | | X7 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 018 | | X8 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 021 | X1 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 022 | X2 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 023 | X3 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 024 | X4 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 025 | X5 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 026 | X6 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 027 | X7 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 028 | X8 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| Contact output | 031 | U1 | X1 selected | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| | 032 | U2 | X2 selected | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| | 033 | U3 | X3 selected | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| | 034 | U4 | X4 selected | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| | 035 | U5 | X5 selected | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| | 036 | U6 | X6 selected | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| | 037 | U7 | X7 selected | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| | 038 | U8 | X8 selected | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |

Note: Connection of ITEM011 and ITEM012 are mandatory. ITEM013 to ITEM106 need not be connected. (In this case, the input value becomes -320.00%.)

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|------------------------------|-------------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 007 | Output | Y1 |
| 021 | X1 input | X1 |
| 022 | X2 input | X2 |
| 023 | X3 input | X3 |
| 024 | X4 input | X4 |
| 025 | X5 input | X5 |
| 026 | X6 input | X6 |
| 027 | X7 input | X7 |
| 028 | X8 input | X8 |
| 031 | X1 selected | U1 |
| 032 | X2 selected | U2 |
| 033 | X3 selected | U3 |
| 034 | X4 selected | U4 |
| 035 | X5 selected | U5 |
| 036 | X6 selected | U6 |
| 037 | X7 selected | U7 |
| 038 | X8 selected | U8 |

| Block Model | Block Name | Block Address |
|-------------|----------------|---------------|
| <162> | Input Selector | 100 to 349 |

Outline

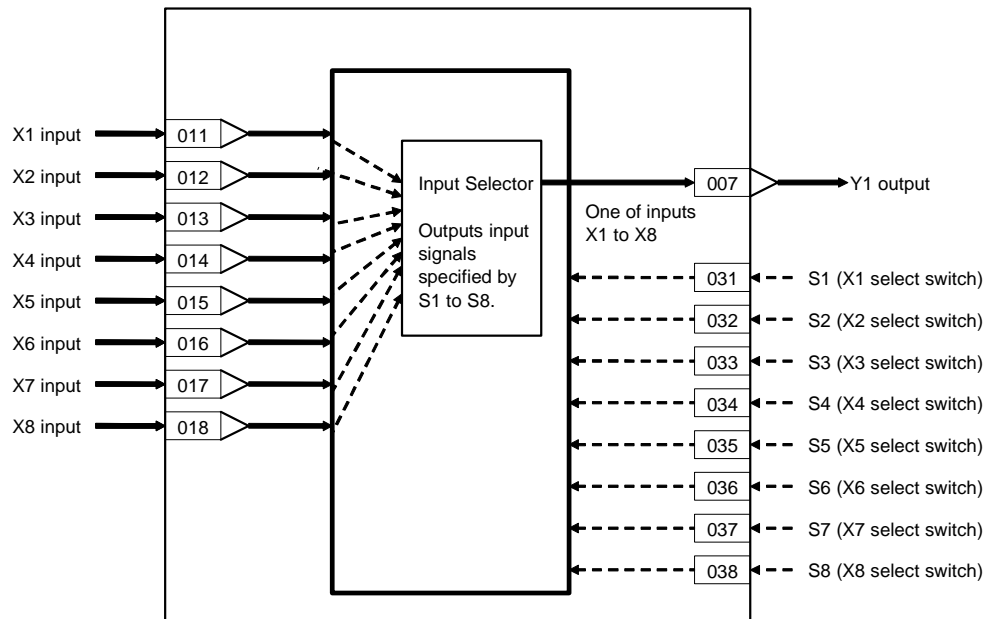
This function block selects a single analog signal specified by the contact signal from up to eight analog signals.

This function block differs from the Constant Selector block (Block Model 165) in that selection is made from analog values to be converted and not from fixed values.

Function block applications

Multiplexer

Block diagram



The analog signal is selected by the select switch changing to 1 (ON). When multiple select switches are 1 (ON), the switch having the smallest number among S1 to S8 is valid.

8 Signal Selection/Switching blocks

<162> Input Selector 100 to 349

ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|--|---------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Input Selector | 162 | 162 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Analog output | 007 | Y1 | Output | ±320.00% | 0.00 | Yes | r/w | - | - | - | S | 2 |
| Analog input connection information | 011 | | X1 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 012 | | X2 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 013 | | X3 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 014 | | X4 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 015 | | X5 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 016 | | X6 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 017 | | X7 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 018 | | X8 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 021 | X1 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 022 | X2 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 023 | X3 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 024 | X4 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 025 | X5 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 026 | X6 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 027 | X7 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 028 | X8 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| Contact input | 031 | S1 | X1 select switch --- Selected by "1" | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 032 | S2 | X2 select switch --- Selected by "1" | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 033 | S3 | X3 select switch --- Selected by "1" | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 034 | S4 | X4 select switch --- Selected by "1" | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 035 | S5 | X5 select switch --- Selected by "1" | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 036 | S6 | X6 select switch --- Selected by "1" | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 037 | S7 | X7 select switch --- Selected by "1" | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 038 | S8 | X8 select switch --- Selected by "1" | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |

Note1: Connection of ITEM011 and ITEM012 are mandatory. ITEM013 to ITEM106 need not be connected. (In this case, the input value becomes -320.00%.)

Note2: Inputs are selected by X1 to X8 select switches changing to 1 (ON) and not when operation is started. When multiple select switches are 1 (ON), the select switch for the ITEM having the smallest ITEM number is valid.

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|------------------------------|----------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 007 | Output | Y1 |
| 021 | X1 input | X1 |
| 022 | X2 input | X2 |
| 023 | X3 input | X3 |
| 024 | X4 input | X4 |
| 025 | X5 input | X5 |
| 026 | X6 input | X6 |
| 027 | X7 input | X7 |
| 028 | X8 input | X8 |
| 031 | X1 select switch | S1 |
| 032 | X2 select switch | S2 |
| 033 | X3 select switch | S3 |
| 034 | X4 select switch | S4 |
| 035 | X5 select switch | S5 |
| 036 | X6 select switch | S6 |
| 037 | X7 select switch | S7 |
| 038 | X8 select switch | S8 |

8 Signal Selection/Switching blocks

<163> 3-input Selector 100 to 349

| Block Model | Block Name | Block Address |
|-------------|------------------|---------------|
| <163> | 3-input Selector | 100 to 349 |

Outline

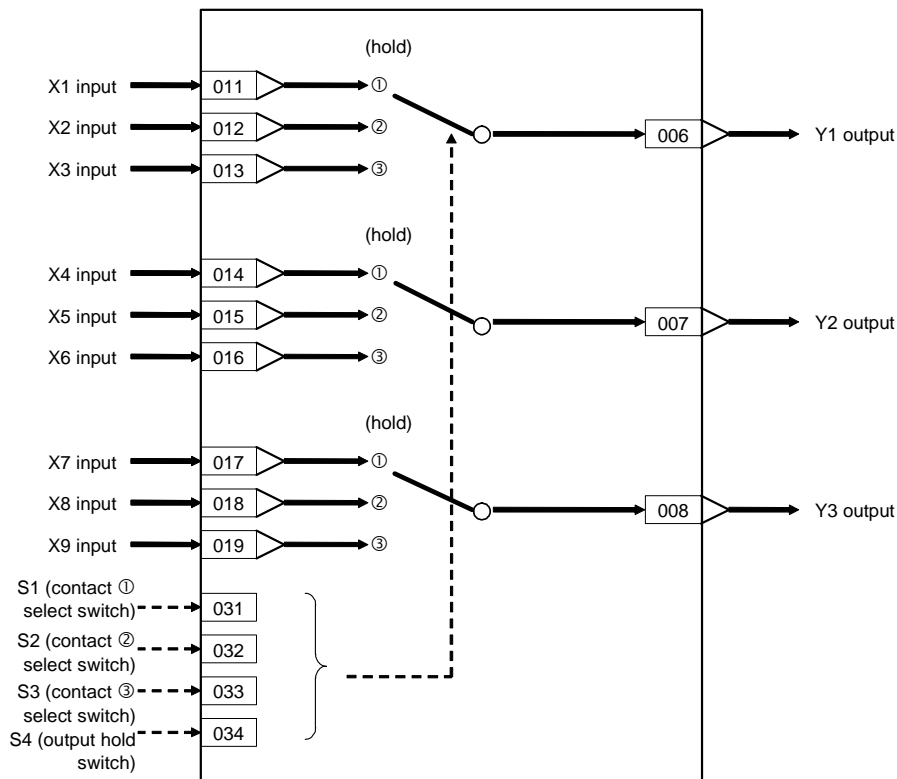
This function block selects and outputs one of three analog input signals. Three sets of analog input signals are held by this function.

- In addition to switching of three analog input signals, the previous value can also be held.

Function block applications

Switching of measuring systems or sensors having different measurement targets

Block diagram



When S1 contact select switch is 1 (ON), X1, X4 and X7 are selected, and are output to Y1, Y2 and Y3, respectively.

When S2 contact select switch is 1 (ON), X2, X5 and X8 are selected, and are output to Y1, Y2 and Y3, respectively.

When S3 contact select switch is 1 (ON), X3, X6 and X9 are selected, and are output to Y1, Y2 and Y3, respectively.

When S4 output hold switch is 1 (ON), X1 to X9 inputs are not selected. The previous output values are held for Y1, Y2 and Y3 outputs in this case.

Note: •Use the OUT command or SET command in the Step Ladder Program block (Block Model 301) for manipulating the S1 to S4 contact select switches.

•An error (execution error code 19: inappropriate operation) occurs when two or more S1 to S3 contact select switches are specified at the same time. If an error occurs, the output value that was active before the error occurs is held.

•When S4 contact switch is set to 1 (ON) at the same time as S1 to S3, the setting of S4 (output hold switch) is given priority.

ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|---|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: 3-input Selector | 163 | 163 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Analog output | 006 | Y1 | Output | ±320.00% | 0.00 | Yes | R/W(O) | - | - | - | S | 2 |
| | 007 | Y2 | Output | ±320.00% | 0.00 | Yes | R/W(O) | - | - | - | S | 2 |
| | 008 | Y3 | Output | ±320.00% | 0.00 | Yes | R/W(O) | - | - | - | S | 2 |
| Analog input connection information | 011 | | X1 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 012 | | X2 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 013 | | X3 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 014 | | X4 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 015 | | X5 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 016 | | X6 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 017 | | X7 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 018 | | X8 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 019 | | X9 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 021 | X1 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 022 | X2 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 023 | X3 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 024 | X4 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 025 | X5 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 026 | X6 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 027 | X7 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 028 | X8 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 029 | X9 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| Contact input | 031 | S1 | S1 select switch | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 032 | S2 | S2 select switch | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 033 | S3 | S3 select switch | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 034 | S4 | Output hold switch --- Output is held when set to ON. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|------------------------------|----------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 006 | Y1 output | Y1 |
| 007 | Y2 output | Y2 |
| 008 | Y3 output | Y3 |
| 021 | X1 input | X1 |
| 022 | X2 input | X2 |
| 023 | X3 input | X3 |
| 024 | X4 input | X4 |
| 025 | X5 input | X5 |
| 026 | X6 input | X6 |
| 027 | X7 input | X7 |
| 028 | X8 input | X8 |
| 029 | X9 input | X9 |
| 031 | S1 select switch | S1 |
| 032 | S2 select switch | S2 |
| 033 | S3 select switch | S3 |
| 034 | Output hold switch | S4 |

| Block Model | Block Name | Block Address |
|-------------|-------------------|---------------|
| <164> | 3-output Selector | 100 to 349 |

Outline

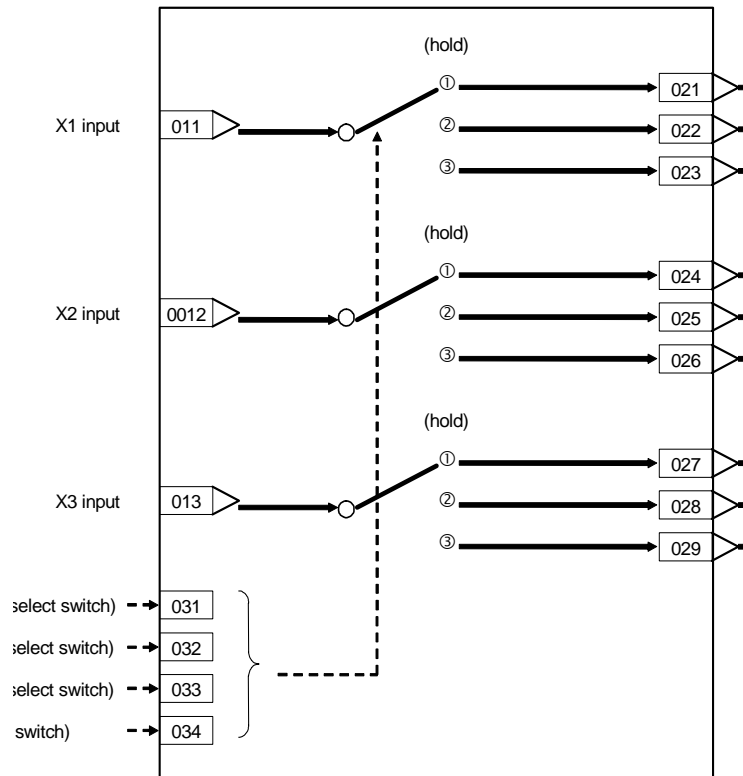
This function block selects and outputs one analog input signal to one of three switched outputs.
 Three sets of analog input signal and switched output are held by this function block.

- In addition to switching to one of three switched outputs, the previous value can also be held.

Function block applications

Selection of control panels or control targets having different targets to be manipulated

Block diagram



When S1 contact select switch is 1 (ON), X1, X2 and X3 inputs are output to Y1, Y4 and Y7, respectively.

When S2 contact select switch is 1 (ON), X1, X2 and X3 inputs are output to Y2, Y5 and Y8, respectively.

When S3 contact select switch is 1 (ON), X1, X2 and X3 inputs are output to Y3, Y6 and Y9, respectively.

When S4 output hold switch is 1 (ON), X1 to X3 inputs are not output. The previous output values are held for Y1 through Y9 outputs in this case.

Note: •Use the OUT command or SET command in the Step Ladder Program block (Block Model 301) for manipulating the S1 to S4 switches.

•An error (execution error code 19: inappropriate operation) occurs when two or more S1 to S3 contact select switches are specified at the same time. If an error occurs, the output value that was active before the error occurs is held.

•When S4 output hold switch is set to 1 (ON) at the same time as S1 to S3, the setting of S4 is given priority.

8 Signal Selection/Switching blocks

<164> 3-output Selector 100 to 349

ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|---------------------------------|------|--------|---|---------------|------------|---------------------------|--|-----------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor*1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | R/W | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: 3-output Selector | 164 | 164 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Analog input wiring information | 011 | | X1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 012 | | X2 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 013 | | X3 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 014 | X1 | X1 input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 015 | X2 | X2 input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 016 | X3 | X3 input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| Analog output | 021 | Y1 | Output | ±320.00% | 0.00 | Yes | R/W(O) | - | - | - | S | 2 |
| | 022 | Y2 | Output | ±320.00% | 0.00 | Yes | R/W(O) | - | - | - | S | 2 |
| | 023 | Y3 | Output | ±320.00% | 0.00 | Yes | R/W(O) | - | - | - | S | 2 |
| | 024 | Y4 | Output | ±320.00% | 0.00 | Yes | R/W(O) | - | - | - | S | 2 |
| | 025 | Y5 | Output | ±320.00% | 0.00 | Yes | R/W(O) | - | - | - | S | 2 |
| | 026 | Y6 | Output | ±320.00% | 0.00 | Yes | R/W(O) | - | - | - | S | 2 |
| | 027 | Y7 | Output | ±320.00% | 0.00 | Yes | R/W(O) | - | - | - | S | 2 |
| | 028 | Y8 | Output | ±320.00% | 0.00 | Yes | R/W(O) | - | - | - | S | 2 |
| | 029 | Y9 | Output | ±320.00% | 0.00 | Yes | R/W(O) | - | - | - | S | 2 |
| Contact input | 031 | S1 | S1 select switch | 0, 1 | 0 | - | R/W(O) | - | - | R/W | S/R | 1 |
| | 032 | S2 | S2 select switch | 0, 1 | 0 | - | R/W(O) | - | - | R/W | S/R | 1 |
| | 033 | S3 | S3 select switch | 0, 1 | 0 | - | R/W(O) | - | - | R/W | S/R | 1 |
| | 034 | S4 | Output hold switch --- Output is held when set to ON. | 0, 1 | 0 | - | R/W(O) | - | - | R/W | S/R | 1 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|------------------------------|----------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 014 | X1 input | X1 |
| 015 | X2 input | X2 |
| 016 | X3 input | X3 |
| 021 | Y1 output | Y1 |
| 022 | Y2 output | Y2 |
| 023 | Y3 output | Y3 |
| 024 | Y4 output | Y4 |
| 025 | Y5 output | Y5 |
| 026 | Y6 output | Y6 |
| 027 | Y7 output | Y7 |
| 028 | Y8 output | Y8 |
| 029 | Y9 output | Y9 |
| 031 | S1 select switch | S1 |
| 032 | S2 select switch | S2 |
| 033 | S3 select switch | S3 |
| 034 | Output hold switch | S4 |

8 Signal Selection/Switching blocks

<165> Constant Selector 100 to 349

| Block Model | Block Name | Block Address |
|-------------|-------------------|---------------|
| <165> | Constant Selector | 100 to 349 |

Outline

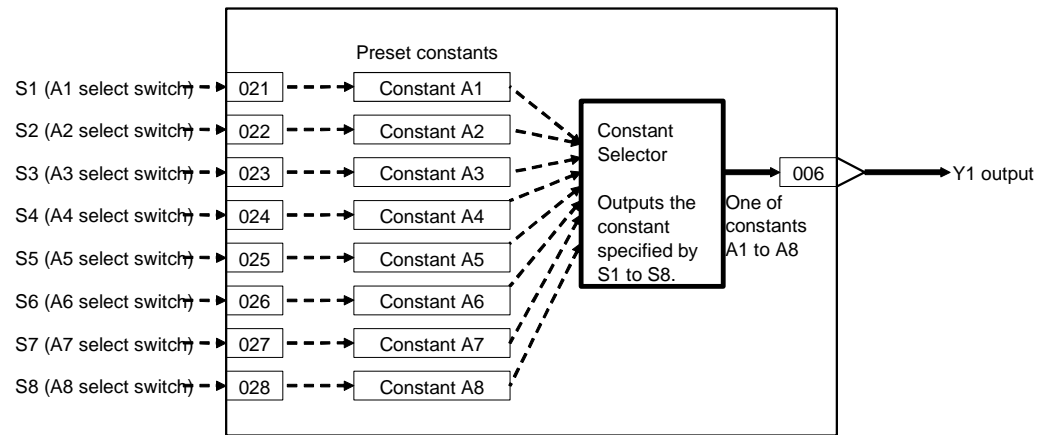
This function block selects eight preset constants (fixed values) by the contact signal, and outputs the selected constant as an analog signal.

This function block differs from the Input Selector block (Block Model 162) in that the constants are selected from fixed values and not from analog values that change.

Function block applications

Switching of multiple parameters (e.g. Set Point values)

Block diagram



The analog signal is selected by the select switch changing to 1 (ON). When multiple select switches are 1 (ON), the switch having the smallest number among S1 to S8 is valid.

ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|---------------|------|--------|--|---------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Constant Selector | 165 | 165 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Analog output | 006 | Y1 | Output | ±320.00% | 0.00 | Yes | r/w | - | - | - | S | 2 |
| Parameter | 011 | A1 | A1 constant | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 012 | A2 | A2 constant | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 013 | A3 | A3 constant | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 014 | A4 | A4 constant | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 015 | A5 | A5 constant | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 016 | A6 | A6 constant | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 017 | A7 | A7 constant | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 018 | A8 | A8 constant | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| Contact input | 021 | S1 | A1 select switch --- Selected by "1" | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 022 | S2 | A2 select switch --- Selected by "1" | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 023 | S3 | A3 select switch --- Selected by "1" | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 024 | S4 | A4 select switch --- Selected by "1" | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 025 | S5 | A5 select switch --- Selected by "1" | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 026 | S6 | A6 select switch --- Selected by "1" | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 027 | S7 | A7 select switch --- Selected by "1" | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 028 | S8 | A8 select switch --- Selected by "1" | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |

Note: Inputs are selected by A1 to A8 select switches changing to 1 (ON) and not when operation is started. When multiple select switches are 1 (ON), the select switch for the ITEM having the smallest ITEM number is valid.

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|------------------------------|-------------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 006 | Output | Y1 |
| 011 | A1 constant | A1 |
| 012 | A2 constant | A2 |
| 013 | A3 constant | A3 |
| 014 | A4 constant | A4 |
| 015 | A5 constant | A5 |
| 016 | A6 constant | A6 |
| 017 | A7 constant | A7 |
| 018 | A8 constant | A8 |
| 021 | A1 select switch | S1 |
| 022 | A2 select switch | S2 |
| 023 | A3 select switch | S3 |
| 024 | A4 select switch | S4 |
| 025 | A5 select switch | S5 |
| 026 | A6 select switch | S6 |
| 027 | A7 select switch | S7 |
| 028 | A8 select switch | S8 |

| Block Model | Block Name | Block Address |
|-------------|--------------------|---------------|
| <166> | Constant Generator | 100 to 349 |

Outline

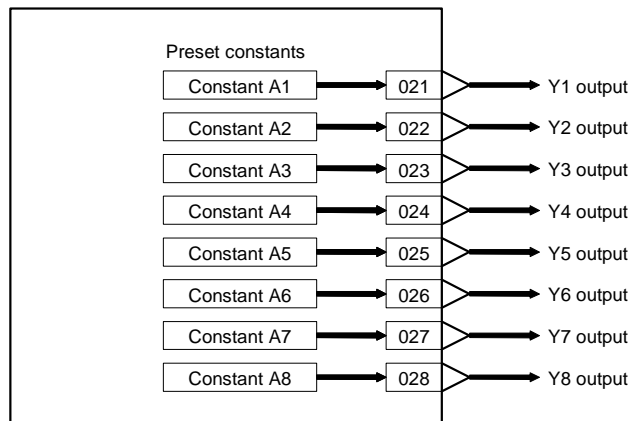
This function block outputs eight preset constants (fixed values) in batch manner as analog signals.

All A1 to A8 constants are output to Y1 to Y8 analog outputs at all times.

Function block applications

Use of certain fixed values as input values (e.g. to make one of the values in an addition operation a fixed value)

Block diagram



8 Signal Selection/Switching blocks

<166> Constant Generator 100 to 349

ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|---------------|------|--------|--|---------------|------------|---------------------------|--|-----------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor*1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Constant Generator | 166 | 166 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Parameter | 011 | A1 | A1 constant | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 012 | A2 | A2 constant | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 013 | A3 | A3 constant | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 014 | A4 | A4 constant | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 015 | A5 | A5 constant | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 016 | A6 | A6 constant | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 017 | A7 | A7 constant | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 018 | A8 | A8 constant | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| Analog output | 021 | Y1 | Output | ±320.00% | 0.00 | Yes | r/w | - | - | - | - | 2 |
| | 022 | Y2 | Output | ±320.00% | 0.00 | Yes | r/w | - | - | - | - | 2 |
| | 023 | Y3 | Output | ±320.00% | 0.00 | Yes | r/w | - | - | - | - | 2 |
| | 024 | Y4 | Output | ±320.00% | 0.00 | Yes | r/w | - | - | - | - | 2 |
| | 025 | Y5 | Output | ±320.00% | 0.00 | Yes | r/w | - | - | - | - | 2 |
| | 026 | Y6 | Output | ±320.00% | 0.00 | Yes | r/w | - | - | - | - | 2 |
| | 027 | Y7 | Output | ±320.00% | 0.00 | Yes | r/w | - | - | - | - | 2 |
| | 028 | Y8 | Output | ±320.00% | 0.00 | Yes | r/w | - | - | - | - | 2 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|------------------------------|----------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 011 | A1 constant | A1 |
| 012 | A2 constant | A2 |
| 013 | A3 constant | A3 |
| 014 | A4 constant | A4 |
| 015 | A5 constant | A5 |
| 016 | A6 constant | A6 |
| 017 | A7 constant | A7 |
| 018 | A8 constant | A8 |

| Block Model | Block Name | Block Address |
|-------------|---------------|---------------|
| <167> | Ramped Switch | 001 to 032 |

Outline

The function block creates a ramped switch that switches between two analog inputs, X1 and X2, or constants.

When the status of the Input Switch Command, S1, is changed, output Y1 is changed at a constant rate to equal the value of analog input X1 or analog input X2 at the end of the specified time.

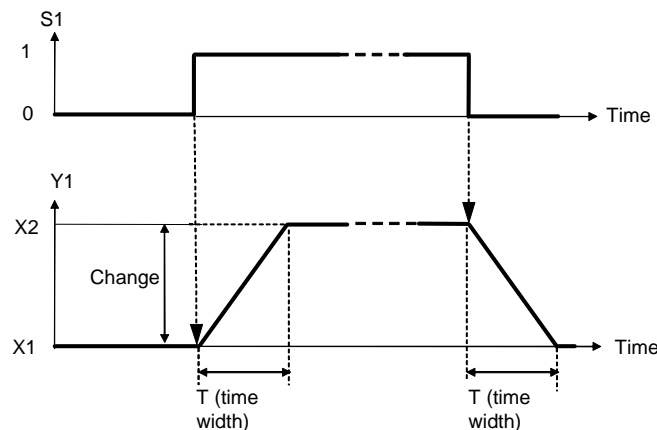
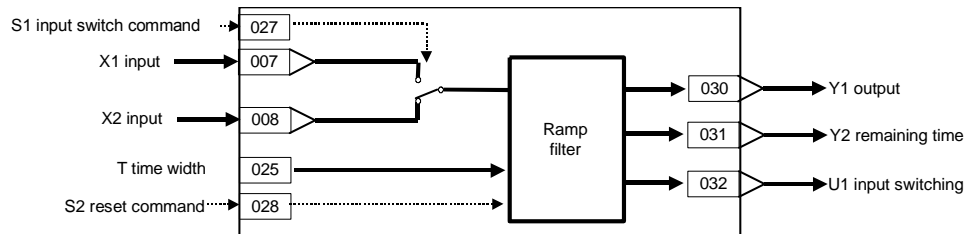
Ramped Switch blocks can be used when it is necessary to change a process value gradually over a set period of time.

Note: Internal values resulting from calculations from just prior to power interruptions or stopping operation are cleared for cold starts. They are maintained for hot starts.

Function block applications

Changing a process value over a set period of time for opening/closing valves, ramping temperature increases for heat processing, etc.

Block diagram



When Input Switch Command S1 changes to 1 (ON), the value of Y1 changes from X1 to X2 over time width T. When Input Switch Command S1 changes to 0 (OFF), the value of Y1 changes from X2 to X1 over time width T. When time width T has lapsed, the value of the selected input is output.

The ramp filter is operating only while input switching U1 is ON.

(The above figure explains the relationship when $X2 > X1$. The relationship when $X2 < X1$ is also possible.)

Note1: When Reset Command S2 is set to 1 (ON), the value of Y1 will be reset to X2 if Input Switch Command S1 is set to 1 (ON), and to X1 if Input Switch Command S1 is set to 0 (OFF).

Note2: If the Input Switch Command is changed while Output Y1 is changing, the value being output will change to X1 or X2 over time width T.

Note3: If you have changed the time unit (Item 026) while Output Y1 is changing, change Reset Command S2 from 1 (ON) to 0 (OFF).

8 Signal Selection/Switching blocks

<167> Ramped Switch 001 to 032

ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|---|---------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | R/W | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Ramped Switch | 167 | 167 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Analog input connection information | 007 | | X1 source destination BBB: Block address, III: ITEM No. Note: If 000000 is set, the value of ITEM 015 is used as a constant for X1 (fixed value). | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 008 | | X2 source destination BBB: Block address, III: ITEM No. Note: If 000000 is set, the value of ITEM 016 is used as a constant for X2 (fixed value). | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 015 | X1 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 016 | X2 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| Parameter | 025 | T | Time width (0: No delay) | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | S/R | 2 |
| | 026 | TU | Time unit (0: sec, 1: min, 2: hr) | 0 to 2 | 0 | - | R/W(S) | - | W | - | S/R | 1 |
| Contact input | 027 | S1 | Input Switch Command (1: Y1= X2 to X1, 0: Y1= X1 to X2) | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 028 | S2 | Reset Command When set to 1, if S1 (ITEM 027) =0 Y1 is reset to X1. If S1(ITEM 027) =1, Y1 is reset to X2. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| Analog output | 030 | Y1 | Output | ±320.00% | 0.00 | Yes | R/W | - | - | - | S | 2 |
| | 031 | Y2 | Remaining Time (Time set to 0) | 0 to 3200.0 | 0.0 | Yes | r | - | W | - | S | 2 |
| Contact output | 032 | U1 | Input switching (ramp filter operating: 1) | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|------------------------------|----------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 015 | X1 input | X1 |
| 016 | X2 input | X2 |
| 025 | Time width | T |
| 026 | Time unit | TU |
| 027 | Input switch command | S1 |
| 028 | Reset command | S2 |
| 030 | Y1 output | Y1 |
| 031 | Remaining time | Y2 |

| Block Model | Block Name | Block Address |
|-------------|-----------------------|---------------|
| <171> | Constant ITEM Setting | 100 to 349 |

Outline

This function block writes the constant data (fixed values) to the specified parameter ITEM in specified function blocks. Constants are written to parameter ITEMS when E1 to E8 send switches or the batch send switch are ON.

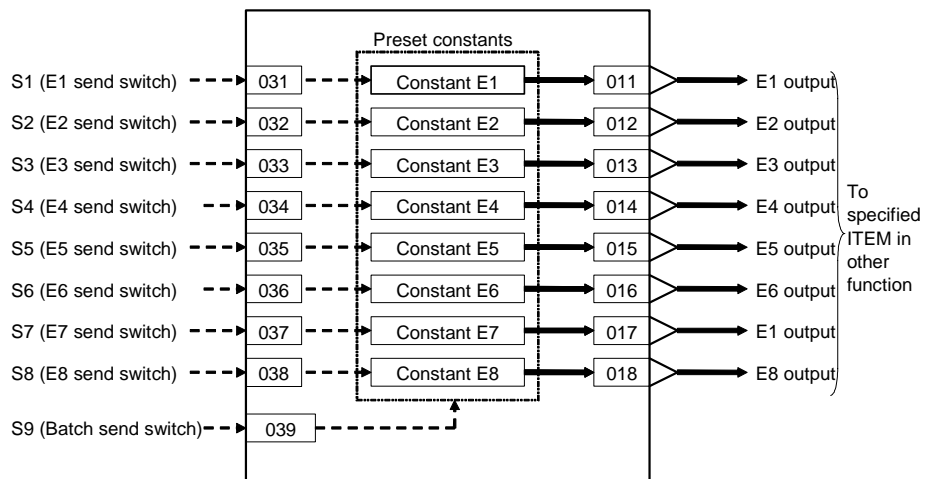
Constant data is written within the range -32000 to +32000, and all numbers are expressed as values without any digits past the decimal point. (For example, 100 becomes 1.00 when it is written to an ITEM that is expressed with two digits past the decimal point.)

- In function block ITEM lists, constant data can be written to ITEMS defined as settable (W) by ITEM Setting blocks. Constant data cannot be written to ITEMS defined as non-settable (-).

| ITEM | R/W method | | | | Data Length (bytes) |
|------|---------------------------------|---------------------------------|----------------------------------|--|---------------------|
| | According to CX-Process Monitor | According to ITEM Setting block | According to Step Ladder Program | | |
| | W | W | - | | 1 |

- ITEM002 (Block Model) of the write destination function block cannot be changed.
- Writing is executed for the duration that a send switch is 1 (ON). Send switches are automatically set to 0 (OFF) after writing is completed. For this reason, to execute writing only once, use the differentiated output command (DIFU) of the Step Ladder Program block (Block Model 301) to manipulate the send switches. To repeat execution of writing, use the OUT or SET command to manipulate the send switch.

Block diagram



9 ITEM Setting blocks

<171> Constant ITEM Setting 100 to 349

ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|--------------------------------------|------|--------|--|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Constant ITEM Setting | 171 | 171 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Analog output connection information | 011 | | E1 destination (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 012 | | E2 destination (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 013 | | E3 destination (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 014 | | E4 destination (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 015 | | E5 destination (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 016 | | E6 destination (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 017 | | E7 destination (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 018 | | E8 destination (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Parameter | 021 | E1 | E1 setting | ±32000 | 0 | - | R/W(O) | - | W | - | S/R | 2 |
| | 022 | E2 | E2 setting | ±32000 | 0 | - | R/W(O) | - | W | - | S/R | 2 |
| | 023 | E3 | E3 setting | ±32000 | 0 | - | R/W(O) | - | W | - | S/R | 2 |
| | 024 | E4 | E4 setting | ±32000 | 0 | - | R/W(O) | - | W | - | S/R | 2 |
| | 025 | E5 | E5 setting | ±32000 | 0 | - | R/W(O) | - | W | - | S/R | 2 |
| | 026 | E6 | E6 setting | ±32000 | 0 | - | R/W(O) | - | W | - | S/R | 2 |
| | 027 | E7 | E7 setting | ±32000 | 0 | - | R/W(O) | - | W | - | S/R | 2 |
| | 028 | E8 | E8 setting | ±32000 | 0 | - | R/W(O) | - | W | - | S/R | 2 |
| Contact input | 031 | S1 | E1 send switch --- Send when ON. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 2 |
| | 032 | S2 | E2 send switch --- Send when ON. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 033 | S3 | E3 send switch --- Send when ON. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 034 | S4 | E4 send switch --- Send when ON. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 035 | S5 | E5 send switch --- Send when ON. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 036 | S6 | E6 send switch --- Send when ON. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 037 | S7 | E7 send switch --- Send when ON. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 038 | S8 | E8 send switch --- Send when ON. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 039 | S9 | Batch send switch --- Send all when ON. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|------------------------------|-------------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 021 | E1 setting | E1 |
| 022 | E2 setting | E2 |
| 023 | E3 setting | E3 |
| 024 | E4 setting | E4 |
| 025 | E5 setting | E5 |
| 026 | E6 setting | E6 |
| 027 | E7 setting | E7 |
| 028 | E8 setting | E8 |
| 031 | E1 send switch | S1 |
| 032 | E2 send switch | S2 |
| 033 | E3 send switch | S3 |
| 034 | E4 send switch | S4 |
| 035 | E5 send switch | S5 |
| 036 | E6 send switch | S6 |
| 037 | E7 send switch | S7 |
| 038 | E8 send switch | S8 |
| 039 | Batch send switch | S9 |

9 ITEM Setting blocks

<172> Variable ITEM Setting 100 to 349

| Block Model | Block Name | Block Address |
|-------------|-----------------------|---------------|
| <172> | Variable ITEM Setting | 100 to 349 |

Outline

This function block input analog signals (variables), and writes that variable data (values that change) to the specified parameter ITEM in specified function blocks. Variables are written to parameter ITEMS when E1 to E8 send switches or the batch send switch are ON.

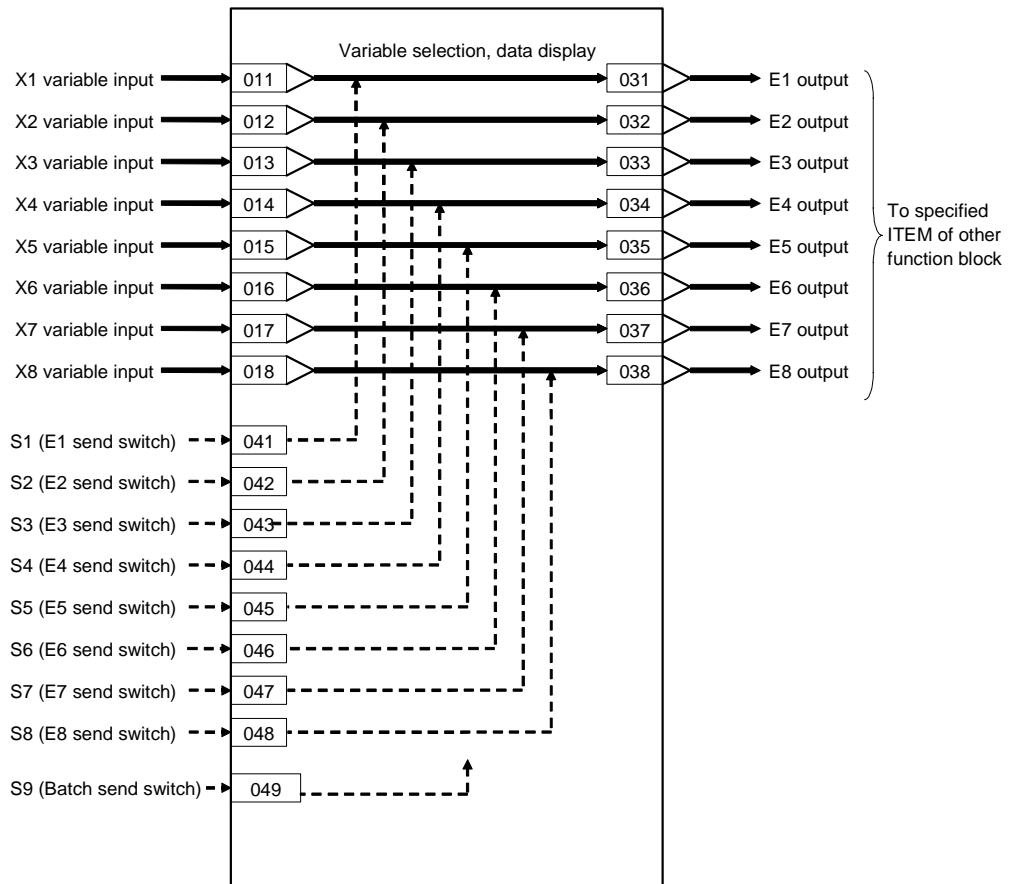
Variable data corresponding to variable data range -3200.00 to +3200.00% is written within the range -32000 to +32000, and all numbers are expressed as values without any digits past the decimal point. (For example, 100 becomes 1.00 when it is written to an ITEM that is expressed with two digits past the decimal point.)

- In function block ITEM lists, analog input (variable) data can be written to ITEMS defined as settable (W) by ITEM Setting blocks. Variable data cannot be written to ITEMS defined as non-settable (-).

| ITEM | R/W method | | | Data Length (bytes) |
|------|---------------------------------|---------------------------------|----------------------------------|---------------------|
| | According to CX-Process Monitor | According to ITEM Setting block | According to Step Ladder Program | |
| | W | W | - | 1 |

- ITEM002 (Block Model) of the write destination function block cannot be changed.
- Writing is executed for the duration that a send switch is 1 (ON). Send switches are automatically set to 0 (OFF) after writing is completed. For this reason, to execute writing only once, use the differentiated output command (DIFU) of the Step Ladder Program block (Block Model 301) to manipulate the send switches. To repeat execution of writing, use the OUT or SET command to manipulate the send switches.

Block diagram



9 ITEM Setting blocks

<172> Variable ITEM Setting 100 to 349

ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|--------------------------------------|------|---|---|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Variable ITEM Setting | 172 | 172 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Analog input connection information | 011 | | X1 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 012 | | X2 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 013 | | X3 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 014 | | X4 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 015 | | X5 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 016 | | X6 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 017 | | X7 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 018 | | X8 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 021 | X1 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 022 | X2 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 023 | X3 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 024 | X4 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 025 | X5 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 026 | X6 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 027 | X7 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 028 | X8 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| Analog output connection information | 031 | | E1 destination designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 032 | | E2 destination designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 033 | | E3 destination designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 034 | | E4 destination designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 035 | | E5 destination designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 036 | | E6 destination designation (BBB: Block address, III: ITEM No.(no connection allowed)) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 037 | | E7 destination designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| 038 | | E8 destination designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 | |
| Contact input | 041 | S1 | E1 send switch --- Send when ON. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 042 | S2 | E2 send switch --- Send when ON. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 043 | S3 | E3 send switch --- Send when ON. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 044 | S4 | E4 send switch --- Send when ON. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 045 | S5 | E5 send switch --- Send when ON. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 046 | S6 | E6 send switch --- Send when ON. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 047 | S7 | E7 send switch --- Send when ON. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 048 | S8 | E8 send switch --- Send when ON. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 049 | S9 | Batch send switch --- Send all when ON. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |

Note Bumpless output of MV functions when PID constants are changed in the Basic PID block (Block Model 011) and Advanced PID block (Block Model 012). For this reason, MV is no longer updated and PID control is not executed correctly if variables are written to PID constants at each operation cycle by the Variable ITEM Setting block (Block Model 172). If this happens, use the Step Ladder Program block (Block Model 301) to provide a time interval for writing by the ITEM Setting block.

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|------------------------------|----------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 021 | X1 input | X1 |
| 022 | X2 input | X2 |
| 023 | X3 input | X3 |
| 024 | X4 input | X4 |
| 025 | X5 input | X5 |
| 026 | X6 input | X6 |
| 027 | X7 input | X7 |
| 028 | X8 input | X8 |
| 041 | E1 send switch | S1 |
| 042 | E2 send switch | S2 |
| 043 | E3 send switch | S3 |
| 044 | E4 send switch | S4 |
| 045 | E5 send switch | S5 |
| 046 | E6 send switch | S6 |
| 047 | E7 send switch | S7 |
| 048 | E8 send switch | S8 |
| 049 | Batch send switch | S9 |

9 ITEM Setting blocks

<174> Batch Data Collector 100 to 349

| Block Model | Block Name | Block Address |
|-------------|----------------------|---------------|
| <174> | Batch Data Collector | 100 to 349 |

Outline

This function block holds up to eight analog inputs in buffer according to a certain timing within sequence processing.

After batch processing ends, the data held in buffer ITEMS are read by the CPU Unit or CX-Process Monitor for use.

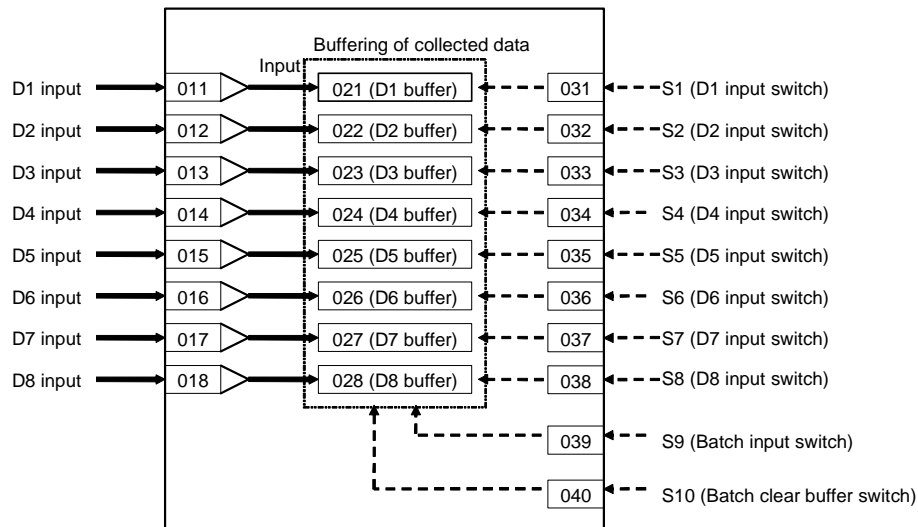
Note: To read the data on CX-Process Monitor, use the AO Terminal to Expanded CPU Unit block (Block Model 458) to temporarily store the data held in buffer ITEMS to the CPU Unit I/O Memory and then read the data.

Function block applications

Collection of data at the timing of sequence processing to create a ledger at a batch processing plant

Example Collect temperature data and level data to create a batch report after raw materials have been poured into a tank.

Block diagram



When the state of S1 to S8 input switches changes from 0 to 1, each of D1 to D8 inputs are held in ITEM021 to ITEM028 (hold data in buffer). After data has been loaded, S1 to S8 input switches are automatically reset to 0.

When the state of S9 batch input switch changes from 0 to 1, all of D1 to D8 inputs are held in ITEM021 to ITEM028 (hold data in buffer). After data has been loaded, S1 to S8 input switches are automatically reset to 0.

When the state of S10 batch clear buffer switch changes from 0 to 1, all of the data held in ITEM021 to ITEM028 (hold data in buffer) is cleared. After all buffers are cleared, S10 batch clear buffer switch is automatically reset to 0.

ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) | |
|---------------------------------|---------------|--------|--|--|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|---|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 | |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 | |
| | 002 | | Block Model: Batch Data Collector | 174 | 174 | - | R/W(S) | - | - | - | - | 2 | |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 | |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 | |
| Analog input wiring information | 011 | | D1 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 | |
| | 012 | | D2 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 | |
| | 013 | | D3 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 | |
| | 014 | | D4 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 | |
| | 015 | | D5 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 | |
| | 016 | | D6 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 | |
| | 017 | | D7 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 | |
| | 018 | | D8 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 | |
| Analog input | 021 | D1 | D1 input (hold data in buffer) | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 | |
| | 022 | D2 | D2 input (hold data in buffer) | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 | |
| | 023 | D3 | D3 input (hold data in buffer) | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 | |
| | 024 | D4 | D4 input (hold data in buffer) | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 | |
| | 025 | D5 | D5 input (hold data in buffer) | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 | |
| | 026 | D6 | D6 input (hold data in buffer) | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 | |
| | 027 | D7 | D7 input (hold data in buffer) | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 | |
| | 028 | D8 | D8 input (hold data in buffer) | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 | |
| | Contact input | 031 | S1 | D1 input switch --- Data input when setting changes from 0 to 1. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | | 032 | S2 | D2 input switch --- Data input when setting changes from 0 to 1. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| 033 | | S3 | D3 input switch --- Data input when setting changes from 0 to 1. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 | |
| 034 | | S4 | D4 input switch --- Data input when setting changes from 0 to 1. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 | |
| 035 | | S5 | D5 input switch --- Data input when setting changes from 0 to 1. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 | |
| 036 | | S6 | D6 input switch --- Data input when setting changes from 0 to 1. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 | |
| 037 | | S7 | D7 input switch --- Data input when setting changes from 0 to 1. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 | |
| 038 | | S8 | D8 input switch --- Data input when setting changes from 0 to 1. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 | |
| 039 | | S9 | Batch input switch --- Data of D1 to D8 is batch-input when setting changes from 0 to 1. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 | |
| 040 | | S10 | Batch clear buffer switch --- Contents (held values) of D1 to D8 buffers area batch-cleared when switch state changes from 0 to 1. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 | |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|------------------------------|-------------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 021 | D1 input | D1 |
| 022 | D2 input | D2 |
| 023 | D3 input | D3 |
| 024 | D4 input | D4 |
| 025 | D5 input | D5 |
| 026 | D6 input | D6 |
| 027 | D7 input | D7 |
| 028 | D8 input | D8 |
| 031 | D1 input switch | S1 |
| 032 | D2 input switch | S2 |
| 033 | D3 input switch | S3 |
| 034 | D4 input switch | S4 |
| 035 | D5 input switch | S5 |
| 036 | D6 input switch | S6 |
| 037 | D7 input switch | S7 |
| 038 | D8 input switch | S8 |
| 039 | Batch input switch | S9 |
| 040 | Batch clear buffer switch | S10 |

| Block Model | Block Name | Block Address |
|-------------|-------------------------------|---------------|
| <182> | Accumulated Value Input Adder | 100 to 349 |

Outline

This function block adds up to four accumulated value signals (0000 to 9999 repeat signals).

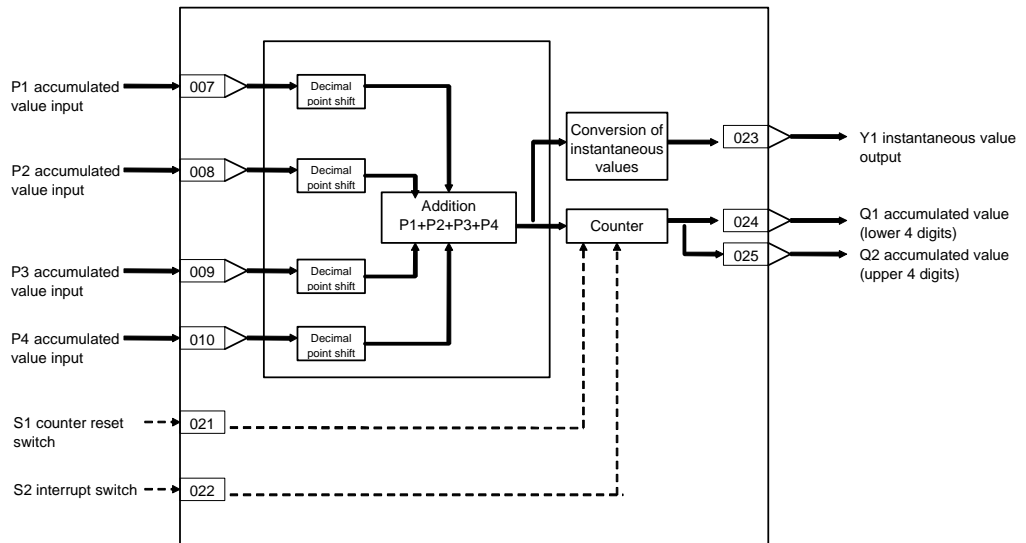
- Digit shift can be set to each of the accumulated value inputs.
- The results of addition are output as accumulated values (eight digits) and instantaneous values.
- When S1 counter reset switch is set to 1 (ON), the accumulated value count is returned to 0 (zero).
- All count operations are stopped by the S2 interrupt switch.

Note: When a cold start is performed, the accumulated values of the operation results that were held before output OFF or before running was stopped are cleared from memory. These values are held when a hot start is performed.

Function block applications

Calculation of the total flowrate accumulated values of various fluids

Block diagram



10 Pulse Train Operation blocks
<182> Accumulated Value Input Adder 100 to 349

ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Sym bol | Data Description | Data Range | Default | COLD start initializ ation | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|---|------|------------|---|--------------------|---------------|-------------------------------------|---|---|--|---|-----------------------------------|---------------------------|
| | | | | | | | Accordi ng to CX-Pro cess Tool | Accordi ng to CX-Pro cess Monitor *1 | Accordi ng to ITEM Setting block | Accordi ng to Step Ladder Progra m | Send/ Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Accumulated Value Input Adder | 182 | 182 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Accumu-late d value input connection information | 007 | | P1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 008 | | P2 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 009 | | P3 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 010 | | P4 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Accumu-late d value input | 011 | P1 | Input | 0 to 9999 | 0 | Yes | r | - | - | - | S | 2 |
| | 012 | P2 | Input | 0 to 9999 | 0 | Yes | r | - | - | - | S | 2 |
| | 013 | P3 | Input | 0 to 9999 | 0 | Yes | r | - | - | - | S | 2 |
| | 014 | P4 | Input | 0 to 9999 | 0 | Yes | r | - | - | - | S | 2 |
| Parameter | 015 | | P1 decimal point shift (10x, -3: x0.001, -2: x0.01, -1: x0.1, 0: x1, 1: x10) Note 1 | -3 to +1 | 0 | - | R/W(S) | - | - | - | - | 1 |
| | 016 | | P2 decimal point shift (same as above) | -3 to +1 | 0 | - | R/W(S) | - | - | - | - | 1 |
| | 017 | | P3 decimal point shift (same as above) | -3 to +1 | 0 | - | R/W(S) | - | - | - | - | 1 |
| | 018 | | P4 decimal point shift (same as above) | -3 to +1 | 0 | - | R/W(S) | - | - | - | - | 1 |
| | 019 | | Instantaneous value conversion parameter (The number of pulses per second at instantaneous value output 100% is set.) | 0 to 99999.9999 | 1000.00 00 | - | R/W(S) | - | - | - | - | 4 |
| | 020 | | Sample number for moving average in instantaneous value conversion | 1 to 16 | 16 | - | R/W(S) | - | - | - | S/R | 1 |
| Contact input | 021 | S1 | Counter reset switch (1: Reset) | 0, 1 | 0 | Yes | R/W(O) | - | - | - | S/R | 1 |
| | 022 | S2 | Interrupt switch (1: Interrupt) | 0, 1 | 0 | Yes | R/W(O) | - | - | - | S/R | 1 |
| Analog output | 023 | Y1 | Instantaneous value output | 0 to 320.00% | 0.00 | Yes | r/w | - | - | - | S | 2 |
| Accumu-late d value output | 024 | Q1 | Accumulated value (lower 4 digits) | 0000 to 9999 | 0 | Yes | r/w | - | - | - | S | 2 |
| | 025 | Q2 | Accumulated value (upper 4 digits) | 0000 to 9999 | 0 | Yes | r/w | - | - | - | S | 2 |

Note: When decimal point shift is set to -3 to -1, only integer pulses are used for instantaneous value calculation. Digits past the decimal point are added to the next calculation.

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software Tag ITEM (fixed) |
|------|--|--|
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 011 | P1 input | P1 |
| 012 | P2 input | P2 |
| 013 | P3 input | P3 |
| 014 | P4 input | P4 |
| 020 | Sample number for moving average in instantaneous value conversion | N |
| 021 | Counter reset switch | S1 |
| 022 | Interrupt switch | S2 |
| 023 | Instantaneous value output | Y1 |
| 024 | Accumulated value (lower 4 digits) | Q1 |
| 025 | Accumulated value (upper 4 digits) | Q2 |

10 Pulse Train Operation blocks

<183> Accumulated Value Analog Multiplier 100 to 349

| Block Model | Block Name | Block Address |
|-------------|-------------------------------------|---------------|
| <183> | Accumulated Value Analog Multiplier | 100 to 349 |

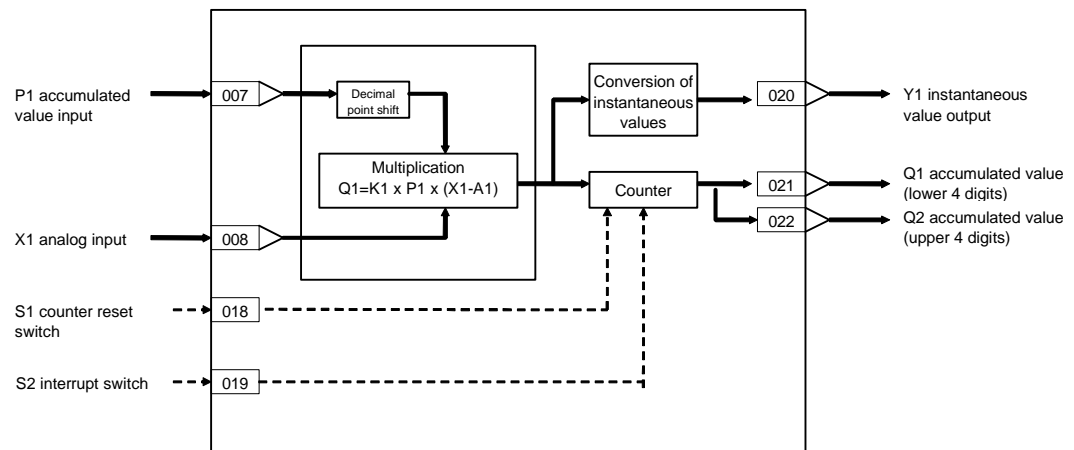
Outline

This function block multiplies analog signals by one set of accumulated value signals (0000 to 9999 repeat signals).

- Digit shift can be set to each of the accumulated value inputs.
- The results of multiplication are output as accumulated values (eight digits) and instantaneous values.
- When S1 counter reset switch is set to 1 (ON), the accumulated value count is returned to 0 (zero).
- All count operations are stopped by the S2 interrupt switch.

Note: When a cold start is performed, the accumulated values of the operation results that were held before output OFF or before running was stopped are cleared from memory. These values are held when a hot start is performed.

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|--|------|--------|---|-----------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Accumulated Value Analog Multiplier | 183 | 183 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Accumulated value input connection information | 007 | | P1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input connection information | 008 | | X1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Accumulated value input | 011 | P1 | Input | 0 to 9999 | 0 | Yes | r | - | - | - | S | 2 |
| Analog input | 012 | X1 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| Parameter | 013 | | Decimal point shift (10x, -3: x0.001, -2: x0.01, -1: x0.1, 0: x1, 1: x10) Note 1 | -3 to +1 | 0 | - | R/W(S) | - | - | - | - | 1 |
| | 014 | K1 | Gain | ±10.000 | 1.000 | - | R/W(O) | - | - | - | S/R | 2 |
| | 015 | A1 | Bias | ±320.00% | 0.00 | - | R/W(O) | - | - | - | S/R | 2 |
| | 016 | | Instantaneous value conversion parameter (The number of pulses per second at instantaneous value output 100% is set.) | 0 to 99999.9999 | 1000.0000 | - | R/W(S) | - | - | - | - | 4 |
| | 017 | | Sample number for moving average in instantaneous value conversion | 1 to 16 | 16 | - | R/W(S) | - | - | - | S/R | 1 |
| Contact input | 018 | S1 | Counter reset switch (1: Reset) | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 019 | S2 | Interrupt switch (1: Interrupt) | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| Analog output | 020 | Y1 | Instantaneous value output | 0 to 320.00% | 0.00 | Yes | r/w | - | - | - | S | 2 |
| Accumulated value output | 021 | Q1 | Accumulated value (lower 4 digits) | 0000 to 9999 | 0 | Yes | r/w | - | - | - | S | 2 |
| | 022 | Q2 | Accumulated value (upper 4 digits) | 0000 to 9999 | 0 | Yes | r/w | - | - | - | S | 2 |

Note1: The multiplication formula is $Q1=K1 \times P1 \times (X1-A1)$. Each of the values of Q1, K1 and P1 are the ranges indicated in the ITEM List above. Note, however, that X1 and A1 are calculated with 100%=1.0, and the data ranges for each are -3.2 to +3.2.

Note2: If the result of multiplication is a minus value, the result is taken to be 0 (zero).

Note3: When decimal point shift is set to -3 to -1, only integer pulses are used for instantaneous value calculation. Digits past the decimal point are added to the next calculation.

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|--|-------------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 011 | P1 input | P1 |
| 012 | X1 input | X1 |
| 014 | Gain | K1 |
| 015 | Bias | A1 |
| 017 | Sample number for moving average in instantaneous value conversion | N |
| 018 | Counter reset switch | S1 |
| 019 | Interrupt switch | S2 |
| 020 | Instantaneous value output | Y1 |
| 021 | Accumulated value (lower 4 digits) | Q1 |
| 022 | Accumulated value (upper 4 digits) | Q2 |

| Block Model | Block Name | Block Address |
|-------------|--|---------------|
| <184> | Accumulator for accumulated value input | 100 to 349 |

Outline

This function block continuously accumulates 4-digit accumulated value signals (repeated signals within 0000 to 9999 range), and converts them to eight digits. This function block can also be used for batch control.

- Accumulated values are divided into upper four digits and lower four digits before they are output. If necessary, join these two sets of digits together for display on a host computer.
- When Qn accumulated value output is used as analog input for other function blocks, the count 9999 is processed as 99.99%.
- When S1 reset switch is set to 1 (ON), the accumulated values are returned to count 0.
- When S3 batch controller reset switch is input, Q3 batch accumulated value becomes count 0, and U1 arrival at preset value is reset to 0 (OFF).
- S2 interrupt switch stops all count operations.
- Minus inputs are regarded as 0% input.

Note: When a cold start is performed, the values that were held before output OFF or before running was stopped are cleared from memory. These values are held when a hot start is performed.

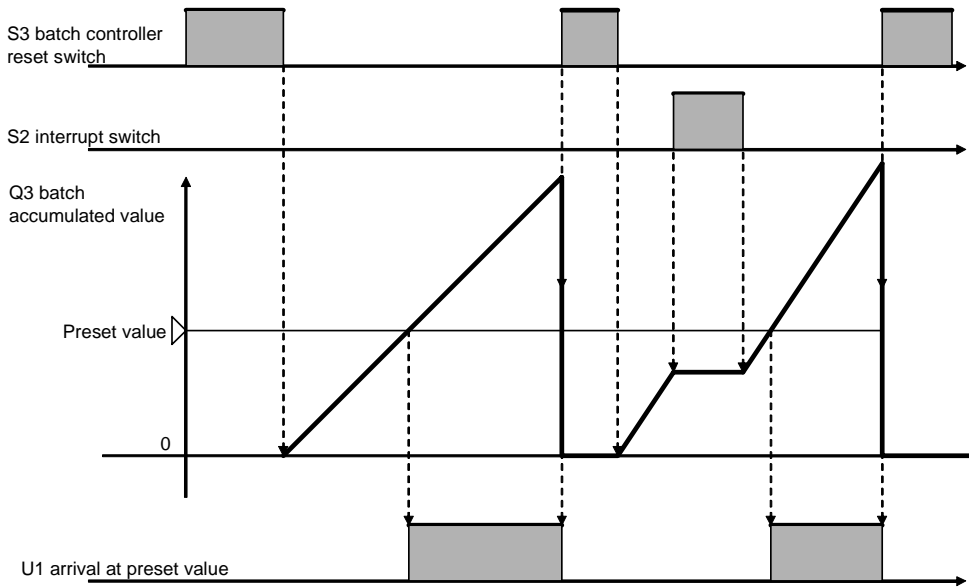
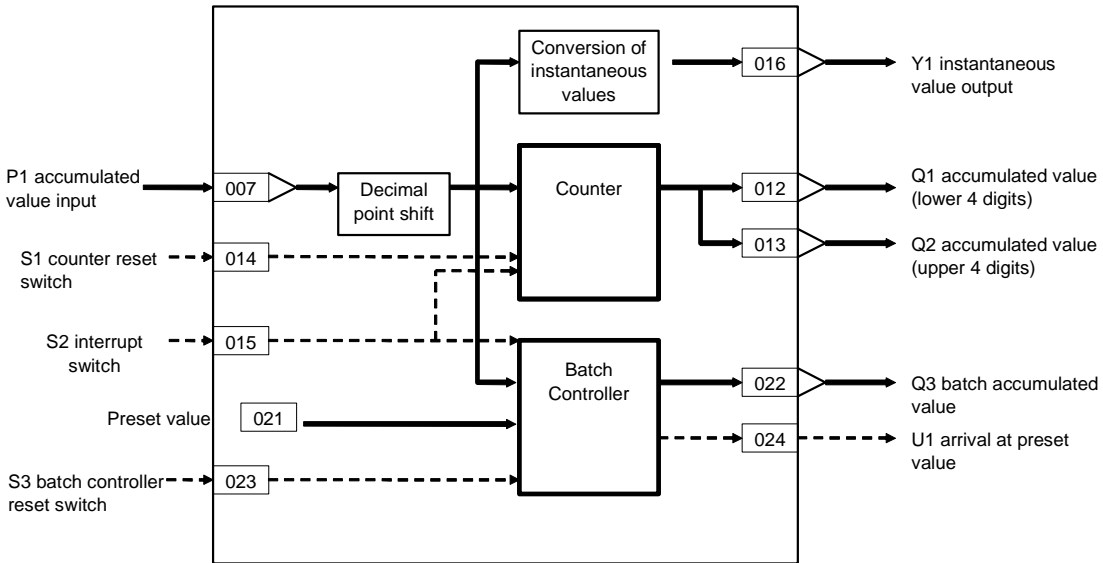
Function block applications

- Input of accumulated values 0000 to 9999 from Pulse Input Unit (CS1W-PPS01: Block Model 562) as P1 accumulated value input
- Input of accumulated values 0000 to 9999 from Contact input/Accumulated value output block (Block Model 185) as P1 accumulated value input

10 Pulse Train Operation blocks

<184> Accumulator for accumulated value input 100 to 349

Block diagram



10 Pulse Train Operation blocks
<184> Accumulator for accumulated value input 100 to 349

ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|---------------|------|--------|---|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Accumulator for accumulated value input | 184 | 184 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |

Accumulated value input P1

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|--|------|--------|--|-----------------|-----------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Accumulated value input connection information | 007 | | P1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Accumulated value input | 008 | P1 | Input | 0 to 9999 | 0 | Yes | r | - | - | - | S | 2 |
| Parameter | 009 | | Decimal point shift (10x, -3: x0.001, -2: x0.01, -1: x0.1, 0: x1, 1: x10) Note 1 | -3 to +1 | 0 | - | R/W(S) | - | - | - | - | 1 |
| | 010 | | Instantaneous value conversion parameter (The number of pulses per second at instantaneous value output 100% is set.) | 0 to 99999.9999 | 1000.0000 | - | R/W(S) | - | - | - | - | 4 |
| | 011 | | Sample number for moving average in instantaneous value conversion | 1 to 16 | 16 | - | R/W(S) | - | - | - | - | 1 |
| Accumulated value output | 012 | Q1 | Accumulated value (lower 4 digits) | 0000 to 9999 | 0 | Yes | r/w | - | W | - | S | 2 |
| | 013 | Q2 | Accumulated value (upper 4 digits) | 0000 to 9999 | 0 | Yes | r/w | - | W | - | S | 2 |
| Contact input | 014 | S1 | Counter reset switch (1: Reset) | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 015 | S2 | Interrupt switch (1: Interrupt) | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| Analog output | 016 | Y1 | Instantaneous value output | 0 to 320.00% | 0.00 | Yes | r/w | - | - | - | S | 2 |

10 Pulse Train Operation blocks

<184> Accumulator for accumulated value input 100 to 349

Batch controller

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|--------------------------|------|--------|--|--------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 021 | | Preset value | 0000 to 9999 | 9999 | - | R/W(O) | - | W | - | S/R | 2 |
| Accumulated value output | 022 | Q3 | Batch accumulated value | 0000 to 9999 | 0 | Yes | r/w | - | W | - | S | 2 |
| Contact input | 023 | S3 | Batch controller reset switch (1: Reset) | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| Contact output | 024 | U1 | Arrival at preset value | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |

Note: When decimal point shift is set to -3 to -1, only integer pulses are used for instantaneous value calculation. Digits past the decimal point are added to the next calculation.

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software Tag ITEM (fixed) |
|------|------------------------------------|---|
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 008 | P1 input | P1 |
| 012 | Accumulated value (lower 4 digits) | Q1 |
| 013 | Accumulated value (upper 4 digits) | Q2 |
| 014 | Counter reset switch | S1 |
| 015 | Interrupt switch | S2 |
| 016 | Instantaneous value output | Y1 |
| 021 | Preset value | BM |
| 022 | Batch accumulated value | Q3 |
| 023 | Batch controller reset switch | S3 |
| 024 | Arrival at preset value | U1 |

| Block Model | Block Name | Block Address |
|-------------|--|---------------|
| <185> | Contact Input/ Accumulated Value Output | 100 to 349 |

Outline

This function block counts the rising edges of contact inputs (low-speed pulses) to output accumulated value signals.

- This function block is used when the Contact Input Unit is used instead of the Pulse Input Unit to accumulate low-speed pulse train signals.
- Assign contact inputs in the Contact Distributor block (Block Model 201) or Step Ladder Program block (Block Model 301).
- Counting is not performed after the contact input signal is set to 1 (ON) unless it is temporarily set to 0 (OFF). For this reason, thoroughly check the relationship between operation cycle and pulse rate before use.

Note1: When the contact signals input from the Basic Input Unit are taken as the input, the operation cycle of DI Terminal blocks can be used only when accumulating low-speed pulse inputs as the cycle is 0.1 to 2 seconds. The operation cycle of DI Terminal blocks cannot be used for accumulating high-speed pulses from flowrate meters, for example.

Note2: Set the operation cycle of ITEM004 to a value shorter than the contact input.

Note3: When a cold start is performed, the values that were held before CPU Unit output turned OFF or before running of the Loop Control Unit was stopped are cleared from memory. These values are held when a hot start is performed.

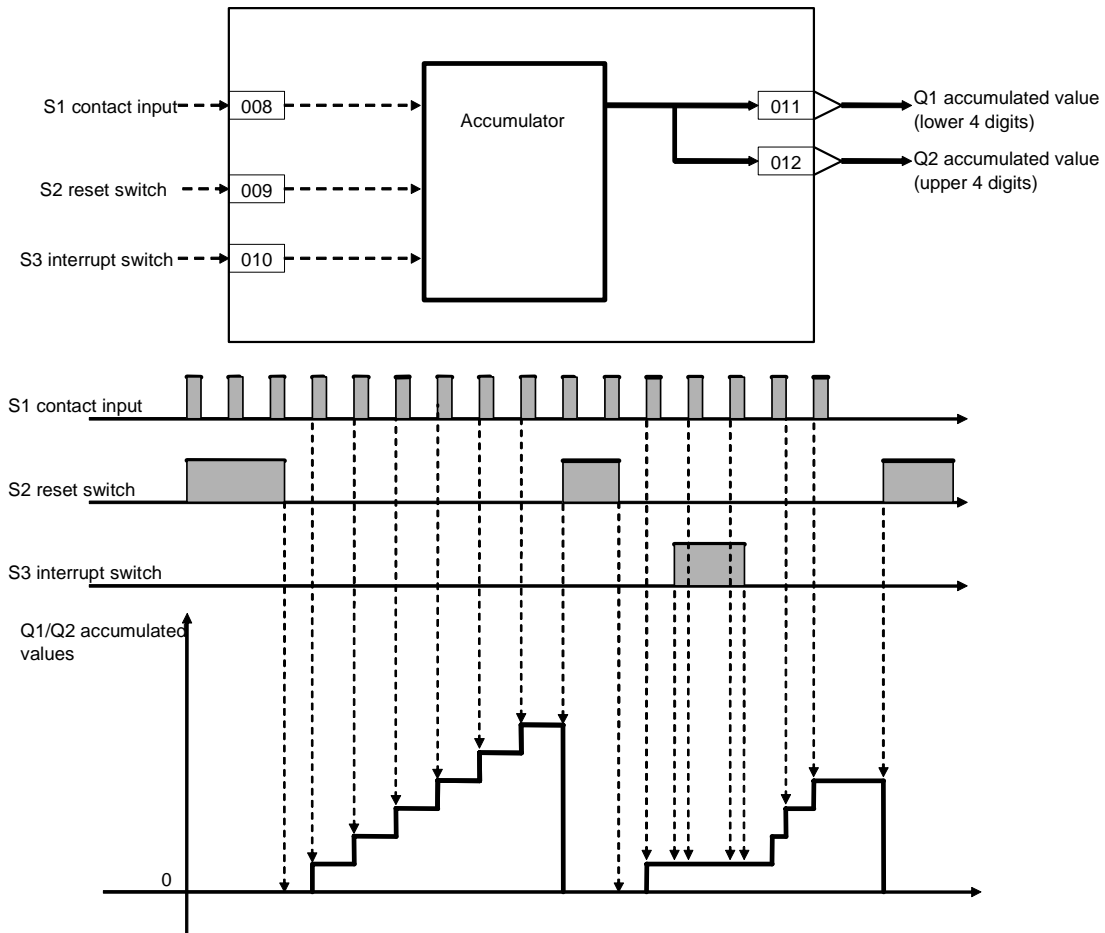
Function block applications

Input and accumulation of low-speed pulses such as power

Output of accumulated values to the Accumulator for accumulated value input block (Block Model 184) for conversion to eight digits when accumulated values must be expressed up to eight digits

10 Pulse Train Operation blocks
**<185> Contact Input/
Accumulated Value Output 100 to 349**

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|--------------------------|------|--------|---|---------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Contact Input/Accumulated Value Output | 185 | 185 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Contact input | 008 | S1 | Contact input | 0, 1 | 0 | Yes | - | - | - | R/W | S/R | 1 |
| | 009 | S2 | Reset switch (1: Reset) | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 010 | S3 | Interrupt switch (1: Interrupt) | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| Accumulated value output | 011 | Q1 | Accumulated value (lower 4 digits) | 0000 to 9999 | 0 | Yes | - | - | W | - | S | 2 |
| | 012 | Q2 | Accumulated value (upper 4 digits) | 0000 to 9999 | 0 | Yes | - | - | W | - | S | 2 |

Note Set the operation cycle of ITEM004 to a value the same or shorter than the pulse cycle of the contact input.
Contacts inputs cannot be counted correctly if the operation cycle is set to a value that is longer than the pulse cycle of the contact input.

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software Tag ITEM (fixed) |
|------|------------------------------------|---|
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 008 | Contact input | S1 |
| 009 | Reset switch | S2 |
| 010 | Interrupt switch | S3 |
| 011 | Accumulated value (lower 4 digits) | Q1 |
| 012 | Accumulated value (upper 4 digits) | Q2 |

10 Pulse Train Operation blocks

<186> Accumulated Value Input/
Contact Output 100 to 349

| Block Model | Block Name | Block Address |
|-------------|--|---------------|
| <186> | Accumulated Value Input/ Contact Output | 100 to 349 |

Outline

This function block converts accumulated values inputs to contact outputs (low-speed pulses).

- This function block is used when the Contact Output Unit is used instead of the Pulse Output Unit to output low-speed pulse train signals.
- Connect contact outputs in the Contact Distributor block (Block Model 201) or Step Ladder Program block (Block Model 301).
- The next operation cycle is set to 0 (OFF) after the contact output signal has turned 1 (ON) for one operation cycle.
- Input values are accumulated internally when the output pulse rate is twice or more than the operation cycle and the output speed cannot keep pace with conversion.
- If internal accumulation continues, change the decimal point shift setting to set a slower pulse rate.

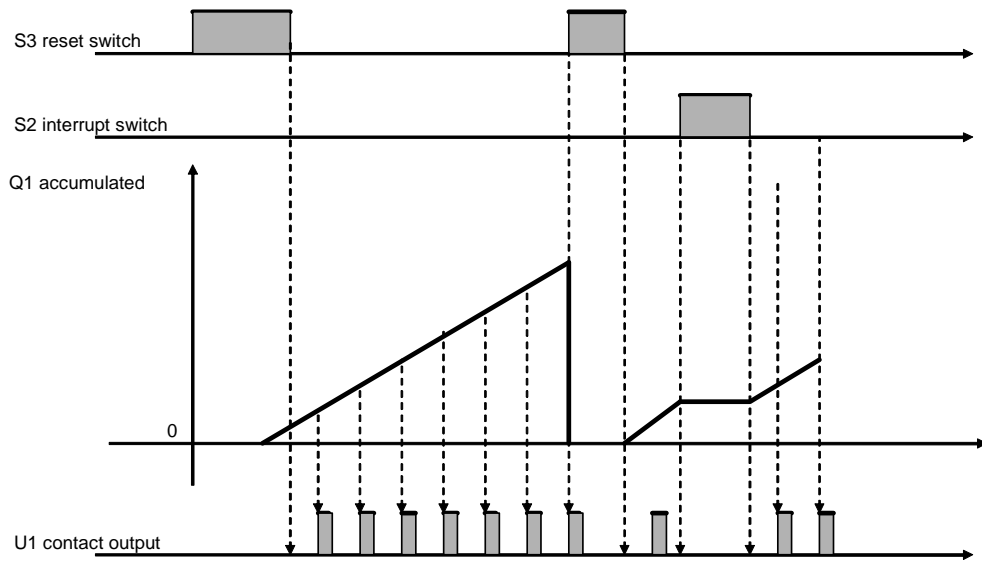
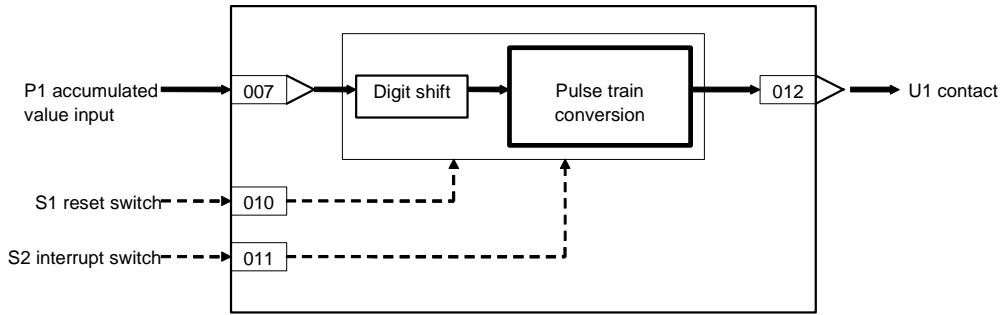
Note: •The maximum value of the internal counter is 99999999.

- When a cold start is performed, the accumulated values that were held before CPU Unit output turned OFF or before running of the Loop Control Unit was stopped are cleared from memory. These accumulated values are held when a hot start is performed.

Function block applications

Input of accumulated values from the Accumulator for instantaneous value input block (Block Model 150) as P1 accumulated value input
Notification of accumulated values by an on-site contact input mechanical counter

Block diagram



10 Pulse Train Operation blocks
<186> Accumulated Value Input/
Contact Output 100 to 349

ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|--|------|--------|--|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Accumulated Value Input/Contact Output | 186 | 186 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Accumulated value input connection information | 007 | | P1 source designation (BBB: Block address, III: ITEM No., Connection mandatory) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Accumulated value input | 008 | P1 | Input | 0 to 9999 | 0 | Yes | r | - | - | - | S | 2 |
| Parameter | 009 | | Decimal point shift (10x, -3: x0.001, -2: x0.01, -1: x0.1, 0: x1, 1: x10) | -3 to +1 | 0 | - | R/W(S) | - | - | - | - | 1 |
| Contact input | 010 | S1 | Counter reset switch (1: Reset) | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 011 | S2 | Interrupt switch (1: Interrupt) | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| Contact output | 012 | U1 | Contact output | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|------------------------------|----------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 008 | P1 input | P1 |
| 010 | Counter reset switch | S1 |
| 011 | Interrupt switch | S2 |
| 012 | Contact output | U1 |

| Block Model | Block Name | Block Address |
|-------------|------------------------------|---------------|
| <192> | Analog/Pulse Width Converter | 100 to 349 |

Outline

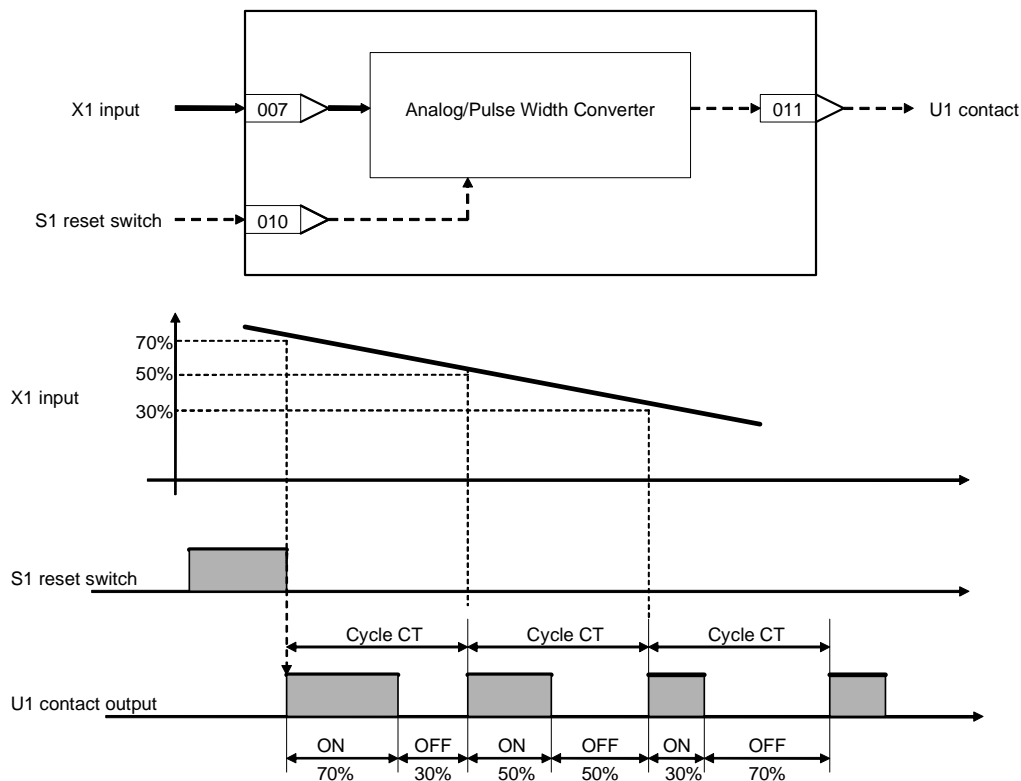
This function block changes the ON/OFF duration ratio in a constant cycle so that it is proportional to the analog input signal. (The ON duration ratio is changed within the range 0 to 100% corresponding to analog input range 0 to 100%.)

- The ON elapsed time and analog input value (that is, the ON time setting value) are compared at each operation cycle. When the analog input becomes OFF, the OFF state continues until CT pulse cycle time is completed.
- This function block is used, for example, to manipulate an ON/OFF control heater by output from a PID controller (time-proportional control).
- U1 contact output is set to 0 (OFF) for the entire cycle when input is 0% or less, and 1 (ON) for the entire cycle when input is 100% or more.
- The minimum time resolution is 0.1 seconds. However, time cannot be shorter than the operation cycle.
- U1 contact output is reset when S1 reset switch is set to 1 (ON), and set to 0 (OFF) for the entire cycle. When S1 reset switch is set to 0 (OFF), the ON time of U1 contact output is output proportionately to X1 analog input.

Function block applications

Time-proportional control (proportional control by which the time ratio between ON and OFF is changed proportionately)

Block diagram



11 Other blocks

<192> Analog/Pulse Width Converter 100 to 349

ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | According to | | | | Data Length (bytes) |
|-------------------------------------|------|--------|--|---------------|------------|---------------------------|--|-----------------|----------------------|--------------------|---------------------|---------------------|
| | | | | | | | | CX-Process Tool | CX-Process Monitor*1 | ITEM Setting block | Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Analog/Pulse Width Converter | 192 | 192 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Analog input connection information | 007 | | X1 source designation BBB: Block address, III: ITEM No., (Connection mandatory) | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 008 | X1 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| Parameter | 009 | CT | Pulse cycle time | 1 to 1000.0s | 1.0 | - | R/W(S) | - | - | - | S/R | 2 |
| Contact input | 010 | S1 | Reset switch (1: Reset) | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| Contact output | 011 | U1 | Contact output | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV tags in SCADA software |
|------|------------------------------|----------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 008 | X1 input | X1 |
| 009 | Pulse cycle time | CT |
| 010 | Reset switch | S1 |
| 011 | Contact output | U1 |

| Block Model | Block Name | Block Address |
|-------------|---------------------|---------------|
| <201> | Contact Distributor | 100 to 349 |

Outline

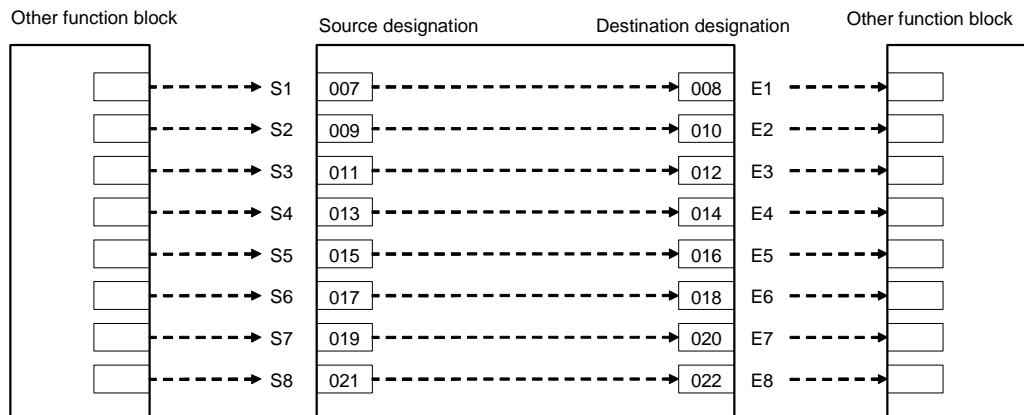
This function block connects contact signals between function blocks in a 1:1 connection without the need to use the Step Ladder Program block (Block Model 301).

- Eight pairs can be connected per Contact Distributor block.
- To connect a contact signal, specify the block number and ITEM number of the source and destination function blocks.
- The ITEMS that can be specified are the same as those in the Step Ladder Program block (Block Model 301). That is, "contact output" or "contact input" ITEMS can be specified as the source, and "contact input" ITEMS can be specified as the destination. For details, refer to ITEM type or R/W Mode "According to Step Ladder Program" in function block ITEM lists.

| ITEM type | R/W method | | | Data Length (bytes) |
|---------------|---------------------------------|---------------------------------|----------------------------------|---------------------|
| | According to CX-Process Monitor | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | - | - | R/W | 1 |

- Constant output or single output can be selected (supported from version 2.50 of the Loop Control Unit). For constant output, the contact input is connected to constant contact output. For single output, the contact input is connected to contact output only when 0 changes to 1, or 1 changes to 0.

Block diagram



12 Sequential Operation blocks

<201> Contact Distributor 100 to 349

ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|---------------------------------------|------------------|--------|---|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: Contact Distributor | 201 | 201 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameters | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| | 006 ¹ | | Output type 0: Constant output, 1: Single output Note: For single output, the connection to contact output E@ is made only when contact input S@ changes. | 0, 1 | 0 | - | R/W(S) | - | - | - | 1 |
| Contact input connection information | 007 | | S1 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| Contact output connection information | 008 | | E1 destination designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| Contact input connection information | 009 | | S2 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| Contact output connection information | 010 | | E2 destination designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| Contact input connection information | 011 | | S3 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| Contact output connection information | 012 | | E3 destination designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| Contact input connection information | 013 | | S4 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| Contact output connection information | 014 | | E4 destination designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| Contact input connection information | 015 | | S5 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| Contact output connection information | 016 | | E5 destination designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| Contact input connection information | 017 | | S6 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| Contact output connection information | 018 | | E6 destination designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| Contact input connection information | 019 | | S7 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| Contact output connection information | 020 | | E7 destination designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| Contact input connection information | 021 | | S8 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| Contact output connection information | 022 | | E8 destination designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |

*1: This ITEM has been added to Loop Control Unit Ver. 2.50.

| Block Model | Block Name | Block Address |
|-------------|---------------------|---------------|
| <202> | Constant Comparator | 100 to 349 |

Outline

This function block compares (one of >, = or < comparison mode) analog input signals and constants, and outputs the comparison results as contacts.

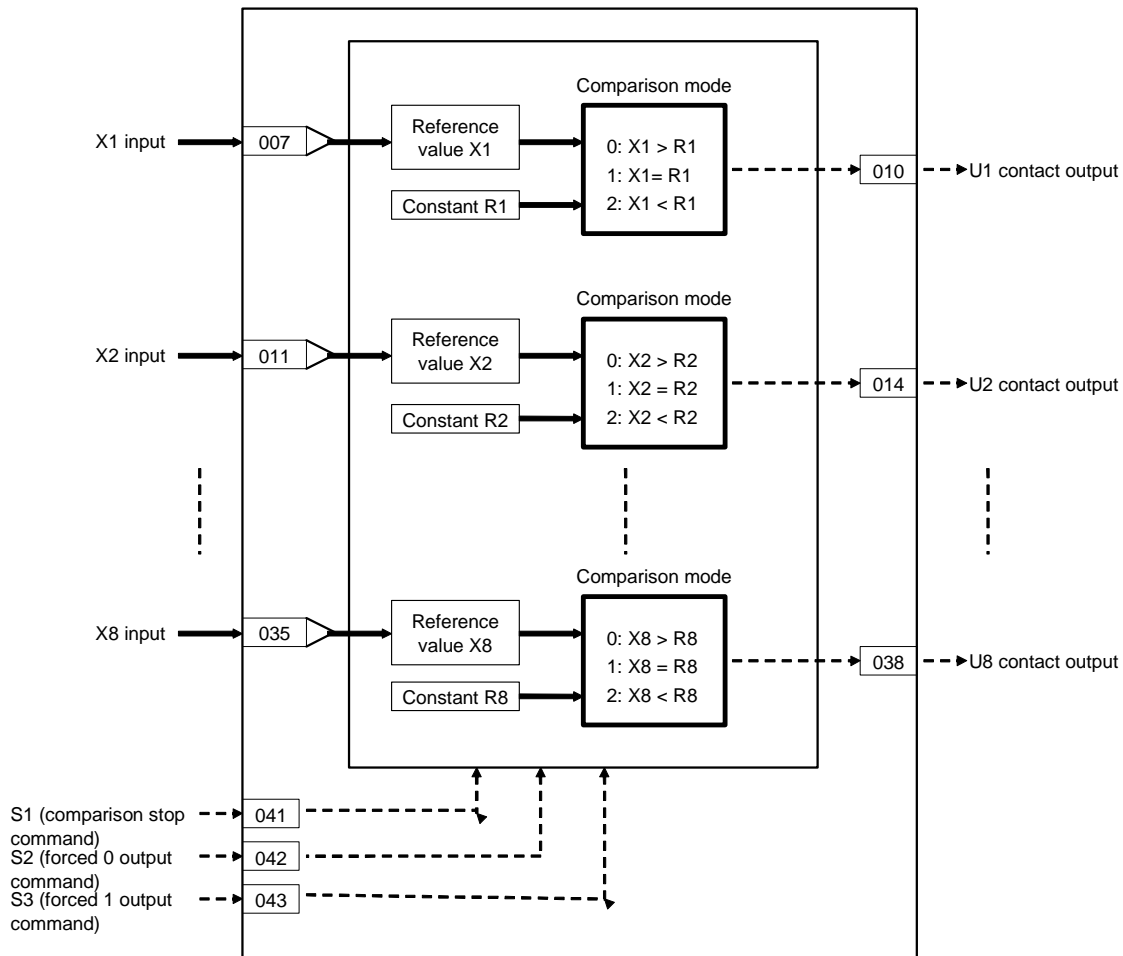
- Comparison can be performed on up to eight sets of signals and constants.
- All outputs for the comparison results can be forcibly turned ON or OFF.
- All comparison operations can be stopped.

Note: When the comparison mode is set to either > or <, comparison contacts do not have hysteresis.

Function block applications

Switching of control conditions (PID constants, heat/cool control, etc.) when the input is a certain value or higher (matching a certain value or a certain value or lower)

Block diagram



12 Sequential Operation blocks

<202> Constant Comparator 100 to 349

ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|---------------------------------|------|--------|--|---------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Constant Comparator | 202 | 202 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Analog input wiring information | 007 | | X1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Parameter | 008 | | R1 constant | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 009 | | C1 comparison mode (0: X>R, 1: X=R, 2: X<R) | 0 to 2 | 1 | - | R/W(O) | - | W | - | - | 1 |
| Contact output | 010 | U1 | Comparison result | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| Analog input wiring information | 011 | | X2 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Parameter | 012 | | R2 constant | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 013 | | C2 comparison mode (0: X>R, 1: X=R, 2: X<R) | 0 to 2 | 1 | - | R/W(O) | - | W | - | - | 1 |
| Contact output | 014 | U2 | Comparison result | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| Analog input wiring information | 015 | | X3 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Parameter | 016 | | R3 constant | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 017 | | C3 comparison mode (0: X>R, 1: X=R, 2: X<R) | 0 to 2 | 1 | - | R/W(O) | - | W | - | - | 1 |
| Contact output | 018 | U3 | Comparison result | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| Analog input wiring information | 019 | | X4 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Parameter | 020 | | R4 constant | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 021 | | C4 comparison mode (0: X>R, 1: X=R, 2: X<R) | 0 to 2 | 1 | - | R/W(O) | - | W | - | - | 1 |
| Contact output | 022 | U4 | Comparison result | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| Analog input wiring information | 023 | | X5 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Parameter | 024 | | R5 constant | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 025 | | C5 comparison mode (0: X>R, 1: X=R, 2: X<R) | 0 to 2 | 1 | - | R/W(O) | - | W | - | - | 1 |
| Contact output | 026 | U5 | Comparison result | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| Analog input wiring information | 027 | | X6 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Parameter | 028 | | R6 constant | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 029 | | C6 comparison mode (0: X>R, 1: X=R, 2: X<R) | 0 to 2 | 1 | - | R/W(O) | - | W | - | - | 1 |
| Contact output | 030 | U6 | Comparison result | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| Analog input wiring information | 031 | | X7 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Parameter | 032 | | R7 constant | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 033 | | C7 comparison mode (0: X>R, 1: X=R, 2: X<R) | 0 to 2 | 1 | - | R/W(O) | - | W | - | - | 1 |

12 Sequential Operation blocks <202> Constant Comparator 100 to 349

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|---------------------------------|-------------------|--------|--|------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | |
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact output | 034 | U7 | Comparison result | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| Analog input wiring information | 035 | | X8 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Parameter | 036 | | R8 constant | ±320.00% | 0.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 037 | | C8 comparison mode (0: X>R, 1: X=R, 2: X<R) | 0 to 2 | 1 | - | R/W(O) | - | W | - | - | 1 |
| Contact output | 038 | U8 | Comparison result | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| Contact input | 041 | S1 | Comparison stop command | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 042 | S2 | Forced 0 output command | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 043 | S3 | Forced 1 output command | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| Analog input | 051 ^{*1} | X1 | X1 input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 052 ^{*1} | X2 | X2 input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 053 ^{*1} | X3 | X3 input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 054 ^{*1} | X4 | X4 input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 055 ^{*1} | X5 | X5 input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 056 ^{*1} | X6 | X6 input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 057 ^{*1} | X7 | X7 input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 058 ^{*1} | X8 | X8 input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |

*1: These ITEMS were added in Loop Control Unit Ver. 2.00.

Note:

- When S1 comparison stop command turns 1 (ON), all comparison processing on inputs X1 to X8 is stopped. All comparison result outputs at that time are held at the output values that were current when S1 turned 1 (ON).
- When S2 forced 0 output command turns 1 (ON), all contact outputs U1 to U8 turn 0 (OFF) regardless of the comparison results.
- When S3 forced 1 output command turns 1 (ON), all contact outputs U1 to U8 turn 1 (ON) regardless of the comparison results.
- The S2 forced 0 output command and S3 forced 1 output command are given priority over the S1 comparison stop command.
- If both the S2 forced 0 output command and S3 forced 1 output command turn 1 (ON), an execution error (error code 19: illegal operation) occurs.

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|------------------------------|----------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 008 | R1 constant | R1 |
| 010 | U1 comparison result | U1 |
| 012 | R2 constant | R2 |
| 014 | U2 comparison result | U2 |
| 016 | R3 constant | R3 |
| 018 | U3 comparison result | U3 |
| 020 | R4 constant | R4 |
| 022 | U4 comparison result | U4 |
| 024 | R5 constant | R5 |
| 026 | U5 comparison result | U5 |
| 028 | R6 constant | R6 |
| 030 | U6 comparison result | U6 |
| 032 | R7 constant | R7 |
| 034 | U7 comparison result | U7 |
| 036 | R8 constant | R8 |
| 038 | U8 comparison result | U8 |
| 041 | Comparison stop command | S1 |
| 042 | Forced 0 output command | S2 |
| 043 | Forced 1 output command | S3 |
| 051 | X1 input | X1 |
| 052 | X2 input | X2 |
| 053 | X3 input | X3 |
| 054 | X4 input | X4 |
| 055 | X5 input | X5 |
| 056 | X6 input | X6 |
| 057 | X7 input | X7 |
| 058 | X8 input | X8 |

| Block Model | Block Name | Block Address |
|-------------|---------------------|---------------|
| <203> | Variable Comparator | 100 to 349 |

Outline

This function block compares (one of $>$, $=$ or $<$ comparison mode) pairs of analog signals, and outputs the comparison results as contacts.

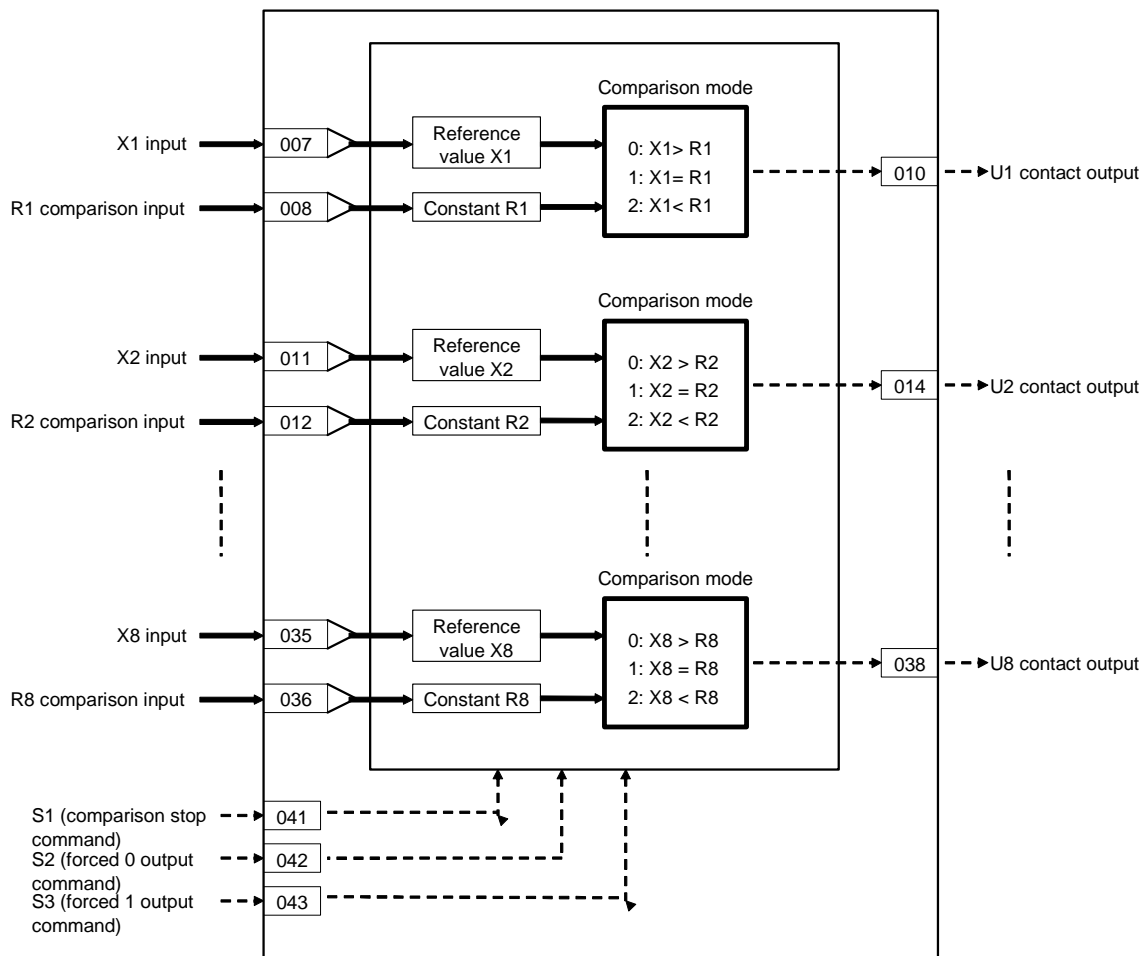
- Comparison can be performed on up to eight sets of analog input signal pairs.
- All outputs for the comparison results can be forcibly turned ON or OFF.
- All comparison operations can be stopped.

Note: When the comparison mode is set to either $>$ or $<$, comparison contacts do not have hysteresis.

Function block applications

Switching of control conditions (PID constants, heat/cool control, etc.) when the input is equal to or higher than the comparison input (or matching the comparison input, or equal to or lower than the comparison input)

Block diagram



12 Sequential Operation blocks

<203> Variable Comparator 100 to 349

ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|---------------------------------|------|--------|--|---------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Variable Comparator | 203 | 203 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Analog input wiring information | 007 | | X1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 008 | | R1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 009 | | C1 comparison mode (0: X>R, 1: X=R, 2: X<R) | 0 to 2 | 1 | - | R/W(O) | - | W | - | - | 1 |
| Contact output | 010 | U1 | Comparison result | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| Analog input wiring information | 011 | | X2 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 012 | | R2 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 013 | | C2 comparison mode (0: X>R, 1: X=R, 2: X<R) | 0 to 2 | 1 | - | R/W(O) | - | W | - | - | 1 |
| Contact output | 014 | U2 | Comparison result | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| Analog input wiring information | 015 | | X3 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 016 | | R3 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 017 | | C3 comparison mode (0: X>R, 1: X=R, 2: X<R) | 0 to 2 | 1 | - | R/W(O) | - | W | - | - | 1 |
| Contact output | 018 | U3 | Comparison result | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| Analog input wiring information | 019 | | X4 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 020 | | R4 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 021 | | C4 comparison mode (0: X>R, 1: X=R, 2: X<R) | 0 to 2 | 1 | - | R/W(O) | - | W | - | - | 1 |
| Contact output | 022 | U4 | Comparison result | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| Analog input wiring information | 023 | | X5 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 024 | | R5 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 025 | | C5 comparison mode (0: X>R, 1: X=R, 2: X<R) | 0 to 2 | 1 | - | R/W(O) | - | W | - | - | 1 |
| Contact output | 026 | U5 | Comparison result | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| Analog input wiring information | 027 | | X6 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 028 | | R6 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 029 | | C6 comparison mode (0: X>R, 1: X=R, 2: X<R) | 0 to 2 | 1 | - | R/W(O) | - | W | - | - | 1 |
| Contact output | 030 | U6 | Comparison result | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |

12 Sequential Operation blocks <203> Variable Comparator 100 to 349

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|---------------------------------|-------------------|--------|--|------------|---------|---------------------------|--|--|------------------------------|------------------------------------|---------------------------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled | Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | |
| Analog input wiring information | 031 | | X7 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 032 | | R7 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 033 | | C7 comparison mode (0: X>R, 1: X=R, 2: X<R) | 0 to 2 | 1 | - | R/W(O) | - | W | - | - | 1 |
| Contact output | 034 | U7 | Comparison result | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| Analog input wiring information | 035 | | X8 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 036 | | R8 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| | 037 | | C8 comparison mode (0: X>R, 1: X=R, 2: X<R) | 0 to 2 | 1 | - | R/W(O) | - | W | - | - | 1 |
| Contact output | 038 | U8 | Comparison result | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| Contact input | 041 | S1 | Comparison stop command | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 042 | S2 | Forced 0 output command | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 043 | S3 | Forced 1 output command | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| Analog input | 051 ^{*1} | X1 | X1 input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 052 ^{*1} | X2 | X2 input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 053 ^{*1} | X3 | X3 input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 054 ^{*1} | X4 | X4 input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 055 ^{*1} | X5 | X5 input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 056 ^{*1} | X6 | X6 input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 057 ^{*1} | X7 | X7 input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 058 ^{*1} | X8 | X8 input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 061 ^{*1} | R1 | R1 input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 062 ^{*1} | R2 | R2 input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 063 ^{*1} | R3 | R3 input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 064 ^{*1} | R4 | R4 input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 065 ^{*1} | R5 | R5 input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 066 ^{*1} | R6 | R6 input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 067 ^{*1} | R7 | R7 input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| | 068 ^{*1} | R8 | R8 input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |

*1: These ITEMS were added in Loop Control Unit Ver. 2.00.

- Note
- When S1 comparison stop command turns 1 (ON), all comparison processing on inputs X1 to X8 is stopped. All comparison result outputs at that time are held at the output values that were current when S1 turned 1 (ON).
 - When S2 forced 0 output command turns 1 (ON), all contact outputs U1 to U8 turn 0 (OFF) regardless of the comparison results.
 - When S3 forced 1 output command turns 1 (ON), all contact outputs U1 to U8 turn 1 (ON) regardless of the comparison results.
 - The S2 forced 0 output command and S3 forced 1 output command are given priority over the S1 comparison stop command.
 - If both the S2 forced 0 output command and S3 forced 1 output command turn 1 (ON), an execution error (error code 19: illegal operation) occurs.

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|------------------------------|----------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 010 | U1 comparison result | U1 |
| 014 | U2 comparison result | U2 |
| 018 | U3 comparison result | U3 |
| 022 | U4 comparison result | U4 |
| 026 | U5 comparison result | U5 |
| 030 | U6 comparison result | U6 |
| 034 | U7 comparison result | U7 |
| 038 | U8 comparison result | U8 |
| 041 | Comparison stop command | S1 |
| 042 | Forced 0 output command | S2 |
| 043 | Forced 1 output command | S3 |
| 051 | X1 input | X1 |
| 052 | X2 input | X2 |
| 053 | X3 input | X3 |
| 054 | X4 input | X4 |
| 055 | X5 input | X5 |
| 056 | X6 input | X6 |
| 057 | X7 input | X7 |
| 058 | X8 input | X8 |
| 061 | R1 input | R1 |
| 062 | R2 input | R2 |
| 063 | R3 input | R3 |
| 064 | R4 input | R4 |
| 065 | R5 input | R5 |
| 066 | R6 input | R6 |
| 067 | R7 input | R7 |
| 068 | R8 input | R8 |

| Block Model | Block Name | Block Address |
|-------------|------------|---------------|
| <205> | Timer | 100 to 349 |

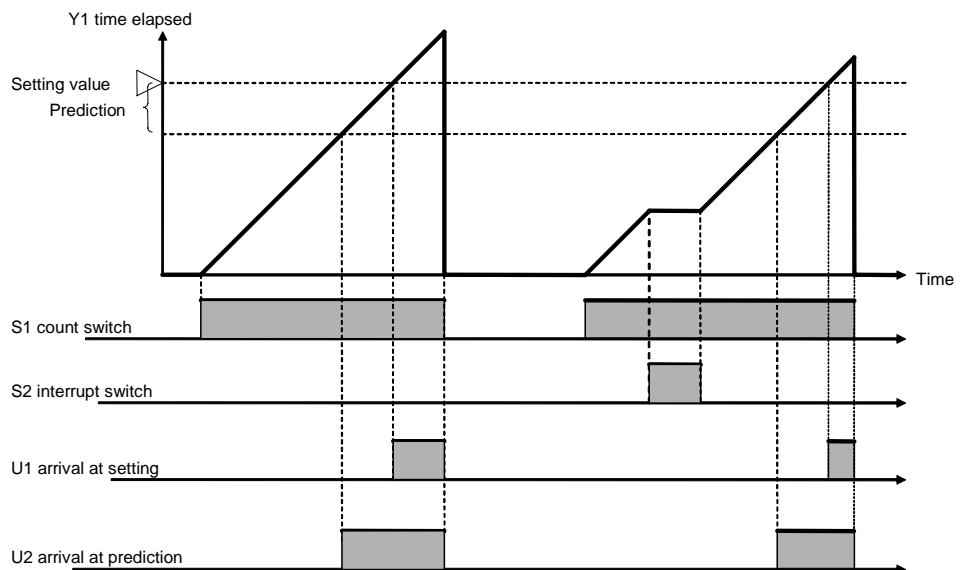
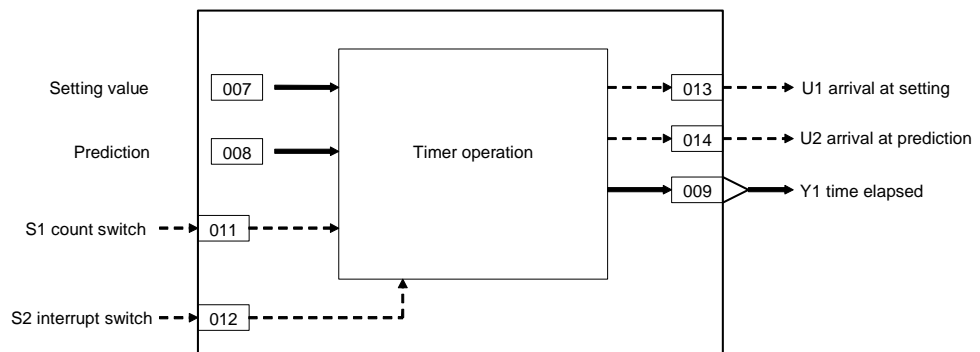
Outline

This function block performs 2-stage alarm operations.

- Timer operation is performed when S1 run/stop command is set to 1 (ON). When the count reaches "setting - prediction", U2 contact output is set to 1 (ON). When the setting is reached, U1 contact output is set to 1 (ON). When S1 run/stop command is set to 0 (OFF), the timer is reset, Y1 time elapsed is set to 0, and contact outputs U1 and U2 are set to 0 (OFF).
- Timer operation stops when S2 interrupt switch is set to 1 (ON).
- Set the number of hours before the setting as the prediction.
- The minimum resolution is the same as the operation cycle.
- Counting of the elapsed time continues even after the timer has reached the setting and stops when the timer reaches 3200.0.

Note: When a cold start is performed, the current timer value that was held before output OFF or before running of the Loop Control Unit was stopped are cleared from memory. This value is held when a hot start is performed.

Block diagram



12 Sequential Operation blocks

<205> Timer 100 to 349

ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Send/Receive All Blocks | Data Length (bytes) |
|----------------|------|--------|---|---------------|------------|---------------------------|--|-----------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor*1 | According to ITEM Setting block | According to Step Ladder Program | | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Timer | 205 | 205 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| | 007 | | Setting | 0 to 3200.0 | 0.0 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 008 | | Prediction (subtracted from setting) | 0 to 3200.0 | 0.0 | - | R/W(O) | R/W | W | - | S/R | 2 |
| Analog output | 009 | Y1 | Time elapsed | 0 to 3200.0 | 0.0 | Yes | r | R | W | - | S | 2 |
| Parameter | 010 | | Time unit (0: s, 1: min, 2: hr, 3: 0.1 s) | 0 to 3 | 0 | - | R/W(S) | R | - | - | S/R | 1 |
| Contact input | 011 | S1 | Count switch | 0, 1 | 0 | Yes | R/W(O) | R/W | - | R/W | S/R | 1 |
| Contact input | 012 | S2 | Interrupt switch | 0, 1 | 0 | Yes | R/W(O) | R/W | - | R/W | S/R | 1 |
| Contact output | 013 | U1 | Arrival at setting | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 014 | U2 | Arrival at prediction | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |

List of tag ITEMS on CX-Process Monitor or SCADA software

The following tag ITEMS are used to specify ITEMS with either 1) Monitor tags when sending function blocks to the CX-Process Monitor from 1-Block/4-Block Send Terminal to Computer (Block Model 403/404) or 2) CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (Block Model 461)/Send All Blocks (Block Model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in CX-Process Monitor | CSV Tags in SCADA Software |
|------|--------------------------------------|--------------------------------|----------------------------|
| | | Tag ITEM (fixed) | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST | MT_ST |
| 003 | Execution error display | None | ERR |
| 007 | Setting | SP | SP |
| 008 | Prediction (subtracted from setting) | PRESET | PRS |
| 009 | Time elapsed | PV | Y1 |
| 010 | Time unit | None | TMU |
| 011 | Count switch | S1 | S1 |
| 012 | Interrupt switch | S2 | S2 |
| 013 | Arrival at setting | U1 | U1 |
| 014 | Arrival at prediction | U2 | U2 |

Note Note that this function block cannot be sent by the 1-Block Send Terminal to Computer block (Block Model 403).

| Block Model | Block Name | Block Address |
|-------------|--------------|---------------|
| <206> | ON/OFF Timer | 100 to 349 |

Outline

This function block is a timer for performing ON-OFF operation at preset ON and OFF times.

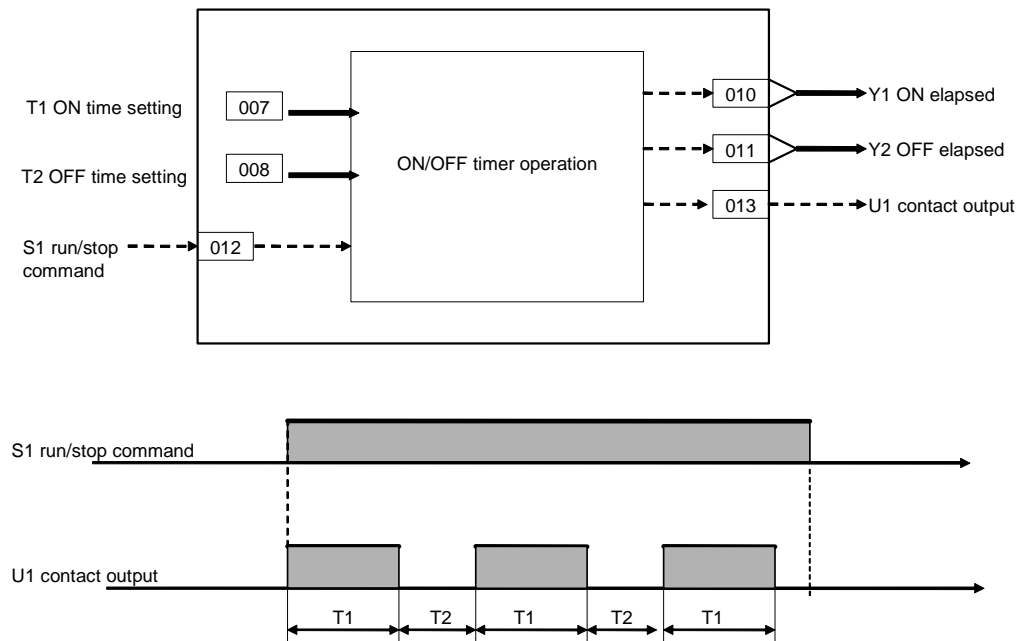
- The minimum resolution is the same as the operation cycle.
- Timer operation is performed when S1 run/stop command is set to 1 (ON), and is reset when set to 0 (ON).

Note: When a cold start is performed, the current timer value that was held before output OFF or before running of the Loop Control Unit was stopped are cleared from memory. This value is held when a hot start is performed.

Function block applications

Sample PI control

Block diagram



12 Sequential Operation blocks

<206> ON/OFF Timer 100 to 349

ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------|------|--------|--|---------------|------------|---------------------------|--|-----------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor*1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: ON/OFF Timer | 206 | 206 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Parameter | 007 | T1 | ON time setting | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | S/R | 2 |
| | 008 | T2 | OFF time setting | 0 to 3200.0 | 0.0 | - | R/W(O) | - | W | - | S/R | 2 |
| | 009 | | Time unit (0: s, 1:min, 2: hr, 3:0.1 s) | 0 to 3 | 0 | - | R/W(S) | - | - | - | S/R | 1 |
| Analog output | 010 | Y1 | Elapsed ON time | 0 to 3200.0 | 0.0 | Yes | r/w | - | - | - | S | 2 |
| | 011 | Y2 | Elapsed OFF time | 0 to 3200.0 | 0.0 | Yes | r/w | - | - | - | S | 2 |
| Contact input/parameter | 012 | S1 | Run/stop command | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| Contact output | 013 | U1 | Contact output | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software Tag ITEM (fixed) |
|------|------------------------------|---|
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 007 | ON time setting | T1 |
| 008 | OFF time setting | T2 |
| 009 | Time unit | TMU |
| 010 | Elapsed ON time | Y1 |
| 011 | Elapsed OFF time | Y2 |
| 012 | Run/stop command | S1 |
| 013 | Contact output | U1 |

| Block Model | Block Name | Block Address |
|-------------|-------------|---------------|
| <207> | Clock Pulse | 100 to 349 |

Outline

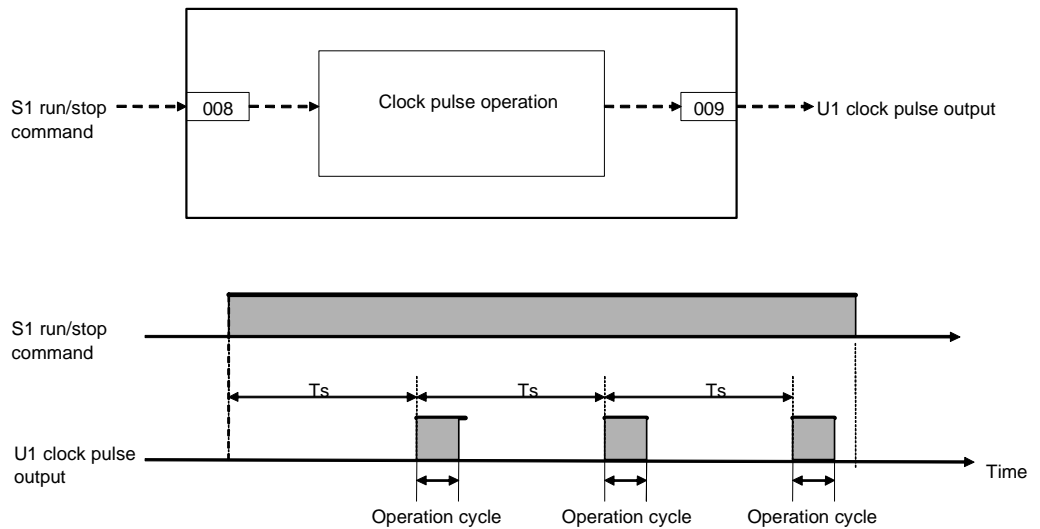
This function block outputs clock pulses that turn ON for one operation cycle only at each set time (T_s).

Clock pulses are output only for the duration that S1 operation command is 1 (ON). Output contacts remain 0 (OFF) when S1 operation command is 0 (OFF).

Function block applications

This function block is used to create a sequential control program (for example, for the measurement of current values at fixed time intervals) that takes the clock pulse as its input condition in Step Ladder Program block (Block Model 301).

Block diagram



Note: When T_s is 0, clock pulse output is always 1 (ON) when operation command is 1 (ON).

12 Sequential Operation blocks

<207> Clock Pulse 100 to 349

ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|----------------|------|--------|---|---------------|------------|---------------------------|--|-----------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor*1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Clock Pulse | 207 | 207 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1 | 1 to 4 | 1 | - | R/W(S) | - | - | - | - | 2 |
| Parameter | 007 | | Ts setting (unit: s) Note: When set to 0 s, clock pulse output remains at 1 (ON) all the time. | 0 to 32000s | 0 | - | R/W(O) | - | W | - | S/R | 2 |
| Contact input | 008 | S1 | Operation command (1: Clock pulse output ON) | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| Contact output | 009 | U1 | Clock pulse output | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software Tag ITEM (fixed) |
|------|------------------------------|---|
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 007 | Ts setting | TS |
| 008 | Operation command | S1 |
| 009 | Clock pulse output | U1 |

| Block Model | Block Name | Block Address |
|-------------|------------|---------------|
| <208> | Counter | 100 to 349 |

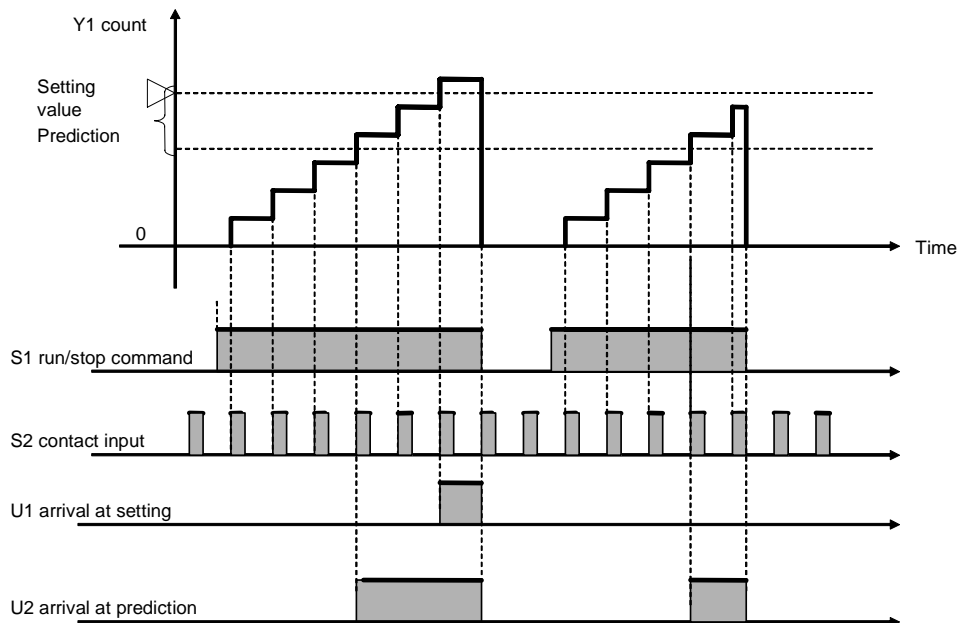
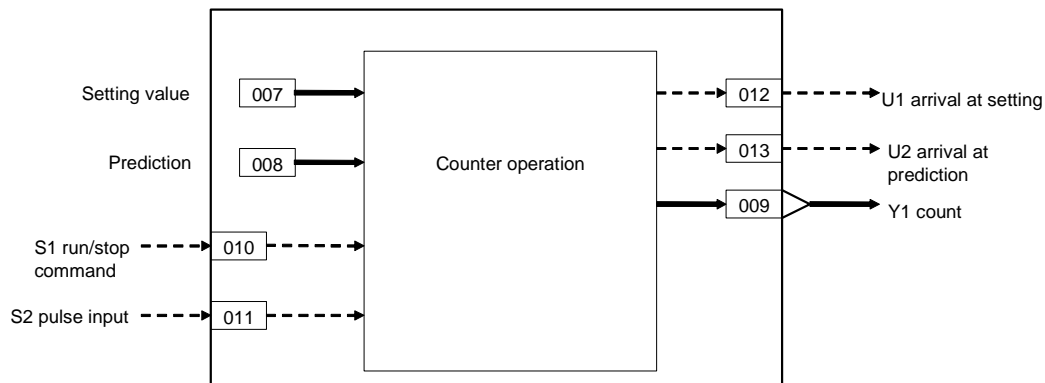
Outline

This function block performs 2-stage alarm operations.

- The number of rising edges of S2 contact pulse input is counted and Y1 count is output when S1 run/stop command is set to 1 (ON). When the count reaches "setting - prediction", U2 contact output is set to 1 (ON). When the U1 contact output is set to 1 (ON). When S1 run/stop command is set to 0 (OFF), the timer is reset, Y1 count is set to 0, and contact outputs U1 and U2 are set to 0 (OFF).
- Set the value to be subtracted from the setting as the prediction.
- Though the counter returns to 0 when the count reaches 9999, the prediction arrival and setting arrival signals are held.

Note: When a cold start is performed, the current counter value that was held before output OFF or before running of the Loop Control Unit was stopped are cleared from memory. This value is held when a hot start is performed.

Block diagram



12 Sequential Operation blocks

<208> Counter 100 to 349

ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|----------------|------|--------|---|---------------|------------|---------------------------|---|-----------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor*1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Counter | 208 | 208 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Parameter | 007 | | Setting | 0 to 9999 | 0 | - | R/W(O) | R/W | W | - | S/R | 2 |
| | 008 | | Prediction (subtracted from setting) | 0 to 9999 | 0 | - | R/W(O) | R/W | W | - | S/R | 2 |
| Analog output | 009 | Y1 | Count | 0 to 9999 | 0 | Yes | r | R | - | - | S | 2 |
| Contact input | 010 | S1 | Run/stop command | 0, 1 | 0 | Yes | R/W(O) | R/W | - | R/W | S/R | 1 |
| | 011 | S2 | Pulse input | 0, 1 | 0 | Yes | R/W | R/W | - | R/W | - | 1 |
| Contact output | 012 | U1 | Arrival at setting | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 013 | U2 | Arrival at prediction | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |

List of tag ITEMS on CX-Process Monitor or SCADA software

The following tag ITEMS are used to specify ITEMS with either 1) Monitor tags when sending function blocks to the CX-Process Monitor from 1-Block/4-Block Send Terminal to Computer (Block Model 403/404) or 2) CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (Block Model 461)/Send All Blocks (Block Model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in CX-Process Monitor | CSV Tags in SCADA Software |
|------|--------------------------------------|--------------------------------|----------------------------|
| | | Tag ITEM (fixed) | Tag ITEM (fixed) |
| 000 | Stop block operation command | None | MT_ST |
| 003 | Execution error display | None | ERR |
| 007 | Setting | SP | SP |
| 008 | Prediction (subtracted from setting) | PRESET | PRS |
| 009 | Count | PV | Y1 |
| 010 | Run/stop command | S1 | S1 |
| 012 | Arrival at setting | U1 | U1 |
| 013 | Arrival at prediction | U2 | U2 |

Note: Note that this function block cannot be sent by the 1-Block Send Terminal to Computer block (Block Model 403).

| Block Model | Block Name | Block Address |
|-------------|-----------------|---------------|
| <209> | Internal Switch | 100 to 349 |

Outline

This function block is for inputting and temporarily storing contact signals, and is equivalent to Work Area (W) on a PLC (Programmable Controller). When CX-Process Tool is used, this Internal Switch is assigned to block address 349 as default, and is automatically created as "temporary storage" area. The Internal Switch in block address 349 is for system use only and cannot be used by the user. Use another block address if you need to use this function block.

•224 internal switches can be used in one of these Internal Switch blocks.

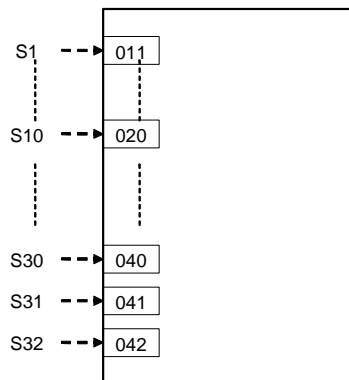
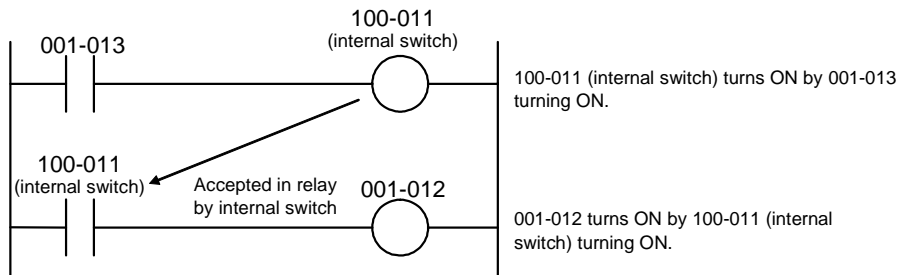
Note: When a cold start is performed, the temporary relay values that were held before output OFF or before running of the Loop Control Unit was stopped are cleared from memory. These values are held when a hot start is performed.

Function block applications

This function block can be used to accept interim results of Step Ladder Program operation in internal relays without writing them to specific "contact input" ITEMS in the Step Ladder Program block (Block Model 301).

Results can be output to this internal switch by output type commands such as OUT, and read by input type commands such as LOAD.

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------|-------------------|-----------------|--|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Internal Switch | 209 | 209 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Contact input | 011 | S1 | Internal switch | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | to | to | | to | | Yes | | | | | | |
| | 020 | S10 | Internal switch | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | to | to | | to | | Yes | | | | | | |
| | 040 | S30 | Internal switch | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| | 041 ^{*1} | S31 | Internal switch | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | S/R | 1 |
| to | to | | to | | Yes | | | | | | | |
| 234 ^{*1} | S224 | Internal switch | 0, 1 | 0 | 0 | - | R/W(O) | - | - | R/W | S/R | 1 |

*1: These ITEMS were added in Loop Control Unit Ver. 2.00.

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software Tag ITEM (fixed) |
|------------|------------------------------|---|
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 011 to 026 | S1 to S16 internal switch | S1 to S16 |
| 027 to 042 | S17 to S32 internal switch | S17 to S32 |
| 043 to 058 | S33 to S48 internal switch | S33 to S48 |
| 059 to 074 | S49 to S64 internal switch | S49 to S64 |
| 075 to 090 | S65 to S80 internal switch | S65 to S80 |
| 091 to 106 | S81 to S96 internal switch | S81 to S96 |
| 107 to 122 | S97 to S112 internal switch | S97 to S112 |
| 123 to 138 | S113 to S128 internal switch | S113 to S128 |
| 139 to 154 | S129 to S144 internal switch | S129 to S144 |
| 155 to 170 | S145 to S160 internal switch | S145 to S160 |
| 171 to 186 | S161 to S176 internal switch | S161 to S176 |
| 187 to 202 | S177 to S192 internal switch | S177 to S192 |
| 203 to 218 | S193 to S208 internal switch | S193 to S208 |
| 219 to 234 | S209 to S224 internal switch | S209 to S224 |

| Block Model | Block Name | Block Address |
|-------------|-------------|---------------|
| <210> | Level Check | 100 to 349 |

Outline

Each analog input is checked against eight levels and the contact corresponding to the level is output. The level number is also output at an analog value at the same time.

*Eight levels per block are checked.

*Hysteresis can be set for each level.

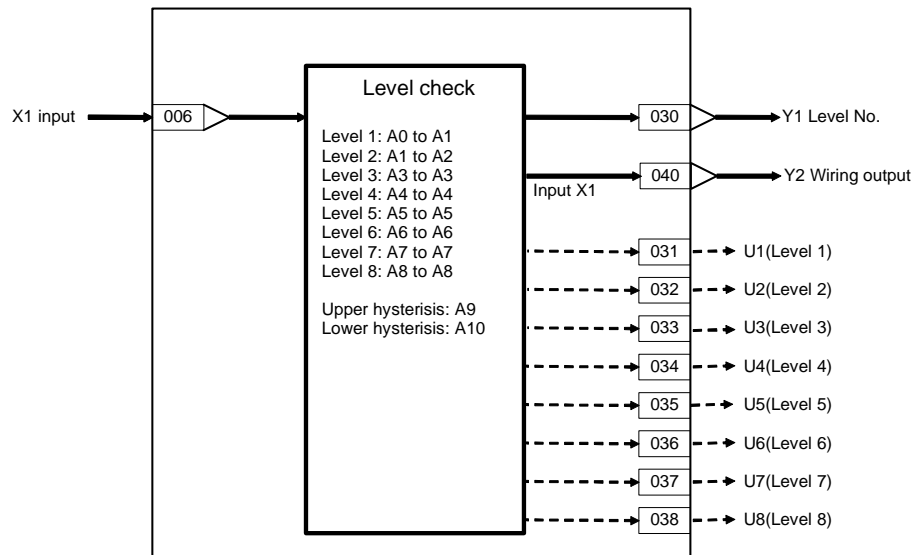
*A series connection of multiple blocks (using wiring outputs) enables checking of nine or more levels.

Function block applications

Combined with an ITEM write block (connecting a contact output to an ITEM Write block in response to level), this function can be used to change other block ITEMS in response to analog data levels.

Example: Changing the proportional band of a PID block in response to temperature levels (from this block to an ITEM Write block for constants to changing the proportional band of a basic PID block).

Block diagram



12 Sequential Operation blocks

<210> Level Check 100 to 349

ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|---------------|------|--------|---|---------------|------------|---------------------------|------------------------------|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Level Check | 210 | 210 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |

Input

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|---------------------------------|------|--------|--|------------|---------|---------------------------|------------------------------|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Analog input wiring information | 006 | | X1 source destination BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 007 | X1 | Input | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |

Level check boundaries

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------|------|--------|---------------------|--------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 010 | A0 | Lower limit | ±320.00% | -320.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 011 | A1 | Level 1 upper limit | ±320.00% | 320.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 012 | A2 | Level 2 upper limit | ±320.00% | 320.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 013 | A3 | Level 3 upper limit | ±320.00% | 320.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 014 | A4 | Level 4 upper limit | ±320.00% | 320.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 015 | A5 | Level 5 upper limit | ±320.00% | 320.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 016 | A6 | Level 6 upper limit | ±320.00% | 320.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 017 | A7 | Level 7 upper limit | ±320.00% | 320.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 018 | A8 | Level 8 upper limit | ±320.00% | 320.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 019 | A9 | Upper hysteresis | 0 to 320.00% | 1.00 | - | R/W(O) | - | W | - | S/R | 2 |
| | 020 | A10 | Lower hysteresis | 0 to 320.00% | 1.00 | - | R/W(O) | - | W | - | S/R | 2 |

Level check results

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|----------------|------|--------|---|------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Analog output | 030 | Y1 | Level No. (0: out of range) | 0 to 8 | 0 | Yes | - | - | - | - | S | 2 |
| Contact output | 031 | U1 | Level 1 (A0 < X1 ≤A1) | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| | 032 | U2 | Level 2 (A1 < X1 ≤A2) | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| | 033 | U3 | Level 3 (A2 < X1 ≤A3) | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| | 034 | U4 | Level 4 (A3 < X1 ≤A4) | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| | 035 | U5 | Level 5 (A4 < X1 ≤A5) | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| | 036 | U6 | Level 6 (A5 < X1 ≤A6) | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| | 037 | U7 | Level 7 (A6 < X1 ≤A7) | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| | 038 | U8 | Level 8 (A7 < X1 ≤A8) | 0, 1 | 0 | Yes | - | - | - | R | S | 1 |
| Analog output | 040 | Y2 | Wiring output (input value X1 output unchanged) | ±320.00% | 0.00 | Yes | r | - | - | - | - | 2 |

12 Sequential Operation blocks

<210> Level Check 100 to 349

Note1: Level upper limit (A1 to A8) setting

Set the upper limit so that $A0 \leq A1 \leq A2 \leq A3 \leq A4 \leq A5 \leq A6 \leq A7 \leq A8$. The reason for this is that, with a setting like $A0 \leq A1 \leq A2 \leq A3 > A4$, the level check will proceed in the order A0, A1, A2...A8, making A4 and subsequent settings invalid. This would result in an execution error (error code 71: inappropriate parameter) for $X1 > A4$, and the output would be treated as out of range ($Y1 = 0$, $U1$ to $U8 = 0$).

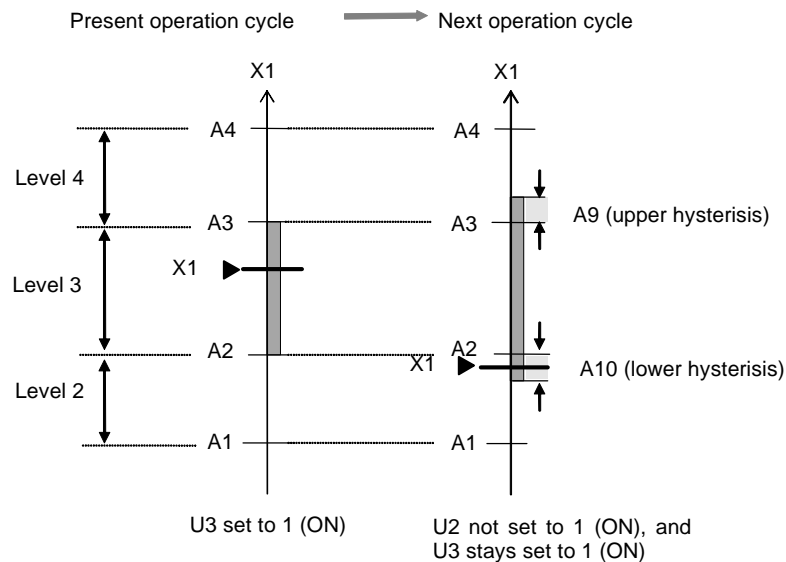
When equal values are included, such as $A0 < A1 = A2 = A3 < A4 < A5...$, they will be ignored (in this case A2 and A3), but this will not result in an execution error.

Note2: Hysteresis

The level check is equipped with hysteresis to prevent chattering in ongoing level checks due to the oscillation of the X1 input.

For example, in an operation cycle where X1 is positioned at level 3 with $A2 < X1 \leq A3$, the level check of the next operation cycle determines whether X1 is within the lower hysteresis ($A2 - \text{lower hysteresis value}$) and upper hysteresis ($A3 + \text{upper hysteresis value}$) range. Thus, even if $(A2 - \text{lower hysteresis value}) < X1 \leq A2$, level 2 (U2) will not be set to 1 (ON) and level 3 (U3) will remain set to 1 (ON). Similarly, even if $A3 < X1 \leq (A3 + \text{upper hysteresis value})$, level 4 (U4) will not be set to 1 (ON) and level 3 (U3) will remain set to 1 (ON).

Example



Note3: Y2 wiring output

Wiring with the Y2 wiring output differs from simple X1 input branching, because it can be used to prevent operations, due to hysteresis, where different levels turn ON simultaneously.

Reference:

By linking the level settings of several function blocks, nine or more levels can be achieved.

To do this, set as follows:

1. Connect the Y2 wiring output of the first function block to X1 input of the second function block.
2. Set A8 of the first function block and A0 of the second function block to the same value.
3. Set the upper hysteresis between the first and second function blocks to the same value.
4. Set the block address for the second function block to a higher value than the block address for the first function block.
5. Set the operation cycle of the first and second function blocks to the same value.

List of tag ITEMS on SCADA software

The following tag ITEMS are used to specify ITEMS with CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (model 461)/Send All Blocks (model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in SCADA Software |
|------|------------------------------|----------------------------|
| | | Tag ITEM (fixed) |
| 000 | Stop block operation command | MT_ST |
| 003 | Execution error display | ERR |
| 007 | Input | X1 |
| 010 | Lower limit | A0 |
| 011 | Level 1 upper limit | A1 |
| 012 | Level 2 upper limit | A2 |
| 013 | Level 3 upper limit | A3 |
| 014 | Level 4 upper limit | A4 |
| 015 | Level 5 upper limit | A5 |
| 016 | Level 6 upper limit | A6 |
| 017 | Level 7 upper limit | A7 |
| 018 | Level 8 upper limit | A8 |
| 019 | Upper hysteresis | A9 |
| 020 | Lower hysteresis | A10 |
| 030 | Level No. | Y1 |
| 031 | Level 1 | U1 |
| 032 | Level 2 | U2 |
| 033 | Level 3 | U3 |
| 034 | Level 4 | U4 |
| 035 | Level 5 | U5 |
| 036 | Level 6 | U6 |
| 037 | Level 7 | U7 |
| 038 | Level 8 | U8 |

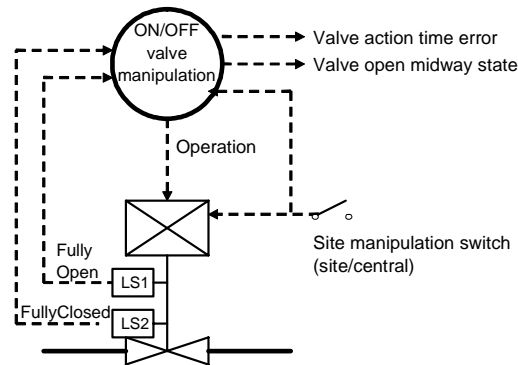
13 Contact Type Control Target
<221> ON/OFF Valve Manipulator 100 to 349

| Block Model | Block Name | Block Address |
|-------------|--------------------------|---------------|
| <221> | ON/OFF Valve Manipulator | 100 to 349 |

Outline

This function block manipulates and monitors ON/OFF valves with open/close limit switches.

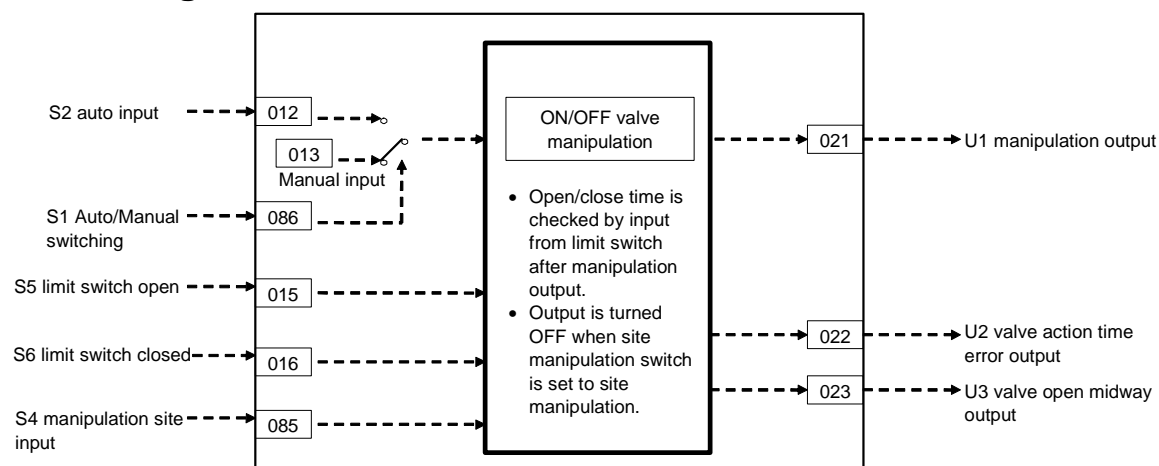
- Provided with a valve action time error detection function (The contact state is output as a valve action time error unless the limit switch turns ON after a fully close or open operation.)
- Provided with a site manipulation switch input function (This switch enables input of either valve manipulation from the site or from a central Loop Control Unit. Manipulation output is turned OFF when valve manipulation is input from the site.)
- Provided with an Auto/Manual switching function (When set to Auto, the input is taken as the manipulation output, and when set to Manual, the internal specified state is taken as the manipulation output.)
- Provided with a valve open midway output function (When the limit switches for detecting valve fully open or closed are both OFF, the valve state is regarded as valve open midway and the output contact is turned ON.)
- When switching from Auto to Manual, the manual input is matched to the value of the auto input immediately prior to switching (supported from version 2.50 of the Loop Control Unit).
- When the site manipulation switch is switched from ON (site) to OFF (central), the operation is forced to manual. At the same time, the manual input is matched to the value of the limit switch open/close input immediately prior to switching, in order to maintain actual site conditions (supported from version 2.50 of the Loop Control Unit).



Function block applications

Manipulation of pneumatic-operated valves and motor-operated valves

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------|------|--------|--|---------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: ON/OFF valve manipulator | 221 | 221 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Parameter | 006 | | Open limit switch (0: Used, 1: Not used) Note: When set to 0, open limit switch input (ITEM015) turns 0 (OFF). | 0, 1 | 1 | - | R/W(S) | - | - | - | - | 1 |
| | 007 | | Open time setting Note: This setting is enabled when open limit switch (ITEM006) is set to 1. | 0 to 32000s | 5 | - | R/W(O) | - | W | - | S/R | 2 |
| Parameter | 008 | | Close limit switch (0: Used, 1: Not used) Note: When set to 0, close limit switch input (ITEM016) turns 0 (OFF). | 0, 1 | 1 | - | R/W(S) | - | - | - | - | 1 |
| | 009 | | Close time setting Note: This setting is enabled when close limit switch (ITEM008) is set to 1. | 0 to 32000s | 5 | - | R/W(O) | - | W | - | S/R | 2 |
| Parameter | 010 | | Valve action direction 0: Forward (close at power ON) 1: Reverse (open at power ON) | 0, 1 | 1 | - | R/W(S) | - | - | - | - | 1 |
| Contact input | 012 | S2 | Auto input | 0, 1 | 0 | Yes | - | R | - | R/W | S | 1 |
| Contact input/parameter | 013 | S3 | Manual input | 0, 1 | 0 | Yes | R/W(O) | R/W | - | R/W | S/R | 1 |
| Contact input | 015 | S5 | Open limit switch input 0: Open limit switch OFF 1: Open limit switch ON Note: This setting becomes 0 when ITEM006 (open limit switch) is set to 0. | 0, 1 | 0 | Yes | - | R | - | R/W | S | 1 |

13 Contact Type Control Target

<221> ON/OFF Valve Manipulator 100 to 349

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|-------------------------|------|--------|--|------------|---------|---------------------------|--|-----------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | |
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor*1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| | 016 | S6 | Close limit switch input 0: Close limit switch OFF 1: Close limit switch ON Note: This setting becomes 0 when ITEM008 (close limit switch) is set to 0. | 0, 1 | 0 | Yes | - | R | - | R/W | S | 1 |
| Contact output□□ | 021 | U1 | Manipulation output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 022 | U2 | Valve action time error (1: Error) | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 023 | U3 | Valve open midway (1: Open midway) | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| Contact input | 085 | S4 | Site manipulation switch input (1: Site, 0: Central)*1 Note: When 1 (Site) is input, ITEM021 (Manipulation output) turns 0, and ITEM022 (Valve action time error) and ITEM023 (Valve open midway) turn 0. | 0, 1 | 0 | Yes | - | R | - | R/W | S | 1 |
| Contact input/parameter | 086 | S1 | Auto/Manual switching*2 0: Manual, 1: Auto | 0, 1 | 0 | Yes | R/W(O) | R/W | - | R/W | S/R | 1 |
| Parameter | 099 | | Label | 0 to 15 | 0 | Yes | R/W(O) | R/W | W | - | S/R | 2 |

*1: When the S4 manipulation site input switch is switched from 1 (site) to 0 (central), the value of auto/manual switching (ITEM 086) is forced to 0 (Man) and the U1 manipulation output is set as follows. (Supported from version 2.50 of the Loop Control Unit.)
 When the S5 open limit switch input is set to 1 (open) immediately prior to switching, ITEM 013 (manual input) will be 1 and U1 manipulation output will be 1.
 When the S6 close limit switch input is set to 1 (close) immediately prior to switching, ITEM 013 (manual input) will be 0 and U1 manipulation output will be 0.
 When the S5 open limit switch input and S6 close limit switch input are both set to 1 or both set to 0 immediately prior to switching, if ITEM 010 (valve action direction) is 1 (reverse), U1 manipulation output will be 0. Similarly, if ITEM 010 (valve action direction) is 0 (forward), U1 manipulation output will be 1.

*2: When S1 auto/manual switching is changed from Auto to Manual, the value of ITEM 012 (auto input) is automatically transferred to ITEM 013 (manual input). This results in a manual state with the manual input matched to the value of the auto input immediately prior to switching. (Supported from version 2.50 of the Loop Control Unit.)

List of tag ITEMS on CX-Process Monitor or SCADA software

The following tag ITEMS are used to specify ITEMS with either 1) Monitor tags when sending function blocks to the CX-Process Monitor from 1-Block/4-Block Send Terminal to Computer (Block Model 403/404) or 2) CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (Block Model 461)/Send All Blocks (Block Model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in CX-Process Monitor | CSV Tags in SCADA Software |
|------|--|--------------------------------------|----------------------------------|
| | | Tag ITEM (fixed) | Tag ITEM (fixed) |
| 000 | Stop block operation command (0: Cancel stop, 1: Stop) | None | MT_ST |
| 003 | Execution error display | None | ERR |
| 007 | Open time setting | None | TO |
| 009 | Close time setting | None | TC |
| 012 | Auto input | S2 | S2 |
| 013 | Manual input | S3 | S3 |
| 015 | Open limit switch input | S5 | S5 |
| 016 | Close limit switch input | S6 | S6 |
| 021 | Manipulation output | U1 | U1 |
| 022 | Valve action time error | U2 | U2 |
| 023 | Valve open midway | U3 | U3 |
| 085 | Site manipulation switch input | S4 | S4 |
| 086 | Auto/Manual switching | S1 | S1 |
| 099 | Label | OP_MK | OP_MK |

Note Note that this function block cannot be sent by the 1-Block Send Terminal to Computer block (Block Model 403).

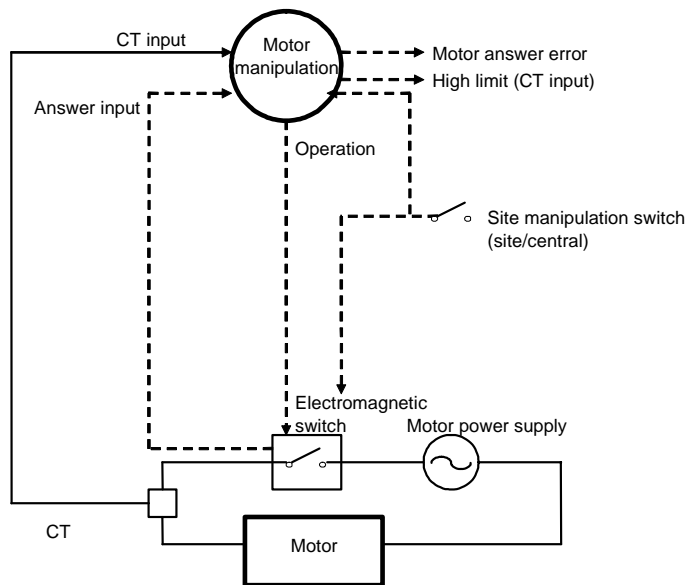
13 Contact Type Control Target
<222> Motor Manipulator 100 to 349

| Block Model | Block Name | Block Address |
|-------------|-------------------|---------------|
| <222> | Motor Manipulator | 100 to 349 |

Outline

This function block manipulates and monitors motor operation.

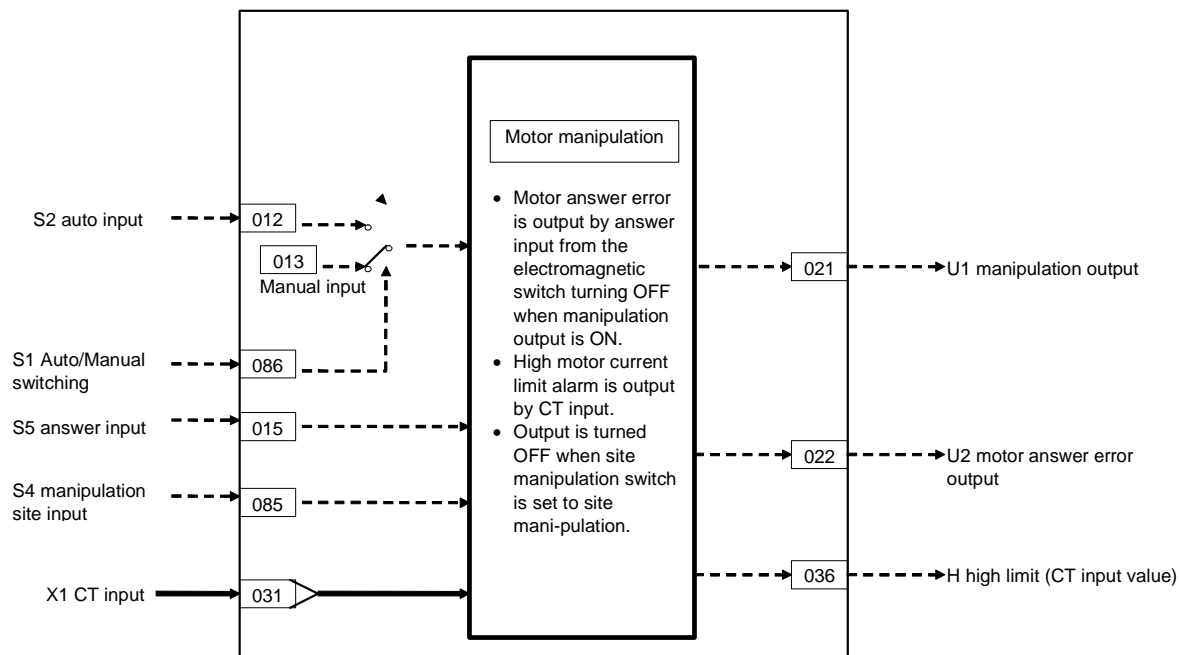
- Provided with a site manipulation switch input (This switch enables input of either motor manipulation from the site or from a central Loop Control Unit. Manipulation output is turned OFF when motor manipulation is input from the site.)
- Provided with an Auto/Manual switching function (When set to Auto, the input is taken as the manipulation output, and when set to Manual, the internal specified state is taken as the manipulation output.)
- Provided with a motor answer error alarm (The contact state is output as an error if the answer contact input is OFF for the answer check time or longer during execution of the manipulation ON command on the motor.)
- Provided with a CT input high alarm output (The contact state is output as an error when the CT input from the CT converter is the setting value or higher.)
- When switching from Auto to Manual, the manual input is matched to the value of the auto input immediately prior to switching (supported from version 2.50 of the Loop Control Unit).
- When the site manipulation switch is switched from ON (site) to OFF (central), the operation is forced to manual. At the same time, the manual input is matched to the value of the answer input immediately prior to switching, in order to maintain actual site conditions (supported from version 2.50 of the Loop Control Unit).



Function block applications

Manipulation of motors on pumps, stirrer, conveyors, etc.

Block diagram



13 Contact Type Control Target

<222> Motor Manipulator 100 to 349

ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|------------------|------|--------|---|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0 to 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Motor Manipulator | 222 | 222 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Parameter | 006 | | Answer check time (unit: s) | 1 to 8s | 3 | - | R/W(S) | - | - | - | S/R | 2 |
| Contact input | 012 | S2 | Auto input | 0 to 1 | 0 | Yes | - | R | - | R/W | S | 1 |
| Parameter | 013 | S3 | Manual input | 0 to 1 | 0 | Yes | R/W(O) | R/W | - | R/W | S/R | 1 |
| Contact input | 015 | S5 | Answer input 0: OFF, 1: ON | 0 to 1 | 0 | Yes | - | R | - | R/W | S | 1 |
| Contact output □ | 021 | U1 | Manipulation output | 0 to 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 022 | U2 | Answer error (1: Error, 0: Normal) Note: When manipulation output (ITEM021) is 1, an error is assumed if answer input (ITEM015) stays 0 for the answer check time (ITEM006) or longer. If answer input (ITEM015) turns 1 after an error is assumed (1), the state is assumed to normal and this setting returns to 0. | 0 to 1 | 0 | Yes | - | R | - | R | S | 1 |

CT input alarm

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|---|--------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Analog input connection information | 031 | | X1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 032 | X1 | CT input | ±320.00% | 0.00 | Yes | r | R | - | - | S | 2 |
| Parameter | 033 | | CT input high alarm setting | ±320.00% | 100.00 | - | R/W(O) | R | W | - | S/R | 2 |
| | 035 | | Hysteresis setting | 0 to 320.00% | 1.00 | - | R/W(O) | - | W | - | S/R | 2 |
| Contact output | 036 | H | CT input high alarm output Note: Alarm output is functional even if site manipulation switch input (ITEM085) is set to 1 (Site). | 0 to 1 | 0 | Yes | - | R | - | R | S | 1 |
| Contact input | 085 | S4 | Site manipulation switch input*1 (1: Site, 0: Central) Note: When 1 (Site) is input, both manipulation output (ITEM021) and motor answer output (ITEM022) turn 0. | 0 to 1 | 0 | Yes | - | R | - | R/W | S | 1 |
| Contact input/parameter | 086 | S1 | Auto/Manual switching*2 0: Manual, 1: Auto | 0 to 1 | 0 | Yes | R/W(O) | R/W | - | R/W | S/R | 1 |

*1: When the S4 manipulation site input switch is switched from 1 (site) to 0 (central), the value of auto/manual switching (ITEM 086) is forced to 0 (Man) and the value of ITEM 015 (answer input) is automatically transferred to ITEM 013 (manual input). This results in a manual state with the manual input matched to the value of the auto input immediately prior to switching. (Supported from version 2.50 of the Loop Control Unit.)

*2: When S1 auto/manual switching is switched from Auto to Manual, the value of ITEM 012 (auto input) is automatically transferred to ITEM 013 (manual input). This results in a manual state with the manual input matched to the value of the auto input immediately prior to switching. (Supported from version 2.50 of the Loop Control Unit.)

Data for host display

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------|------|--------|------------------|------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 099 | | Label | 0 to 15 | 0 | Yes | R/W(O) | R/W | W | - | S/R | 2 |

List of tag ITEMS on CX-Process Monitor or SCADA software

The following tag ITEMS are used to specify ITEMS with either 1) Monitor tags when sending function blocks to the CX-Process Monitor from 1-Block/4-Block Send Terminal to Computer (Block Model 403/404) or 2) CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (Block Model 461)/Send All Blocks (Block Model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in CX-Process Monitor | CSV Tags in SCADA Software |
|------|---------------------------------|--------------------------------------|----------------------------------|
| | | Tag ITEM (fixed) | Tag ITEM (fixed) |
| 000 | Stop block operation command | None | MT_ST |
| 003 | Execution error display | None | ERR |
| 006 | Answer check time | None | ANS |
| 012 | Auto input | S2 | S2 |
| 013 | Manual input | S3 | S3 |
| 015 | Answer input | S5 | S5 |
| 021 | Manipulation output | U1 | U1 |
| 022 | Answer error | U2 | U2 |
| 032 | CT input | X1 | X1 |
| 033 | CT input high alarm setting | H_SP | H_SP |
| 035 | Hysteresis setting | None | HS |
| 036 | CT input high alarm output | None | CTH |
| 085 | Site manipulation switch input | OP_MK | S4 |
| 086 | Auto/Manual switching | None | S1 |
| 099 | Label | None | OP_MK |

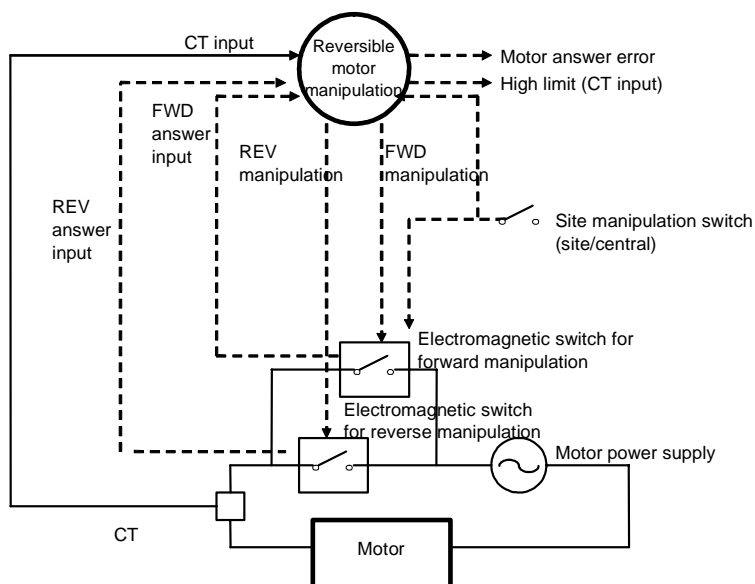
Note Note that this function block cannot be sent by the 1-Block Send Terminal to Computer block (Block Model 403).

| Block Model | Block Name | Block Address |
|-------------|------------------------------|---------------|
| <223> | Reversible Motor Manipulator | 100 to 349 |

Outline

Manipulates and monitors reversible motor operation.

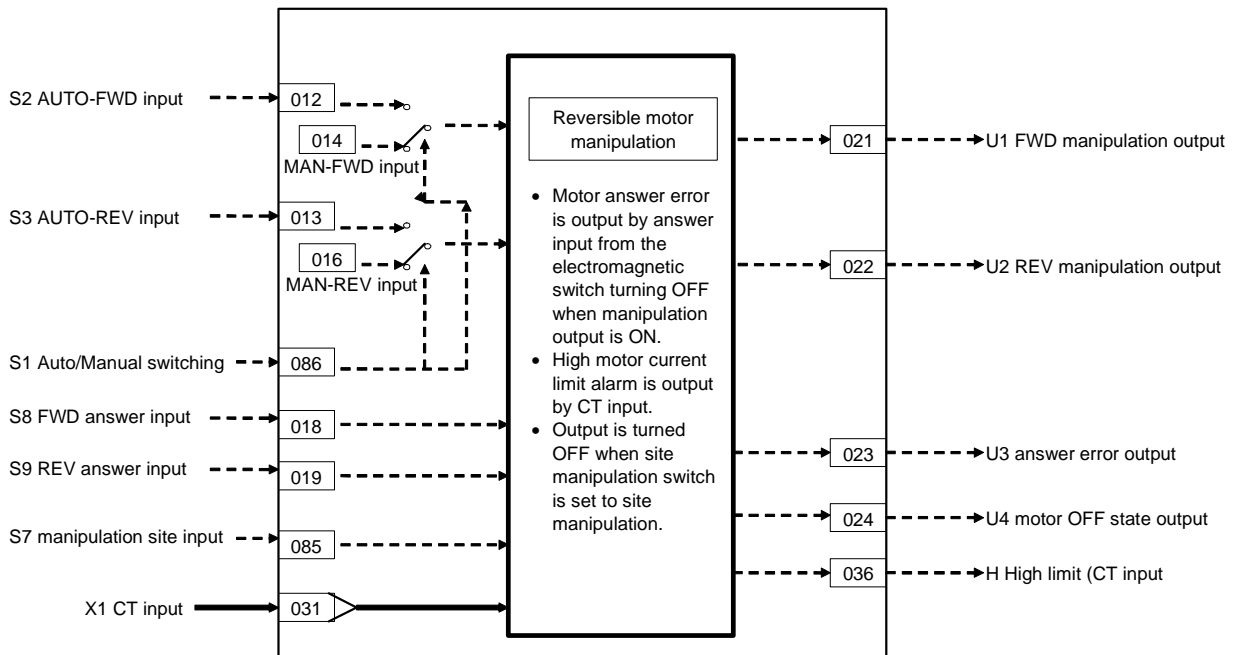
- Manipulation commands can be specified in both the forward and reverse directions for a reversible motor.
- Provided with a site manipulation switch input (This switch enables input of either motor manipulation from the site or from a central Loop Control Unit. Manipulation output is turned OFF when motor manipulation is input from the site.)
- Provided with an Auto/Manual switching function (When set to Auto in regular operation, the input is taken as the manipulation output, and when set to Manual, the internal specified state is taken as the manipulation output.)
- Provided with a motor answer error alarm (The contact state is output as an error if the FWD or REV answer contact input is OFF for the answer check time or longer during execution of the FWD or REV manipulation ON command on the motor.)
- Provided with a CT input high alarm output (The contact state is output as an error when the CT input from the CT converter is the setting value or higher.)
- When switching from Auto to Manual, the manual input is matched to the value of the auto input immediately prior to switching (supported from version 2.50 of the Loop Control Unit).
- When the site manipulation switch is switched from ON (site) to OFF (central), the operation is forced to manual. At the same time, the MAN-FWD and MAN-REV inputs are matched to the value FWD and REV answer inputs immediately prior to switching, in order to maintain actual site conditions (supported from version 2.50 of the Loop Control Unit).



Function block applications

Manipulation of motors on conveyors, for example, that are continuously run in the forward and reverse directions

Block diagram



ITEMlist

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|----------------|------|--------|---|---------------|------------|---------------------------|--|--|------------------------------|------------------------------------|---------------------------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled | Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEMSe tting block | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Reversible Motor Manipulator | 223 | 223 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Parameter | 006 | | Answer check time (unit: s) | 1 to 8 | 3 | - | R/W(S) | - | - | - | S/R | 2 |
| | 007 | | OFF time during FWD/REV switching (unit: s) Note: When FWD input (Auto or Manual) and REV input (Auto or Manual) both turn 0 (motor operation is stopped) to switch the direction of motor rotation, 0 continues for both FWD manipulation output (ITEM021) and REV manipulation output (ITEM022) for the time set here. After the time set here has elapsed, REV manipulation output (ITEM022) or FWD manipulation output (ITEM021) is switched to 1.*1 | 1 to 8 | 1 | - | R/W(S) | - | - | - | S/R | 2 |
| Contact input | 012 | S2 | AUTO-FWD input | 0, 1 | 0 | Yes | - | R | - | R/W | S | 1 |
| | 013 | S3 | AUTO-REV input | 0, 1 | 0 | Yes | - | R | - | R/W | S | 1 |
| Parameter | 014 | S4 | MAN-FWD input | 0, 1 | 0 | Yes | R/W(O) | R/W | - | R/W | S/R | 1 |
| | 016 | S6 | MAN-REV input | 0, 1 | 0 | Yes | R/W(O) | R/W | - | R/W | S/R | 1 |
| Contact input | 018 | S8 | FWD answer input 0: OFF 1: ON | 0, 1 | 0 | Yes | - | R | - | R/W | S | 1 |
| | 019 | S9 | REV answer input 0: OFF 1: ON | 0, 1 | 0 | Yes | - | R | - | R/W | S | 1 |
| Contact output | 021 | U1 | FWD manipulation output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 022 | U2 | REV manipulation output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 023 | U3 | Answer error (1: Error, 0: Normal) Note: An error is assumed when FWD manipulation output (ITEM021) or REV manipulation output (ITEM022) turns 1, and FWD answer input (ITEM018) or REV answer input (ITEM019) are 0 for answer check time (ITEM006) or longer. If FWD answer input (ITEM018) or REV answer input (ITEM019) turns 1 after an error is assumed (1), the state is assumed to normal and this setting returns to 0. | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 024 | U4 | Motor OFF state output (1: OFF) | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |

13 Contact Type Control Target
<223> Reversible Motor Manipulator 100 to 349

CT input alarm

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|---|--------------|---------|---------------------------|--|-----------------------------------|--------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor*1 | According to ITEMSetting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Analog input connection information | 031 | | X1 source designation BBB: Block address, III: ITEMNo. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 032 | X1 | CT input | ±320.00% | 0.00 | Yes | r | R | - | - | S | 2 |
| Parameter | 033 | | CT input high alarm setting | ±320.00% | 100.00 | - | R/W(O) | R | W | - | S/R | 2 |
| | 035 | | Hysteresis setting | 0 to 320.00% | 1.00 | - | R/W(O) | - | W | - | S/R | 2 |
| Contact output | 036 | H | CT input high alarm output Note: Alarm output is functional even if site manipulation switch input (ITEM085) is set to 1 (Site). | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| Contact input | 085 | S7 | Site manipulation switch input (1: Site, 1: Central) Note: When 1 (Site) is input, both FWD manipulation output (ITEM021) and REV manipulation output (ITEM022) turn 0. | 0, 1 | 0 | Yes | - | R | - | R/W | S | 1 |
| Contact input/Parameter | 086 | S1 | Auto/Manual switching 0: Manual, 1: Auto | 0, 1 | 0 | Yes | R/W(O) | R/W | - | R/W | S/R | 1 |

- *1: When FWD input (Auto or Manual) and REV input (Auto or Manual) have both become 0 even if the direction of motor operation has not been switched, the 0 state is continued for both FWD manipulation output (ITEM021) and REV manipulation output (ITEM022) for the duration of the time set at this ITEM.
 Both FWD manipulation output (ITEM021) and REV manipulation output (ITEM022) turn 0 for the OFF time during FWD/REV switching (ITEM007) also when site manipulation switch input (ITEM085) is switched from 1 (site) to 0 (central).
- *2: When the S4 manipulation site input switch is switched from 1 (site) to 0 (central), the value of auto/manual switching (ITEM086) is forced to 0 (Man), the value of ITEM018 (forward answer input) is automatically transferred to ITEM014 (manual-forward input), and the value of ITEM019 (reverse answer input) is automatically transferred to ITEM016 (manual-reverse input). This results in a manual state with the manual input matched to the value of the auto input immediately prior to switching. (Supported from version 2.50 of the Loop Control Unit.)
- *3: When S1 auto/manual switching is switched from Auto to Manual, the value of ITEM012 (auto-forward input) is automatically transferred to ITEM014 (manual input) and the value of ITEM013 (auto-reverse input) is automatically transferred to ITEM016 (manual-reverse input). This results in a manual state with the manual input matched to the value of the auto input immediately prior to switching. (Supported from version 2.50 of the Loop Control Unit.)

Data for host display

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-----------|------|--------|------------------|------------|---------|---------------------------|--|-----------------------------------|--------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor*1 | According to ITEMSetting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 099 | | Label | 0 to 15 | 0 | Yes | R/W(O) | R/W | W | - | S/R | 2 |

List of tag ITEMS on CX-Process Monitor or SCADA software

The following tag ITEMS are used to specify ITEMS with either 1) Monitor tags when sending function blocks to the CX-Process Monitor from 1-Block/4-Block Send Terminal to Computer (Block Model 403/404) or 2) CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (Block Model 461)/Send All Blocks (Block Model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in CX-Process Monitor | CSV Tags in SCADA Software |
|------|-----------------------------------|--------------------------------------|----------------------------------|
| | | Tag ITEM(fixed) | Tag ITEM(fixed) |
| 000 | Stop block operation command | None | MT_ST |
| 003 | Execution error display | None | ERR |
| 006 | Answer check time (unit: s) | None | ANS |
| 007 | OFF time during FWD/REV switching | None | OFT |
| 012 | AUTO-FWD input | S2 | S2 |
| 013 | AUTO-REV input | S3 | S3 |
| 014 | MAN-FWD input | S4 | S4 |
| 016 | MAN-REV input | S6 | S6 |
| 018 | FWD answer input | S8 | S8 |
| 019 | REV answer input | S9 | S9 |
| 021 | FWD manipulation output | U1 | U1 |
| 022 | REV manipulation output | U2 | U2 |
| 023 | Answer error | U3 | U3 |
| 024 | Motor OFF state output | U4 | U4 |
| 032 | CT input | X1 | X1 |
| 033 | CT input high alarm setting | H_SP | H_SP |
| 035 | Hysteresis setting | None | HS |
| 036 | Hysteresis setting | CTH | CTH |
| 085 | CT input high alarm output | S7 | S7 |
| 086 | Auto/Manual switching | S1 | S1 |
| 099 | Label | OP_MK | OP_MK |

Note Note that this function block cannot be sent by the 1-Block Send Terminal to Computer block (Block Model 403).

13 Contact Type Control Target
<224> Motor Opening Manipulator 100 to 349

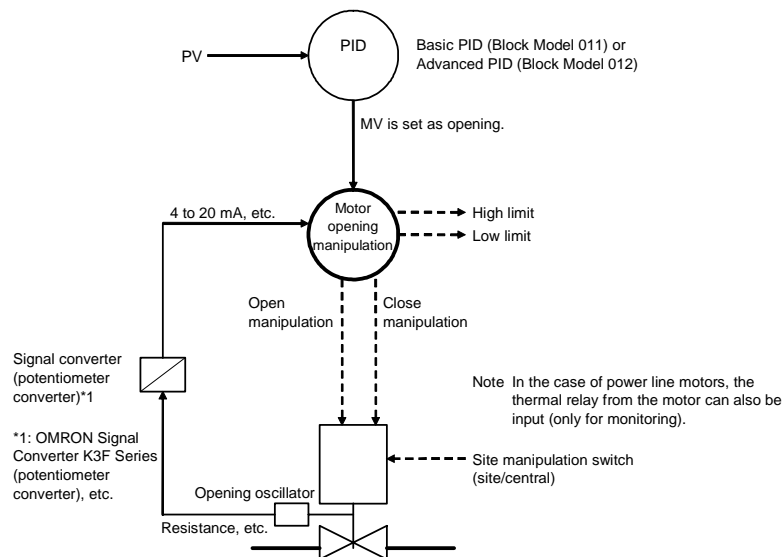
| Block Model | Block Name | Block Address |
|-------------|---------------------------|---------------|
| <224> | Motor Opening Manipulator | 100 to 349 |

Outline

This function block inputs a target opening to manipulate an open/close instruction input type electric position-proportional motor. Combining this function block with other Control blocks (e.g. PID block) enables position-proportional control of electric motors.

- The MV value from a Control block (e.g. PID block) is input as an analog signal, and this is taken to be the motor opening setting value. The motor is controlled so that the motor opening is this target opening.
- The open/close commands (stop) are instructed to the motor as contact outputs, and the feedback signal (current opening) from the motor is received as analog signals to control motor opening.
- Provided with an Auto/Manual switching function (When set to Auto in regular operation, the input is taken as the target opening, and when set to Manual, the internal specified state is taken as the target opening.)
- Provided with a restart control time function (This prevents damage to the motor caused by frequent forward/reverse operation.)
- Provided with an opening input high/low limit alarm function (The state of the contact is output as an error when the feedback signal input from the opening oscillator is at the alarm setting or higher or lower.)
- When switching from Auto to Manual, the manual input is matched to the value of the auto input immediately prior to switching (supported from version 2.50 of the Loop Control Unit).
- When the site manipulation switch is switched from ON (site) to OFF (central), the operation is forced to manual. At the same time, the Manual input target opening setting is matched to the value of the Opening input immediately prior to switching, in order to maintain actual site conditions (supported from version 2.50 of the Loop Control Unit).

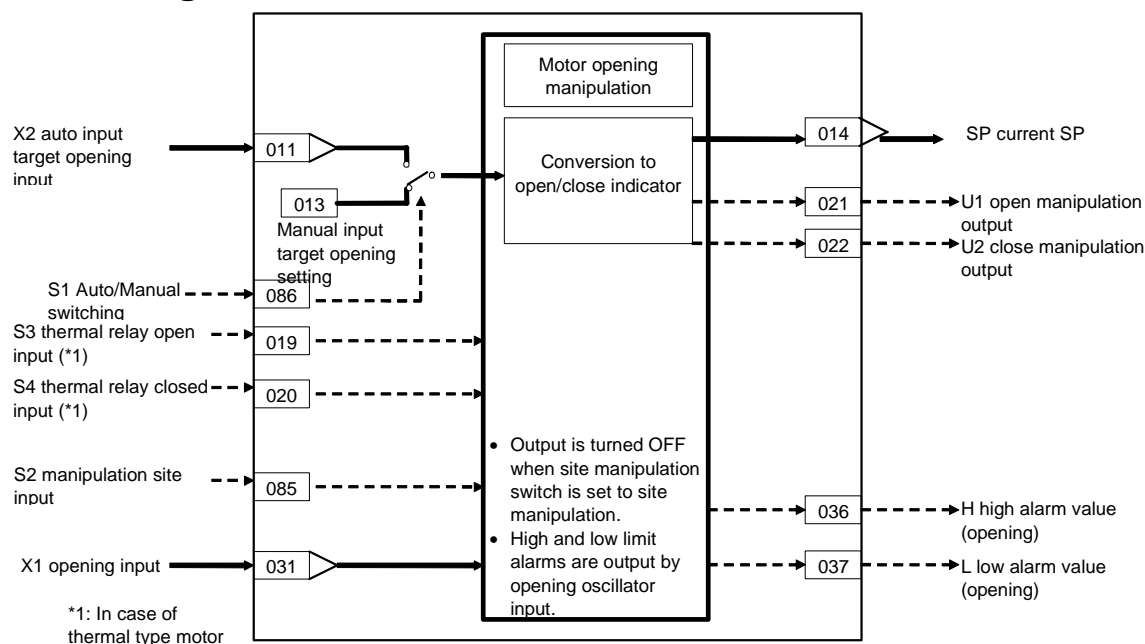
Function block



Function block application

Manipulation of an electric position-proportional motor

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Sym bol | Data Description | Data Range | Default | COLD start initializ ation | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) | |
|---------------|------|---------|---|---------------|------------|----------------------------|--|--------------------------------------|----------------------------------|------------------------------------|---------------------|--------------------------|
| | | | | | | | Accordi ng to CX-Pro cess Tool | Accordi ng to CX-Pro cess Monitor *1 | Accordi ng to ITEM Setting block | Accordi ng to Step Ladder Progra m | | Send/ Receive All Blocks |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | S/R | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Motor Opening Manipulator | 224 | 224 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List") | | 0000 | - | r | - | - | - | S | 2 |
| Parameter | 004 | | Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |

13 Contact Type Control Target
<224> Motor Opening Manipulator 100 to 349

Target opening setting, open/close instruction output

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|--|--------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Analog input connection information | 011 | | X2 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 012 | X2 | Auto input target opening | ±320.00% | 0.00 | Yes | r | - | - | - | S | 2 |
| Parameter | 013 | | Manual input target opening setting | ±320.00% | 0.00 | Yes | R/W(O) | W | W | - | R | 2 |
| Analog output | 014 | SP | Current SP output | ±320.00% | 0.00 | Yes | r | R | - | - | S | 2 |
| Parameter | 015 | T1 | Full-stroke time (unit: s) Note: Time required from fully closed to fully open. | 0 to 999.9s | 10.0 | - | R/W(S) | - | - | - | S/R | 2 |
| | 016 | T2 | Restart control time | 0 to 999.9s | 1.0 | - | R/W(S) | - | - | - | S/R | 2 |
| Parameter | 017 | | Dead-band | 0 to 320.00% | 1.00 | - | R/W(S) | - | - | - | S/R | 2 |
| Contact input | 019 | S3 | Open monitor switch thermal relay operation (1: ON) Note: Operation is mainly input when connected to thermal type motor. Operation is monitor only. | 0, 1 | 0 | Yes | - | R | - | R/W | S | 1 |
| | 020 | S4 | Close monitor switch thermal relay operation (1: ON) Note: Operation is mainly input when connected to thermal type motor. Operation is monitor only. | 0, 1 | 0 | Yes | - | R | - | R/W | S | 1 |
| Contact output | 021 | U1 | Open manipulation output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 022 | U2 | Close manipulation output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |

Opening feedback input

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------------------|------|--------|--|--------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Analog input connection information | 031 | | X1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | - | 4 |
| Analog input | 032 | X1 | Opening input | ±320.00% | 0.00 | Yes | r | R | - | - | S | 2 |
| Parameter | 033 | | Opening input high limit alarm setting | ±320.00% | 100.00 | - | R/W(O) | R | W | - | S/R | 2 |
| | 034 | | Opening input low limit alarm setting | ±320.00% | 0.00 | - | R/W(O) | R | W | - | S/R | 2 |
| | 035 | | Hysteresis setting | 0 to 320.00% | 1.00 | - | R/W(O) | - | W | - | S/R | 2 |
| Contact output | 036 | H | Opening input high limit alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| | 037 | L | Opening input low limit alarm output | 0, 1 | 0 | Yes | - | R | - | R | S | 1 |
| Contact input | 085 | S2 | Site manipulation switch input*1 (1: Site, 1: Central) Note: When 1 (Site) is input, open close manipulation output (ITEM021) close manipulation output (ITEM022) turn ON. | 0, 1 | 0 | Yes | - | R | - | R/W | S | 1 |
| Contact input/parameter | 086 | S1 | Auto/Manual switching*2 0: Manual, 1: Auto | 0, 1 | 0 | Yes | R/W(O) | R/W | - | R/W | S/R | 1 |

*1: When the S2 manipulation site input switch is switched from 1 (site) to 0 (central), the value of auto/manual switching (ITEM 086) is forced to 0 (Man) and the value of ITEM 032 (opening input) is automatically transferred to ITEM 013 (Manual input target opening setting). This results in a manual state with the manual input matched to the value of the auto input immediately prior to switching. (Supported from version 2.50 of the Loop Control Unit.)

*2: When S1 auto/manual switching is switched from Auto to Manual, the value of ITEM 012 (auto input) is automatically transferred to ITEM 013 (manual input target opening setting). This results in a manual state with the manual input matched to the value of the auto input immediately prior to switching. (Supported from version 2.50 of the Loop Control Unit.)

13 Contact Type Control Target
<224> Motor Opening Manipulator 100 to 349

Data for host display

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | | Data Length (bytes) |
|-----------|------|--------|------------------|------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | |
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Parameter | 099 | | Label | 0 to 15 | 0 | Yes | R/W(O) | R/W | W | - | S/R | 2 |

Note: When both open manipulation output (ITEM021) and close manipulation output (ITEM022) both turn 0 for switching the direction of motor operation, the 0 state is continued for both open manipulation output (ITEM021) and close manipulation output (ITEM022) for the duration of the restart control time (ITEM16). Close manipulation output (ITEM022) and open manipulation output (ITEM021) actually turn 1 after the set time has elapsed. When both open manipulation output (ITEM021) and close manipulation output (ITEM022) turn 0 (motor operation is stopped) even if the direction of motor operation is not switched, the 0 state is continued for both open manipulation output (ITEM021) and close manipulation output (ITEM022) for the duration of the restart control time (ITEM16). Both open manipulation output (ITEM021) and close manipulation output (ITEM022) turn 0 for the duration of the restart control time (ITEM16) also when site manipulation switch input (ITEM085) is switched from 1 (site) to 0 (central).

Description of Operation

In the following description, the target deviation is "auto input target opening (manual input target opening setting) - opening input."
 Opening input (ITEM032) is compared with auto input target opening (ITEM012) or manual input target opening setting (ITEM013). If the opening deviation is greater than 0, open manipulation output (ITEM021) is taken to be 1. If the opening deviation is smaller than 0, close manipulation output (ITEM022) is taken to be 1.
 Note, however, that when the opening deviation is smaller than the dead band (ITEM017), both open manipulation output (ITEM021) and close manipulation output (ITEM022) are taken to be 0 to stop motor operation.
 The open/close time is calculated by multiplying the full-stroke time (ITEM015) by opening deviation (1 when 100%).

List of tag ITEMS on CX-Process Monitor or SCADA software

The following tag ITEMS are used to specify ITEMS with either 1) Monitor tags when sending function blocks to the CX-Process Monitor from 1-Block/4-Block Send Terminal to Computer (Block Model 403/404) or 2) CSV tags from SCADA software when sending/receiving data to/from the CPU Unit using Receive All Blocks (Block Model 461)/Send All Blocks (Block Model 462). All tag ITEMS are fixed and cannot be changed.

| ITEM | Data Name | CSV Tags in CX-Process Monitor | CSV Tags in SCADA Software |
|------|--|--------------------------------|----------------------------|
| | | Tag ITEM (fixed) | Tag ITEM (fixed) |
| 000 | Stop block operation command | None | MT_ST |
| 003 | Execution error display | None | ERR |
| 012 | Auto input target opening | None | X2 |
| 013 | Manual input target opening setting | None | SP |
| 014 | Current SP output | SP | SP |
| 015 | Full-stroke time. | None | T1 |
| 016 | Restart control time | None | T2 |
| 017 | Dead-band | None | DB |
| 019 | Open monitor switch thermal relay operation | S3 | S3 |
| 020 | Close monitor switch thermal relay operation | S4 | S4 |
| 021 | Open manipulation output | U1 | U1 |
| 022 | Close manipulation output | U2 | U2 |
| 032 | Opening input | X1 | X1 |
| 033 | Opening input high limit alarm setting | None | H_SP |
| 034 | Opening input low limit alarm setting | None | L_SP |
| 035 | Hysteresis setting | None | HS |
| 036 | Opening input high limit alarm output | H | H |
| 037 | Opening input low limit alarm output | L | L |
| 085 | Site manipulation switch input | S2 | S2 |
| 086 | Auto/Manual switching | S1 | S1 |
| 099 | Label | OP_MK | OP_MK |

Note Note that this function block cannot be sent by the 1-Block Send Terminal to Computer block (Block Model 403).

14 Sequential Control block
<301> Step Ladder Program 400 to 499

| Block Model | Block Name | Block Address |
|-------------|---------------------|---------------|
| <301> | Step Ladder Program | 400 to 499 |

Outline

This function block is configured in the form of a ladder diagram comprising a logic sequence and step sequence. This function block differs from the Contact Distributor block (Block Model 201) in that not only are contacts connected but also ladder sequence operations can be executed in between.

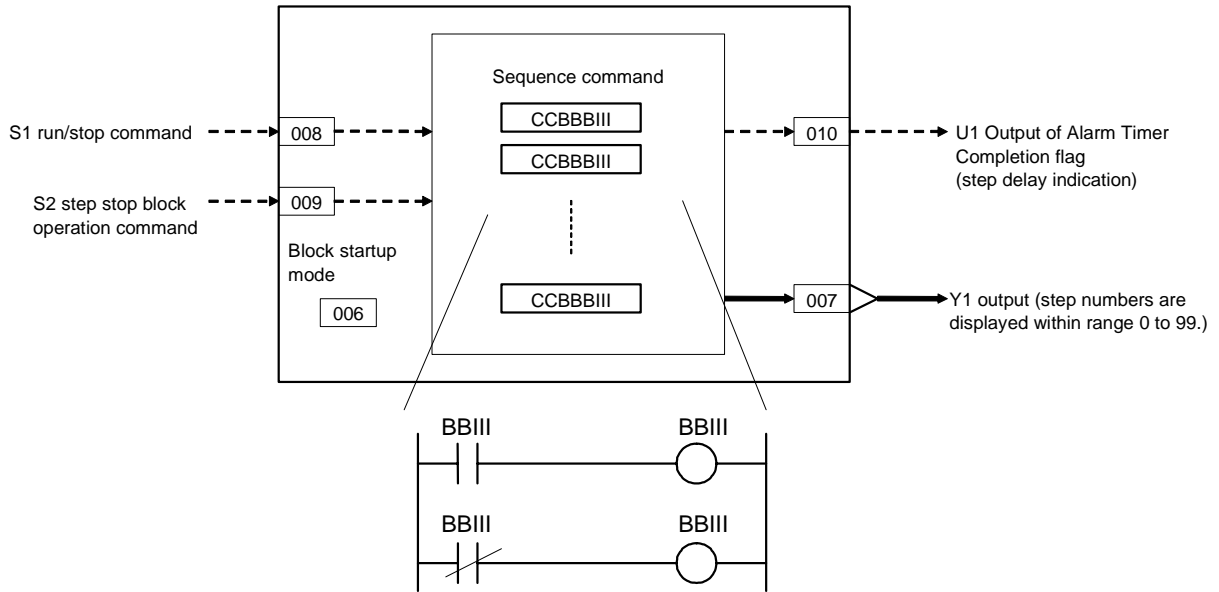
- Each Loop Control Unit has enough program space for holding a total of 4000 commands. This number of commands can be used by breaking them up to 100 independent Step Ladder Program blocks. A logic sequence and step sequence co-exist within each single Step Ladder program block.
- Up to 100 commands can be programmed to a single Step Ladder Program block.
- The logic sequence is executed at each operation cycle. For this reason, this sequence is suited to control of devices that must be monitored at all times. The logic sequence is executed at all times when block startup mode (ITEM006) is set to 0. The sequence is also executed for the duration S1 run/stop command is 1 (ON) when block setup mode is set to 1 or according to the BLOCK SET command in other Step Ladder Program blocks.
- A step sequence is a scheme where only one of a number of programmed STEPs is executed, and STEPs are assigned to processes of devices to be operated successively. Step sequences can be programmed with few commands that are executed at each scan cycle, which facilitates locating and remedying errors during debugging.
- ITEMs that can be specified as the operands of sequence commands are "contact output" or "contact input" ITEMs in the case of input type instructions such as LOAD and "contact input" ITEMs in the case of output type instructions such as OUT. For details, refer to ITEM type or R/W Mode "According to Step Ladder Program" in function block ITEM lists.

| ITEM type | Settable Methods | | | Data Length (bytes) |
|---------------|---------------------------------|---------------------------------|----------------------------------|---------------------|
| | According to CX-Process Monitor | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | — | — | R/W | 1 |

Note 1: Only "contact input" or "contact output" ITEMs can be specified by sequence commands such as LOAD and OUT. Other ITEM types cannot be specified.

Note 2: Also use "contact input" ITEMs in Field Terminal DI Terminal blocks or "contact output" ITEMs in Field Terminal DO Terminal blocks when the Step Ladder Program block is used to input and output external contacts. External contacts cannot be input or output directly from the Step Ladder Program block.

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|----------------|------|--------|---|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: Step Ladder Program | 301 | 301 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| Parameter | 006 | | Block startup mode (0: Start at all times, 1: Start by S1) | 0 to 1 | 0 | - | R/W(S) | - | - | - | 2 |
| Analog output | 007 | Y1 | Output (step No.) | 0 to 99 | 0 | Yes | r | - | - | - | 2 |
| Contact input | 008 | S1 | Run/stop command | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | 1 |
| | 009 | S2 | Cancel "go to next step" switch | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | 1 |
| Contact output | 010 | U1 | Output of Alarm Timer Completion flag | 0, 1 | 0 | Yes | - | - | - | R | 1 |

Sequence commands

(Maximum number of ITEMS is 100. Data conventions differ from other function blocks.)

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | Data Length (bytes) |
|-----------|------|--------|---|------------|---------|---------------------------|--|--|------------------------------|------------------------------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled | Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | According to CX-Process Tool | According to CX-Process Monitor *1 | |
| Command | 011 | | CC: Command, BBB: Block No., III: ITEM No. Note: Reading/writing by FINS commands is not possible. | CCBBBIII | | - | R/W(S) | - | - | - | 4 |
| | to | to | | to | | - | | | | | |
| | 110 | | CC: Command, BBB: Block No., III: ITEM No. Note: Reading/writing by FINS commands is not possible. | CCBBBIII | | - | R/W(S) | - | - | - | 4 |

Disabling conversion between ladder diagrams and mnemonic programs

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | Data Length (bytes) |
|-----------|------|--------|---|------------|---------|---------------------------|--|--|------------------------------|------------------------------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled | Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | According to CX-Process Tool | According to CX-Process Monitor *1 | |
| Parameter | 200 | | Mnemonic flag *1 0: Conversion to ladder diagrams (reverse assembly) and from ladder diagrams (assembly) enabled. 1: Conversion to and from ladder diagrams disabled. | 0, 1 | 0 | - | R/W (S) | - | - | - | 1 |

*1: Set ITEM200 to 1 when inputting step ladder programs in mnemonic from the CX-Process Tool to prevent conversion of programs between ladder diagrams and mnemonic programs.
 Note: Sequence commands (ITEM 011 to ITEM 110) cannot be read and written with FINS commands addressed to the Loop Control Unit (command codes: 0240, 0241, 0242, and 0243).

List of basic commands

| Name | Mnemonic | Command | Ladder Symbol | Description (command format, CC: command, BBB: block address, III: ITEM number) |
|-------------------------|----------|----------|---------------|--|
| | | CCBBBIII | | |
| Input condition | | | | |
| LOAD | LOAD | 01BBBIII | | Indicates a logical start of the logic block, creates an ON/OFF execution condition based on the ON/OFF status of the contact, and connects to the next stage. |
| LOAD NOT | LN | 02BBBIII | | Indicates a logical start of the logic block, creates an ON/OFF execution condition based on the reverse of the ON/OFF status of the contact, and connects to the next stage. |
| AND | AD | 03BBBIII | | Takes a logical AND of the status of the contact and the current execution condition. |
| AND NOT | AN | 04BBBIII | | Reverses the status of the contact and takes a logical AND with the current execution condition. |
| OR | OR | 05BBBIII | | Takes a logical OR of the status of the contact and the current execution condition. |
| OR NOT | RN | 06BBBIII | | Reverses the status of the contact and takes a logical OR with the the current execution condition. |
| AND LOAD | AL | 07000000 | | Takes a logical AND between logic blocks. |
| OR LOAD | OL | 08000000 | | Takes a logical OR between logic blocks. |
| Output operation | | | | |
| OUT | OT | 11BBBIII | | Outputs the result (execution condition) of logical processing: 0 (OFF) at condition 0 (OFF), and 1 (ON) at condition 1 (ON). |
| OUT NOT | ON | 12BBBIII | | Outputs the result (execution condition) of logical processing: 1 (ON) at condition 0 (OFF), and 0 (OFF) at condition 1 (ON). |
| SET | ST | 13BBBIII | | SET turns the operand bit 1 (ON) when the execution condition is 1 (ON), and does not affect the status of the operand bit when the execution condition is 0 (OFF). Use RESET to turn OFF a bit that has been turned ON with SET. |
| RESET | RS | 14BBBIII | | RESET turns the operand bit 0 (OFF) when the execution condition is 1 (ON), and does not affect the status of the operand bit when the execution condition is 0 (OFF). Use SET to turn OFF a bit that has been turned ON with RESET. |

14 Sequential Control block

<301> Step Ladder Program 400 to 499

| Name | Mnemonic | Command | Ladder Symbol | Description (command format, CC: command, BBB: block address, III: ITEM number) |
|--|----------|----------|---------------|---|
| | | CCBBBIII | | |
| Output operation | | | | |
| DIFU | DU | 15BBBIII | | Outputs 1 (ON) for one operation cycle only when the execution condition goes to 1 (ON) from 0 (OFF). |
| DIFD | DD | 16BBBIII | | Outputs 1 (ON) for one operation cycle only when the execution condition goes to 0 (OFF) from 1 (ON). |
| Step Ladder Control Commands (SS: STEP number) | | | | |
| STEP declaration | SP | 21SS | | STEP declares the step number, and has no input conditions (is a direction connection to the bus). Any numbers in the range 00 to 99 are used as the step number, and are placed in ascending order. 1) Logic sequence: The step number is fixed at 00, and is functional at all times. Declaration of step number 00 can be omitted. 2) Step sequence: When the step number is within the range 01 to 99, only one of the steps is functional. When the program is started, step number 01 is functional. |
| BLOCK SET | BS | 22BBBSS | | When the input conditions turn ON, operation of the specified step number of the Step Ladder Program block at the specified block address (400 to 499) is started. Run/stop command S1 of the specified block turns automatically 1 (ON). Operation of currently executing steps in already operating Step Ladder Program block is interrupted, and execution of the program jumps to the specified step. Note: This command cannot be used in the logic sequence (STEP00). |
| BLOCK RESET | BR | 23 BBB | | When the input conditions turn ON, operation of the Step Ladder Program block is stopped at the specified block address (Execution of the self function block continues.) Run/stop command S1 of the specified block automatically turns 0 (OFF). Note: This command cannot be used in the logic sequence (STEP00). |
| JUMP | JP | 25 BBBSS | | When the input conditions turn ON, execution of the program jumps to the specified step number (01 to 99) of the Step Ladder Program block at the specified block address (400 to 499). - To specify a jump to the self step number, set the block address to 000. - When a jump is made to another Step Ladder Program block, run/stop command S1 of the source block automatically turns 0 (OFF), and run/stop command S1 of the destination block turns 1 (ON). |

14 Sequential Control block
<301> Step Ladder Program 400 to 499

| Name | Mnemonic | Command | Ladder Symbol | Description (command format, CC: command, BBB: block address, III: ITEM number) |
|--|----------|----------|----------------|---|
| | | CCBBBIII | | |
| Step Ladder Control Commands (SS: STEP number) | | | | |
| STEP TIMER | TS | 27 NNNN | — STEP TIMER — | This is the timer (setting range: 0 to 9999 sec) for moving between steps. It has no input conditions. (STEP TIMER is placed in the same line as the STEP command.) Operation is started when program execution moves to the line containing STEP command. When the time set by STEP TIMER is reached, the program execution moves to the next step. Note "Move conditions to next step" is performed on a first-come, first-served basis. |
| ALARM TIMER | TA | 28 NNNN | — ALM TIMER — | This is the timer (setting range: 0 to 9999 sec) for monitoring steps. It has no input conditions. (ALARM TIMER is placed in the same line as the STEP command.) Operation is started when program execution moves to the line containing STEP command. When the time set by ALARM TIMER is reached, the Step Timer Completion flag (step congestion indicator) turns 1 (ON). At this time, the step is held at the current values. |
| Others | | | | |
| END | ED | 00 | | Indicates the end of a program. Note: The END command is automatically placed at the end of a program when the Step Ladder Program block is prepared using CX-Process Tool. It is placed after STEP00 when the program comprises STEP00 only, and is placed after the nth STEP where the program ends. |
| NO OPERATION | NP | 30 | | This instruction has no function. (No Processing is for NOP.) |

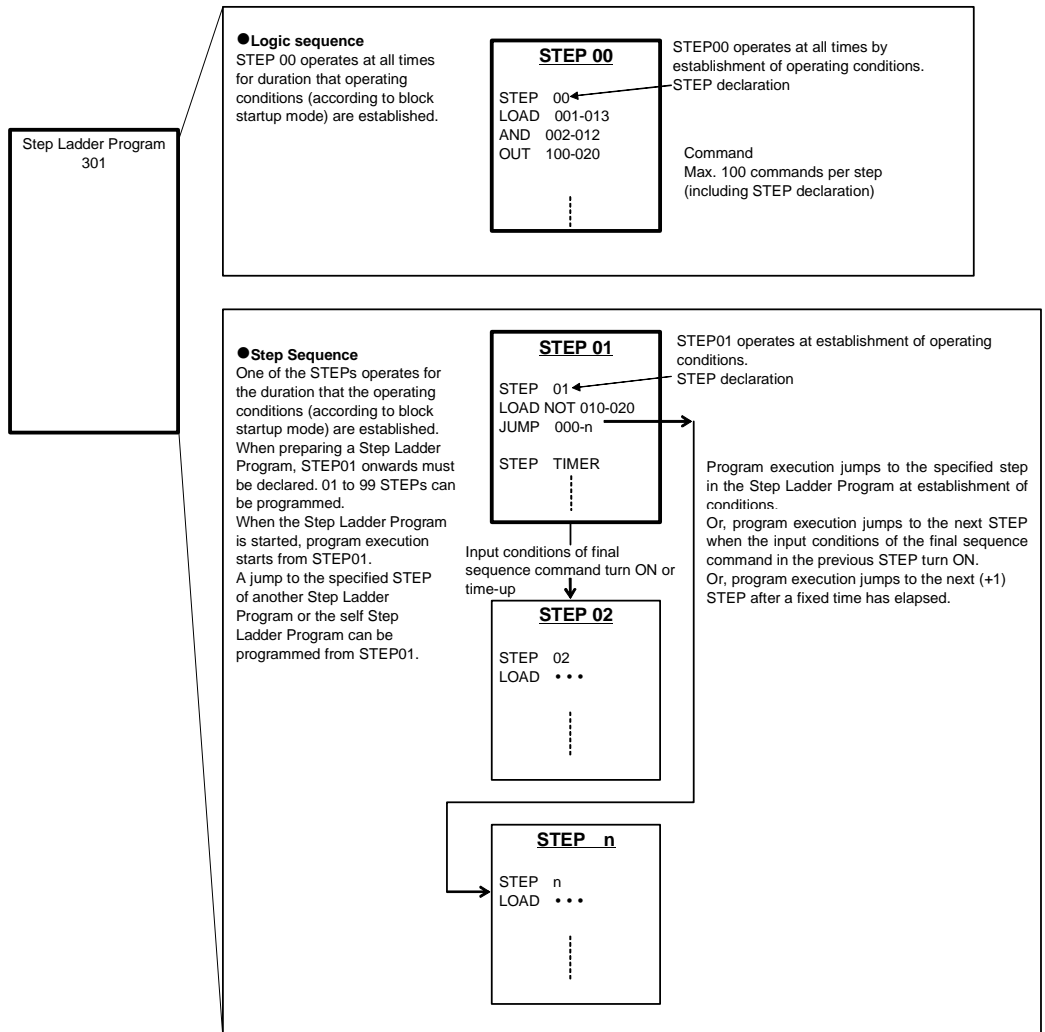
- Note**
- The LOAD command cannot be input by entering "LD".
 - Use the Internal Switch block (Block Model 209) for temporarily holding the results of operations on contacts.

Specifications of Step Ladder Program block

| Item | | Description | |
|---|--------------------------|---|---|
| Total number of command in all Step Ladder Program blocks available on a single Loop Control Unit | | 4000 Note This is the total value when up to 100 Step Ladder Program blocks are used. The actual limit is "number of commands + number of Step Ladder Program blocks =< 4100". For this reason, the actual total number of commands becomes 4000 to 4059 depending on the number of Step Ladder Program blocks used (41 to 100). | |
| Per single Loop Control Unit | Total number of commands | 100 | |
| | Total number of steps | 100 | |
| Creating step ladder programs on the CX-Process Tool software | Ladder diagrams | 22 rows and 10 columns max. | |
| | Mnemonics | No restrictions | |
| Function block operation conditions | | You can select from the following two conditions (set in block startup mode [ITEM006]): <ul style="list-style-type: none"> •Start at all times •Start by S1 run/stop command Note: Program execution can also be started by the BLOCK SET command programmed in other Step Ladder Program blocks. | |
| Types of sequence | STEP00 | Logic sequence | This sequence must be prepared. This sequence is operated at all times when the function block operation conditions are established. |
| | STEP 01 to 99 | Step sequence | This sequence may be omitted. Program execution starts from STEP01 when the function block operation conditions are established. Program execution moves between STEPs by one of the following conditions (when two or more conditions are in contention, the first condition to have occurred takes priority): <ul style="list-style-type: none"> •When the input condition of the final sequence command in the previous STEP is ON •By JUMP command •By STEP TIMER command |
| Usable command types | STEP00 | Logic sequence | LOAD, LOAD NOT, AND, AND NOT, OR, OR NOT, AND LOAD, OR LOAD, OUT, OUT NOT, DIFU, DIFD, NOP, END |
| | STEP 01 to 99 | Step sequence | LOAD, LOAD NOT, AND, AND NOT, OR, OR NOT, AND LOAD, OR LOAD, OUT, OUT NOT, DIFU, DIFD STEP, BLOCK SET, BLOCK RESET, JUMP, STEP TIMER, ALARM TIMER, NOP, END |

Configuration of Step Ladder Program block

The Step Ladder Program block comprises a logic sequence (STEP00) and a step sequence (STEP01 onwards).



Mechanism of Step Ladder Programs

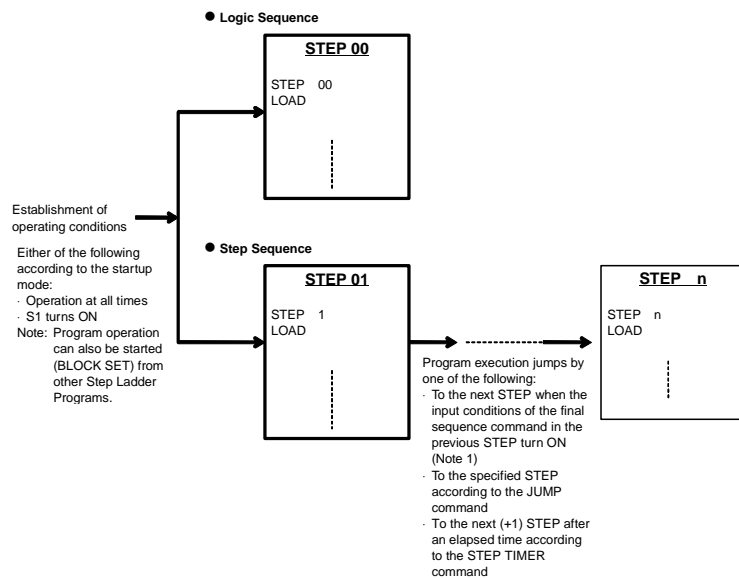
The logic sequence and step sequence can be executed simultaneously.

Note: When the step sequence is not used, create only STEP00 and do not create steps STEP01 onwards.

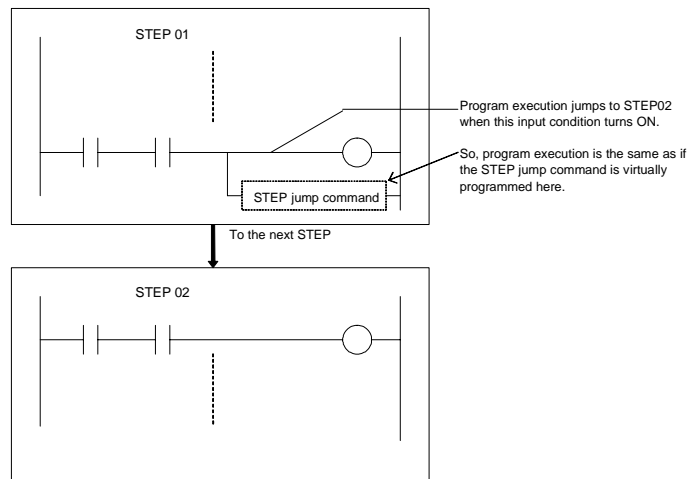
When the logic sequence is not used, create steps STEP01 onwards and do not create STEP00.

- The logic sequence is executed at all times at each operation cycle when the operating conditions of the function block are established.
- Execution of the step sequence normally*1 starts from STEP01 when the operating conditions of the function block are established. Basically, when the input conditions of the final sequence command in that STEP turns ON, program execution jumps to the next (+1) STEP. Program execution can also jump to other STEPS by using the JUMP command or STEP TIMER command. Only one STEP is executed at each operation cycle. For this reason, when program execution jumps to another STEP, the STEP at the jump destination is executed at the next operation cycle.

*1: Program execution can also be started from a STEP other than STEP01 by using the JUMP or BLOCK SET command.



Note 1. Program execution jumps to the next STEP in the following instances

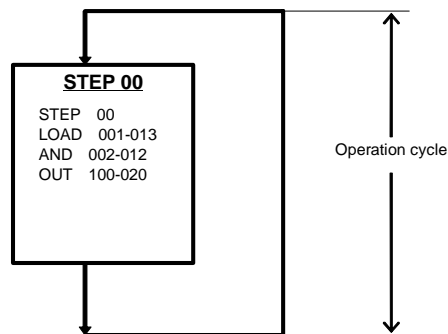


A "contact input" ITEM that has been turned ON by the OUT command before a jump in program execution stays ON even if program execution moves to the next STEP. To clear the state of the "contact input" ITEM, use the OUT NOT or RESET command on the same ITEM.

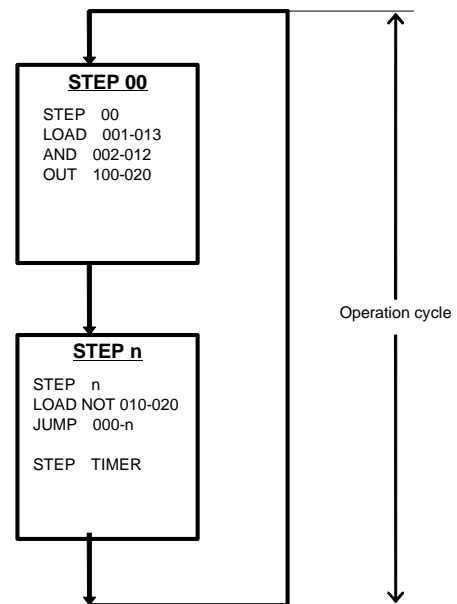
Execution of STEPS at each operation cycle is as follows.

- When the Step Ladder Program comprises only the logic sequence (STEP00 only), STEP00 is executed at each operation cycle (ITEM004). When commands such as LOAD or OUT are executed, the specified ITEM of the specified function block is read and written.
- When the Step Ladder Program comprises both a logic sequence and a step sequence (STEP00 and STEP01 onwards), STEP00 and one of the STEPS (STEPn) are executed at each operation cycle.

• Logic sequence only



• Logic sequence and step sequence



Note: All commands can be input into the program regardless of whether ladder programs or mnemonic programs are being used.

When using ladder diagrams, however, a maximum of 22 rows and 10 columns can be input per circuit. If a circuit containing more than 22 rows or 10 columns is converted from mnemonic to ladder diagram form (reverse assembly), an error will occur. When entering programs in mnemonic form, set the Mnemonic Flag (ITEM 200)^{*1} to 1 (ON) to disable conversion to ladder diagrams. (Supported from version 2.50 of the Loop Control Unit.)

*1: The Mnemonic Flag (ITEM 200) is supported from version 2.50 of the Loop Control Unit. When this flag is set to 1 (ON), conversion is not possible between ladder diagrams and mnemonic programs.

Description of sequence commands

Note: In the following descriptions, error code 80 means "Step Ladder Program command error" and error code 81 means "Step Ladder Program connection terminal not defined."

Basic commands

The following commands can be used in the logic sequence (STEP00) and in the step sequence (STEP01 to STEP99).

LOAD (01), LOAD NOT (02)

Input conditions

Not required

Operand

Block address-ITEM number

Function

Reads the ON/OFF status of the specified "contact output" or "contact input" ITEM when this command is executed.

Supplementary description

•At least one LOAD or LOAD NOT command is required as the input condition for the following commands:

OUT, OUT NOT, SET, RESET, DIFU, DIFD, BLOCK SET, BLOCK RESET, JUMP

•To read changes in contact states (OFF to ON, ON to OFF), temporarily read the state of the contact using this command, and then use the differentiated up (DIFU) or differentiated down (DIFD) command.

•In the following cases, an execution error occurs and the command in question is not executed:

The specified block does not exist (is not registered). (error code: 81)

The specified ITEM does not exist. (error code: 81)

The specified ITEM is neither a "contact input" ITEM nor a "contact output" ITEM. (error code: 81. Note, however, that this is possible only when the command is entered by its mnemonic.)

AND (03), AND NOT (04), OR (05), OR NOT (06)

Input conditions

Required

Operand

Block address-ITEM number

Function

Reads the ON/OFF status of the specified "contact output" or "contact input" ITEM when this command is executed (reverses the state in the case of NOT commands), and takes the logical AND or OR with the previous execution condition.

Supplementary description

- In the following cases, an execution error occurs and the command in question is not executed:
 - The LOAD or LOAD NOT command does not precede this command. (error code: 80, Step Ladder Program command error)
 - The specified block does not exist (is not registered). (error code: 81)
 - The specified ITEM does not exist. (error code: 81)
 - The specified ITEM is neither a "contact input" ITEM nor a "contact output" ITEM. (error code: 81)

AND LOAD (07), OR LOAD (08)

Input conditions

Required

Operand

None (0000-00)

Function

Takes a logical AND or OR between logic blocks.
("Logic block" refers to a logical operation that starts from the LOAD or LOAD NOT command and continues up to before the next LOAD or LOAD NOT command.)

Supplementary description

- When three or more logic blocks are to be connected in series, the logic blocks can also be connected successively in such a way that two logic blocks are connected in series by this command and then the next logic block is connected in series by this command. This command can also be placed after three or more logic blocks so that all logic blocks are connected in series.
- In the following cases, an execution error occurs and the command in question is not executed:
 - Two or more LOAD or LOAD NOT commands do not precede this command. (error code: 80)
 - The total number of AND LOAD or OR LOAD commands is less than the "total number of LOAD or LOAD NOT commands - 1". (error code: 80)

OUT (11), OUT NOT (12)

Input conditions

Required

Operand

Block address-ITEM number

Function

Outputs the result (OUT) or reverses the result (OUT NOT) of logical processing on the specified "contact input" ITEM when the input conditions are ON.

- Note** A contact ITEM that has been turned ON by the OUT command stays ON even if program execution moves to the next STEP. For this reason, to perform step progression control in a step sequence, use the RESET command at the next STEP to turn OFF the contact ITEM that has been turned ON.
- Supplementary description

- This command differs from the SET and RESET commands in that ON is output if the input condition is ON, and OFF is output when the input condition is OFF. (This description applies to the OUT command.) For this reason, changes in states such as Auto/Manual or Remote/Local are used as output to take the result of logical processing. (When indicating manipulation of Auto/Manual switching or Remote/Local switching, use the SET and RESET commands with the DIFU command.)
- When program execution has jumped to a specified STEP by the JUMP command, contact ITEMS that have turned ON by the OUT command do not turn OFF and are held at the ON state.
- In the following cases, an execution error occurs and the command in question is not executed:

The specified block does not exist (is not registered). (error code: 81)

The specified ITEM is not a "contact input" ITEM. (error code: 81)

There are LOAD or LOAD NOT command input conditions. (when connected directly to bus bar) (error code: 80)

SET (13), RESET (14)

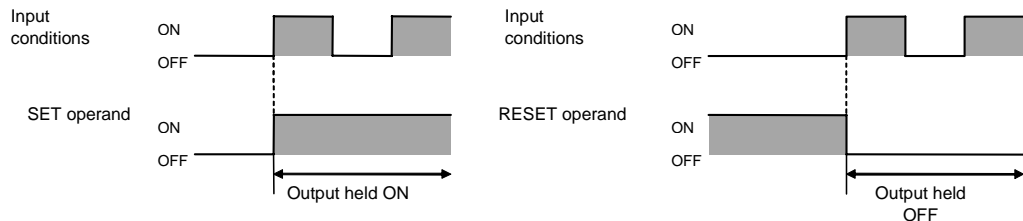
Input conditions

Required

Operand

Block address-ITEM number

Function SET turns the specified "contact input" ITEM ON when the input condition is ON, and RESET turns the ITEM OFF when the input condition is ON. The ON (SET) or OFF (RESET) state of the ITEM is held as it is even if the input condition is OFF. The ON or OFF state of the ITEM is held as long as the RESET command is not executed for the SET command or vice versa.



Supplementary description

- This command is used in combination with the DIFU command when indicating manipulation such as Auto/Manual switching or Remote/Local switching. (Refer to the example in the supplementary description for the DIFU and DIFD commands.)
 - The state of contact ITEMS that are set or reset by these commands is held even if program execution moves to another STEP for as long as the RESET command and SET command are not executed.
 - In the following cases, an execution error occurs and the command in question is not executed:
- The specified block does not exist (is not registered). (error code: 81)
 The specified ITEM is not a "contact input" ITEM. (error code: 81)
 There are no LOAD or LOAD NOT command input conditions. (when connected directly to bus bar) (error code: 80)

DIFU (15), DIFD (16)

Input conditions

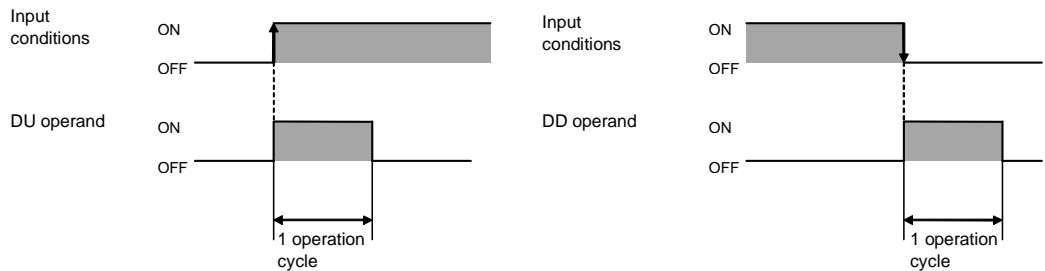
Required

Operand

Block address-ITEM number

Function

DIFU turns the specified "contact input" ITEM ON for one cycle when the input condition goes from OFF to ON, and DIFD turn the ITEM ON for one cycle when the input condition goes from ON to OFF.



Note When an ON signal for one operation cycle that has been generated by this command is to be used as the input at another function block, set the operation cycle of that function block to the same as or longer than the operation cycle of the source Step Ladder Program block where this ON signal is to be generated. If an attempt is made to read at a function block having an operation cycle that is shorter than the Step Ladder Program block where this ON signal is generated, the ON signal may not be read correctly.

Supplementary description

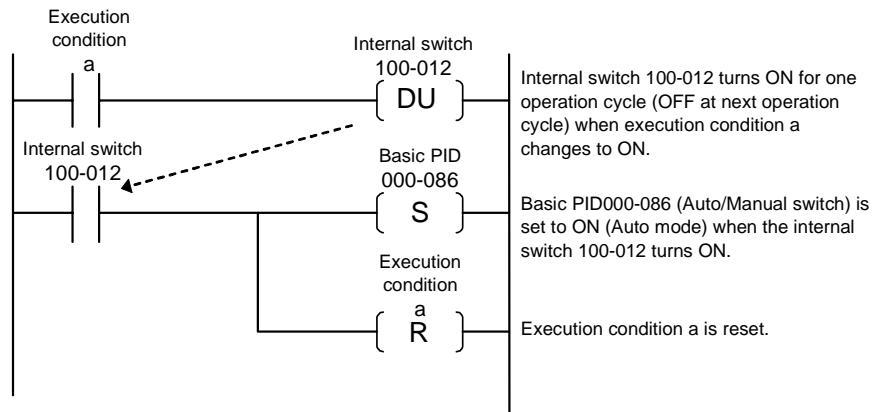
- Note that the ON signal is held by this command at execution of the first command in the Step Ladder Program block and not at execution of this command at the next operation cycle.
- This command is canceled at the moment that program execution jumps to another STEP. When this command is canceled, the specified operand is returned to OFF.
- When this command is used in STEP00, it will not be canceled as program execution does not jump to other STEPs in the Step Ladder Program from this STEP, and the number of DIFU or DIFD commands that can be used in other STEPs is reduced by one. (The maximum number of DIFU or DIFD commands that can be executed simultaneously is 256.)
- This command can be used to specify a "contact input" ITEM in the Internal Switch block (Block Model 209) to create a differentiated contact that is ON or OFF for one operation cycle.
- The rising edge of the contact is not detected when a constantly ON contact (ITEM021 of System Common block) is set as the input condition.

14 Sequential Control block

<301> Step Ladder Program 400 to 499

- Use the DIFU or DIFD commands to perform Auto/Manual switching or Remote/Local switching as shown below in PID or other Control blocks.

Example)



- In the following cases, an execution error occurs and the command in question is not executed:

The specified block does not exist (is not registered). (error code: 81)

The specified ITEM is not a "contact input" ITEM. (error code: 81)

There are no LOAD or LOAD NOT command input conditions. (when connected directly to bus bar) (error code: 80)

Step sequence commands

The following commands (see Note) can be used only in the step sequence (STEP01 to STEP99).

Note: BLOCK SET and BLOCK RESET can also be used in the logic sequence (STEP00).

STEP (16)

Input conditions

Not required

Operand

Step number (00 to 99)

Function

Sets finite break points (STEPS) in a step sequence.

When the logic sequence is used, STEP00 is automatically assigned as the default STEP. This step has no input conditions.

STEPS in the step sequence are automatically assigned a step number starting from 00.

Program execution jumps to the STEP declared by STEP at the next operation cycle when one of the following conditions is established:

- 1)When the input condition of the final command of the STEP having the immediately previous number is ON
- 2)When program execution has jumped to this STEP by the JUMP command
- 3)When the time count set by the STEP TIMER command in the STEP having the immediately previous number has been reached

The first of the above three conditions that is met is the valid condition.

Supplementary description

Example (Command description using mnemonics)

```
(SP) 2101   Declares STEP01.  
(LOAD) 012000101  Executes LOAD (01) on ITEM010 at block address 200.  
:  
:  
(LOAD) 01200011   Executes LOAD (01) on ITEM011 at block address 200.  
(OUT) 1120012   Executes OUT (11) on ITEM012 at block address 200.  
(SP) 2102   Declares STEP02.  
:  
:
```

In the above example, program execution jumps to STEP02 when ITEM011 at block address 200, that is programmed as the input condition of the final command of the previous STEP, turns ON.

BLOCK SET (22)

Input conditions

Required

Operand

Step Ladder Program block address, step number (00 to 99)

Function

(This function cannot be used in logic sequence STEP00.)
Starts program execution at the specified step number of the specified Step Ladder Program block at the next operation cycle when the input condition is ON. (This command differs from JUMP in that execution of the self STEP onwards is continued.)
When this command is executed, S1 run/stop command of the specified Step Ladder Program block is forcibly turned ON, and S2 step stop switch is forcibly turned OFF. (At the same time, execution of STEP TIMER or ALARM TIMER is canceled if they are currently executing, and the Step Timer Completion flag turns OFF if it is ON when the time set by the ALARM TIMER command is reached.)

Supplementary description

- When the specified Step Ladder Program block is already executing, the currently executing STEP in the program is quit, and program execution jumps to the specified STEP.
- When the block startup mode ITEM of the specified Step Ladder Program block is set to 0 (start at all times), the function block starts up as it is and program execution jumps to the specified step number.
- In the following cases, an execution error occurs and the command in question is not executed:

There are no LOAD or LOAD NOT command input conditions. (when connected directly to bus bar) (error code: 80)

The self block address is specified as the specified function block. (error code: 80)

There is no specified block address. (error code: 81)

The specified block address is not the Step Ladder Program block (Block Model 301). (error code: 81)

BLOCK RESET (23)

Input conditions

Required

Operand

Step Ladder Program block address, step number (00 to 99)

Function

(This function cannot be used in logic sequence STEP00.)

Stops program execution at the specified step number of the specified Step Ladder Program at the next operation cycle when the input condition is ON. When this command is executed, S1 run/stop command of the specified Step Ladder Program block is forcibly turned OFF.

Supplementary description

- This command is invalid when the block startup mode of the specified Step Ladder Program block is set to 0 (start at all times).
- In the following cases, an execution error occurs and the command in question is not executed:
 - There are no LOAD or LOAD NOT command input conditions. (when connected directly to bus bar) (error code: 80)
 - The self block address is specified as the specified function block. (error code: 80)
 - There is no specified block address. (error code: 81)
 - The specified block address is not the Step Ladder Program block (Block Model 301). (error code: 81)

JUMP (25)

Input conditions

Required

Operand

Step Ladder Program block address, step number (00 to 99)

Note: Block address 000 is the self block.

Function

- To jump to another Step Ladder Program block (block address other than 000)
Causes program execution to jump to the specified step number of the specified Step Ladder Program block address at the next operation cycle when the input condition is ON. Commands onwards from the self STEP are not executed, and the self function block (including logic sequence STEP00) is stopped.
When this command is executed, S1 run/stop command of the source Step Ladder Program block automatically turns OFF, and S1 run/stop command of the jump destination Step Ladder Program block automatically turns ON. At the same time, timer execution set by the STEP TIMER or ALARM TIMER commands is continued if it is executing while the specified STEP at the jump destination is being executed. Timer execution set by the STEP TIMER or ALARM TIMER commands is canceled if it is executing at other STEPS and the specified STEP at the jump destination is not being executed. The Alarm Timer Completion flag turns OFF if it is ON when the time set by the ALARM TIMER command is reached.
When the input condition is OFF, nothing happens, and the subsequent commands are executed.
- To jump to a location within the self Step Ladder Program block (block address: 000)
Causes program execution to jump to the specified step number of the self function

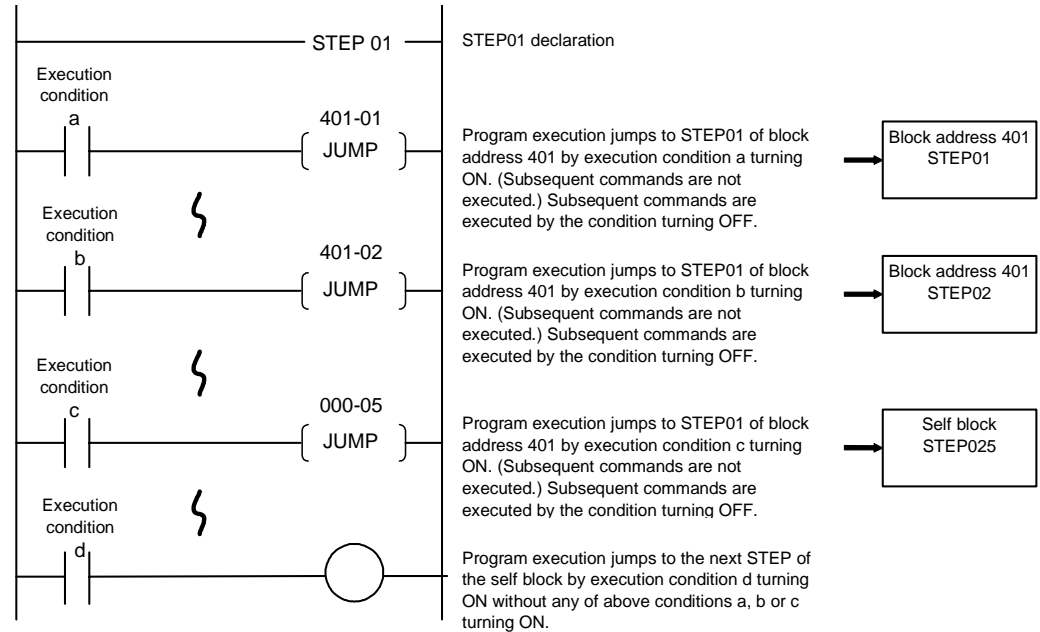
block when the input condition is ON. Commands onwards from the self STEP are not executed. The self function block (including logic sequence STEP00) continues to execute.

When the input condition is OFF, nothing happens, and the subsequent commands are executed.

Supplementary description

- When the specified STEP in the specified Step Ladder Program block is already executing, nothing happens on the specified Step Ladder Program block, and subsequent commands are not executed.

Example



- In the following cases, an execution error occurs and the command in question is not executed:

- There are no LOAD or LOAD NOT command input conditions. (when connected directly to bus bar)
- There is no specified block address. (error code: 81)
- The specified block address is not the Step Ladder Program block (Block Model 301). (error code: 81)
- The specified STEP number does not exist. (error code 81)
- The self step number of the self block is specified. (error code: 81)
- The self step number is specified. (error code: 80)
- The jump destination STEP number is STEP00. (error code: 81)

STEP TIMER (27)

Input conditions

Not required

Operand

Timer setting value (0 to 9999 seconds)

Function

Automatically starts counting by the timer when program execution jumps to the self step. When the value set by this command is reached, execution of the self step is quit, and program execution jumps to the next (+1) STEP at the next operation cycle. This command has no input condition and is described in the same line as the STEP declaration command.

Supplementary description

- This command is canceled at the moment that the self STEP jumps to another location. ("Cancel" here refers to the time count being stopped and cleared.)

Example: (Command description using mnemonics)

(SP) 2102 Declares STEP02.

(TS) 27010 Sets STEP TIMER 10 seconds.

(LOAD) 01200011 Executes LOAD (01) on ITEM011 at block address 200.

(OUT) 1120012 Executes OUT (11) on ITEM012 at block address 200.

(SP) 2102 STEP03 Declares STEP03.

:
:

In the above example, program execution jumps to STEP03 by whichever of the conditions is established the earliest ten seconds after program execution jumps to STEP02 when ITEM011 of block address 200 (input condition of the final command in the previous STEP) turns ON.

- In the following case, an execution error occurs and the command in question is not executed:

The self step number is STEP00. (error code: 80)

ALARM TIMER (28)

Input conditions

Not required

Operand

Timer setting value (0 to 9999 seconds)

Function

Automatically starts counting by the timer when program execution jumps to the self step. When the value set by this command is reached, the output of Alarm Timer Completion flag (ITEM010) is turned ON. This command has no input condition and is described in the same line as the STEP declaration command.

Supplementary description

- This command is canceled at the moment that program execution jumps to another STEP.
- The output of Alarm Timer Completion flag (ITEM010) turns OFF when program execution jumps to another STEP or when program execution is stopped by the BLOCK RESET command at another Step Ladder Program block.

Example (Command description using mnemonics)

(SP) 2102 Declares STEP02.

(TA) 27010 Sets ALARM TIMER 10 seconds.

(LOAD) 01200011 Executes LOAD (01) on ITEM011 at block address 200.

(OUT) 1120012 Executes OUT (11) on ITEM012 at block address 200.

(SP) 2102 STEP03 Declares STEP03.

:
:

Counting by the ALARM TIMER command is canceled and program execution jumps to STEP03 when ITEM011 at block address 200 turns ON. Ten seconds after program execution jumps to STEP02 (and when it has not jumped to another STEP), output of Alarm Timer Completion flag (ITEM010) turns ON.

- In the following case, an execution error occurs and the command in question is not executed:

The self step number is STEP00. (error code: 80)

15 Node Terminal blocks
<401> DO to Computer 501 to 532

| Block Model | Block Name | Block Address |
|-------------|----------------|---------------|
| <401> | DO to Computer | 501 to 532 |

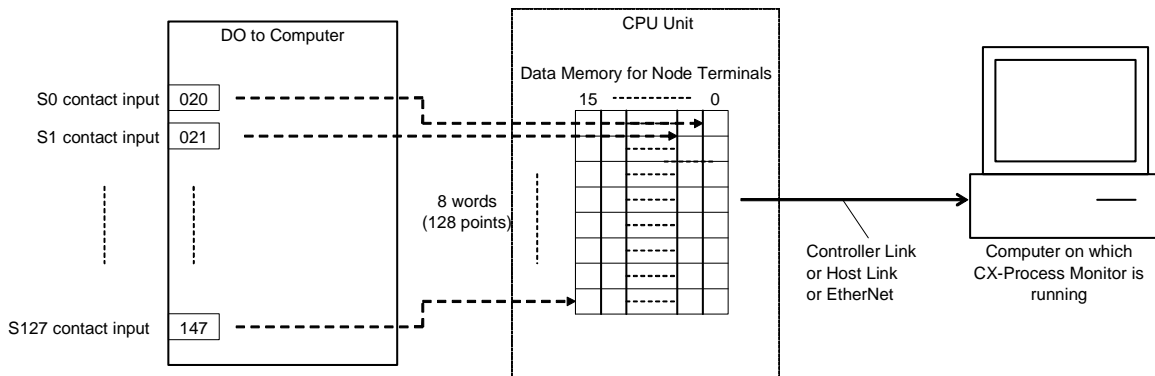
Outline

This function block is the Node Terminal for sending 128 contact signals to the computer.

- To monitor the state of the contacts on CX-Process Monitor, be sure to connect the contact signals (including parameters) to this function block, and set the monitor tags on CX-Process Tool.
- Up to three Loop Control Units can be mounted on a single PLC. The block address of the PLC is shared by these three Loop Control Units. So, set the block addresses for each of the Loop Control Units to unique values.
- All ITEMS (contact input and output signals, and contact parameters) for contact signals whose data is either 0 or 1 in all function blocks can be designated as the source.
- There are two ways of designating the contacts as the source:
 - Batch designation of multiple contacts
 - Individual designation: Contacts are designated by the Step Ladder Program block (Block Model 301) or Contact Distributor block (Block Model 201).

Note To send to CX-Process Monitor contact ITEMS other than ITEMS (tag ITEMS) that can be sent by the 1-Block Send Terminal to Computer block (Block Model 403) or 4-block Send Terminal to Computer block (Block Model 404), specify the relevant ITEMS as the source using the DO to Computer block.

Block diagram



ITEM list

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|------------------|-----------|-----------|--|--|--------------------|---|--------|--|---|---------------------------|
| | | | | | | Accord ing to CX-Pro cess Tool | | Accord ing to ITEM Setting block | Accord ing to Step Ladder Progra m | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: DO to Computer | 401 | 401 | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | R/W(S) | - | - | - | 2 |
| | 011 | DX1 | Terminal1 | BBBBIII: Source designation block address and leading ITEM number PPP: 001 to 032: number of input points JJJ: 020 to 147: leading ITEM number of self block | BBBBIII-PPPJ JJ | 000000 000000 | R/W(S) | - | - | 8 |
| | 012 | DX2 | Terminal2 | | BBBBIII-PPPJ JJ | 000000 000000 | R/W(S) | - | - | 8 |
| | to | | | | | | | | | |
| 018 | DX8 | Terminal8 | BBBBIII-PPPJ JJ | | 000000 000000 | R/W(S) | - | - | 8 | |
| Contact input | 020 | S0 | Contact input | 0, 1 | 0 | - | - | - | R/W | 1 |
| | to 147 | S127 | Contact input | 0, 1 | 0 | - | - | - | R/W | 1 |

15 Node Terminal blocks
<402> AO to Computer 501 to 532

| Block Model | Block Name | Block Address |
|-------------|----------------|---------------|
| <402> | AO to Computer | 501 to 532 |

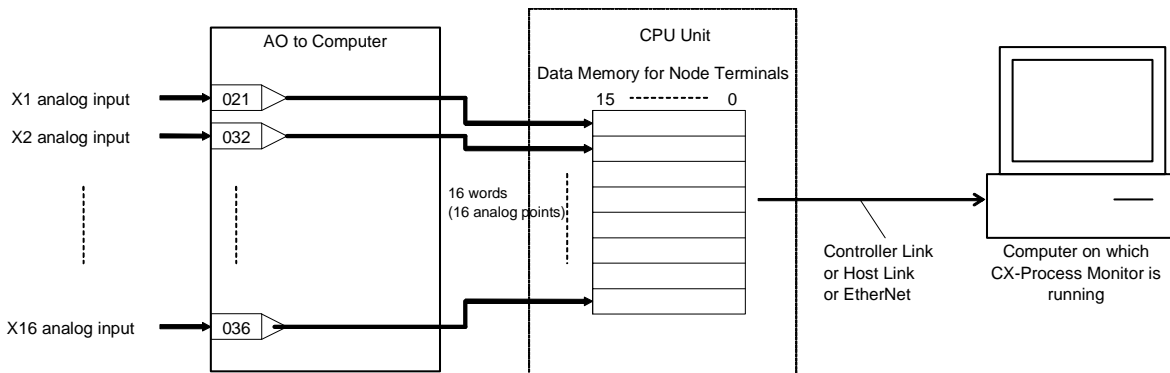
Outline

This function block is the Node Terminal for sending 16 analog points to the computer.

- To monitor the state of the contacts on CX-Process Monitor, be sure to connect the contact signals (including parameters) to this function block, and set the monitor tags on CX-Process Tool.
- Up to three Loop Control Units can be mounted on a single PLC. The block address of the PLC is shared by these three Loop Control Units. So, set the block addresses for each of the Loop Control Units to unique values.
- All ITEMS (contact input and output signals, and contact parameters) for contact signals whose data is either 0 or 1 in all function blocks can be designated as the source.

Note To send to CX-Process Monitor contact ITEMS other than ITEMS (tag ITEMS) that can be sent by 1-Block Send Terminal to Computer block (Block Model 403) or 4-block Send Terminal to Computer block (Block Model 404), specify the relevant ITEMS as the source using the AO to Computer block.

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Sym bol | Data Description | Data Range | Default | COLD start initializ ation | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|---|-----------|------------|---|------------------|---------------|-------------------------------------|---|---|--|---|---------------------------|
| | | | | | | | Accordi ng to CX-Pro cess Tool | Accordi ng to CX-Pro cess Monitor *1 | Accordi ng to ITEM Setting block | Accordi ng to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: AO to Computer | 402 | 402 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| Analog input connection information | 021 | | X1 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| | to 036 | | X16 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| Analog input | 041 | X1 | Analog input | ±320.00% | 0.00 | Yes | r | R | - | - | 2 |
| | to 056 | X16 | Analog output | ±320.00% | 0.00 | Yes | r | R | - | - | 2 |

15 Node Terminal blocks

<403> 1-Block Send Terminal to Computer 501 to 532

| Block Model | Block Name | Block Address |
|-------------|-----------------------------------|---------------|
| <403> | 1-Block Send Terminal to Computer | 501 to 532 |

Outline

This function block is the Node Terminal for specifying the block address of the Control block to be sent to the computer.

- To monitor the state of one of the following Control blocks on CX-Process Monitor and to change the Set Point or other settings on the Control block at the same time, be sure to connect the Control block as the source of this function block, and set the monitor tags for the function block and each ITEM using CX-Process Tool.

- The following Control blocks can be specified for monitoring:

- 001: 2-position ON/OFF
- 002: 3-position ON/OFF
- 011: Basic PID
- 012: Advanced PID
- 013: Blended PID
- 014: Batch Flowrate Capture
- 031: Indication and Setting
- 032: Indication and Operation
- 033: Ratio Setting
- 034: Indicator

Note1

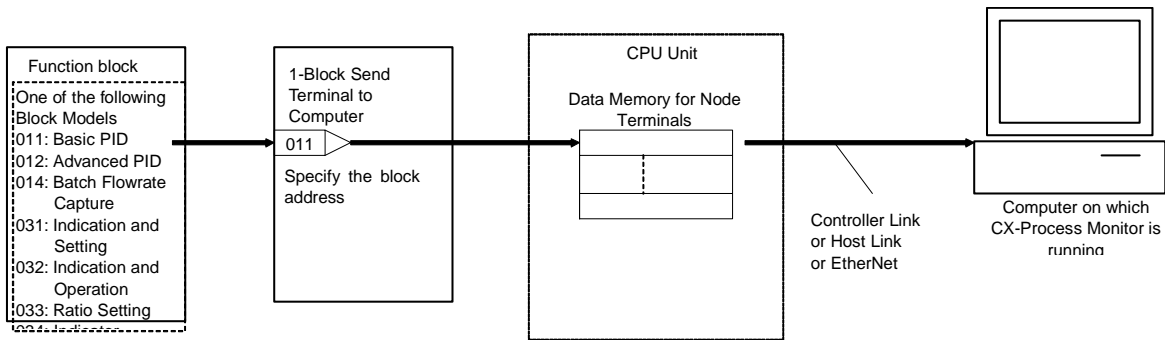
- The High/Low Alarm block (Block Model 111), Timer block (Block Model 205) and Counter block (Block Model 208) function blocks cannot be specified by this function block. To specify these function blocks, use the 4-Block Send Terminal to Computer block (Block Model 404).
- To register the above Control blocks in the Tuning screen, be sure to use the 1-Block Send Terminal to Computer block (Block Model 403). Control blocks that are specified by the 4-Block Send Terminal to Computer block (Block Model 404) cannot be registered to the Tuning screen on CX-Process Monitor.

Note2

The ITEMS that can be sent to CX-Process Monitor by 1-Block Send Terminal to Computer block (Block Model 403) are determined by the default settings of each function block. (Fixed names called "tag ITEMS" are assigned to each ITEM.) To send ITEMS other than these (parameters having contact or analog values) to CX-Process Monitor, specify the relevant ITEM as the source in the AO to Terminal block (Block Model 402) or DO to Terminal block (Block Model 401).

- Up to three Loop Control Units can be mounted on a single PLC. However, only 32 block addresses (501 to 532) can be used on a single PLC. So, set the block addresses for each of the Loop Control Units to unique values.

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|-----------------------------|------|--------|---|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: 1-Block Send Terminal to Computer | 403 | 403 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| Block address specification | 011 | | Source designated Control block address | 001 to 032 | 001 | - | R/W(S) | - | - | - | 2 |

Note To send data of the Basic PID block (Block Model 011) or the Advanced PID block (Block Model 012) to CX-Process Monitor by the 1-Block Send Terminal to Computer (Block Model 403), set the operation cycle of the Send to Computer blocks to the same or longer than that of the Basic PID or Advanced PID blocks. If the operation cycle of Send to Computer blocks is set to a shorter value, the Set Point momentarily becomes 0 when a cold start is performed.

15 Node Terminal blocks

<404> 4-Block Send Terminal to Computer 501 to 532

| Block Model | Block Name | Block Address |
|-------------|-----------------------------------|---------------|
| <404> | 4-Block Send Terminal to Computer | 501 to 532 |

Outline

This function block is for specifying the block address of four Control blocks or some Operation blocks to be sent to the computer.

- To monitor the state of four of the following Control blocks or some Operation blocks on CX-Process Monitor, or to change the Set Point or other settings on the Control block at the same time, be sure to connect the Control block or some Operation blocks as the source of this function block, and set the monitor tags for the function blocks and each ITEM using CX-Process Tool.

- The following Control blocks and Sequential Operation blocks can be specified for monitoring:

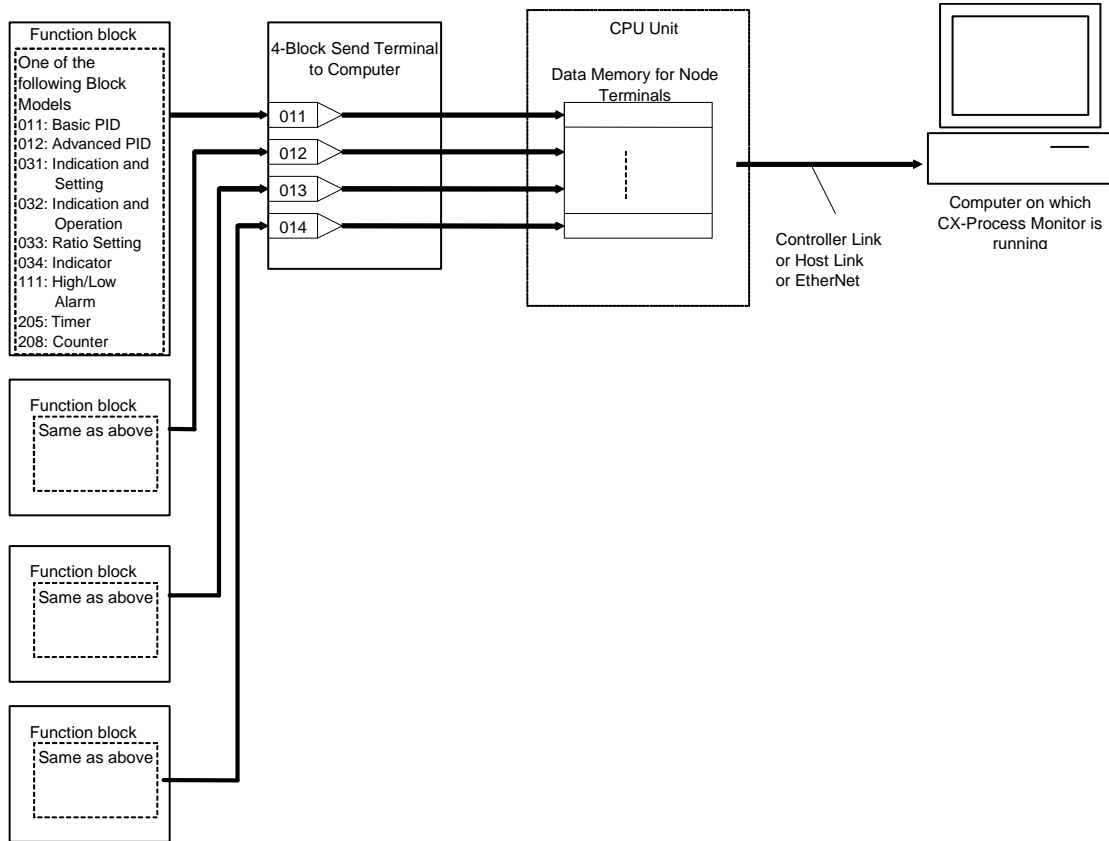
- 001: 2-position ON/OFF
- 002: 3-position ON/OFF
- 011: Basic PID
- 012: Advanced PID
- 031: Indication and Setting
- 032: Indication and Operation
- 033: Ratio Setting
- 034: Indicator
- 111: High/Low Limit
- 157: Segment Program 2
- 205: Timer
- 208: Counter
- 221: ON/OFF Valve Manipulator
- 222: Motor Manipulator
- 223: Reversible Motor Manipulator
- 224: Motor Opening Manipulator

Note1 Control blocks that are designed as the source by the 4-Block Send Terminal to Computer block (Block Model 404) cannot be registered to the Tuning screen on CX-Process Monitor. To register the above Control blocks in the Tuning screen, be sure to use the 1-Block Send Terminal to Computer block (Block Model 403).

Note2 The ITEMS that can be sent to CX-Process Monitor by 4-Block Send Terminal to Computer block (Block Model 404) are determined by the default settings of each function block. (Fixed names called "tag ITEMS" are assigned to each ITEM.) To send ITEMS other than these (parameters having contact or analog values) to CX-Process Monitor, specify the relevant ITEM as the source in the AO to Terminal block (Block Model 402) or DO to Terminal block (Block Model 401).

- Up to three Loop Control Units can be mounted on a single PLC. However, only 32 block addresses (501 to 532) can be used on a single PLC. So, set the block addresses for each of the Loop Control Units to unique values.

Block diagram



15 Node Terminal blocks

<404> 4-Block Send Terminal to Computer 501 to 532

ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | Data Length (bytes) |
|-----------------------------|--------|--------|--|---------------|------------|---------------------------|------------------------------|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: 4-Block Send Terminal to Computer | 404 | 404 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Error indication 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| Block address specification | 011 | | No.1 source designated Control block address (000: Not registered) | 000 to 999 | 000 | - | R/W(S) | - | - | - | 2 |
| | to 014 | | No.4 source designated Control block address (000: Not registered) | 000 to 999 | 000 | - | R/W(S) | - | - | - | 2 |

Note To send data of the Basic PID block (Block Model 011) or the Advanced PID block (Block Model 012) to CX-Process Monitor by the 4-Block Send Terminal to Computer (Block Model 404), set the operation cycle of the Send to Computer blocks to the same or longer than that of the Basic PID or Advanced PID blocks. If the operation cycle of Send to Computer blocks is set to a shorter value, the Set Point momentarily becomes 0 when a cold start is performed.

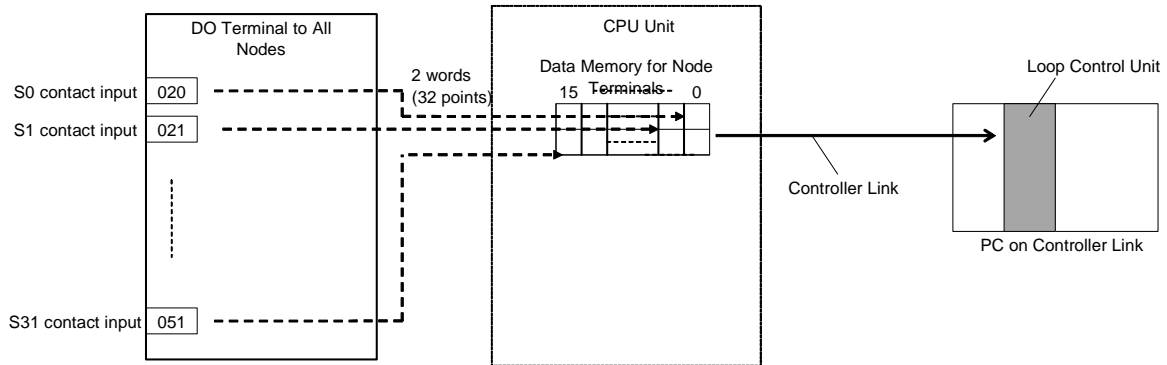
| Block Model | Block Name | Block Address |
|-------------|--------------------------|---------------|
| <407> | DO Terminal to All Nodes | 550 to 599 |

Outline

This function block sends 32 contact signals to other nodes (PLC or computer).

- Up to three Loop Control Units can be mounted on a single PLC. The block address of the PLC is shared by these three Loop Control Units. So, set the block addresses for each of the Loop Control Units to unique values.
- There are two ways of designating the contacts as the source:
 - Batch designation of multiple contacts
 - Individual designation: Contacts are designated by the Step Ladder Program block (Block Model 301) or Contact Distributor block (Block Model 201).

Block diagram



15 Node Terminal blocks

<407> DO Terminal to All Nodes 550 to 599

ITEM list

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | Data Length (bytes) | |
|-----------------------------|------|--------|---|--|-------------------|---|--|---|---------------------------|---|
| | | | | | | Accord ing to CX-Pro cess Tool | Accord ing to ITEM Setting block | Accord ing to Step Ladder Progra m | | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | 1 | |
| Parameter | 001 | | Comment | 23 characters | Block name | R/W(S) | - | - | 24 | |
| | 002 | | Block Model: DO Terminal to all nodes | 407 | 407 | R/W(S) | - | - | 2 | |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | r | - | - | 2 | |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | R/W(S) | - | - | 2 | |
| Block address specification | 011 | DX1 | Terminal 1 | BBBIII: Source designation block | BBBIII-PPP JJJ | 000000 000000 | R/W(S) | - | 8 | |
| | 012 | DX2 | Terminal 2 | address and leading ITEM number PPP: 001 to 032: number of input points JJJ: 020 to 147: leading ITEM number of self block | BBBIII-PPP JJJ | 000000 000000 | R/W(S) | - | 8 | |
| Contact input | 020 | S0 | Contact input | 0, 1 | 0 | - | R | - | R/W | 1 |
| | 051 | S31 | Contact input | 0, 1 | 0 | - | R | - | R/W | 1 |

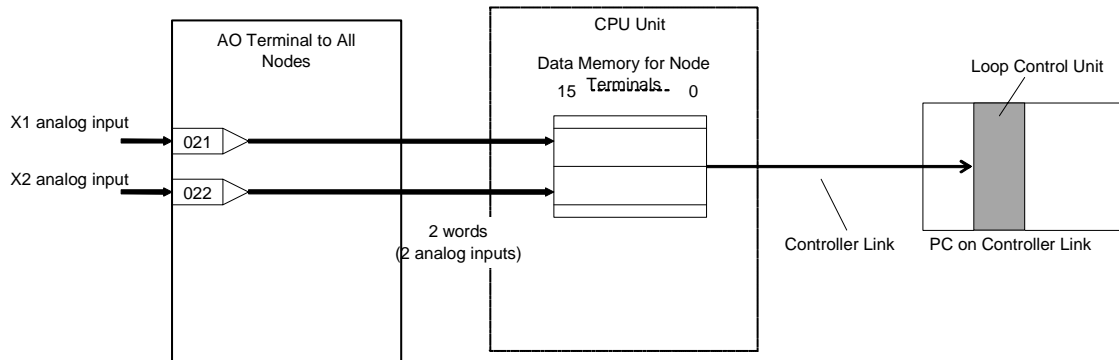
| Block Model | Block Name | Block Address |
|-------------|--------------------------|---------------|
| <408> | AO Terminal to All Nodes | 550 to 599 |

Outline

This function block sends two contact signals to other nodes (PLC or computer).

- Up to three Loop Control Units can be mounted on a single PLC. The block address of the PLC is shared by these three Loop Control Units. So, set the block addresses for each of the Loop Control Units to unique values.

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | Data Length (bytes) |
|-------------------------------------|------|--------|---|---------------|------------|---------------------------|--|-------|------------------------------|------------------------------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled | Note: | According to CX-Process Tool | According to CX-Process Monitor *1 | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: AO Terminal fro All Nodes | 408 | 408 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| Analog input connection information | 021 | | X1 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| | 022 | | X2 source designation (BBB: Block address, III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| Analog input | 031 | X1 | Analog input | ±320.00% | 0.00 | Yes | r | R | - | - | 2 |
| | 032 | X2 | Analog input | ±320.00% | 0.00 | Yes | r | R | - | - | 2 |

15 Node Terminal blocks

<409> DO Terminal Settings from Computer 550 to 599

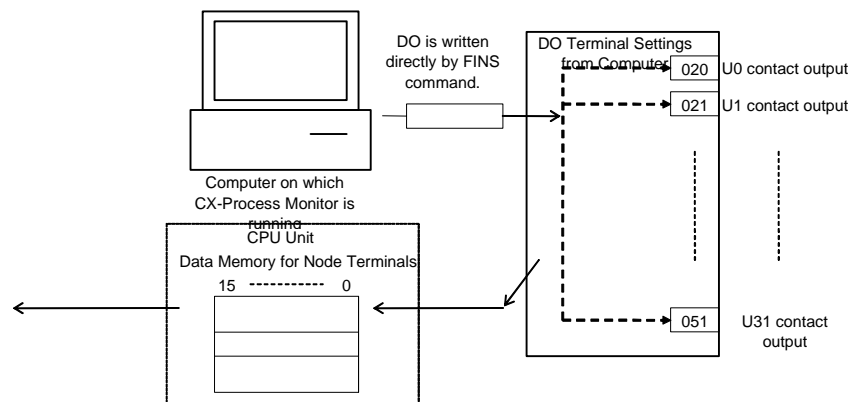
| Block Model | Block Name | Block Address |
|-------------|------------------------------------|---------------|
| <409> | DO Terminal Settings from Computer | 550 to 599 |

Outline

This function block receives contact signals from the computer by issuing the FINS WRITE ITEM commands (command code 0241 and 0243 Hex) to this function block from the computer.

- Contact signals that are received can also be used for internal Loop Control Unit operations.
- If necessary, FINS commands can be re-issued to other nodes (PLC or computer).
- To write contact signals to contact output ITEMS in this function block from CX-Process Monitor, CX-Process Tool must be used to set the tag numbers to the ITEMS. (Note, however, that re-issue to network must be set to "ON". This enables monitoring for checking the results of writing on CX-Process Monitor.)
- Up to three Loop Control Units can be mounted on a single PLC. The block address of the PLC is shared by these three Loop Control Units. So, set the block addresses for each of the Loop Control Units to unique values.

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Sym bol | Data Description | Data Range | Default | COLD start initializ ation | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|--------------------------------|------|------------|---|------------------|---------------|-------------------------------------|---|---|--|---|---------------------------|
| | | | | | | | Accordi ng to CX-Pro cess Tool | Accordi ng to CX-Pro cess Monitor *1 | Accordi ng to ITEM Setting block | Accordi ng to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: DO Terminal Settings from Computer | 409 | 409 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| Parameter | 007 | | Re-issue to network 0: Not used, 1: Used | 0, 1 | 1 | - | R/W(S) | - | - | - | 1 |
| Contact output Parameter | 020 | U0 | Contact output | 0, 1 | 0 | Yes | R/W(O) | R/W | - | - | 1 |
| | to | | | | | Yes | | | | | |
| | 051 | U31 | Contact output | 0, 1 | 0 | Yes | R/W(O) | R/W | - | - | 1 |

15 Node Terminal blocks

<410> AO Terminal Settings from Computer 550 to 599

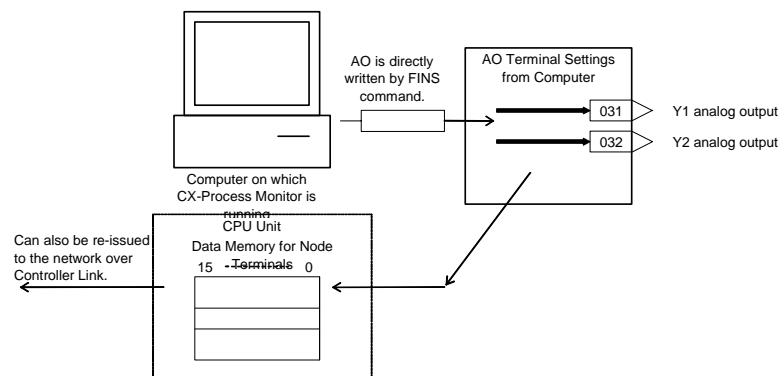
| Block Model | Block Name | Block Address |
|-------------|------------------------------------|---------------|
| <410> | AO Terminal Settings from Computer | 550 to 599 |

Outline

This function block receives analog signals from the computer by issuing the FINS WRITE ITEM commands (command code 0241 and 0243 Hex) to this function block from the computer.

- Analog signals that are received can also be used for internal Loop Control Unit operations.
- If necessary, FINS commands can be re-issued to other nodes (PLC or computer).
- To write contact signals to contact output ITEMS in this function block from CX-Process Monitor, CX-Process Tool must be used to set the tag numbers to the ITEMS. (Note, however, that re-issue to network must be set to "ON". This enables monitoring for checking the results of writing on CX-Process Monitor.)
- Up to three Loop Control Units can be mounted on a single PLC. The block address of the PLC is shared by these three Loop Control Units. So, set the block addresses for each of the Loop Control Units to unique values.

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Sym bol | Data Description | Data Range | Default | COLD start initializ ation | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|------------------|------|------------|---|------------------|---------------|-------------------------------------|---|---|--|---|---------------------------|
| | | | | | | | Accordi ng to CX-Pro cess Tool | Accordi ng to CX-Pro cess Monitor *1 | Accordi ng to ITEM Setting block | Accordi ng to Step Ladder Progra m | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: AO Terminal Settings from Computer | 410 | 410 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| Parameter | 007 | | Re-issue to network 0: Not used, 1: Used | 0, 1 | 1 | - | R/W(S) | - | - | - | 1 |
| Analog output | 031 | Y1 | Analog output | ±320.00% | 0.00 | Yes | R/W(O) | R/W | - | - | 2 |
| | 032 | Y2 | Analog output | ±320.00% | 0.00 | Yes | R/W(O) | R/W | - | - | 2 |

15 Node Terminal blocks

<414> DI Terminal from All Nodes 600 to 699

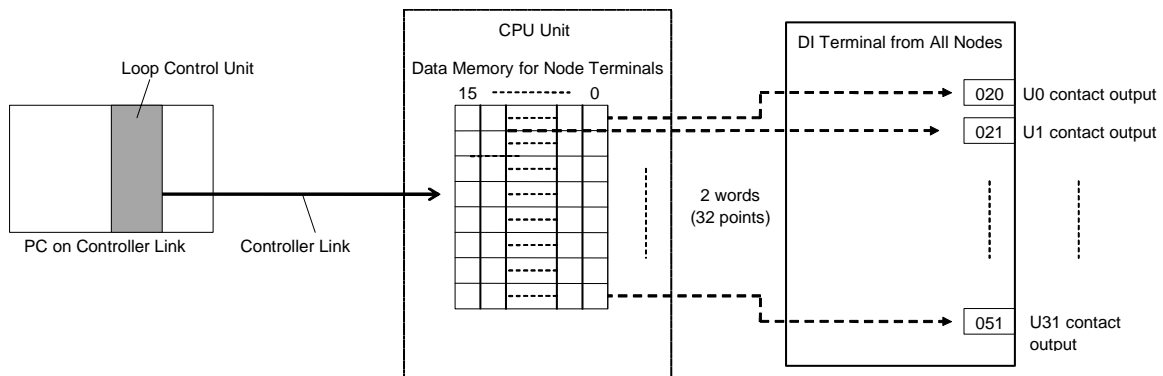
| Block Model | Block Name | Block Address |
|-------------|----------------------------|---------------|
| <414> | DI Terminal from All Nodes | 600 to 699 |

Outline

This function block receives data sent by the DO Terminal to All Nodes block (Block Model 407) on another Loop Control Unit. 32 contact signals sent from other nodes are received.

- Specify the contacts to be input by the source node address and source block address.

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Sym bol | Data Description | Data Range | Default | COLD start initializ ation | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|---------------|-----------|------------|---|------------------|---------------|-------------------------------------|---|---|--|---|---------------------------|
| | | | | | | | Accordi ng to CX-Pro cess Tool | Accordi ng to CX-Pro cess Monitor *1 | Accordi ng to ITEM Setting block | Accordi ng to Step Ladder Progra m | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: DI Terminal from All Nodes | 414 | 414 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| Parameter | 007 | | Source node address 0: Self node (see Note) | 0 to 32 | 1 | - | R/W(S) | - | - | - | 2 |
| | 008 | | Source block address | 550 to 599 | 550 | - | R/W(S) | - | - | - | 2 |
| Contact input | 020 | U0 | Contact output (field input) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | to 051 | U31 | Contact output (field input) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |

Note To receive a value sent by the self node by the DO Terminal to All Nodes block (Block Model 407), set the source node address to 0 (self node).

15 Node Terminal blocks

<415> AI Terminal from All Nodes 600 to 699

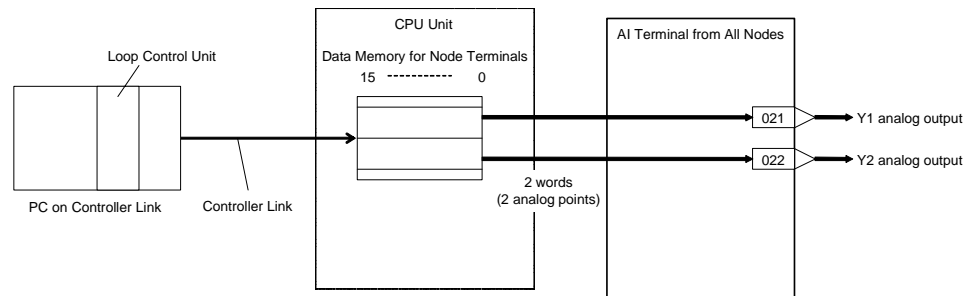
| Block Model | Block Name | Block Address |
|-------------|----------------------------|---------------|
| <415> | AI Terminal from All Nodes | 600 to 699 |

Outline

This function block receives data sent by the AO Terminals to All Nodes block (Block Model 408) on another Loop Control Unit. 2 contact signals sent from other nodes are received.

- Specify the data to be input by the source node address and source block address.

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | Data Length (bytes) |
|---------------|------|--------|--|---------------|------------|---------------------------|--|--|------------------------------|------------------------------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled | Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | According to CX-Process Tool | According to CX-Process Monitor *1 | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: Ai Terminal from All Nodes | 415 | 415 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| Parameter | 007 | | Source node address 0: Self node | 0 to 32 | 1 | - | R/W(S) | - | - | - | 2 |
| | 008 | | Source block address | 550 to 599 | 550 | - | R/W(S) | - | - | - | 2 |
| Analog output | 021 | Y1 | Analog output (field input) | ±320.00% | 0.00 | Yes | r/w | - | - | - | 2 |
| | 022 | Y2 | Analog output (field input) | ±320.00% | 0.00 | Yes | r/w | - | - | - | 2 |

Note: To receive a value sent by the self node by the AO Terminal to All Nodes block (Block Model 408), set the source node address to 0 (self node).

| Block Model | Block Name | Block Address |
|-------------|---------------------------|---------------|
| <451> | DI Terminal from CPU Unit | 861 to 876 |

Outline

This function block inputs contact data from CPU Unit I/O memory.

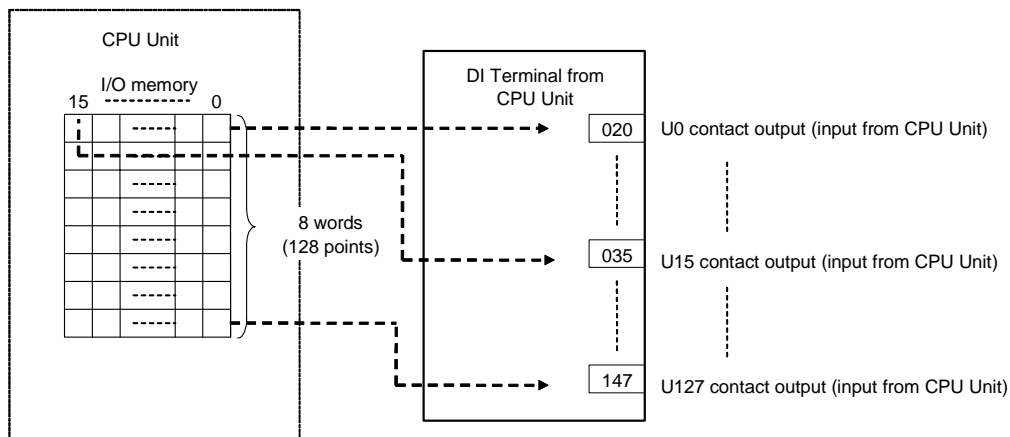
- Types of CPU Unit I/O memory area to which data can be input
 - CIO (channel I/O) Area: Data of any address can be input
 This area is mainly used for input of the following remote I/O data that is not supported on the Field Terminals:

Example)

CompoBus/D Remote I/O, CompoBus/S Remote I/O, SYSBUS Remote I/O

- W: Work Area (W)
- H: Holding Area (H)
- D: Data Memory (D)
- E0: Extended Data Memory (E) bank No. 0 only

Block diagram



16 CPU Unit Terminal Block

<451> DI Terminal from CPU Unit 861 to 876

ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|---------------|------|---|--|-------------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: DI Terminal from CPU Unit | 451 | 451 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| Parameter | 007 | | CPU Unit I/O memory area type 0: CIO (Channel I/O) Area, 1: W (Work Area), 2: H (Holding Area), 3: D (Data Memory), 4: E0 (Extended Data Memory [E] bank No.) | 0 to 4 | 3 | - | R/W(S) | - | - | - | 2 |
| | 008 | | Leading address | 0 to 32767 | 0 | - | R/W(S) | - | - | - | 2 |
| | 009 | | Number of words (number of input contacts = number of words x 16 points) | 1 to 8 (words) | 8 | - | R/W(S) | - | - | - | 1 |
| Contact input | 020 | U0 | Contact output (input from CPU Unit, 1 word bit 00) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | to | | to | | | Yes | | | | | |
| | 035 | U15 | Contact output (input from CPU Unit, 1 word bit 15) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | 036 | U16 | Contact output (input from CPU Unit, 2 words bit 00) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | to | | to | | | Yes | | | | | |
| | 051 | U31 | Contact output (input from CPU Unit, 2 words bit 15) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | 052 | U32 | Contact output (input from CPU Unit, 3 words bit 00) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | to | | to | | | Yes | | | | | |
| | 067 | U47 | Contact output (input from CPU Unit, 3 words bit 15) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | 068 | U48 | Contact output (input from CPU Unit, 4 words bit 00) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | to | | to | | | Yes | | | | | |
| Contact input | 083 | U63 | Contact output (input from CPU Unit, 4 words bit 15) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | 084 | U64 | Contact output (input from CPU Unit, 5 words bit 00) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | to | | to | | | Yes | | | | | |
| | 099 | U79 | Contact output (input from CPU Unit, 5 words bit 15) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | 100 | U80 | Contact output (input from CPU Unit, 6 words bit 00) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | to | | to | | | Yes | | | | | |
| | 115 | U95 | Contact output (input from CPU Unit, 6 words bit 15) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| Contact input | 116 | U96 | Contact output (input from CPU Unit, 7 words bit 00) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | to | | to | | | Yes | | | | | |
| | 131 | U111 | Contact output (input from CPU Unit, 7 words bit 15) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | 132 | U112 | Contact output (input from CPU Unit, 8 words bit 00) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| to | | to | | | Yes | | | | | | |
| 147 | U127 | Contact output (input from CPU Unit, 8 words bit 15) | 0, 1 | 0 | Yes | - | - | - | R | 1 | |

| Block Model | Block Name | Block Address |
|-------------|-------------------------|---------------|
| <452> | DO Terminal to CPU Unit | 861 to 876 |

Outline

This function block outputs contact signals to CPU Unit I/O memory.

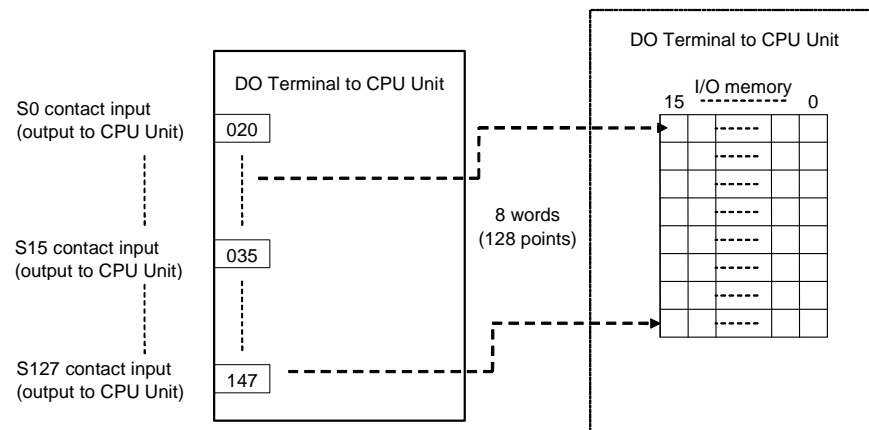
- Types of CPU Unit I/O memory area to which data can be output
 - CIO (channel I/O) Area: Data of any address can be output
 This area is mainly used for output of the following remote I/O data that is not supported on the Field Terminals:

Example)

CompoBus/D Remote I/O, CompoBus/S Remote I/O, SYSBUS Remote I/O

- W: Work Area (W)
- H: Holding Area (H)
- D: Data Memory (D)
- E0: Extended Data Memory (E) (bank No. 0 only)

Block diagram



16 CPU Unit Terminal Block

<452> DO Terminal to CPU Unit 861 to 876

ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|---------------|------|---|--|-------------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: DO Terminal to CPU Unit | 452 | 452 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| | 007 | | CPU Unit I/O memory area type 0: CIO (Channel I/O) Area, 1: W (Work Area), 2: H (Holding Area), 3: D (Data Memory), 4: E0 (Extended Data Memory [E] bank No.) | 0 to 4 | 3 | - | R/W(S) | - | - | - | 2 |
| | 008 | | Leading address | 0 to 32767 | 32767 | - | R/W(S) | - | - | - | 2 |
| | 009 | | Number of words (number of input contacts = number of words x 16 points) | 1 to 8 (words) | 8 | - | R/W(S) | - | - | - | 1 |
| Contact input | 020 | S0 | Contact input (output to CPU unit, 1 word bit 00) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | | | to | | | | | | | | |
| | 035 | S15 | Contact input (output to CPU unit, 1 word bit 15) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | 036 | S16 | Contact input (output to CPU unit, 2 words bit 00) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | | | to | | | | | | | | |
| | 051 | S31 | Contact input (output to CPU unit, 2 words bit 15) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | 052 | S32 | Contact input (output to CPU unit, 3 words bit 00) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | | | to | | | | | | | | |
| | 067 | S47 | Contact input (output to CPU unit, 3 words bit 15) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | 068 | S48 | Contact input (output to CPU unit, 4 words bit 00) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | | | to | | | | | | | | |
| | 083 | S63 | Contact input (output to CPU unit, 4 words bit 15) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | 084 | S64 | Contact input (output to CPU unit, 5 words bit 00) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | | | to | | | | | | | | |
| | 099 | S79 | Contact input (output to CPU unit, 5 words bit 15) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | 100 | S80 | Contact input (output to CPU unit, 6 words bit 00) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | | to | | | | | | | | | |
| 115 | S95 | Contact input (output to CPU unit, 6 words bit 15) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 | |
| 116 | S96 | Contact input (output to CPU unit, 7 words bit 00) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 | |
| | | to | | | | | | | | | |
| 131 | S111 | Contact input (output to CPU unit, 7 words bit 15) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 | |
| 132 | S112 | Contact input (output to CPU unit, 8 words bit 00) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 | |
| | | to | | | | | | | | | |
| 147 | S127 | Contact input (output to CPU unit, 8 words bit 15) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 | |

| Block Model | Block Name | Block Address |
|-------------|---------------------------|---------------|
| <453> | AI Terminal from CPU Unit | 861 to 876 |

Outline

This function block inputs analog data from CPU Unit I/O memory.

- Types of CPU Unit I/O memory area from which data can be input
 - CIO (channel I/O) Area: Data of any address can be input.
 This area is mainly used for input of the following remote I/O data that is not supported on the Field Terminals:

Example

CompoBus/D Remote I/O, CompoBus/S Remote I/O, SYSBUS Remote I/O

- W: Work Area (W)
- H: Holding Area (H)
- D: Data Memory (D)
- E0: Extended Data Memory (E) (bank No. 0 only)

Analog data for the number of words specified by ITEM009 from the leading word address of the I/O memory specified by ITEM008 are treated as signed binary data (two's complement taken for minus numbers) and converted to signed decimal. The range of the resulting values is converted to 0.00 to 100.00% according to the input range (specified by ITEM010 to ITEM012) to be read to Y1 to Y8. (Actual data can be output within the range -320.00 to +320.00%.)

Example

To read 100.00% when 4000 (decimal) is stored and read 0.00% when 0 (decimal) is stored on word data currently stored by 0000 to 0FA0 Hex (decimal 0 to 4000), set 0%: 0 and 100%: 4000 as the input range.

- Either one range can be set for all points (Y1 to Y8) or a different range can be set for each point (supported from version 2.50 of the Loop Control Unit).

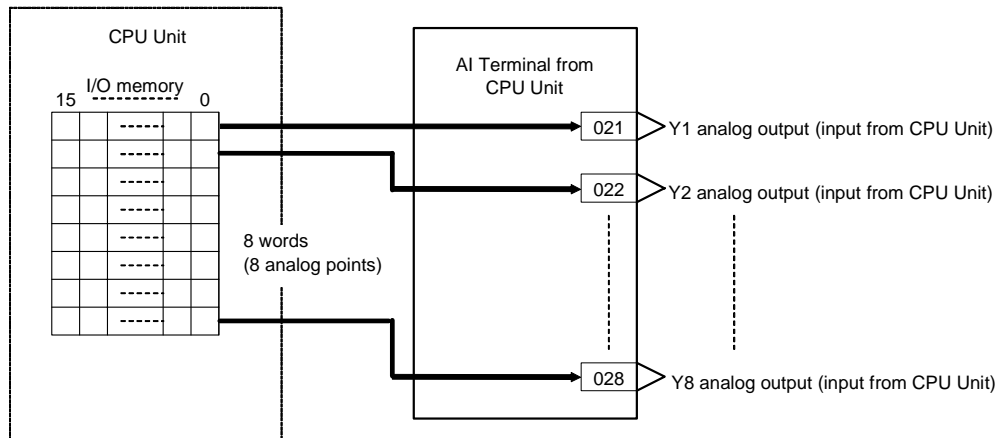
Note1: The "input range" described here does not refer to scaling defined by the user. Set the range of the data currently stored to the word data on the CPU Unit correctly based on the values to be stored to the specified words on the CPU Unit. In the above example, 100.00% is read to Y by 01F4 Hex (decimal 500) when 0%: 0 and 100%: 500 are set as the input range instead of 0%: 0 and 100%: 4000.

Note2: Data that can be read from the CPU Unit is 4-digit Hex 8300 to FFFF and 0000 to 7D00 (decimal -32000 to +32000).

16 CPU Unit Terminal Block

<453> AI Terminal from CPU Unit 861 to 876

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|---------------|------|--------|--|----------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: AI Terminal from CPU Unit | 453 | 453 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| | 007 | | CPU Unit I/O memory area type 0: CIO (Channel I/O) Area, 1: W (Work Area), 2: H (Holding Area), 3: D (Data Memory), 4: E0 (Extended Data Memory [E] bank No.) | 0 to 4 | 3 | - | R/W(S) | - | - | - | 2 |
| | 008 | | Leading address | 0 to 32767 | 0 | - | R/W(S) | - | - | - | 2 |
| | 009 | | Number of words (=number of analog points) | 1 to 8 (words) | 8 | - | R/W(S) | - | - | - | 2 |
| | 010 | | Common or Y1 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM011 and ITEM012) Note: ITEM 013 determines if this parameter is for all ranges or only the Y1 input range. | 0 to 4, 9 | 0 | - | R/W(S) | - | - | - | 1 |
| | 011 | | 0% value for all ranges or Y1 range (Specify which value is to be taken as 0% after signed binary-to-decimal conversion.) | ±32000 | 0 | - | R/W(S) | - | - | - | 2 |
| | 012 | | 100% value for all ranges or Y1 range (Specify which value is to be taken as 100% after signed binary-to-decimal conversion.) | ±32000 | 10000 | - | R/W(S) | - | - | - | 2 |
| | 013* | | Range conversion method 0: Common setting for all ranges, 1: Individual setting for each range | 0, 1 | 0 | - | R/W (S) | - | - | - | 1 |
| Analog output | 021 | Y1 | Analog output (input value from CPU Unit) 1 | ±320.00% | 0.00 | Yes | r/w | - | - | - | 2 |
| | 028 | Y8 | Analog output (input value from CPU Unit) 8 | ±320.00% | 0.00 | Yes | r/w | - | - | - | 2 |

Individual range settings

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | According to | | | | Data Length (bytes) |
|-----------|-------------------|--------|--|------------|---------|---------------------------|---|-----------------|-----------------------|--------------------|---------------------|---------------------|
| | | | | | | | | CX-Process Tool | CX-Process Monitor *1 | ITEM Setting block | Step Ladder Program | |
| Parameter | 040* ¹ | | Y2 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM 041 and 042) | 0 to 4, 9 | 0 | - | R/W(S) | - | - | - | - | 1 |
| | 041* ¹ | | 0% value for Y2 range | ±32000 | 0 | - | R/W(S) | - | - | - | - | 2 |
| | 042* ¹ | | 100% value for Y2 range | ±32000 | 10000 | - | R/W(S) | - | - | - | - | 2 |
| | 043* ¹ | | Y3 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM 044 and 045) | 0 to 4, 9 | 0 | - | R/W(S) | - | - | - | - | 1 |
| | 044* ¹ | | 0% value for Y3 range | ±32000 | 0 | - | R/W(S) | - | - | - | - | 2 |
| | 045* ¹ | | 100% value for Y3 range | ±32000 | 10000 | - | R/W(S) | - | - | - | - | 2 |
| | 046* ¹ | | Y4 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM 047 and 048) | 0 to 4, 9 | 0 | - | R/W(S) | - | - | - | - | 1 |
| | 047* ¹ | | 0% value for Y4 range | ±32000 | 0 | - | R/W(S) | - | - | - | - | 2 |
| | 048* ¹ | | 100% value for Y4 range | ±32000 | 10000 | - | R/W(S) | - | - | - | - | 2 |
| | 049* ¹ | | Y5 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM 050 and 051) | 0 to 4, 9 | 0 | - | R/W(S) | - | - | - | - | 1 |
| | 050* ¹ | | 0% value for Y5 range | ±32000 | 0 | - | R/W(S) | - | - | - | - | 2 |
| | 051* ¹ | | 100% value for Y5 range | ±32000 | 10000 | - | R/W(S) | - | - | - | - | 2 |
| | 052* ¹ | | Y6 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM 053 and 054) | 0 to 4, 9 | 0 | - | R/W(S) | - | - | - | - | 1 |
| | 053* ¹ | | 0% value for Y6 range | ±32000 | 0 | - | R/W(S) | - | - | - | - | 2 |
| | 054* ¹ | | 100% value for Y6 range | ±32000 | 10000 | - | R/W(S) | - | - | - | - | 2 |
| | 055* ¹ | | Y7 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM 056 and 057) | 0 to 4, 9 | 0 | - | R/W(S) | - | - | - | - | 1 |
| | 056* ¹ | | 0% value for Y7 range | ±32000 | 0 | - | R/W(S) | - | - | - | - | 2 |
| | 057* ¹ | | 100% value for Y7 range | ±32000 | 10000 | - | R/W(S) | - | - | - | - | 2 |
| | 058* ¹ | | Y8 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM 059 and 060) | 0 to 4, 9 | 0 | - | R/W(S) | - | - | - | - | 1 |
| | 059* ¹ | | 0% value for Y8 range | ±32000 | 0 | - | R/W(S) | - | - | - | - | 2 |
| | 060* ¹ | | 100% value for Y8 range | ±32000 | 10000 | - | R/W(S) | - | - | - | - | 2 |

*1: Supported from version 2.50 of the Loop Control Unit.

16 CPU Unit Terminal Block

<454> AO Terminal to CPU Unit 861 to 876

| Block Model | Block Name | Block Address |
|-------------|-------------------------|---------------|
| <454> | AO Terminal to CPU Unit | 861 to 876 |

Outline

This function block outputs analog data to CPU Unit I/O memory.

- Types of CPU Unit I/O memory area from which data can be output
 - CIO (channel I/O) Area: Data of any address can be input.
This area is mainly used for input of the following remote I/O data that is not supported on the Field Terminals:

Example

CompoBus/D Remote I/O, CompoBus/S Remote I/O, SYSBUS Remote I/O

- W: Work Area (W)
- H: Holding Area (H)
- D: Data Memory (D)
- E0: Extended Data Memory (E) (bank No. 0 only)

Analog data within the range 0.00 to 100.00% (actual data can be input with the range -320.00 to +320.00%) for X1 to X8 is converted to binary data (two's complement taken for minus numbers) according to the output range (specified by ITEM010 to ITEM012), and the resulting data is written to the number of words specified by ITEM009 from the leading word address of the I/O memory specified by ITEM008.

Example

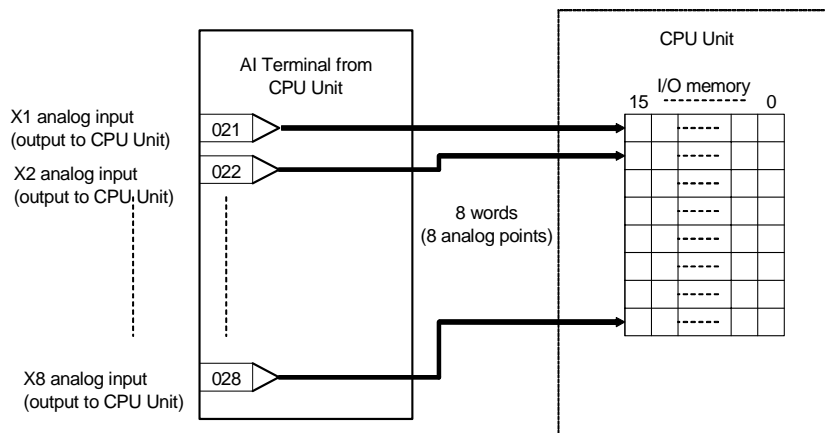
To store 4000 (0FA0 Hex) at 100.00% and 0 (0000 Hex) to the CPU Unit, set 0%: 0 and 100%: 4000 as the output range.

- Either one range can be set for all points (X1 to X8) or a different range can be set for each point (supported from version 2.50 of the Loop Control Unit).

Note1: The "output range" described here does not refer to scaling defined by the user. Set the range of the data currently stored to the word data on the CPU Unit correctly based on the values to be stored to the specified words on the CPU Unit. In the above example, 01F4 Hex (decimal 500) is written to the CPU Unit by 100.00% when 0%: 0 and 100%: 500 are set as the input range instead of 0%: 0 and 100%: 4000.

Note2: Data that can be written to the CPU Unit is 4-digit Hex 8300 to FFFF and 0000 to 7D00.

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|-------------------------------------|------------------|--------|--|----------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: AO Terminal to CPU Unit | 454 | 454 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| | 007 | | CPU Unit I/O memory area type 0: CIO (Channel I/O) Area, 1: W (Work Area), 2: H (Holding Area), 3: D (Data Memory), 4: E0 (Extended Data Memory [E] bank No.) | 0 to 4 | 3 | - | R/W(S) | - | - | - | 2 |
| | 008 | | Leading address | 0 to 32767 | 32767 | - | R/W(S) | - | - | - | 2 |
| | 009 | | Number of words (= number of analog points) | 1 to 8 (words) | 8 | - | R/W(S) | - | - | - | 1 |
| | 010 | | Common or X1 output range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM011 and ITEM012) Note: ITEM 013 determines if this parameter is for all ranges or only the X1 input range. | 0 to 4, 9 | 0 | - | R/W(S) | - | - | - | 1 |
| | 011 | | 0% value for all ranges or X1 range (Specify which value is to be taken as 0% after signed binary conversion.) | ±32000 | 0 | - | R/W(S) | - | - | - | 2 |
| | 012 | | 100% value for all ranges or Y1 range (Specify which value is to be taken as 100% after signed binary conversion.) | ±32000 | 10000 | - | R/W(S) | - | - | - | 2 |
| | 013 ¹ | | Range conversion method 0: Common setting for all ranges, 1: Individual setting for each range | 0, 1 | 0 | - | R/W(S) | - | - | - | 1 |
| Analog input connection information | 021 | | X1 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| | to | | to | | | - | | | | | |
| Analog input | 028 | | X8 source designation BBB: Block address, III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| | 031 | X1 | Analog input (output value to CPU Unit) 1 | ±320.00% | 0.00 | Yes | r | - | - | - | 2 |
| | to | | to | | | Yes | | | | | |
| | 038 | X8 | Analog input (output value to CPU Unit) 8 | ±320.00% | 0.00 | Yes | r | - | - | - | 2 |
| | | | | | | - | | | | | |

16 CPU Unit Terminal Block

<454> AO Terminal to CPU Unit 861 to 876

Individual range settings

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|-----------|------------------|--------|---|------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| | 040 ¹ | | X2 output range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM 041 and 042) | 0 to 4, 9 | 0 | - | R/W(S) | - | - | - | 1 |
| | 041 ¹ | | 0% value for X2 range | ±32000 | 0 | - | R/W(S) | - | - | - | 2 |
| | 042 ¹ | | 100% value for X2 range | ±32000 | 10000 | - | R/W(S) | - | - | - | 2 |
| | 043 ¹ | | X3 output range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM 044 and 045) | 0 to 4, 9 | 0 | - | R/W(S) | - | - | - | 1 |
| | 044 ¹ | | 0% value for X3 range | ±32000 | 0 | - | R/W(S) | - | - | - | 2 |
| | 045 ¹ | | 100% value for X3 range | ±32000 | 10000 | - | R/W(S) | - | - | - | 2 |
| | 046 ¹ | | X4 output range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM 047 and 048) | 0 to 4, 9 | 0 | - | R/W(S) | - | - | - | 1 |
| | 047 ¹ | | 0% value for X4 range | ±32000 | 0 | - | R/W(S) | - | - | - | 2 |
| | 048 ¹ | | 100% value for X4 range | ±32000 | 10000 | - | R/W(S) | - | - | - | 2 |
| | 049 ¹ | | X5 output range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM 050 and 051) | 0 to 4, 9 | 0 | - | R/W(S) | - | - | - | 1 |
| | 050 ¹ | | 0% value for X5 range | ±32000 | 0 | - | R/W(S) | - | - | - | 2 |
| | 051 ¹ | | 100% value for X5 range | ±32000 | 10000 | - | R/W(S) | - | - | - | 2 |
| | 052 ¹ | | X6 output range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM 053 and 054) | 0 to 4, 9 | 0 | - | R/W(S) | - | - | - | 1 |
| | 053 ¹ | | 0% value for X6 range | ±32000 | 0 | - | R/W(S) | - | - | - | 2 |
| | 054 ¹ | | 100% value for X6 range | ±32000 | 10000 | - | R/W(S) | - | - | - | 2 |
| | 055 ¹ | | X7 output range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM 056 and 057) | 0 to 4, 9 | 0 | - | R/W(S) | - | - | - | 1 |
| | 056 ¹ | | 0% value for X7 range | ±32000 | 0 | - | R/W(S) | - | - | - | 2 |
| | 057 ¹ | | 100% value for X7 range | ±32000 | 10000 | - | R/W(S) | - | - | - | 2 |
| | 058 ¹ | | X8 output range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM 059 and 060) | 0 to 4, 9 | 0 | - | R/W(S) | - | - | - | 1 |
| | 059 ¹ | | 0% value for X8 range | ±32000 | 0 | - | R/W(S) | - | - | - | 2 |
| | 060 ¹ | | 100% value for X8 range | ±32000 | 10000 | - | R/W(S) | - | - | - | 2 |

*1: Supported from version 2.50 of the Loop Control Unit.

17 Expanded CPU Unit Terminal blocks
<455> Expanded DI Terminal from CPU Unit 829 to 860

| Block Model | Block Name | Block Address |
|-------------|------------------------------------|---------------|
| <455> | Expanded DI Terminal from CPU Unit | 829 to 860 |

Outline

This function block writes up to 64 contact data on the "contact input" ITEMS of another function block by inputting contact data in CPU Unit I/O Memory, and specifying those ITEMS as the destination.

- This function block differs from the DI Terminal from CPU Unit block (Block Model 451) in that writing can be performed on other function blocks directly from this function block without the need to use the Contact Distributor block (Block Model 201) and Step Ladder Program block (Block Model 301).
- When the previous value of the CPU Unit I/O Memory data is stored at each operation cycle and that data is updated, only the data that has been changed is written to ITEMS in other function blocks.

Note: When a cold start is performed, all of the data that is current at that time is written once unconditionally to ITEMS in other function blocks.

- All data including unchanged data is written constantly (at each operation cycle) to ITEMS in other function blocks for the duration that the S64 constant write switch is set to 1 (ON).
- In function block ITEM lists, contact data can be written to ITEMS defined as writeable (W) by ITEM Setting blocks. Contact data cannot be written to ITEMS defined as non-settable (-).

| ITEM | R/W method | | | Data Length (bytes) |
|------|---------------------------------|---------------------------------|----------------------------------|---------------------|
| | According to CX-Process Monitor | According to ITEM Setting block | According to Step Ladder Program | |
| | W | — | W | 1 |

- Types of CPU Unit I/O memory area to which data can be input.
 - CIO (channel I/O) Area: Data of any address can be input
This area is mainly used for input of touch switch data from the PT (Programmable Terminal) or input of the following remote I/O data that is not supported on the Field Terminals:

Example

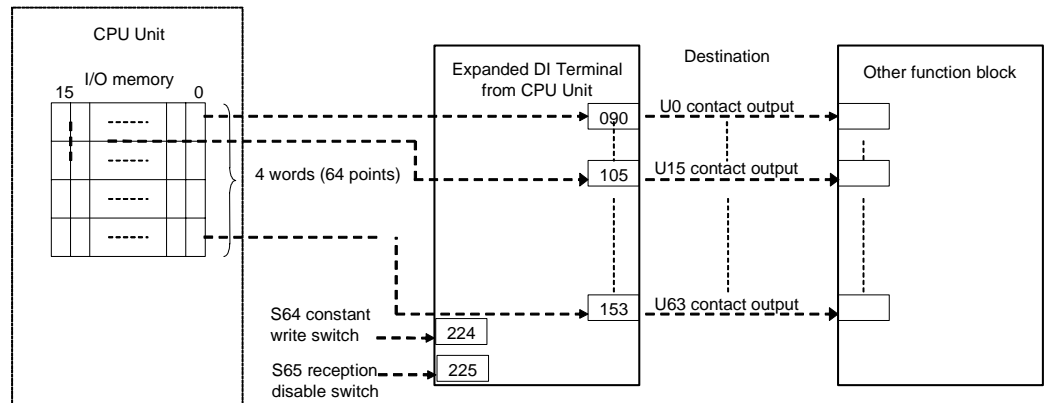
CompoBus/D Remote I/O, CompoBus/S Remote I/O, SYSBUS Remote I/O

- W: Work Area (W)
- H: Holding Area (H)
- D: Data Memory (D)
- E0: Extended Data Memory (E) bank No. 0 only

17 Expanded CPU Unit Terminal blocks

<455> Expanded DI Terminal from CPU Unit 829 to 860

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|---------------------------------------|--------|--------|--|----------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: Expanded DI Terminal from CPU Unit | 455 | 455 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| Parameter | 007 | | CPU Unit I/O memory area type 0: CIO (Channel I/O) Area, 1: W (Work Area), 2: H (Holding Area), 3: D (Data Memory), 4: E0 (Extended Data Memory [E] bank No.) | 0 to 4 | 3 | - | R/W(S) | - | - | - | 1 |
| | 008 | | Leading address | 0 to 32767 | 0 | - | R/W(S) | - | - | - | 2 |
| | 009 | | Number of words (number of input contacts = number of words x 16 points) | 1 to 4 (words) | 4 | - | R/W(S) | - | - | - | 1 |
| Contact output connection information | 090 | | U0 destination (BBB: Block No., III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| | to 153 | | U63 destination (BBB: Block No., III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| Contact output | 160 | U0 | Contact output (input from CPU Unit, 1 word bit 00) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | to 175 | U15 | Contact output (input from CPU Unit, 1 word bit 15) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | 176 | U16 | Contact output (input from CPU Unit, 2 words bit 00) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | to 223 | U63 | Contact output (input from CPU Unit, 4 words bit 15) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| Contact input | 224 | S64 | Constant write switch**Write all inputs at each operation cycle when 1 (ON). | 0, 1 | 0 | - | R/W(O) | - | - | R/W | 1 |
| | | 225 | S65 ^{*1} Reception disable switch 1 (ON): Inputs (reception) from the CPU Unit are disabled. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | 1 |

*1: Supported from version 2.50 of the Loop Control Unit.

| Block Model | Block Name | Block Address |
|-------------|----------------------------------|---------------|
| <456> | Expanded DO Terminal to CPU Unit | 829 to 860 |

Outline

This function block inputs up to 64 contact data and writes that contact data to ITEMS in CPU Unit I/O Memory area by specifying "contact output" or "contact input" ITEMS in other function blocks.

- This function block differs from the DO Terminal to CPU Unit block (Block Model 452) in that "contact output" or "contact input" ITEMS in other function blocks can be specified directly as the source from this function block without the need to use the Contact Distributor block (Block Model 201) or Step Ladder Program block (Block Model 301).
- When the previous value of the contact data is stored at each operation cycle and that data is updated, all the data is written to the CPU Unit I/O Memory area.

Note: When a cold start is performed, all of the data that is current at that time is written once unconditionally to ITEMS in CPU Unit I/O Memory area.

- All data including unchanged data is written constantly (at each operation cycle) to ITEMS in other function blocks for the duration that the S64 constant write switch is set to 1 (ON).
- In function block ITEM lists, the ITEMS that can be designated as the source are ITEMS that are read/writable (R/W) or readable (R) by the Step Ladder Program. ITEMS defined as non-settable (-) cannot be designated as the source.

| ITEM | R/W method | | | Data Length (bytes) |
|------|---------------------------------|---------------------------------|----------------------------------|---------------------|
| | According to CX-Process Monitor | According to ITEM Setting block | According to Step Ladder Program | |
| | W | — | R/W | 1 |

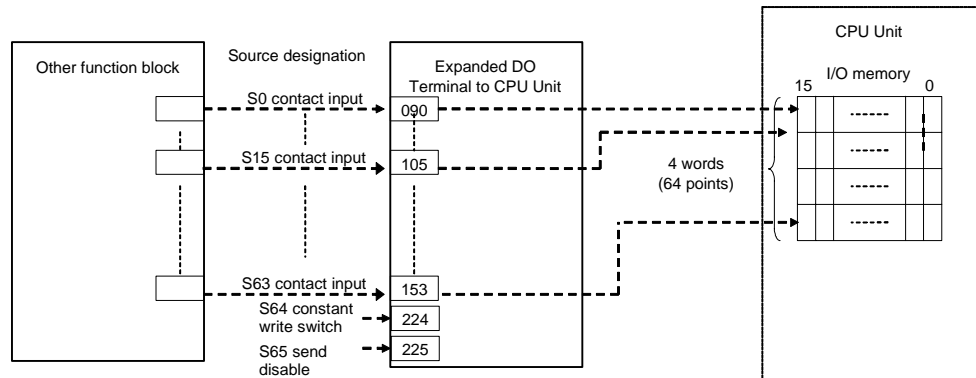
- Types of CPU Unit I/O memory area from which data can be output
 - CIO (channel I/O) Area: Data of any address can be input.
This area is mainly used for output to lamp parts, alarm log and screen switching on the PT (Programmable Terminal) or output of the following remote I/O data that is not supported on the Field Terminals:

Example

CompoBus/D Remote I/O, CompoBus/S Remote I/O, SYSBUS Remote I/O

- W: Work Area (W)
- H: Holding Area (H)
- D: Data Memory (D)
- E0: Extended Data Memory (E) bank No. 0 only

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | Data Length (bytes) |
|--------------------------------------|------|--------|--|----------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled | | | | |
| | | | | | | | Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | |
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | 1 | |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | 24 | |
| | 002 | | Block Model: Expanded DO Terminal to CPU Unit | 456 | 456 | - | R/W(S) | - | - | 2 | |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | 2 | |
| Parameter | 004 | | Operation cycle (s) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | 2 | |
| Parameter | 007 | | CPU Unit I/O memory area type 0: CIO (Channel I/O) Area, 1: W (Work Area), 2: H (Holding Area), 3: D (Data Memory), 4: E0 (Extended Data Memory [E] bank No.) | 0 to 4 | 3 | - | R/W(S) | - | - | 1 | |
| | 008 | | Leading address | 0 to 32767 | 32767 | - | R/W(S) | - | - | 2 | |
| | 009 | | Number of words (number of output contacts = number of words x 16 points) | 1 to 4 (words) | 4 | - | R/W(S) | - | - | 1 | |
| Contact input connection information | 090 | | S0 source designation (BBB: Block No., III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | 4 | |
| | 153 | | S63 source designation (BBB: Block No., III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | 4 | |
| Contact input | 160 | S0 | Contact input (output value to CPU Unit, 1 word bit 00) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | 175 | S15 | Contact input (output value to CPU Unit, 1 word bit 15) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | 176 | S16 | Contact input (output value to CPU Unit, 2 words bit 00) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | 223 | S63 | Contact input (output value to CPU Unit, 4 words bit 15) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | 224 | S64 | Constant write switch...Write all inputs at each operation cycle when 1 (ON). | 0, 1 | 0 | - | R/W(O) | - | - | R/W | 1 |
| | 225 | S65*1 | Send disable switch 1 (ON): Output (sending) to the CPU Unit is disabled. | 0, 1 | 0 | Yes | R/W (O) | - | - | R/W | 1 |

*1: Supported from version 2.50 of the Loop Control Unit.

17 Expanded CPU Unit Terminal blocks
<457> Expanded AI Terminal from CPU Unit 829 to 860

| Block Model | Block Name | Block Address |
|-------------|------------------------------------|---------------|
| <457> | Expanded AI Terminal from CPU Unit | 829 to 860 |

Outline

This function block writes up to 64 analog data on the ITEMS of another function block by inputting analog data in CPU Unit I/O Memory area, and specifying those ITEMS as the destination.

- This function block differs from the AI Terminal from CPU Unit block (Block Model 453) in that writing can be performed on other function blocks directly from this function block without the need to use the Variable ITEM Setting block (Block Model 172).
 - When the previous value of the CPU Unit I/O Memory data is stored at each operation cycle and that data is updated, only the data that has been changed is written to ITEMS in other function blocks.

Note: When a cold start is performed, all of the data that is current at that time is written once unconditionally to ITEMS in other function blocks.

- All data including unchanged data is written constantly (at each operation cycle) to ITEMS in other function blocks for the duration that the S64 constant write switch is set to 1 (ON).
- In function block ITEM lists, analog data can be written to ITEMS defined as writeable (W) by ITEM Setting blocks. Analog data cannot be written to ITEMS defined as non-settable (-).

| ITEM | R/W method | | | Data Length (bytes) |
|------|---------------------------------|---------------------------------|----------------------------------|---------------------|
| | According to CX-Process Monitor | According to ITEM Setting block | According to Step Ladder Program | |
| | W | W | — | 1 |

- Types of CPU Unit I/O memory area to which data can be input
 - CIO (channel I/O) Area: Data of any address can be input
This area is mainly used for input of numerical setting data from the PT (Programmable Terminal) or input of the following remote I/O data that is not supported on the Field Terminals:

Example

CompoBus/D Remote I/O, CompoBus/S Remote I/O, SYSBUS Remote I/O

- W: Work Area (W)
- H: Holding Area (H)
- D: Data Memory (D)
- E0: Extended Data Memory (E) bank No. 0 only

17 Expanded CPU Unit Terminal blocks

<457> Expanded AI Terminal from CPU Unit 829 to 860

Analog data for the number of words specified by ITEM009 from the leading word address of the I/O memory specified by ITEM008 are treated as signed binary data (two's complement taken for minus numbers) and converted to signed decimal. The range of the resulting values is converted to 0.00 to 100.00% according to the input range (specified by ITEM010 to ITEM073) to be read to Y1 to Y64. (Actual data can be output within the range -320.00 to +320.00%.)

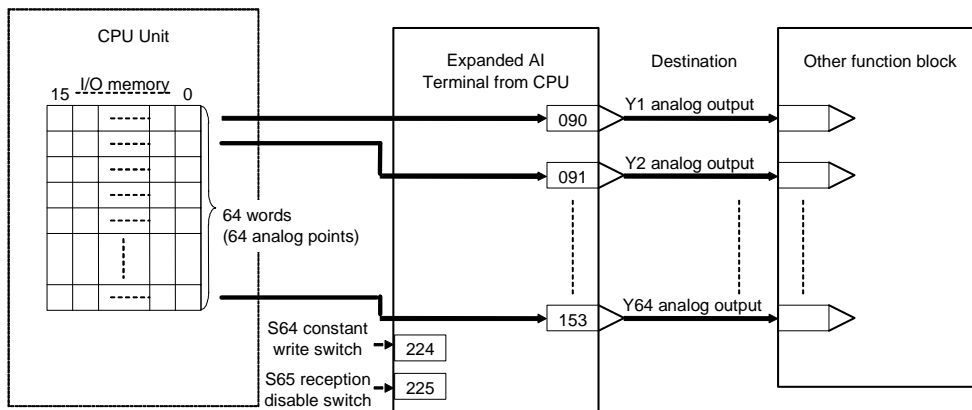
Example

To read 100.00% when 4000 (decimal) is stored and read 0.00% when 0 (decimal) is stored on word data currently stored by 0000 to 0FA0 Hex (decimal 0 to 4000), set 0%: 0 and 100%: 4000 as the input range.

Note1: The "input range" described here does not refer to scaling defined by the user. Set the range of the data currently stored to the word data on the CPU Unit correctly based on the values to be stored to the specified words on the CPU Unit. In the above example, 100.00% is read to Y by 01F4 Hex (decimal 500) when 0%: 0 and 100%: 500 are set as the input range instead of 0%: 0 and 100%: 4000.

Note2: Data that can be read from the CPU Unit is 4-digit Hex 8300 to FFFF and 0000 to 7D00 (decimal -32000 to +32000).

Block diagram



17 Expanded CPU Unit Terminal blocks
<457> Expanded AI Terminal from CPU Unit 829 to 860

ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|--------------------------------------|------|----------------------------------|--|------------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: Expanded AI Terminal from CPU Unit | 457 | 457 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| Parameter | 007 | | CPU Unit I/O memory area type 0: CIO (Channel I/O) Area, 1: W (Work Area), 2: H (Holding Area), 3: D (Data Memory), 4: E0 (Extended Data Memory [E] bank No.) | 0 to 4 | 3 | - | R/W(S) | - | - | - | 1 |
| | 008 | | Leading address | 0 to 32767 | 0 | - | R/W(S) | - | - | - | 2 |
| | 009 | | Number of words (=number of analog points) | 1 to 64 (words) | 64 | - | R/W(S) | - | - | - | 1 |
| | 010 | | Y1 input range conversion (0: Not used, 1: 0 to 4000, 2: -2000 to +2000, 3: 0 to 6000, 4: -3000 to +3000, 11 to 18: Specified range (Specify in ITEM074 to ITEM089.)) | 0 to 4, 11 to 18 | 0 | - | R/W(S) | - | - | - | 1 |
| | to | | to | | | - | | | | | |
| | 073 | | Y64 input range conversion (0: Not used, 1: 0 to 4000, 2: -2000 to +2000, 3: 0 to 6000, 4: -3000 to +3000, 11 to 18: Specified range (Specify in ITEM074 to ITEM089.)) | 0 to 4, 11 to 18 | 0 | - | R/W(S) | - | - | - | 1 |
| | 074 | | Range 0% (specified range: 11) | ±32000 | 0 | - | R/W(S) | - | - | - | 2 |
| | 075 | | Range 100% (specified range: 11) | ±32000 | 10000 | - | R/W(S) | - | - | - | 2 |
| | to | | to | | | - | | | | | |
| | 088 | | Range 0% (specified range: 18) | ±32000 | 0 | - | R/W(S) | - | - | - | 2 |
| 089 | | Range 100% (specified range: 18) | ±32000 | 10000 | - | R/W(S) | - | - | - | 2 | |
| Analog output connection information | 090 | | Y1 destination (BBB: Block No., III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| | to | | to | | | - | | | | | |
| Analog output | 153 | | Y64 destination (BBB: Block No., III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| | 160 | Y1 | Analog output (input from CPU Unit) 1 | ±320.00% | 0.00 | Yes | - | - | - | - | 2 |
| Analog output | to | | to | | | Yes | | | | | |
| | 223 | Y64 | Analog output (input from CPU Unit) 64 | ±320.00% | 0.00 | Yes | - | - | - | - | 2 |
| Contact input | 224 | S64 | Constant write switch***Writes all inputs at each operation cycle when 1 (ON). | 0, 1 | 0 | - | R/W(O) | - | - | R/W | 1 |
| | 225 | S65 ₁ | Reception disable switch 1 (ON): Input (reception) from the CPU Unit disabled. | 0, 1 | 0 | Yes | R/W (O) | - | - | R/W | 1 |

*1: Supported from version 2.50 of the Loop Control Unit.

17 Expanded CPU Unit Terminal blocks

<458> Expanded AO Terminal to CPU Unit 829 to 860

| Block Model | Block Name | Block Address |
|-------------|----------------------------------|---------------|
| <458> | Expanded AO Terminal to CPU Unit | 829 to 860 |

Outline

This function block inputs up to 64 analog data by specifying the ITEMS of another function block as the source and writes that data to CPU Unit I/O Memory area.

- This function block differs from the AO Terminal to CPU Unit block (Block Model 454) in that parameter ITEMS other than "analog input" and "analog output" ITEMS that can be written by ITEM Setting blocks can be specified as the source.

- When the previous value of the source analog data is stored at each operation cycle and that data is updated, all the data is written to CPU Unit I/O memory area.

Note: When a cold start is performed, all of the data that is current at that time is written once unconditionally to ITEMS in other function blocks.

- All data including unchanged data is written constantly (at each operation cycle) to ITEMS in other function blocks for the duration that the S64 constant write switch is set to 1 (ON).

"Analog input" and "analog output" ITEMS or ITEMS in function block ITEM lists defined as writeable (W) by ITEM Setting blocks as shown below can be specified as the source.

| ITEM | R/W method | | | Data Length (bytes) |
|------|---------------------------------|---------------------------------|----------------------------------|---------------------|
| | According to CX-Process Monitor | According to ITEM Setting block | According to Step Ladder Program | |
| | W | W | — | 1 |

- Types of CPU Unit I/O memory area from which data can be output

- CIO (channel I/O) Area: Data of any address can be input.

This area is mainly used for input of numerical setting data from the PT (Programmable Terminal) or input of the following remote I/O data that is not supported on the Field Terminals:

Example

CompoBus/D Remote I/O, CompoBus/S Remote I/O, SYSBUS Remote I/O

- W: Work Area (W)
- H: Holding Area (H)
- D: Data Memory (D)
- E0: Extended Data Memory (E) bank No. 0 only

Analog data within the range 0.00 to 100.00% (actual data can be input with the range -320.00 to +320.00%) for X1 to X64 is converted to binary data (two's complement taken for minus numbers) according to the output range (specified by ITEM010 to ITEM073), and the resulting data is written to the number of words specified by ITEM009 from the leading word address of the I/O memory specified by ITEM008.

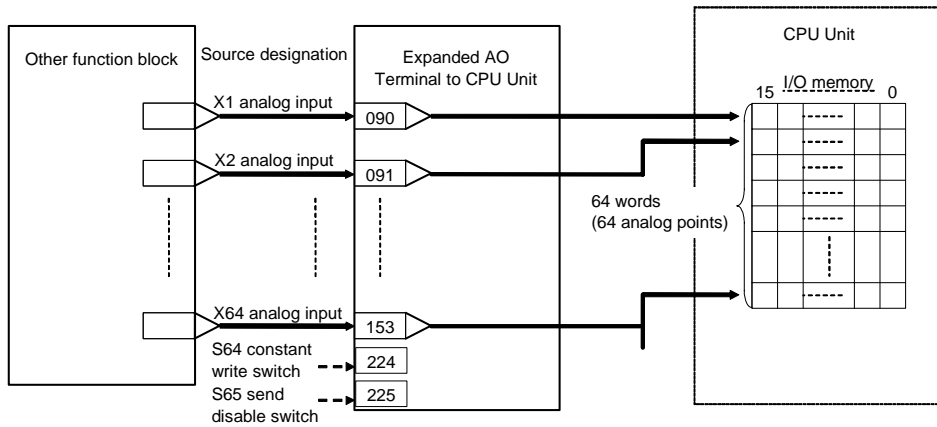
Example

To store 4000 (0FA0 Hex) at 100.00% and 0 (0000 Hex) to the CPU Unit, set 0%: 0 and 100%: 4000 as the output range.

Note1: The "output range" described here does not refer to scaling defined by the user. Set the range of the data currently stored to the word data on the CPU Unit correctly based on the values to be stored to the specified words on the CPU Unit. In the above example, 01F4 Hex (decimal 500) is written to the CPU Unit by 100.00% when 0%: 0 and 100%: 500 are set as the input range instead of 0%: 0 and 100%: 4000.

Note2: Data that can be written to the CPU Unit is 4-digit Hex 8300 to FFFF and 0000 to 7D00 (decimal -32000 to +32000).

Block diagram



17 Expanded CPU Unit Terminal blocks
<458> Expanded AO Terminal to CPU Unit 829 to 860

ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | Data Length (bytes) | |
|-------------------------------------|------|---|--|------------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|---------------------|--|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | |
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 | |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 | |
| | 002 | | Block Model: Expanded AO Terminal to CPU Unit | 458 | 458 | - | R/W(S) | - | - | - | 2 | |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 | |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 | |
| | 007 | | CPU Unit I/O memory area type 0: CIO (Channel I/O) Area, 1: W (Work Area), 2: H (Holding Area), 3: D (Data Memory), 4: E0 (Extended Data Memory [E] bank No.) | 0 to 4 | 3 | - | R/W(S) | - | - | - | 1 | |
| | 008 | | Leading address | 0 to 32767 | 32767 | - | R/W(S) | - | - | - | 2 | |
| | 009 | | Number of words (=number of analog points) | 1 to 64 (words) | 64 | - | R/W(S) | - | - | - | 1 | |
| | 010 | | X1 output range conversion (0: Not used, 1: 0 to 4000, 2: -2000 to +2000, 3: 0 to 6000, 4: -3000 to +3000, 11 to 18: Specified range (Specify in ITEM074 to ITEM089.)) | 0 to 4, 11 to 18 | 0 | - | R/W(S) | - | - | - | 1 | |
| | to | | to | | | - | | | | | | |
| | 073 | | X64 output range conversion (0: Not used, 1: 0 to 4000, 2: -2000 to +2000, 3: 0 to 6000, 4: -3000 to +3000, 11 to 18: Specified range (Specify in ITEM074 to ITEM089.)) | 0 to 4, 11 to 18 | 0 | - | R/W(S) | - | - | - | 1 | |
| | 074 | | Range 0% (specified range: 11) | ±32000 | 0 | - | R/W(S) | - | - | - | 2 | |
| | 075 | | Range 100% (specified range: 11) | ±32000 | 10000 | - | R/W(S) | - | - | - | 2 | |
| | to | | to | | | - | | | | | | |
| 088 | | Range 0% (specified range: 18) | ±32000 | 0 | - | R/W(S) | - | - | - | 2 | | |
| 089 | | Range 100% (specified range: 18) | ±32000 | 10000 | - | R/W(S) | - | - | - | 2 | | |
| Analog input connection information | 090 | | X1 source designation (BBB: Block No., III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 | |
| | to | | to | | | - | | | | | | |
| 153 | | X64 source designation (BBB: Block No., III: ITEM No.) | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 | | |
| Analog input | 160 | X1 | Analog input (output to CPU Unit) 1 | ±320.00% | 0.00 | Yes | - | - | - | - | 2 | |
| | to | | to | | | Yes | | | | | | |
| 223 | X64 | Analog input (output to CPU Unit) 64 | ±320.00% | 0.00 | Yes | - | - | - | - | 2 | | |
| Contact input | 224 | S64 | Constant write switch Write all inputs at each operation cycle when 1 (ON). | 0, 1 | 0 | - | R/W(O) | - | - | R/W | 1 | |
| | 225 | S65* 1 | Send disable switch Reception disable switch 1 (ON): Output (sending) to the CPU Unit disabled. | 0, 1 | 0 | Yes | R/W (O) | - | - | R/W | 1 | |

*1: Supported from version 2.50 of the Loop Control Unit.

| Block Model | Block Name | Block Address |
|-------------|--------------------|---------------|
| <461> | Receive All Blocks | 897 |

Outline

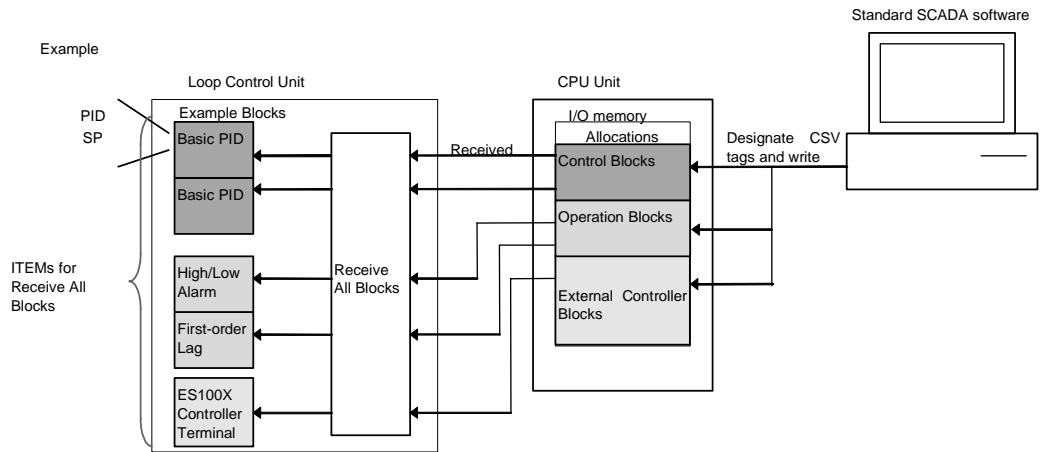
This function block receives the data for all block send/receive ITEMS for the number of specified blocks from the specified I/O memory addresses in the CPU Unit. It can be used for Control Blocks, Operation Blocks, and External Controller Blocks.

Function Block for which Data Can Be Received

- Control Blocks: The specified number of Control Blocks starting from address 001 (32 blocks maximum).
- Operation Blocks: The specified number of Operation Blocks starting from address 100 (249 blocks maximum).
- External Controller Blocks: The specified number of External Controller Blocks starting from address 065 (32 blocks maximum).

This function block is used to write data from the SCADA software to the Loop Control Unit.

Note: From the SCADA software, CSV tags are specified to write data to I/O memory in the CPU Unit.



The ITEMS that can be sent/received for function blocks are determined in advance for each function block model. These are called, "receive block ITEMS." The ITEMS listed as R (receive) or SR (send/receive) in the ITEM list for each function block will be allocated words in the I/O memory of the CPU Unit.

ITEMS that are received for Receive All Block are indicated in this column

| ITEM Type | ITEM | Symbol | Data Description | Data Range | Default | R/W Mode | According to CX-Process Monitor's Tool | According to CX-Process Monitor*1 | According to ITEM Setting Block | According to Ladder Program | Send/Receive All Blocks | Data Length (bytes) |
|---------------|------|--------|--|------------|---------|----------|--|-----------------------------------|---------------------------------|-----------------------------|-------------------------|---------------------|
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - R/W | - | - | - | - | R/S | 1 |

18 Send/Receive All blocks

<461> Receive All Blocks 897

Refer to Data Transfers later in this section for details.

Note1: Use different words in I/O memory of the CPU Unit for Receive All Blocks (model 461) and Send All Blocks (model 462).

If the same words are used, the values in I/O memory written from the SCADA software will be overwritten by the Loop Control Unit. (In other words, the write processing from the SCADA software for Receive All Blocks will not be processed correctly.)

Example: If the SP ITEM value in the Basic PID Block is written to I/O Memory using Send All Blocks after data has been written from the SCADA software to the I/O memory in the CPU Unit but before the SP ITEM has been written using Receive All Block, the value written by the SCADA software will be cleared from I/O memory.

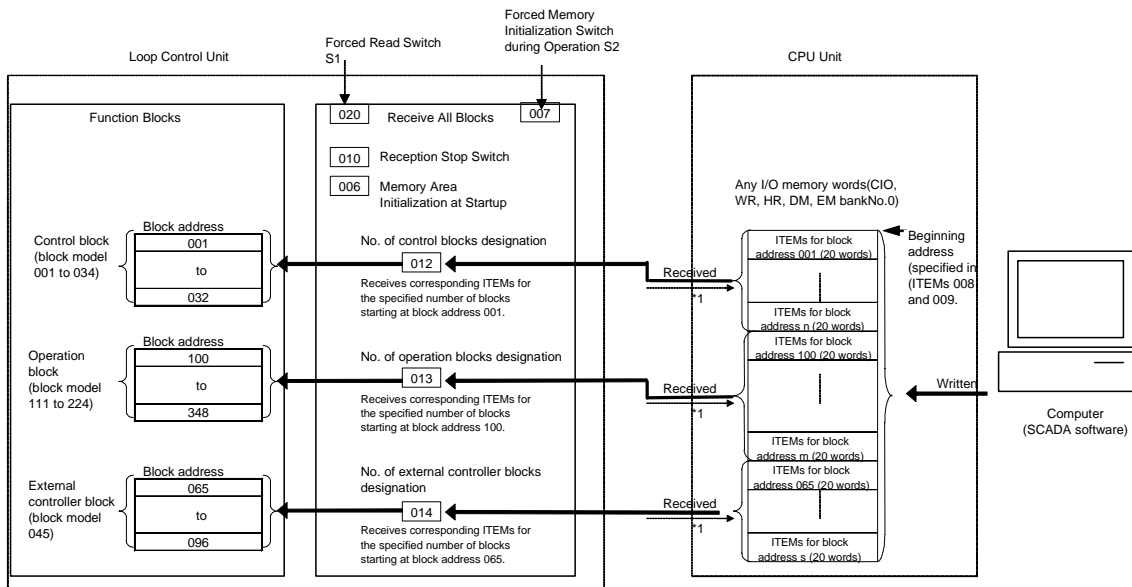
Note2: When compiling CSV tags on the CX-Process Tool, always register both Send All Blocks (model 462) and Receive All Blocks (model 461). If one of each of these function blocks is not registers, the CSV tags will not be compiled correctly.

Function block applications

Use this function block to write ITEM data in the Loop Controller Unit function blocks from standard SCADA software.

The function block ITEM data in the I/O memory of the CPU is written from the SCADA software by designating the CSV tags created using the CX-Process Tool.

Block diagram



*1: When the memory area is initialized directly or periodically, ITEM data is used to initialize it.

Note: Normally, only values that have changed since the last reception are written from the specified I/O memory in the CPU Unit to the all block send/receive ITEMs in the Loop Control Unit.

However, if the Forced Read Switch (ITEM 020) is ON, the specified words in I/O memory in the CPU Unit is received by all block send/receive ITEMs in the Loop Control Unit.

If Memory Area Initialization at Startup (ITEM 006) is ON, data in the specified I/O memory words will be initialized with the ITEM data in the Loop Control Unit at startup. If Memory Area Initialization at Startup (ITEM 006) is OFF, data in the specified I/O memory words will be transferred to the ITEM data in the Loop Control Unit at startup. If the Memory Area Initialization Switch during Operation (ITEM 007) is turned ON, data in the specified I/O memory words will be initialized with the ITEM data in the Loop Control Unit.

If period initialization (ITEM 030) is 1 (ON), the specified words in I/O memory in the CPU Unit will be updated with the data in the Loop Control Unit at the initialization interval (ITEM 031). (Supported from version 2.50 of the Loop Control Unit.)

If Reception Stop Switch (ITEM 010) is ON, reception of data from the specified I/O memory words will be stopped in the Loop Control Unit.

ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

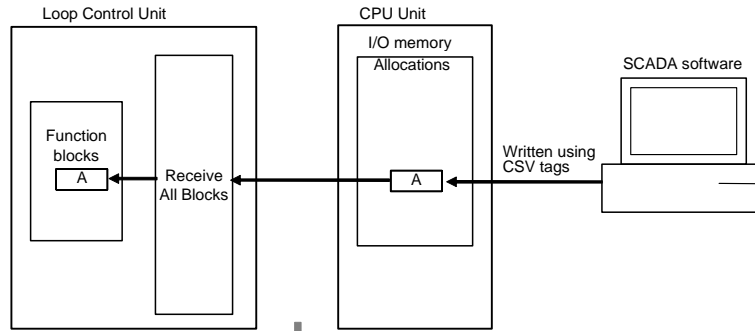
| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|-------------------------|------------------|--------|---|---------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command 0: Cancel stop, 1: Stop | 0, 1 | 0 | - | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Receive All Blocks | 461 | 461 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (seconds) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 4 | - | R/W(S) | - | - | - | - | 2 |
| | 006 | | Memory area initialization at startup 0: No, 1: Yes | 0, 1 | 0 | - | R/W(S) | - | - | - | - | 1 |
| Contact input parameter | 007 | S2 | Forced memory area initialization SW during operation 0 to 1: Execute. Reset to 0 on completion. | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | - | 1 |
| Parameter | 008 | | CPU Unit I/O memory area 0: CIO Area, 1: Work Area, 2: Holding Area, 3: DM Area, 4: EM Area bank 0 | 0 to 4 | 3 | - | R/W(S) | - | - | - | - | 1 |
| | 009 | | Beginning address | 0 to 32767 | 32767 | - | R/W(S) | - | - | - | - | 2 |
| Contact input | 010 | S3 | Reception stop switch 1: Stop | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | - | 1 |
| Parameter | 012 | | Number of Control Blocks | 0 to 32 | 32 | - | R/W(S) | - | - | - | - | 2 |
| | 013 | | Number of Operation Blocks | 0 to 249 | 0 | - | R/W(S) | - | - | - | - | 2 |
| | 014 | | Number of External Controller Blocks | 0 to 32 | 0 | - | R/W(S) | - | - | - | - | 2 |
| Contact input | 020 | S1 | Forced read switch 0: Read only when different from previous time, 1: Always read | 0, 1 | 0 | - | R/W(O) | - | - | R/W | - | 1 |
| Parameter | 030 ¹ | | Periodic initialization 0: No, 1: Yes (Memory will be periodically initialized if this parameter is set to 1 and the operation cycle is 1 sec or less. If the operation cycle is 2 sec, memory will be initialized at an interval twice the initialization interval in ITEM 031.) | 0, 1 | 0 | - | R/W(S) | - | - | - | - | 1 |
| | 031 ¹ | | Initialization interval (unit: sec) (Valid when ITEM 030 is set to 1. If the operation cycle is 2 sec, twice the value of the initialization interval setting will be used.) | 4 to 10 sec | 4 | - | R/W(S) | - | - | - | - | 2 |

*1: If ITEM 030 (periodic initialization) is set to 1 (Yes), set ITEM 012, ITEM 013, and ITEM 014 so that the total number of blocks is 198 or more. I/O memory in the CPU Unit will be allocated for 198 blocks or more. All zeros will be written to allocated I/O memory words for block addresses that are not registered.
ITEM 030 and ITEM 031 are supported from version 2.50 of the Loop Control Unit.

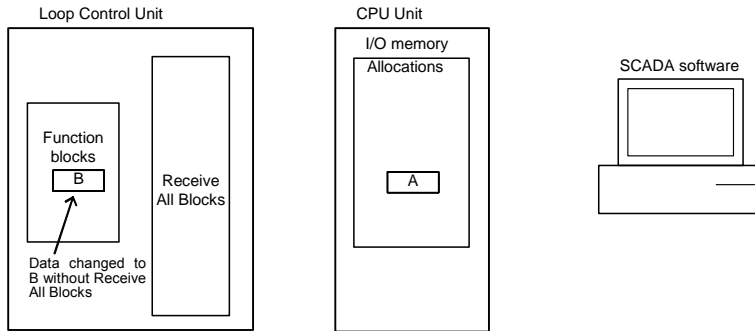
Application Precautions for Receive All Blocks (Block Model 461)

If (1) Receive All Blocks (Block Model 461) is used to change function block ITEM data to the contents of specified I/O memory words (A) in the CPU Unit and then (2) ITEM data is changed to other values (B) without using Receive All Blocks (Block Model 461), ITEM data will not return to the values in the specified I/O memory words (A) even if specified for Receive All Blocks (Block Model 461), and data values (B) will remain.

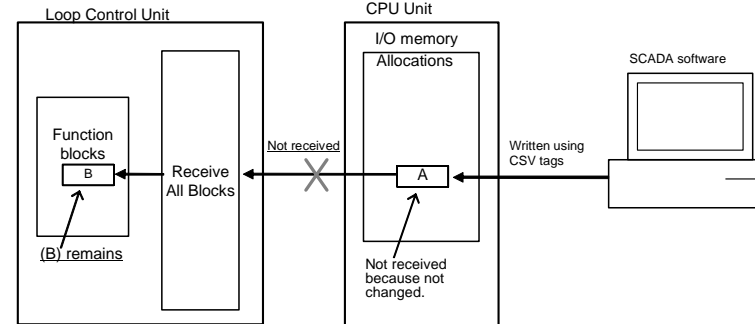
(1) Receive All Blocks (Block Model 461) used to change to data A.



(2) Data changed to B without Receive All Blocks



(3) Data not returned to (A) with Receive All Blocks



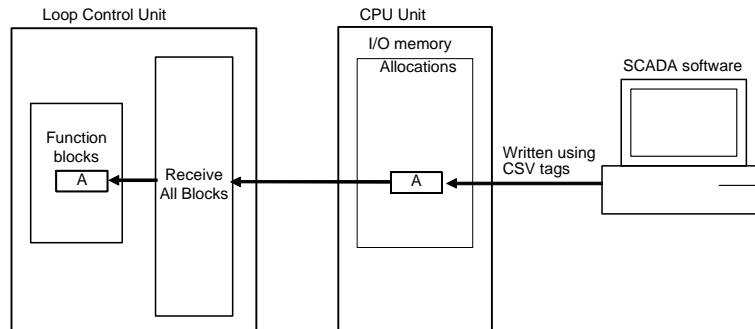
Example: If SCADA software is used to send Receive All Blocks to set the MV for a Basic PID block to 0.00% in manual mode and then the MV is changed in auto mode, the MV will not return to 0.00% even if 0.00% is then specified in manual mode.

This problem occurs because specified I/O memory data is received from the CPU Unit only when the content differs from the last time it was received.

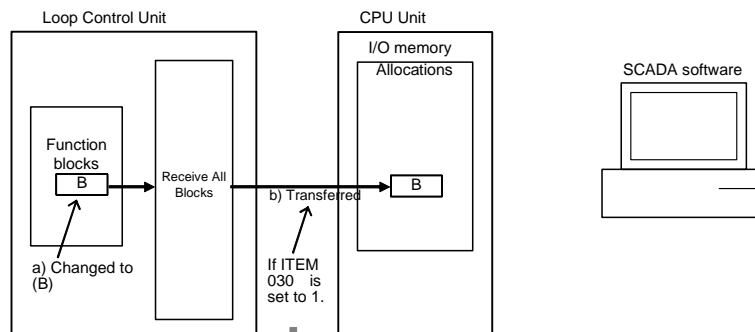
This problem can be solved by setting ITEM 030 (periodic initialization) to 1 (Yes).
 (Supported from version 2.50 of the Loop Control Unit.)

If ITEM 030 is set to 1, the function block ITEM data will be periodically transferred to the CPU Unit. When this occurs, any data changed in the Loop Control Unit (B) will be written to the CPU Unit so that the next time Receive All Blocks is used, the data in the CPU Unit (B) will be different from the previous time (A) and the same data (A) can be transferred to the Loop Control Unit again.

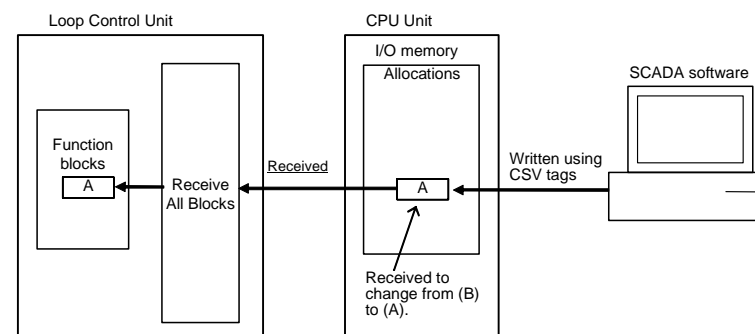
(1) ITEM data changed to (A) using Receive All Blocks



(2) ITEM data changed to (B) without Receive All Blocks and the (B) transferred to CPU Unit.



(3) ITEM data returned to (A).



When ITEM 030 (periodic initialization) is set to 1 (Yes), however, there may be competition between Receive All Blocks transfers from the CPU Unit and periodic initialization from the Loop Control Unit. Transfers from the CPU Unit for Receive All Blocks are disabled when competition occurs.

To avoid this problem, the total number of blocks for Receive All Blocks (total of ITEM012, ITEM013, and ITEM014) should be set to 198 or greater.

18 Send/Receive All blocks

<461> Receive All Blocks 897

Note1: If 198 blocks are set, 3, 961 words (198 x 20 words + 1) of I/O memory in the CPU Unit will be allocated. (There is no problem if the number of blocks for Receive All Blocks is higher than the number actually being used. All zeros will be written at any block addresses not being used. In this case, the probability that writing to the function blocks will be disabled is the CPU Unit cycle time divided by ITEM 031 (initialization interval) times 100% for all writes (0.25% if the CPU Unit cycle time is 10 ms and ITEM 031 is set to 4).

If ITEM 012, ITEM 013, and ITEM 014 are set so that the total number of blocks is less than 198, the probability that writing to the function blocks will be disabled is the operation cycle for Receive All Blocks divided by ITEM 031 (initialization interval) times 100% for all writes (25% if ITEM 004 is set to 4 (1 sec) and ITEM 031 is set to 4).

Note2: If Receive All Blocks (Block Model 461) is used to download individual function blocks from the CX-Process Tool during Loop Control Unit operation, turn ON ITEM 007 (Forced Memory Initialization Switch during Operation) after the download so that the ITEM data in the function blocks in CPU Unit I/O memory is also updated.

Sending/Receiving Data

The following information is the same for both Send All Blocks (model 462) and Receive All Blocks (model 461).

ITEM data (20 words/block) for function items is allocated from the beginning I/O memory word in the following order: Control Blocks, Operation Blocks, and External Controller Blocks.

- Control blocks: The number of control blocks (ITEM 012) starting from block addresses 001.

Example:

If ITEM 012 is 5, the function block data from block address 001 to 005 will be sent or received.

- Operation blocks: The number of operation blocks (ITEM 013) starting from block addresses 100.

Example:

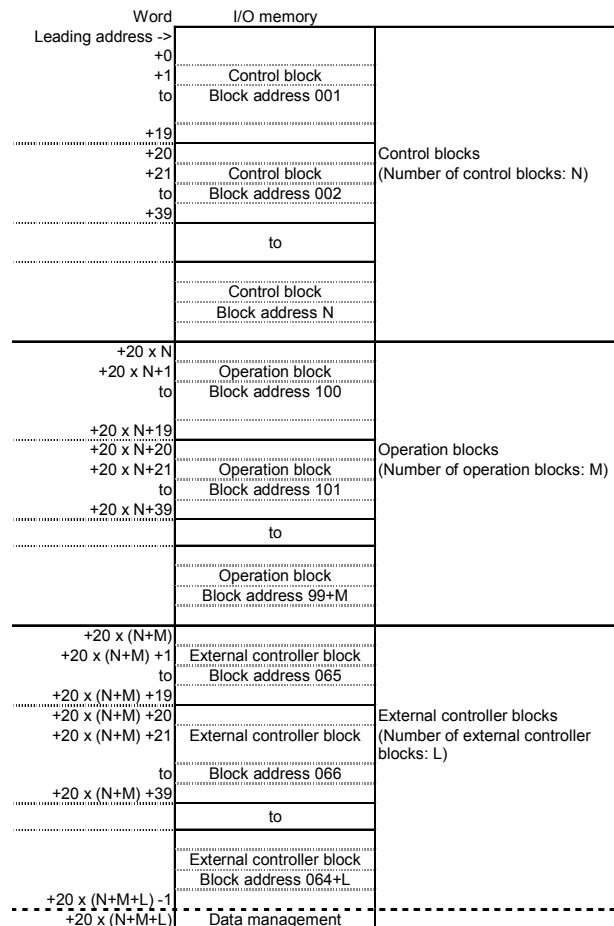
If ITEM 013 is 8, the function block data from block address 100 to 107 will be sent or received.

- External Controller Terminal blocks: The number of External Controller Terminal blocks (ITEM 014) starting from block addresses 065.

Example:

If ITEM 014 is 5, the function block data from block address 065 to 069 will be sent or received.

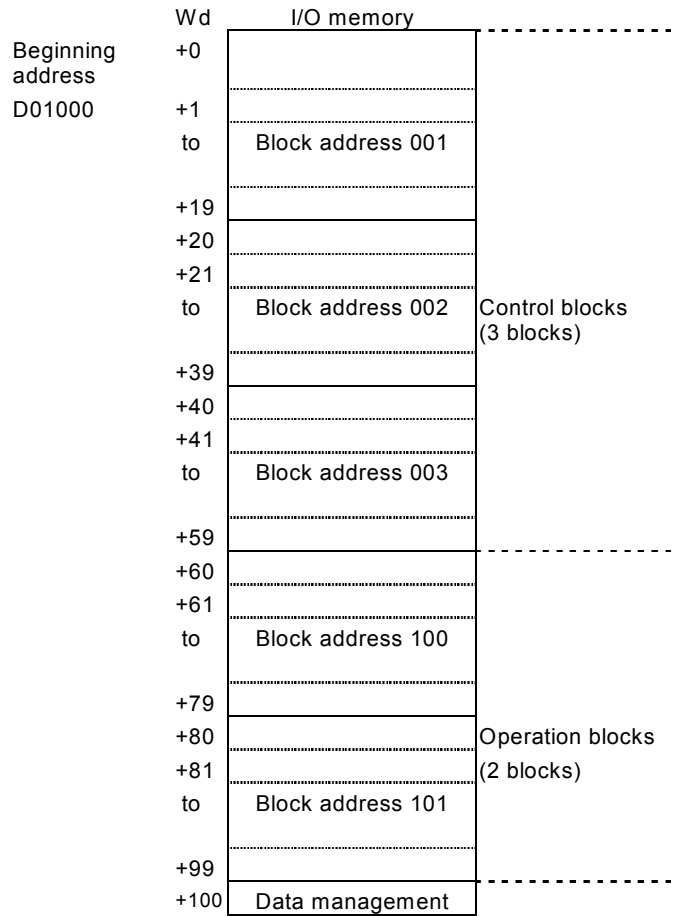
- One word for data management (supported from version 2.50 of the Loop Control Unit).



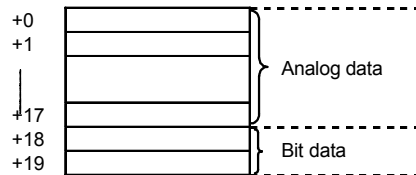
Note: Space for unused block addresses will not be eliminated and block addresses will always be consecutive for the number of blocks specified.

18 Send/Receive All blocks
<461> Receive All Blocks 897

Example for the following: Beginning address: D01000(ITEM 008: 3, ITEM 009: 1000),
 Number of control blocks: 3(ITEM 012: 3), Number of operation blocks: 2(ITEM 013: 2)

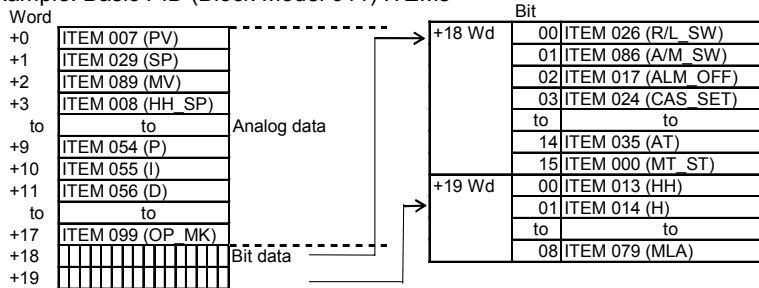


Note: A total of 20 words is allocated to each function block as shown below. The first 18 words (through the +17 words) are allocated to analog data. The words +18 and +19 from the beginning words are allocated as bit data.



The ITEMS received for each function block model are predetermined as Receive Block ITEMS.

Example: Basic PID (Block Model 011) ITEMS



| Block Model | Block Name | Block Address |
|-------------|-----------------|---------------|
| <462> | Send All Blocks | 898 |

Outline

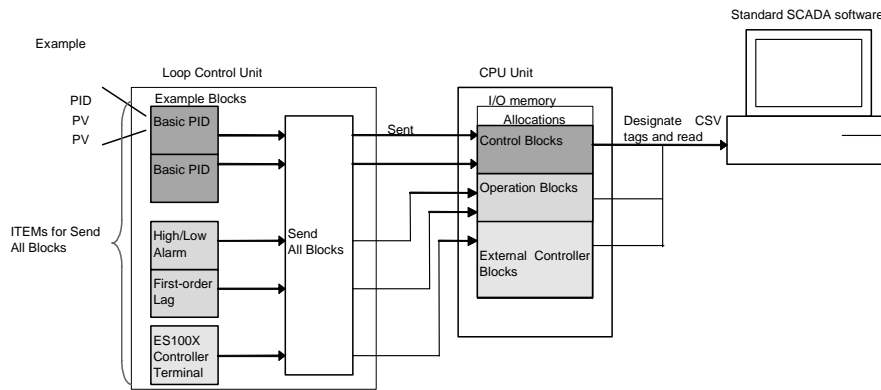
This function block sends the data for all block send/receive ITEMS for the number of specified blocks to the specified I/O memory addresses in the CPU Unit. Control Blocks, Operation Blocks, and External Controller Blocks can be used.

Function Block for which Data Can Be Sent

- Control Blocks: The specified number of Control Blocks starting from address 001 (32 blocks maximum).
- Operation Blocks: The specified number of Operation Blocks starting from address 100 (249 blocks maximum, except internal switches).
- External Controller Blocks: The specified number of External Controller Blocks starting from address 065 (32 blocks maximum).

This function block is used to read data from the Loop Control Unit to SCADA software.

Note: From the SCADA software, CSV tags are specified to read data from I/O memory in the CPU Unit.



The ITEMS that can be sent/received for function blocks are determined in advance for each function block model. These are called, "send block ITEMS." The ITEMS listed as S (send) or SR (send/receive), in the ITEM list for each function block are allocated words in the I/O memory of the CPU Unit.

ITEMs that are sent for Send All Block are indicated in this column

| ITEM Type | ITEM | Symbol | Data Description | Data Range | Default | R/W Mode | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled | Data Length (bytes) | | |
|---------------|------|--------|--|------------|---------|----------|--|---------------------|-----|---|
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | R/W | - | R/S | 1 |

18 Send/Receive All blocks

<462> Send All Blocks 898

Refer to Data Transfers under Receive All Blocks for details.

Note1: Use different words in I/O memory of the CPU Unit for Receive All Blocks (model 461) and Send All Blocks (model 462). (The write processing from the SCADA software for Receive All Blocks will not be processed correctly. The read processing from the SCADA software for Send All Blocks, however, will be processed correctly.)

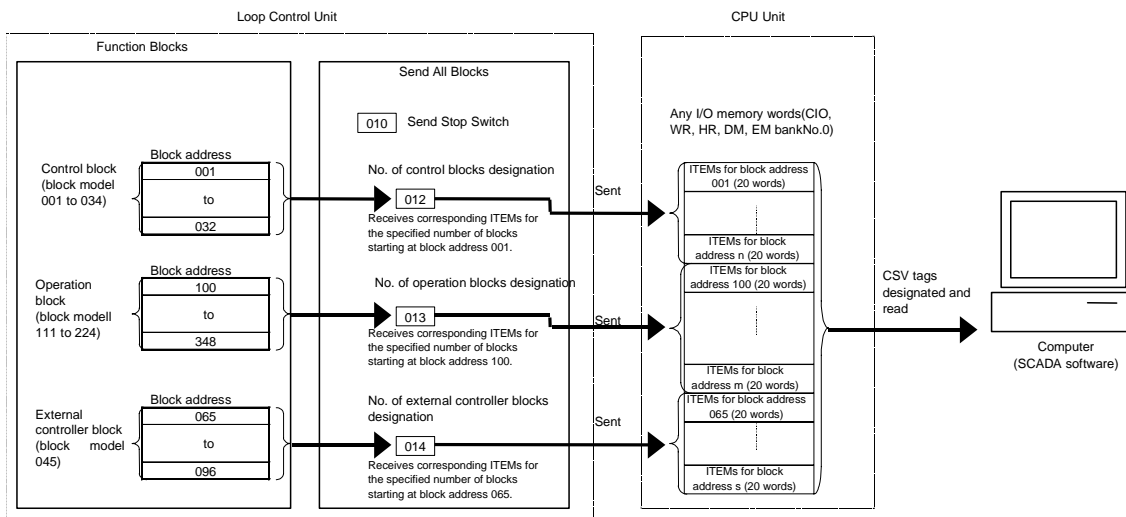
Note2: When compiling CSV tags on the CX-Process Tool, always register both Send All Blocks (model 462) and Receive All Blocks (model 461). If one of each of these function blocks is not registers, the CSV tags will not be compiled correctly.

Function block applications

Use this function block to read ITEM data in the Loop Control Unit function blocks to standard SCADA software.

The function block ITEM data allocated in the I/O memory of the CPU is read to the SCADA software by designating the CSV tags created using the CX-Process Tool.

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | | Data Length (bytes) |
|---------------|------|--------|---|---------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|-------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Send/Receive All Blocks | |
| Contact input | 000 | | Stop block operation command 0: Cancel stop, 1: Stop | 0, 1 | 0 | - | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: Send All Blocks | 462 | 462 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (seconds) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 4 | - | R/W(S) | - | - | - | - | 2 |
| | 008 | | CPU Unit I/O memory area 0: CIO Area, 1: Work Area, 2: Holding Area, 3: DM Area, 4: EM Area bank 0 | 0 to 4 | 3 | - | R/W(S) | - | - | - | - | 1 |
| | 009 | | Beginning address | 0 to 32767 | 32767 | - | R/W(S) | - | - | - | - | 2 |
| Contact input | 010 | | Send stop switch 1: Send stop, 0: Send | 0, 1 | 0 | Yes | R/W(O) | - | - | R/W | - | 1 |
| Parameter | 012 | | Number of Control Blocks | 0 to 32 | 32 | - | R/W(S) | - | - | - | - | 2 |
| | 013 | | Number of Operation Blocks | 0 to 249 | 0 | - | R/W(S) | - | - | - | - | 2 |
| | 014 | | Number of External Controller Blocks | 0 to 32 | 0 | - | R/W(S) | - | - | - | - | 2 |

Note: If Send Stop Switch (ITEM 010) is ON, sending data in the Loop Control Unit to the specified I/O memory words in the CPU Unit will be stopped.

19 Field Terminal Block
<501> DI 8-point Terminal 901 to 980

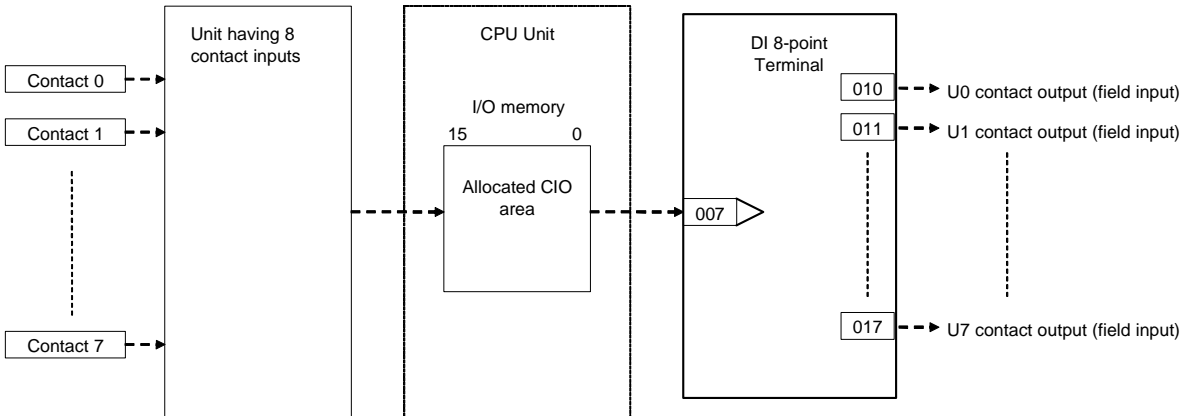
| Block Model | Block Name | Block Address |
|-------------|---------------------|---------------|
| <501> | DI 8-point Terminal | 901 to 980 |

Outline

This function block is the Field Terminal block for inputting eight contacts from 8-point Input Units (C200H-I□□□□).

Note: The word number to be assigned for analog/input to CIO (channel I/O) Area on the CPU Unit must be set to ITEM007 (CIO word No.).

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Sym bol | Data Description | Data Range | Default | COLD start initializ ation | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | Accordi ng to CX-Pro cess Tool | Accordi ng to CX-Pro cess Monitor *1 | Accordi ng to ITEM Setting block | Accordi ng to Step Ladder Progra m | Data Length (bytes) |
|----------------|------|------------|---|---------------|------------|-------------------------------------|---|--|---|--|---|---------------------------|
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: DI 8-point Terminal | 501 | 501 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| | 007 | | CIO word No. (Enter leading word No. allocated to I/O.) | 0 to 32767 | 32767 | - | R/W(S) | - | - | - | - | 2 |
| Contact output | 010 | U0 | Contact output (field contact input) | 0, 1 | 0 | Yes | - | - | - | - | R | 1 |
| | to | | to | | | Yes | | | | | | |
| | 017 | U7 | Contact output (field contact input) | 0, 1 | 0 | Yes | - | - | - | - | R | 1 |

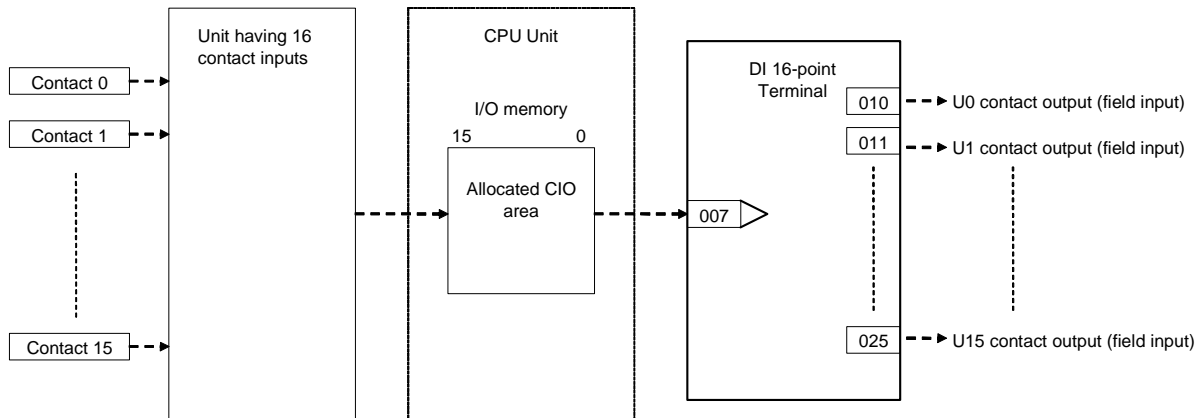
| Block Model | Block Name | Block Address |
|-------------|----------------------|---------------|
| <502> | DI 16-point Terminal | 901 to 980 |

Outline

This function block is the Field Terminal block for inputting 16 contacts from 16-point Input Units (C200H-I□□□□, CS1W-I□□1□, CS1W-INT01, or CS1W-IDP01).

Note: The word number to be assigned for analog/input to CIO (channel I/O) Area on the CPU Unit must be set to ITEM 007 (CIO word No.).

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|--------------------------------------|--------|--------|---|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: DI 16-point Terminal | 502 | 502 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| Parameter | 007 | | CIO word No. (Enter leading word No. allocated to I/O.) | 0 to 32767 | 32767 | - | R/W(S) | - | - | - | 2 |
| Contact output (field contact input) | 010 | U0 | Contact output (field contact input) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | to 025 | U15 | to Contact output (field contact input) | 0, 1 | 0 | Yes | - | - | - | R | 1 |

19 Field Terminal Block

<503> DI 32-point Terminal 901 to 980

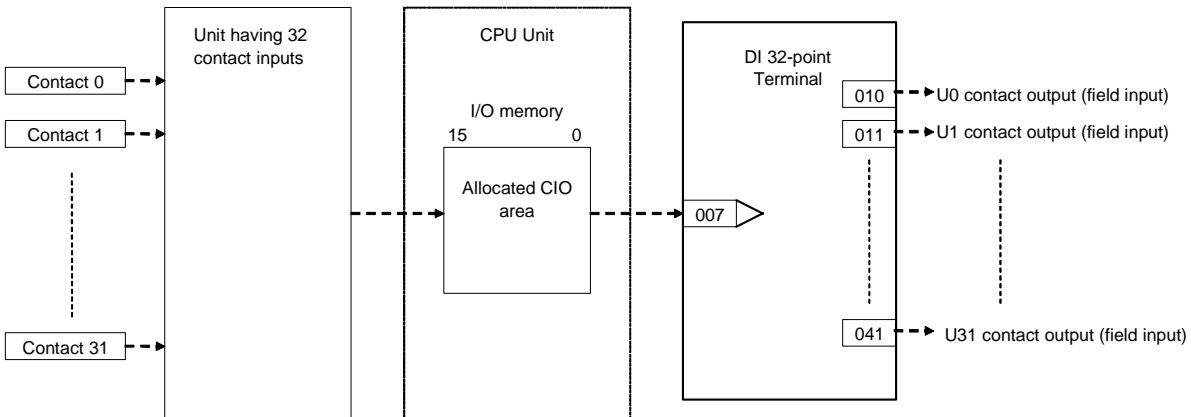
| Block Model | Block Name | Block Address |
|-------------|----------------------|---------------|
| <503> | DI 32-point Terminal | 901 to 980 |

Outline

This function block is the Field Terminal block for inputting 32 contacts from 32-point Input Units (C200H-ID216, CS1W-ID231, or Special I/O Unit C200H-ID215).

Note: The word number to be assigned for analog/input to CIO (channel I/O) Area on the CPU Unit (in the case of the Special I/O Unit, the leading word number allocated to Special I/O Unit relay area) must be set to ITEM007 (CIO word No.).

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Sym bol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | Data Length (bytes) |
|--------------------------------------|------|--------------------------------------|---|---------------|------------|---------------------------|--|------------------------------|------------------------------------|---------------------------------|----------------------------------|---------------------|
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | | - | - | - | - | 24 |
| | 002 | | Block Model: DI 32-point Terminal | 503 | 503 | - | | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | | - | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | | - | - | - | - | 2 |
| | 007 | | CIO word No. (Enter leading word No. allocated to I/O.) | 0 to 32767 | 32767 | - | | - | - | - | - | 2 |
| Contact output (field contact input) | 010 | U0 | Contact output (field contact input) | 0, 1 | 0 | Yes | | - | - | - | R | 1 |
| | to | | to | | | Yes | | - | - | - | | |
| | 025 | U15 | Contact output (field contact input) | 0, 1 | 0 | Yes | | - | - | - | R | 1 |
| | 026 | U16 | Contact output (field contact input) | 0, 1 | 0 | Yes | | - | - | - | R | 1 |
| | to | | to | | | Yes | | - | - | - | | |
| 041 | U31 | Contact output (field contact input) | 0, 1 | 0 | Yes | | - | - | - | R | 1 | |

| Block Model | Block Name | Block Address |
|-------------|----------------------|---------------|
| <504> | DI 64-point Terminal | 901 to 980 |

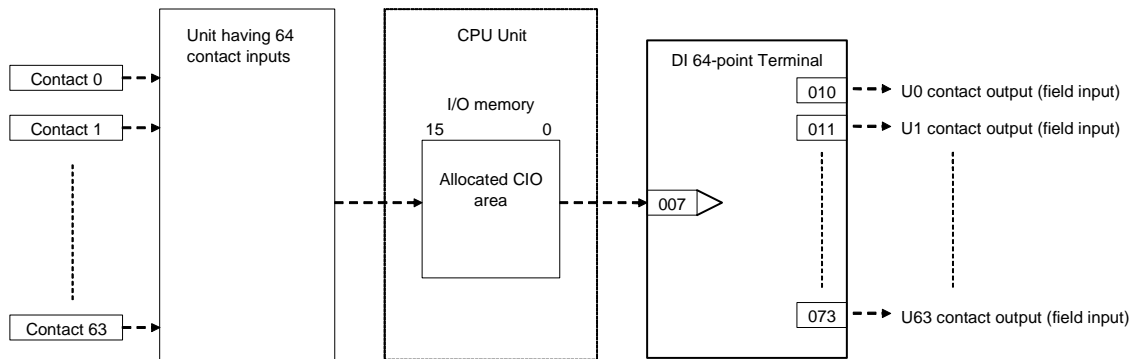
Outline

This function block is the Field Terminal block for inputting 64 contacts from 64-point Input Units (C200H-ID□□□ or CS1W-ID261).

- The setting value set on the unit number setting switch on the front of the I/O Unit is not related to this function block. The CIO (channel I/O) Area is set according to the same rules as the Basic I/O Unit.

Note: The word number to be assigned for analog/input to CIO (channel I/O) Area on the CPU Unit (in the case of the Special I/O Unit, the leading word number allocated to Special I/O Unit relay area) must be set to ITEM007 (CIO word No.).

Block diagram



19 Field Terminal Block

<504> DI 64-point Terminal 901 to 980

ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|------------------------------|------|--------------------------------------|--|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: DI 64-point Terminal | 504 | 504 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| | 007 | | CIO word No. (Enter leading word No. allocated to I/O.) | 0 to 32767 | 32767 | - | R/W(S) | - | - | - | 2 |
| Contact output (field input) | 010 | U0 | Contact output (field contact input) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | to | | to | | | Yes | - | - | - | | |
| | 025 | U15 | Contact output (field contact input) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | 026 | U16 | Contact output (field contact input) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | to | | to | | | Yes | - | - | - | | |
| | 041 | U31 | Contact output (field contact input) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | 042 | U32 | Contact output (field contact input) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | to | | to | | | Yes | - | - | - | | |
| | 057 | U47 | Contact output (field contact input) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | 058 | U48 | Contact output (field contact input) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| to | | to | | | Yes | - | - | - | | | |
| 073 | U63 | Contact output (field contact input) | 0, 1 | 0 | Yes | - | - | - | R | 1 | |

| Block Model | Block Name | Block Address |
|-------------|---------------------|---------------|
| <511> | DO 5-point Terminal | 901 to 980 |

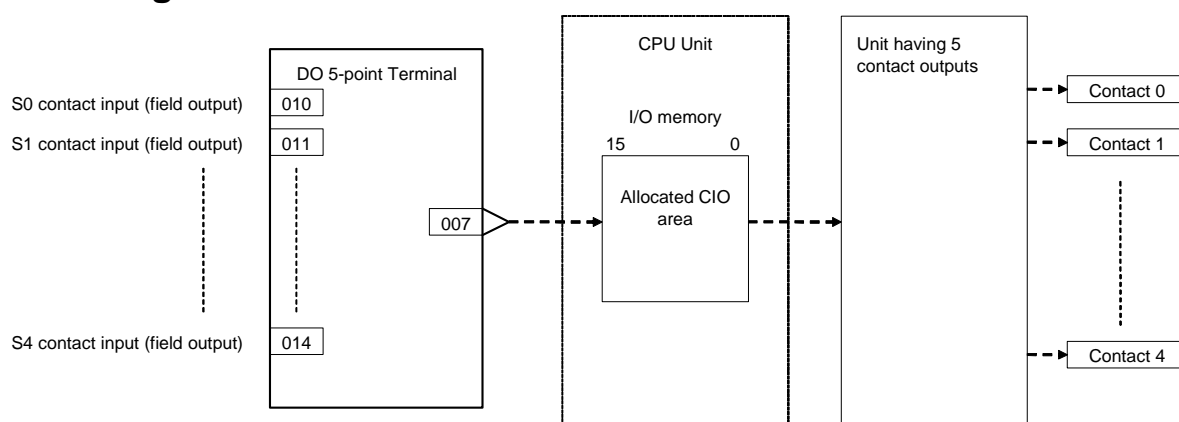
Outline

This function block is the Field Terminal block for outputting five contacts from 5-point Output Units (C200H-OC223).

Note1: The word number to be assigned for analog/input to CIO (channel I/O) Area on the CPU Unit must be set to ITEM007 (CIO word No.).

Note2: The data of the five contact points are written to the lower four bits 00 to 04 of 1st word of the allocated CIO. 0 (OFF) is written to remaining bits 05 to 15.

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|--------------------------------------|------|--------|---|---------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: DO 5-point Terminal | 511 | 511 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| | 007 | | CIO word No. (Enter leading word No. allocated to I/O.) | 0 to 32767 | 32767 | - | R/W(S) | - | - | - | 2 |
| Contact input (field contact output) | 010 | S0 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | 014 | S4 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |

19 Field Terminal Block

<512> DO 8-point Terminal 901 to 980

| Block Model | Block Name | Block Address |
|-------------|---------------------|---------------|
| <512> | DO 8-point Terminal | 901 to 980 |

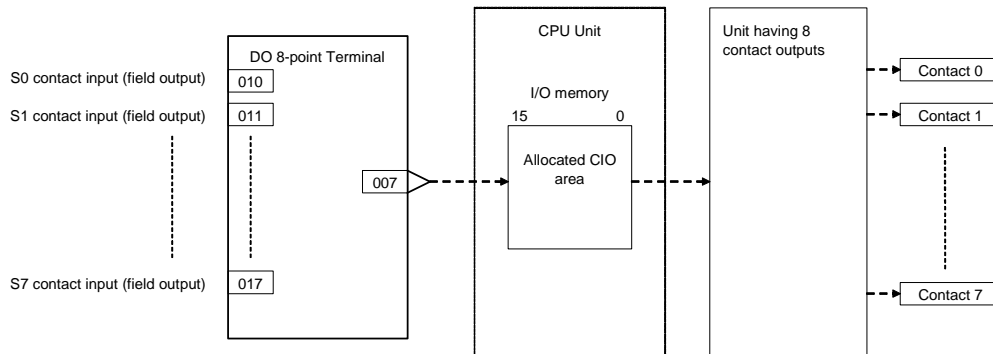
Outline

This function block is the Field Terminal block for outputting eight contacts from 8-point Output Units (C200H-O□□□□).

Note1: The word number to be assigned for analog/input to CIO (channel I/O) Area on the CPU Unit must be set to ITEM007 (CIO word No.).

Note2: The data of the eight contact points are written to the lower eight bits 00 to 07 of 1st word of the allocated CIO. 0 (OFF) is written to remaining bits 08 to 15.

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|--------------------------------------|--------|--------|---|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: DO 8-point Terminal | 512 | 512 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| | 007 | | CIO word No. (Enter leading word No. allocated to I/O.) | 0 to 32767 | 32767 | - | R/W(S) | - | - | - | 2 |
| Contact input (field contact output) | 010 | S0 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | to 017 | S7 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |

| Block Model | Block Name | Block Address |
|-------------|----------------------|---------------|
| <513> | DO 12-point Terminal | 901 to 980 |

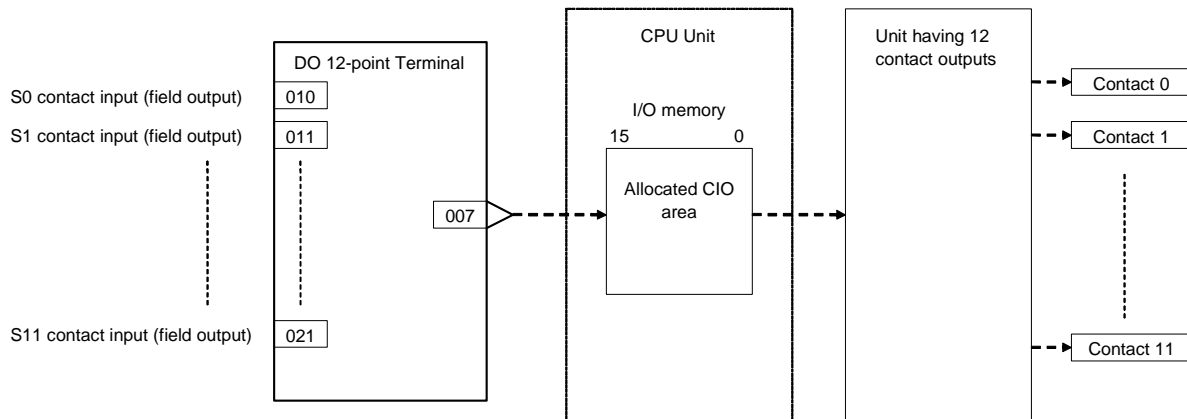
Outline

This function block is the Field Terminal block for outputting 12 contacts from 12-point Output Units (C200H-O□□□).

Note1: The word number to be assigned for analog/input to CIO (channel I/O) Area on the CPU Unit must be set to ITEM007 (CIO word No.).

Note2: The data of the 12 contact points are written to the lower 12 bits 00 to 11 of 1st word of the allocated CIO. 0 (OFF) is written to remaining bits 12 to 15.

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|--------------------------------------|------|--------|---|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: DO 12-point Terminal | 513 | 513 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| | 007 | | CIO word No. (Enter leading word No. allocated to I/O.) | 0 to 32767 | 32767 | - | R/W(S) | - | - | - | 2 |
| Contact input (field contact output) | 010 | S0 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | 021 | S11 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |

19 Field Terminal Block

<514> DO 16-point Terminal 901 to 980

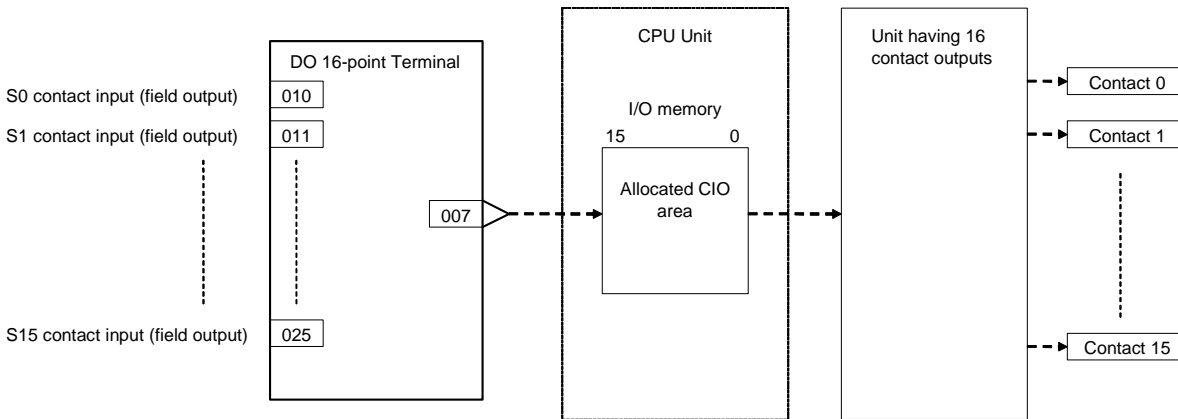
| Block Model | Block Name | Block Address |
|-------------|----------------------|---------------|
| <514> | DO 16-point Terminal | 901 to 980 |

Outline

This function block is the Field Terminal block for outputting 16 contacts from 16-point Output Units (C200H-OD□□□ or CS1W-O□□□□).

Note: The word number to be assigned for analog/input to CIO (channel I/O) Area on the CPU Unit must be set to ITEM007 (CIO word No.).

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Sym bol | Data Description | Data Range | Default | COLD start initializ ation | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | Accordi ng to CX-Pro cess Tool | Accordi ng to CX-Pro cess Monitor *1 | Accordi ng to ITEM Setting block | Accordi ng to Step Ladder Progra m | Data Length (bytes) |
|--------------------------------------|--------|---------|---|---------------|------------|----------------------------|---|--------------------------------|--------------------------------------|----------------------------------|------------------------------------|---------------------|
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | - | 24 |
| | 002 | | Block Model: DO 16-point Terminal | 514 | 514 | - | R/W(S) | - | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | - | 2 |
| | 007 | | CIO word No. (Enter leading word No. allocated to I/O.) | 0 to 32767 | 32767 | - | R/W(S) | - | - | - | - | 2 |
| Contact input (field contact output) | 010 | S0 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | - | R/W | 1 |
| | to 025 | S15 | to Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | - | R/W | 1 |

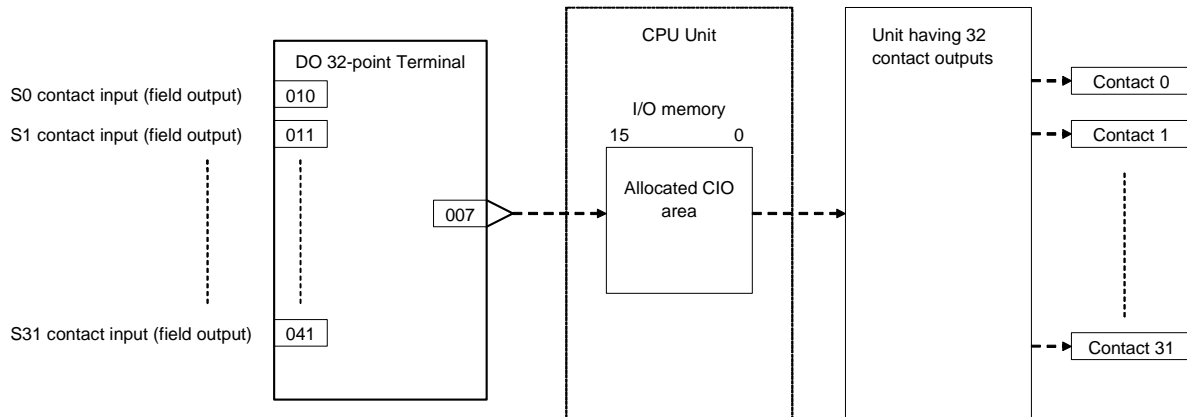
| Block Model | Block Name | Block Address |
|-------------|----------------------|---------------|
| <515> | DO 32-point Terminal | 901 to 980 |

Outline

This function block is the Field Terminal block for outputting 32 contacts from 32-point Output Units (C200H-OD218, CS1W-OD23□, or Special I/O Unit C200H-OD215).

Note: The word number to be assigned for analog/input to CIO (channel I/O) Area on the CPU Unit (in the case of the Special I/O Unit, the leading word number allocated to Special I/O Unit relay area) must be set to ITEM007 (CIO word No.).

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|--------------------------------------|------|--------|---|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: DO 32-point Terminal | 515 | 515 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| | 007 | | CIO word No. (Enter leading word No. allocated to I/O.) | 0 to 32767 | 32767 | - | R/W(S) | - | - | - | 2 |
| Contact input (field contact output) | 010 | S0 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | to | to | | | | Yes | | | | | |
| | 025 | S15 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | 026 | S16 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | to | to | | | | Yes | | | | | |
| | 041 | S31 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |

19 Field Terminal Block

<516> DO 64-point Terminal 901 to 980

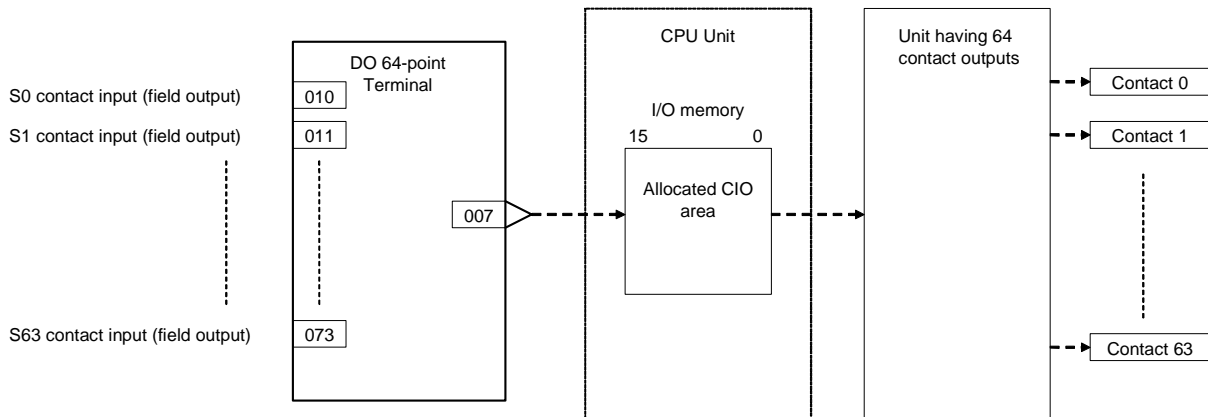
| Block Model | Block Name | Block Address |
|-------------|----------------------|---------------|
| <516> | DO 64-point Terminal | 901 to 980 |

Outline

This function block is the Field Terminal block for outputting 64 contacts from 64-point Output Units (C200H-OD219 or CS1W-OD26□).

Note: The word number to be assigned for analog/input to CIO (channel I/O) Area on the CPU Unit must be set to ITEM007 (CIO word No.).

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|--------------------------------------|------|--------------------------------------|---|---------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: DO 64-point Terminal | 516 | 516 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| | 007 | | CIO word No. (Enter leading word No. allocated to I/O.) | 0 to 32767 | 32767 | - | R/W(S) | - | - | - | 2 |
| Contact input (field contact output) | 010 | S0 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | to | to | | | | Yes | | | | | |
| | 025 | S15 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | 026 | S16 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | to | to | | | | Yes | | | | | |
| | 041 | S31 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | 042 | S32 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | to | to | | | | Yes | | | | | |
| 073 | S63 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 | |

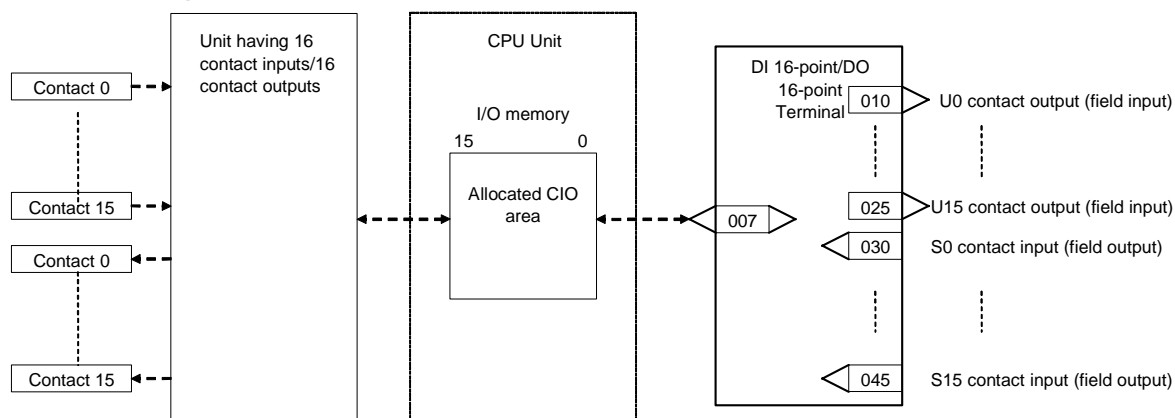
| Block Model | Block Name | Block Address |
|-------------|----------------------------------|---------------|
| <518> | DI 16-point/DO 16-point Terminal | 901 to 980 |

Outline

This function block is the Field Terminal block for inputting 16 contacts and outputting 16 contacts from 16-point Input/16-point Output Units (Special I/O Unit C200H-MD□□□).

Note: The word number to be assigned for analog/input to CIO (channel I/O) Area on the CPU Unit must be set to ITEM007 (CIO word No.).

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | Data Length (bytes) |
|--------------------------------------|------|--------|---|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | R | W | R/W | :- | |
| | | | | | | | Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | |
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | 1 | |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | 24 | |
| | 002 | | Block Model: DI 16-point/DO 16-point Terminal | 518 | 518 | - | R/W(S) | - | - | 2 | |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | 2 | |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | 2 | |
| | 007 | | CIO word No. (Enter leading word No. allocated to I/O.) | 0 to 32767 | 32767 | - | R/W(S) | - | - | 2 | |
| Contact output (field output) | 010 | U0 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | to | to | | | | Yes | | | | | |
| Contact input (field contact output) | 025 | U15 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | 030 | S0 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| Contact input (field contact output) | to | to | | | | Yes | | | | | |
| | 045 | S15 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |

19 Field Terminal Block

<525> DI 96-point Terminal 901 to 980

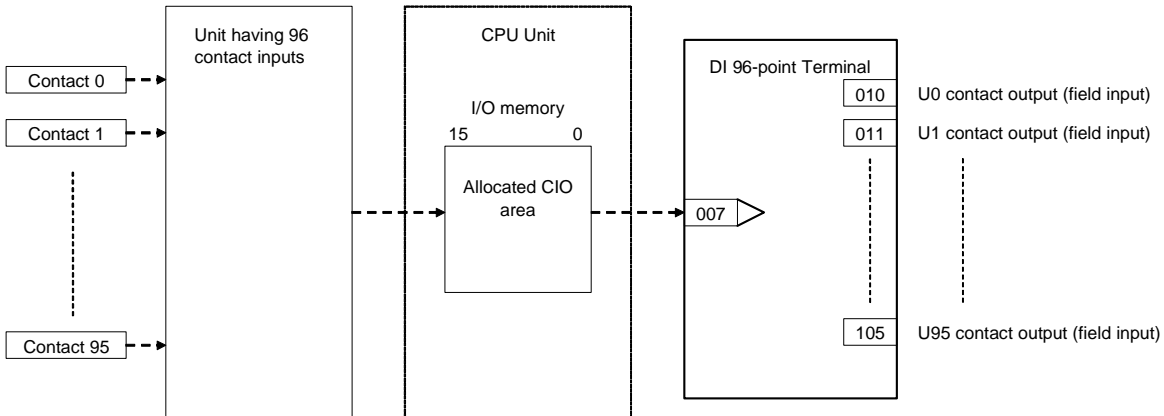
| Block Model | Block Name | Block Address |
|-------------|----------------------|---------------|
| <525> | DI 96-point Terminal | 901 to 980 |

Outline

This function block is the Field Terminal block for inputting 96 contacts from 96-point Input Units (CS1W-ID291).

Note: The word number to be assigned for analog/input to CIO (channel I/O) Area on the CPU Unit must be set to ITEM007 (CIO word No.).

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|--------------------------------------|------|--------------------------------------|---|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: DI 96-point Terminal | 525 | 525 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| | 007 | | CIO word No. (Enter leading word No. allocated to I/O.) | 0 to 32767 | 32767 | - | R/W(S) | - | - | - | 2 |
| Contact output (field contact input) | 010 | U0 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | to | to | | | | Yes | | | | | |
| | 025 | U15 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | 026 | U16 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | to | to | | | | Yes | | | | | |
| 105 | U95 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R | 1 | |

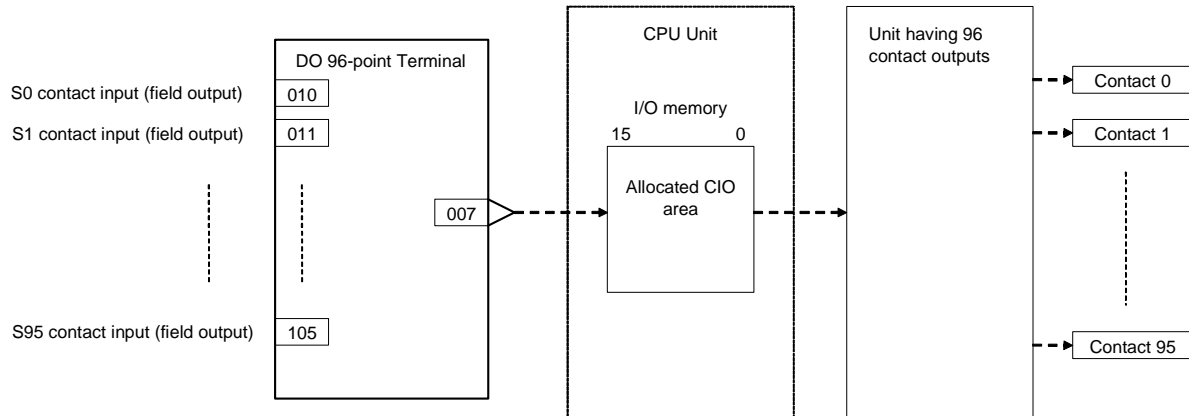
| Block Model | Block Name | Block Address |
|-------------|----------------------|---------------|
| <537> | DO 96-point Terminal | 901 to 980 |

Outline

This function block is the Field Terminal block for outputting 96 contacts from 96-point Output Units (CS1W-OD29 □).

Note: The word number to be assigned for analog/input to CIO (channel I/O) Area on the CPU Unit must be set to ITEM007 (CIO word No.).

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|--------------------------------------|------|--------|---|---------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: DO 96-point Terminal | 537 | 537 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| | 007 | | CIO word No. (Enter leading word No. allocated to I/O.) | 0 to 32767 | 32767 | - | R/W(S) | - | - | - | 2 |
| Contact input (field contact output) | 010 | S0 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | to | | to | | | Yes | | | | | |
| | 025 | S15 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | 026 | S16 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | to | | to | | | Yes | | | | | |
| | 105 | S95 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |

19 Field Terminal Block

<544> DI 48-point/DO 48-point Terminal 901 to 980

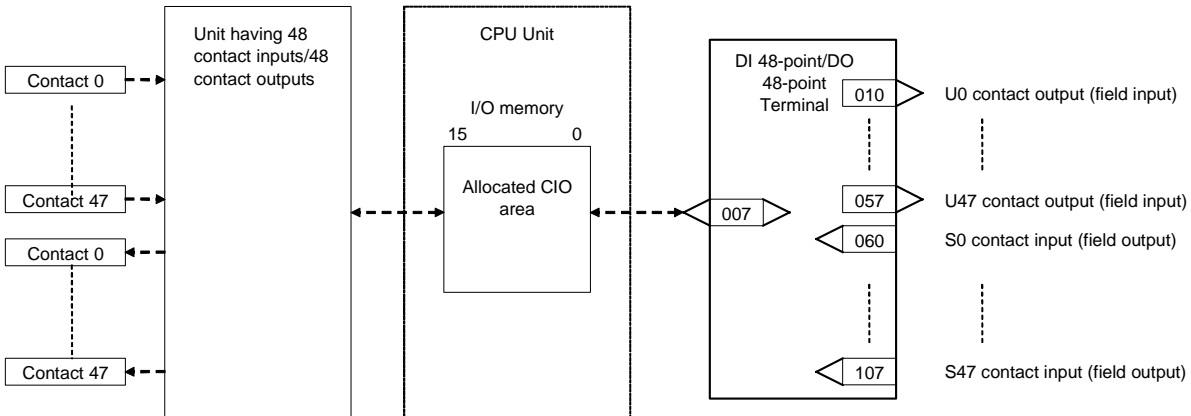
| Block Model | Block Name | Block Address |
|-------------|----------------------------------|---------------|
| <544> | DI 48-point/DO 48-point Terminal | 901 to 980 |

Outline

This function block is the Field Terminal block for inputting 48 contacts and outputting 48 contacts from 48-point Input/48-point Output Units (CS1W-MD29□).

Note: The word number to be assigned for analog/input to CIO (channel I/O) Area on the CPU Unit must be set to ITEM007 (CIO word No.).

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|--------------------------------------|------|--------|---|---------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: DI 48-point/ DO 48-point Terminal | 544 | 544 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| | 007 | | CIO word No. (Enter leading word No. allocated to I/O.) | 0 to 32767 | 32767 | - | R/W(S) | - | - | - | 2 |
| Contact output (field contact input) | 010 | U0 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | to | to | | | | Yes | | | | | |
| Contact input (field contact output) | 057 | U47 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | to | to | | | | Yes | | | | R/W | 1 |
| Contact input (field contact output) | 060 | S0 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |
| | to | to | | | | Yes | | | | R/W | 1 |
| | 107 | S47 | Contact input (field contact output) | 0, 1 | 0 | Yes | - | - | - | R/W | 1 |

| Block Model | Block Name | Block Address |
|-------------|-----------------------------|---------------|
| <551> | AI 8-point Terminal (AD003) | 901 to 980 |

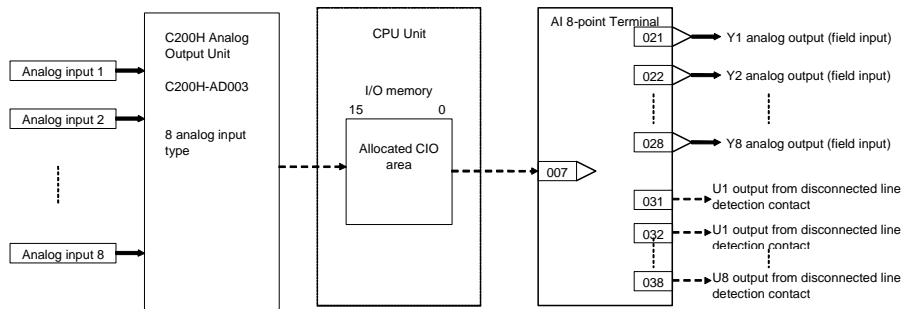
Outline

This function block is the Field Terminal block for inputting eight analog signals from 8-point Input Units (C200H-AD003).

Note1: Prevent the averaging function of the Analog Input Unit from duplicating the functions of the function blocks on the Loop Control Unit.

Note2: For details on how to set the Analog Input Unit, see the Analog I/O Unit User's Manual.

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|-----------------------------|------|--------|---|-------------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: AI 8-point Terminal (AD003) | 551 | 551 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| | 007 | | Unit number | 0 to 15 | 15 | - | R/W(S) | - | - | - | 2 |
| | 011 | S1 | No.1 input range (0: 1 to 5V/4 to 20mA/0 to 10V, 1: -10 to +10V) | 0, 1 | 0 | - | R/W(S) | - | - | - | 2 |
| | 018 | S8 | No.8 input range (0: 1 to 5V/4 to 20mA/0 to 10V, 1: -10 to +10V) | 0, 1 | 0 | - | R/W(S) | - | - | - | 2 |
| Analog output (field input) | 021 | Y1 | Analog output (field input) | -5.00 to +105.00% | 0.00 | Yes | r/w | - | - | - | 2 |
| | 028 | Y8 | Analog output (field input) | -5.00 to +105.00% | 0.00 | Yes | r/w | - | - | - | 2 |
| Contact output | 031 | U1 | Output from disconnected line detection contact (0: No error, 1: Disconnected line) | | 0 | Yes | - | - | - | R | 1 |
| | 038 | U8 | Output from disconnected line detection contact (0: No error, 1: Disconnected line) | | 0 | Yes | - | - | - | R | 1 |

19 Field Terminal Block

<552> AO 8-point Terminal (DA003/4) 901 to 980

| Block Model | Block Name | Block Address |
|-------------|-------------------------------|---------------|
| <552> | AO 8-point Terminal (DA003/4) | 901 to 980 |

Outline

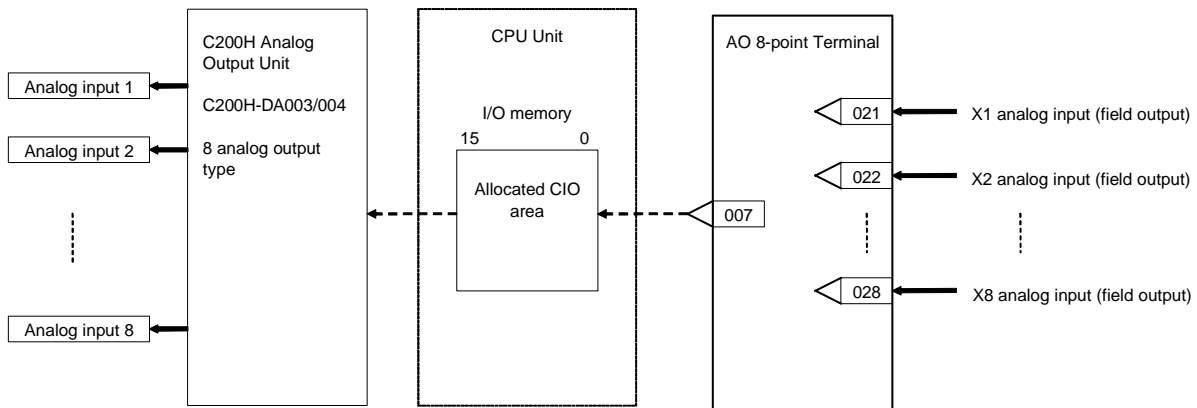
This function block is the Field Terminal block for outputting eight analog signals from 8-point Output Units (C200H-DA003/004).

Note1: Prevent the output hold function of the Analog Output Unit from duplicating the functions of the function blocks on the Loop Control Unit.

Note2: For details on how to set the Analog Output Unit, see the Analog I/O Unit User's Manual (Cat. No. SCCC-338).

Note3: 00FF Hex is automatically set to the 1st word (n) of the allocated relay area of C200H-DA003/004. As a result of this, the Conversion Enabled flag for each of the analog output points is always 1 (start of conversion output). For this reason, conversion output of the Analog Output Unit cannot be stopped.

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|-------------------------------------|------|--------|---|-------------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: AO 8-point Terminal | 552 | 552 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| | 007 | | Unit number | 0 to 15 | 15 | - | R/W(S) | - | - | - | 2 |
| | 011 | | No.1 input range (0: 1 to 5V/0 to 10V/4 to 20mA, 1: -10 to +10V) | 0, 1 | 0 | - | R/W(S) | - | - | - | 2 |
| | to | | to | | | - | | | | | |
| Analog input connection information | 021 | | X1 source designation BBB: Block No., III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| | to | | to | | | - | | | | | |
| Analog input (field output) | 031 | X1 | Analog input (field output) | -5.00 to +105.00% | 0.00 | Yes | r | - | - | - | 2 |
| | to | | to | | | Yes | | | | | |
| | 038 | X8 | Analog input (field output) | -5.00 to +105.00% | 0.00 | Yes | r | - | - | - | 2 |

19 Field Terminal Block

<553> AI 2-point/AO 2-point Terminal (MAD01) 901 to 980

| Block Model | Block Name | Block Address |
|-------------|---|---------------|
| <553> | AI 2-point/AO 2-point Terminal (MAD01) | 901 to 980 |

Outline

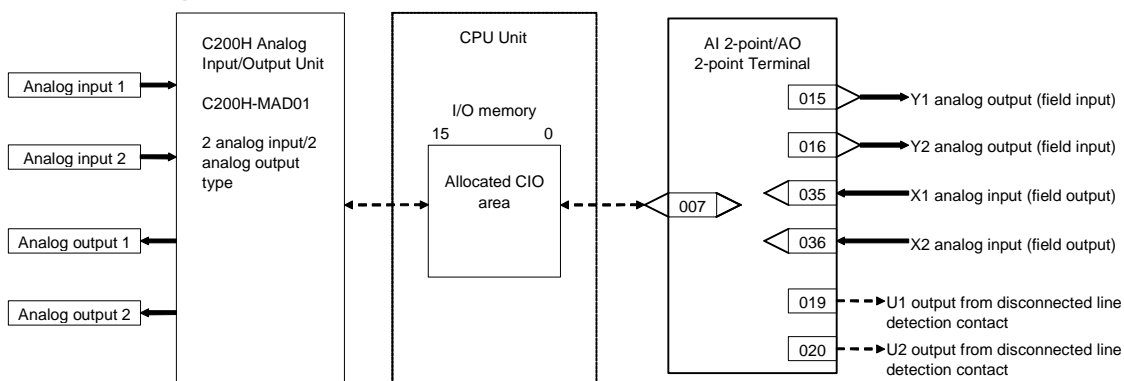
This function block is the Field Terminal block for inputting two analog signals and outputting two analog signals from 2-point Input/2-point Output Units (C200H-MAD01).

Note1: Prevent the averaging, peak hold, output hold and ratio conversion functions of the Analog Input/Output Unit from duplicating the functions of the function blocks on the Loop Control Unit.

Note2: For details on how to set the Analog Output Unit, see the Analog I/O Unit User's Manual (Cat. No. SCCC-338).

Note3: 0003 Hex is automatically set to the 1st word (n) of the allocated relay area of C200H-MAD01. As a result of this, the Conversion Enabled flag for each of the analog output points is always 1 (start of conversion output). For this reason, conversion output of analog output cannot be stopped, and the peak hold function of analog input cannot be used.

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|-------------------------------------|------|--------|---|-------------------|------------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: AI 2-point/AO 2-point Terminal (MAD01) | 553 | 553 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| | 007 | | Unit number | 0 to 15 | 15 | - | R/W(S) | - | - | - | 2 |
| | 011 | | No.1 input range (0: 1 to 5V/4 to 20mA/0 to 10V, 1: -10 to +10V) | 0, 1 | 0 | - | R/W(S) | - | - | - | 1 |
| | 012 | | No.2 input range (0: 1 to 5V/4 to 20mA/0 to 10V, 1: -10 to +10V) | 0, 1 | 0 | - | R/W(S) | - | - | - | 1 |
| Analog output | 015 | Y1 | Analog output (field input) | -5.00 to +105.00% | 0.00 | Yes | r/w | - | - | - | 2 |
| | 016 | Y2 | Analog output (field input) | -5.00 to +105.00% | 0.00 | Yes | r/w | - | - | - | 2 |
| Parameter | 019 | U1 | Output from disconnected line detection contact (0: No error, 1: Disconnected line) Note) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | 020 | U2 | Output from disconnected line detection contact (0: No error, 1: Disconnected line) Note) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | 031 | | No.1 output range (0: 1 to 5V/0 to 10V, 1: -10 to +10V) | 0, 1 | 0 | - | R/W(S) | - | - | - | 2 |
| | 032 | | No.2 output range (0: 1 to 5V/0 to 10V, 1: -10 to +10V) | 0, 1 | 0 | - | R/W(S) | - | - | - | 2 |
| Analog input connection information | 035 | | X1 source designation BBB: Block No., III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| | 036 | | X2 source designation BBB: Block No., III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| Analog input (field output) | 039 | X1 | Analog input (field output) | -5.00 to +105.00% | 0.00 | Yes | r | - | - | - | 2 |
| | 040 | X2 | Analog input (field output) | -5.00 to +105.00% | 0.00 | Yes | r | - | - | - | 2 |

Note: Disconnected line detection functions only when the input is 1 to 5V/4 to 20mA.

19 Field Terminal Block

<561> AI 4-point Terminal

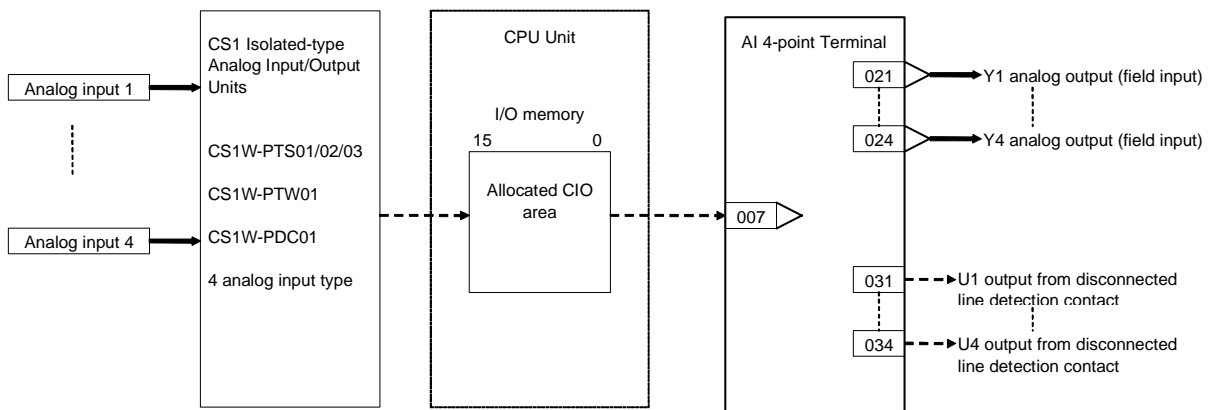
(PTS01/02/03, PDC01, PTW01) 901 to 980

| Block Model | Block Name | Block Address |
|-------------|--|---------------|
| <561> | AI 4-point Terminal (PTS01/02/03, PDC01, PTW01) | 901 to 980 |

Outline

This function block is the Field Terminal for inputting four analog signals from one of Isolated-type Thermocouple Input Unit (CS1W-PTS01), Isolated-type Temperature-resistance Thermometer Input Unit (CS1W-PTS02/03), Isolated-type Analog Input Unit (CS1W-PDC01) or 2-lead Transmitter Input Unit (CS1W-PTW01). Either one range can be set for all points (Y1 to Y8) or a different range can be set for each point (supported from version 2.50 of the Loop Control Unit).

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|-----------------------------|-------|--------|--|-------------------|------------|---------------------------|---|-----------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor*1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: AI 4-point Terminal (PTS01/02/03, PDC01, PTW01) | 561 | 561 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| | 007 | | Unit number | 0 to 95 | 95 | - | R/W(S) | - | - | - | 2 |
| | 008*1 | | Range conversion method 0: Common setting for all ranges, 1: Individual setting for each range | 0, 1 | 0 | - | R/W(S) | - | - | - | 1 |
| | 010 | | Common or Y1 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM011 and ITEM012) Note: ITEM 008 determines if this parameter is for all ranges or only the Y1 input range. | 0 to 4, 9 | 1 | - | R/W(S) | - | - | - | 1 |
| | 011 | | 0% value for all ranges or Y1 range | ±32000 | 0 | - | R/W(S) | - | - | - | 2 |
| | 012 | | 100% value for all ranges or Y1 range | ±32000 | 4000 | - | R/W(S) | - | - | - | 2 |
| Analog output (field input) | 021 | Y1 | Analog output (field input) | -15.00 to +115.00 | 0.00 | Yes | r/w | - | - | - | 2 |
| | to | to | to | | | Yes | | | | | |
| | 024 | Y4 | Analog output (field input) | -15.00 to +115.00 | 0.00 | Yes | r/w | - | - | - | 2 |
| Contact output | 031 | U1 | Output of input error contact (0: No error, 1: Input error) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | to | to | to | | | Yes | | | | | |
| | 034 | U4 | Output of input error contact (0: No error, 1: Input error) | 0, 1 | 0 | Yes | - | - | - | R | 1 |

19 Field Terminal Block
<561> AI 4-point Terminal
(PTS01/02/03, PDC01, PTW01) 901 to 980

Individual range settings

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|-----------|-------------------|--------|--|------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Parameter | 050* ¹ | | Y2 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM 051 and 052) | 0 to 4, 9 | 1 | - | R/W(S) | - | - | - | 1 |
| | 051* ¹ | | 0% value for Y2 range | ±32000 | 0 | - | R/W(S) | - | - | - | 2 |
| | 052* ¹ | | 100% value for Y2 range | ±32000 | 4000 | - | R/W(S) | - | - | - | 2 |
| | 053* ¹ | | Y3 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM 054 and 055) | 0 to 4, 9 | 1 | - | R/W(S) | - | - | - | 1 |
| | 054* ¹ | | 0% value for Y2 range | ±32000 | 0 | - | R/W(S) | - | - | - | 2 |
| | 055* ¹ | | 100% value for Y2 range | ±32000 | 4000 | - | R/W(S) | - | - | - | 2 |
| | 056* ¹ | | Y4 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM 057 and 058) | 0 to 4, 9 | 1 | - | R/W(S) | - | - | - | 1 |
| | 057* ¹ | | 0% value for Y4 range | ±32000 | 0 | - | R/W(S) | - | - | - | 2 |
| | 058* ¹ | | 100% value for Y4 range | ±32000 | 4000 | - | R/W(S) | - | - | - | 2 |

*1: Supported from version 2.50 of the Loop Control Unit.

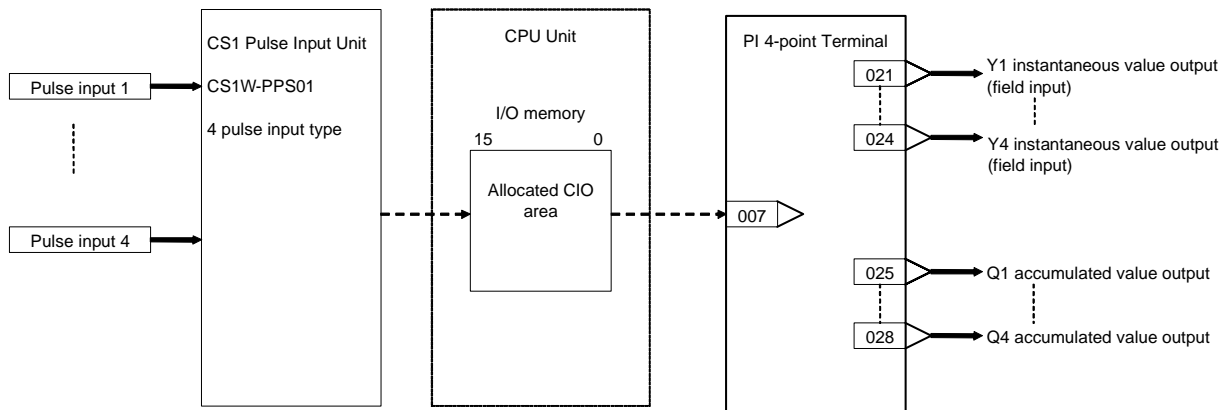
| Block Model | Block Name | Block Address |
|-------------|-----------------------------|---------------|
| <562> | PI 4-point Terminal (PPS01) | 901 to 980 |

Outline

This function block is the Field Block for inputting four pulses from Pulse Input Units (CS1W-PPS01).

Either one range can be set for all points (Y1 to Y8) or a different range can be set for each point (supported from version 2.50 of the Loop Control Unit).

Block diagram



19 Field Terminal Block

<562> PI 4-point Terminal (PPS01) 901 to 980

ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|--------------------------|-------|--------|---|-----------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: PI 4-point Terminal | 562 | 562 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| | 007 | | Unit number | 0 to 95 | 95 | - | R/W(S) | - | - | - | 2 |
| | 008*1 | | Range conversion method 0: Common setting for all ranges, 1: Individual setting for each range | 0, 1 | 0 | - | R/W(S) | - | - | - | 1 |
| | 010 | | Common or Y1 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM011 and ITEM012) Note: ITEM 008 determines if this parameter is for all ranges or only the Y1 input range. | 0 to 4, 9 | 1 | - | R/W(S) | - | - | - | 1 |
| | 011 | | 0% value for all ranges or Y1 range | ±32000 | 0 | - | R/W(S) | - | - | - | 2 |
| | 012 | | 100% value for all ranges or Y1 range | ±32000 | 4000 | - | R/W(S) | - | - | - | 2 |
| Analog output | 021 | Y1 | Instantaneous value output | 0.00 to 115.00% | 0.00 | Yes | r/w | - | - | - | 2 |
| | to | to | | | | Yes | | | | | |
| | 024 | Y4 | Instantaneous value output | 0.00 to 115.00% | 0.00 | Yes | r/w | - | - | - | 2 |
| Accumulated output value | 025 | Q1 | Accumulated value output (Accumulation within range 0 to 9999 is repeated.) | 0 to 9999 | 0 | Yes | r/w | - | - | - | 2 |
| | to | to | | | | Yes | | | | | |
| | 028 | Q4 | Accumulated value output (Accumulation within range 0 to 9999 is repeated.) | 0 to 9999 | 0 | Yes | r/w | - | - | - | 2 |
| Contact output | 031 | U1 | Pulse Input Unit Restart flag Output turns 1 (ON) for 10 sec. at reset of flag. | 0, 1 | 0 | Yes | - | - | - | R | 1 |

Individual range settings

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | Data Length (bytes) |
|-----------|-------|--------|---|------------|---------|---------------------------|--|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled | | | | |
| | | | | | | | Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | |
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Parameter | 050*1 | | Y2 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM 051 and 052) | 0 to 4, 9 | 1 | - | R/W(S) | - | - | - | 1 |
| | 051*1 | | 0% value for Y2 range | ±32000 | 0 | - | R/W(S) | - | - | - | 2 |
| | 052*1 | | 100% value for Y2 range | ±32000 | 4000 | - | R/W(S) | - | - | - | 2 |
| | 053*1 | | Y3 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM 054 and 055) | 0 to 4, 9 | 1 | - | R/W(S) | - | - | - | 1 |
| | 054*1 | | 0% value for Y3 range | ±32000 | 0 | - | R/W(S) | - | - | - | 2 |
| | 055*1 | | 100% value for Y3 range | ±32000 | 4000 | - | R/W(S) | - | - | - | 2 |
| | 056*1 | | Y4 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM 057 and 058) | 0 to 4, 9 | 1 | - | R/W(S) | - | - | - | 1 |
| | 057*1 | | 0% value for Y4 range | ±32000 | 0 | - | R/W(S) | - | - | - | 2 |
| | 058*1 | | 100% value for Y4 range | ±32000 | 4000 | - | R/W(S) | - | - | - | 2 |

*1: This ITEM has been added to Loop Control Unit Ver. 2.50.

Note: Q1 to Q4 accumulated values are not accumulated values output by the Pulse Input Unit; they are values that are accumulated exclusively by this function block. When a cold start is performed, these accumulated values are cleared to 0. For this reason, if the accumulated values of the Pulse Input Unit are not 0 when a cold start is performed, the Q1 to Q4 accumulated values on the Loop Control Unit will not match the accumulated values that are output by the Pulse Input Unit.

19 Field Terminal Block

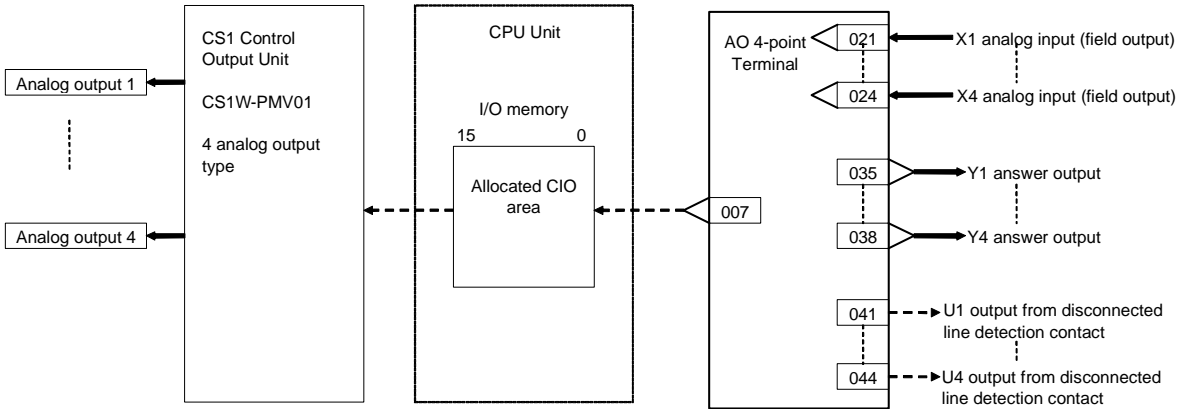
<563> AO 4-point Terminal (PMV01) 901 to 980

| Block Model | Block Name | Block Address |
|-------------|-----------------------------|---------------|
| <563> | AO 4-point Terminal (PMV01) | 901 to 980 |

Outline

This function block is the Field Block for outputting four analog signals from CS-series Control Output Units (CS1W-PMV01).

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Sym bol | Data Description | Data Range | Default | COLD start initializ ation | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|---|------|------------|---|-----------------------|---------------|-------------------------------------|---|---|--|---|---------------------------|
| | | | | | | | Accordi ng to CX-Pro cess Tool | Accordi ng to CX-Pro cess Monitor *1 | Accordi ng to ITEM Setting block | Accordi ng to Step Ladder Progra m | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: AO 4-point Terminal (PMV01) | 563 | 563 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| | 007 | | Unit number | 0 to 95 | 95 | - | R/W(S) | - | - | - | 2 |
| Analog input connection information | 021 | | X1 source designation BBB: Block No., III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| | to | | to | | | - | | | | | |
| Analog input (field output) | 024 | | X4 source designation BBB: Block No., III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| | to | | to | | | - | | | | | |
| Analog output (answer input) | 031 | X1 | Analog input (field output) | -20.00 to +115.00% | 0.00 | Yes | r | - | - | - | 2 |
| | to | | to | | | Yes | | | | | |
| Analog output (answer input) | 034 | X4 | Analog input (field output) | -20.00 to +115.00% | 0.00 | Yes | r | - | - | - | 2 |
| | to | | to | | | Yes | | | | | |
| Analog output (answer input) | 035 | Y1 | Analog output (answer input) | -20.00 to +115.00% | 0.00 | Yes | r/w | - | - | - | 2 |
| | to | | to | | | Yes | | | | | |
| Contact output | 038 | Y4 | Analog output (answer input) | -20.00 to +115.00% | 0.00 | Yes | r/w | - | - | - | 2 |
| | to | | to | | | Yes | | | | | |
| Contact output | 041 | U1 | Output from disconnected line detection contact (0: No error, 1: Disconnected line) | 0, 1 | 0 | Yes | - | - | - | R | 2 |
| | to | | to | | | Yes | | | | | |
| | 044 | U4 | Output from disconnected line detection contact (0: No error, 1: Disconnected line) | 0, 1 | 0 | Yes | - | - | - | R | 2 |

19 Field Terminal Block

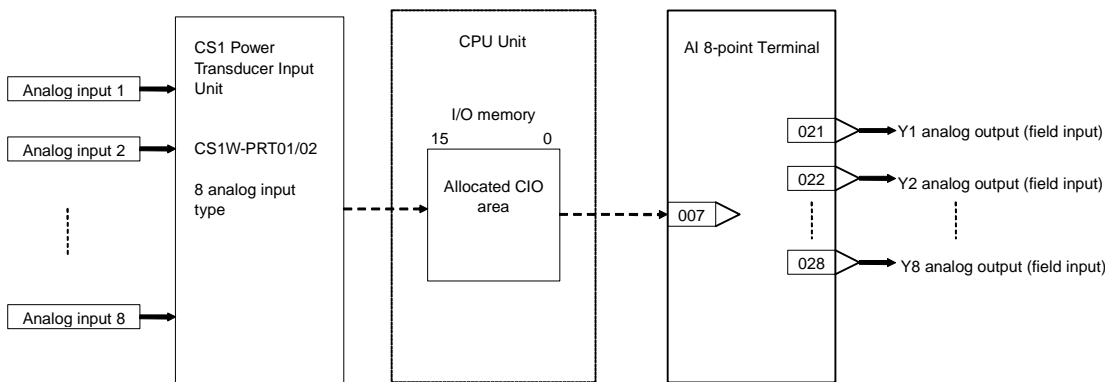
<564> AI 8-point Terminal (PTR01/02) 901 to 980

| Block Model | Block Name | Block Address |
|-------------|--------------------------------|---------------|
| <564> | AI 8-point Terminal (PTR01/02) | 901 to 980 |

Outline

This function block is the Field Block for inputting eight analog signals from CS-series Power Transducer Input Units (CS1W-PTR01/02).
 Either one range can be set for all points (Y1 to Y8) or a different range can be set for each point (supported from version 2.50 of the Loop Control Unit).

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|---------------|------------------|--------|---|--------------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: AI 8-point Terminal (PTR01/02/03) | 564 | 564 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| Parameter | 007 | | Unit number | 0 to 95 | 95 | - | R/W(S) | - | - | - | 2 |
| | 008 ¹ | | Range conversion method 0: Common setting for all ranges, 1: Individual setting for each range | 0, 1 | 0 | - | R/W(S) | - | - | - | 1 |
| Parameter | 010 | | Common or Y1 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM011 and ITEM012) Note: ITEM 008 determines if this parameter is for all ranges or only the Y1 input range. | 0 to 4, 9 | 1 | - | R/W(S) | - | - | - | 1 |
| | 011 | | 0% value for all ranges or Y1 range | ±32000 | 0 | - | R/W(S) | - | - | - | 2 |
| | 012 | | 100% value for all ranges or Y1 range | ±32000 | 4000 | - | R/W(S) | - | - | - | 2 |
| Analog output | 021 | Y1 | Analog output (field input) | -15.00 to +115.00% | 0.00 | Yes | r/w | - | - | - | 2 |
| | 028 | Y8 | Analog output (field input) | -15.00 to +115.00% | 0.00 | Yes | r/w | - | - | - | 2 |

Individual range settings

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|------------------|------------------|-------------------------|--|------------|---------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Parameter | 050 ¹ | | Y2 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM 051 and 052) | 0 to 4, 9 | 1 | - | R/W(S) | - | - | - | 1 |
| | 051 ¹ | | 0% value for Y2 range | ±32000 | 0 | - | R/W(S) | - | - | - | 2 |
| | 052 ¹ | | 100% value for Y2 range | ±32000 | 4000 | - | R/W(S) | - | - | - | 2 |
| | 053 ¹ | | Y3 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM 054 and 055) | 0 to 4, 9 | 1 | - | R/W(S) | - | - | - | 1 |
| | 054 ¹ | | 0% value for Y3 range | ±32000 | 0 | - | R/W(S) | - | - | - | 2 |
| | 055 ¹ | | 100% value for Y3 range | ±32000 | 4000 | - | R/W(S) | - | - | - | 2 |
| | 056 ¹ | | Y4 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM 057 and 058) | 0 to 4, 9 | 1 | - | R/W(S) | - | - | - | 1 |
| | 057 ¹ | | 0% value for Y4 range | ±32000 | 0 | - | R/W(S) | - | - | - | 2 |
| | 058 ¹ | | 100% value for Y4 range | ±32000 | 4000 | - | R/W(S) | - | - | - | 2 |
| | 059 ¹ | | Y5 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM 060 and 061) | 0 to 4, 9 | 1 | - | R/W(S) | - | - | - | 1 |
| | 060 ¹ | | 0% value for Y5 range | ±32000 | 0 | - | R/W(S) | - | - | - | 2 |
| | 061 ¹ | | 100% value for Y5 range | ±32000 | 4000 | - | R/W(S) | - | - | - | 2 |
| | 062 ¹ | | Y6 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM 063 and 064) | 0 to 4, 9 | 1 | - | R/W(S) | - | - | - | 1 |
| | 063 ¹ | | 0% value for Y6 range | ±32000 | 0 | - | R/W(S) | - | - | - | 2 |
| | 064 ¹ | | 100% value for Y6 range | ±32000 | 4000 | - | R/W(S) | - | - | - | 2 |
| | 065 ¹ | | Y7 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM 066 and 067) | 0 to 4, 9 | 1 | - | R/W(S) | - | - | - | 1 |
| | 066 ¹ | | 0% value for Y7 range | ±32000 | 0 | - | R/W(S) | - | - | - | 2 |
| | 067 ¹ | | 100% value for Y7 range | ±32000 | 4000 | - | R/W(S) | - | - | - | 2 |
| | 068 ¹ | | Y8 input range conversion (0: 0 to 10000, 1: 0 to 4000, 2: -2000 to 2000, 3: 0 to 6000, 4: -3000 to 3000, 9: Range specified at ITEM 069 and 070) | 0 to 4, 9 | 1 | - | R/W(S) | - | - | - | 1 |
| | 069 ¹ | | 0% value for Y8 range | ±32000 | 0 | - | R/W(S) | - | - | - | 2 |
| 070 ¹ | | 100% value for Y8 range | ±32000 | 4000 | - | R/W(S) | - | - | - | 2 | |

*1: Supported from version 2.50 of the Loop Control Unit.

19 Field Terminal Block

<583> AI 4-point/AO 4-point Terminal (MAD44) 901 to 980

| Block Model | Block Name | Block Address |
|-------------|---|---------------|
| <583> | AI 4-point/AO 4-point Terminal (MAD44) | 901 to 980 |

Outline

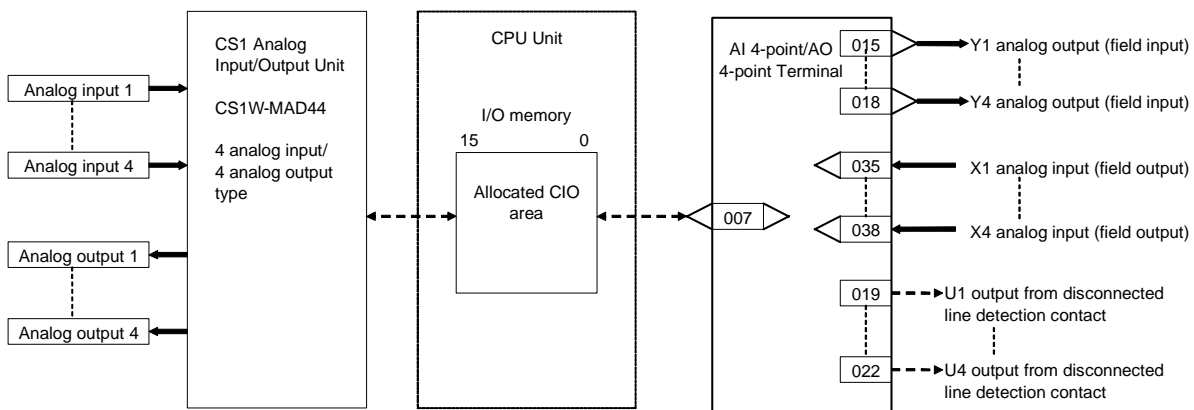
This function block is the Field Terminal for inputting four analog signals and outputting four analog signals from the 4-point Input/4-point Output Unit (CS1W-MAD44).

Note1: Prevent the averaging, peak hold, output hold and ratio conversion functions of the Analog Input/Output Unit from duplicating the functions of the function blocks on the Loop Control Unit.

Note2: For details on how to set the Analog Input/Output Unit, see the Analog I/O Unit User's Manual (Cat. No. SBCC-820).

Note3: 000F Hex is automatically set to the 1st word (n) of the allocated relay area of CS1W-MAD44. As a result of this, the Conversion Enabled flag for each of the analog output points is always 1 (start of conversion output). For this reason, conversion output of analog output cannot be stopped, and the peak hold function of analog input cannot be used.

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|-------------------------------------|------|--------|---|-------------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: AI 4-point/AO 4-point Terminal (MAD44) | 583 | 583 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| | 007 | | Unit number | 0 to 95 | 95 | - | R/W(S) | - | - | - | 2 |
| | 011 | | No.1 input range (0: 1 to 5V/0 to 5V/ 0 to 10V/4 to 20mA, 1: -10 to +10V) | 0, 1 | 0 | - | R/W(S) | - | - | - | 2 |
| | to | to | | | | - | | | | | |
| Analog output | 015 | Y1 | Analog output (field input) | -5.00 to +105.00% | 0.00 | Yes | r/w | - | - | - | 2 |
| | to | to | | | | Yes | | | | | |
| Analog output | 018 | Y4 | Analog output (field input) | -5.00 to +105.00% | 0.00 | Yes | r/w | - | - | - | 2 |
| | to | to | | | | | | | | | |
| Contact output | 019 | U1 | Output from disconnected line detection contact (0: No error, 1: Disconnected line) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | to | to | | | | Yes | | | | | |
| Contact output | 022 | U4 | Output from disconnected line detection contact (0: No error, 1: Disconnected line) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | to | to | | | | | | | | | |
| Parameter | 031 | | No.1 output range (0: 1 to 5V/0 to 5V/ 0 to 10V, 1: -10 to +10V) | 0, 1 | 0 | - | R/W(S) | - | - | - | 2 |
| | to | to | | | | - | | | | | |
| Parameter | 034 | | No.1 output range (0: 1 to 5V/0 to 5V/ 0 to 10V, 1: -10 to +10V) | 0, 1 | 0 | - | R/W(S) | - | - | - | 2 |
| | to | to | | | | - | | | | | |
| Analog input connection information | 035 | | X1 source designation BBB: Block No., III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| | to | to | | | | - | | | | | |
| Analog input connection information | 038 | | X4 source designation BBB: Block No., III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| | to | to | | | | - | | | | | |
| Analog input (field output) | 039 | X1 | Analog output (field output) | -5.00 to +105.00% | 0.00 | Yes | r | - | - | - | 2 |
| | to | to | | | | Yes | | | | | |
| Analog input (field output) | 042 | X4 | Analog output (field output) | -5.00 to +105.00% | 0.00 | Yes | r | - | - | - | 2 |
| | to | to | | | | | | | | | |

19 Field Terminal Block

<584> AI 8-point Terminal (AD081) 901 to 980

| Block Model | Block Name | Block Address |
|-------------|-----------------------------|---------------|
| <584> | AI 8-point Terminal (AD081) | 901 to 980 |

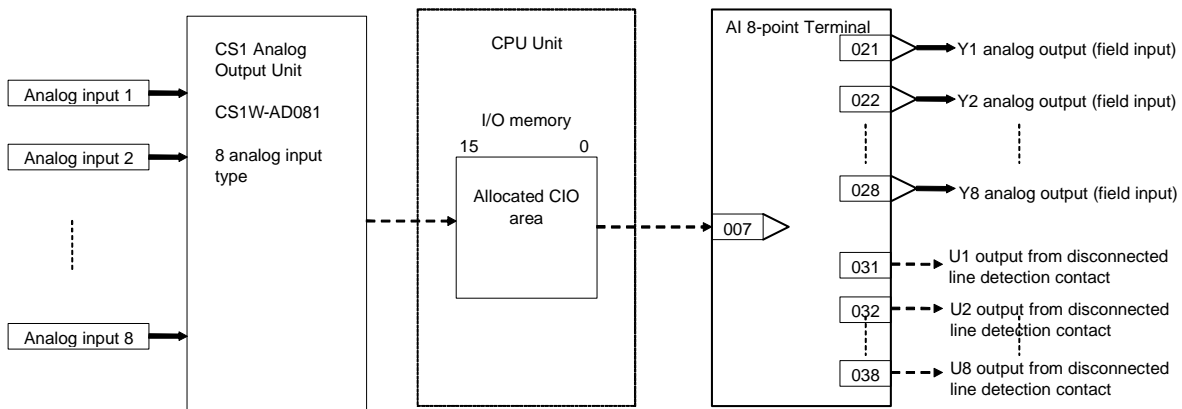
Outline

This function block is the Field Terminal for inputting eight analog signals from the CS-series 8-point Analog Input Unit (CS1W-AD081).

Note1: Prevent the averaging function of the Analog Input Unit from duplicating the functions of the function blocks on the Loop Control Unit.

Note2: For details on how to set the Analog Input Unit, see the Analog I/O Unit User's Manual (Cat. No. SBCC-820).

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|-----------------------------|------|--------|---|-------------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|------------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: AI 8-point Terminal | 584 | 584 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| Parameter | 007 | | Unit number | 0 to 95 | 95 | - | R/W(S) | - | - | - | 2 |
| | 011 | | No.1 input range (0: 1 to 5V/0 to 5V/0 to 10V 4 to 20mA, 1: -10 to +10V) | 0, 1 | 0 | - | R/W(S) | - | - | - | 2 |
| | to | to | | | | - | | | | | |
| Analog output (field input) | 018 | | No.8 input range (0: 1 to 5V/0 to 5V/0 to 10V/4 to 20mA, 1: -10 to +10V) | 0, 1 | 0 | - | R/W(S) | - | - | - | 2 |
| | 021 | Y1 | Analog output (field input) | -5.00 to +105.00% | 0.00 | Yes | r/w | - | - | - | 2 |
| | to | to | | | | Yes | | | | | |
| Contact output | 028 | Y8 | Analog output (field input) | -5.00 to +105.00% | 0.00 | Yes | r/w | - | - | - | 2 |
| | 031 | U1 | Output from disconnected line detection contact (0: No error, 1: Disconnected line) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | to | to | | | | Yes | | | | | |
| | 038 | U8 | Output from disconnected line detection contact (0: No error, 1: Disconnected line) | 0, 1 | 0 | Yes | - | - | - | R | 1 |

19 Field Terminal Block

<585> AO 8-point Terminal (DA08V/C) 901 to 980

| Block Model | Block Name | Block Address |
|-------------|-------------------------------|---------------|
| <585> | AO 8-point Terminal (DA08V/C) | 901 to 980 |

Outline

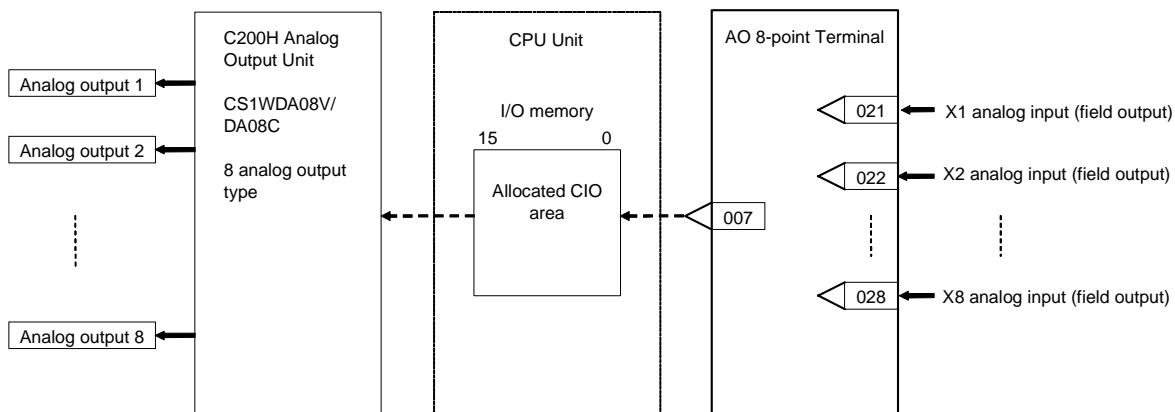
This function block is the Field Terminal for outputting eight analog signals from the CS-series 8-point Analog Output Units (CS1W-DA08V/DA08C).

Note1: Prevent the output hold function of the Analog Output Unit from duplicating the functions of the function blocks on the Loop Control Unit.

Note2: For details on how to set the Analog Output Unit, see the Analog I/O Unit User's Manual (Cat. No. SBCC-820).

Note3: 00FF Hex is automatically set to the 1st word (n) of the allocated relay area of CS1W-DA08V/DA08C. As a result of this, the Conversion Enabled flag for each of the analog output points is always 1 (start of conversion output). For this reason, conversion output of the Analog Output Unit cannot be stopped.

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|-------------------------------------|------|--------|---|-------------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: AO 8-point Terminal (DA08V/C) | 585 | 585 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| | 007 | | Unit number | 0 to 95 | 95 | - | R/W(S) | - | - | - | 2 |
| | 011 | | No.1 output range (0: 1 to 5V/0 to 5V/ 0 to 10V, 1: -10 to +10V) | 0, 1 | 0 | - | R/W(S) | - | - | - | 2 |
| | to | | to | | | - | | | | | |
| Analog input connection information | 018 | | No.8 output range (0: 1 to 5V/0 to 5V/ 0 to 10V, 1: -10 to +10V) | 0, 1 | 0 | - | R/W(S) | - | - | - | 2 |
| | 021 | | X1 source designation BBB: Block No., III: ITEM No. | BBBIII | 000000 | Yes | R/W(S) | - | - | - | 4 |
| Analog input (field output) | to | | to | | | Yes | | | | | |
| | 028 | | X8 source designation BBB: Block No., III: ITEM No. | BBBIII | 000000 | Yes | R/W(S) | - | - | - | 4 |
| Analog input (field output) | 031 | X1 | Analog input (field output) | -5.00 to +105.00% | 0.00 | Yes | r | - | - | - | 2 |
| | to | | to | | | Yes | | | | | |
| | 038 | X8 | Analog input (field output) | -5.00 to +105.00% | 0.00 | Yes | r | - | - | - | 2 |

19 Field Terminal Block

<586> AI 4-point Terminal (AD041) 901 to 980

| Block Model | Block Name | Block Address |
|-------------|-----------------------------|---------------|
| <586> | AI 4-point Terminal (AD041) | 901 to 980 |

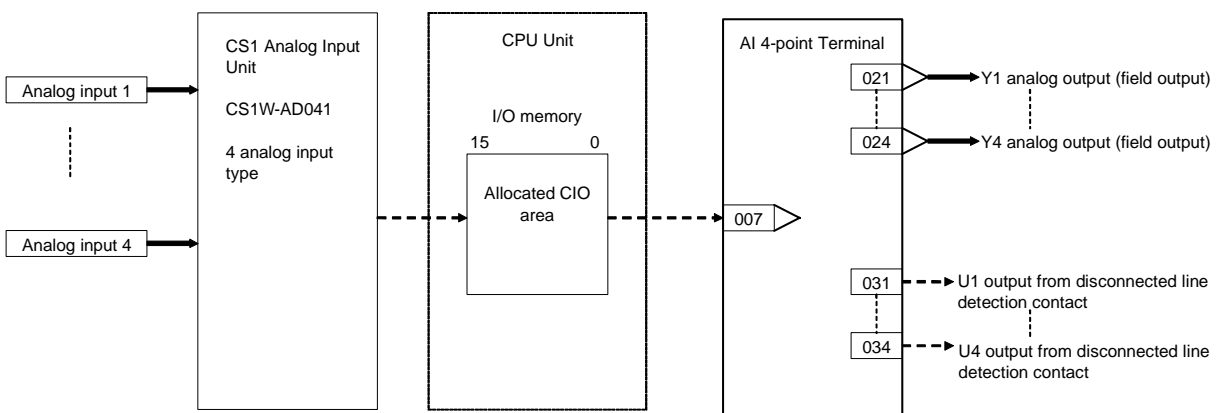
Outline

This function block is the Field Terminal block for inputting four analog signals from the CS-series 4-point Analog Input Units (CS1W-AD041).

Note1: Prevent the averaging function of the Analog Input Unit from duplicating the functions of the function blocks on the Loop Control Unit.

Note2: For details on how to set the Analog Input Unit, see the Analog I/O Unit User's Manual (Cat. No. SBCC-820).

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Sym bol | Data Description | Data Range | Default | COLD start initializ ation | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|-----------------------------------|------|------------|---|----------------------|---------------|-------------------------------------|---|---|--|---|---------------------------|
| | | | | | | | Accordi ng to CX-Pro cess Tool | Accordi ng to CX-Pro cess Monitor *1 | Accordi ng to ITEM Setting block | Accordi ng to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: AI 4-point Terminal (AD041) | 586 | 586 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| | 007 | | Unit number | 0 to 95 | 95 | - | R/W(S) | - | - | - | 2 |
| | 011 | | No.1 input range (0: 1 to 5V/0 to 5V/ 0 to 10V/4 to 20mA, 1: -10 to +10V) | 0, 1 | 0 | - | R/W(S) | - | - | - | 2 |
| | to | | to | | | - | | | | | |
| Analog output (field input) | 021 | Y1 | Analog output (field input) | -5.00 to +105.00% | 0.00 | Yes | r/w | - | - | - | 2 |
| | to | | to | | | Yes | | | | | |
| | 024 | Y4 | Analog output (field input) | -5.00 to +105.00% | 0.00 | Yes | r/w | - | - | - | 2 |
| Contact output | 031 | U1 | Output from disconnected line detection contact (0: No error, 1: Disconnected line) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | to | | to | | | Yes | | | | | |
| | 034 | U4 | Output from disconnected line detection contact (0: No error, 1: Disconnected line) | 0, 1 | 0 | Yes | - | - | - | R | 1 |

19 Field Terminal Block

<587> AO 4-point Terminal (DA041) 901 to 980

| Block Model | Block Name | Block Address |
|-------------|-----------------------------|---------------|
| <587> | AO 4-point Terminal (DA041) | 901 to 980 |

Outline

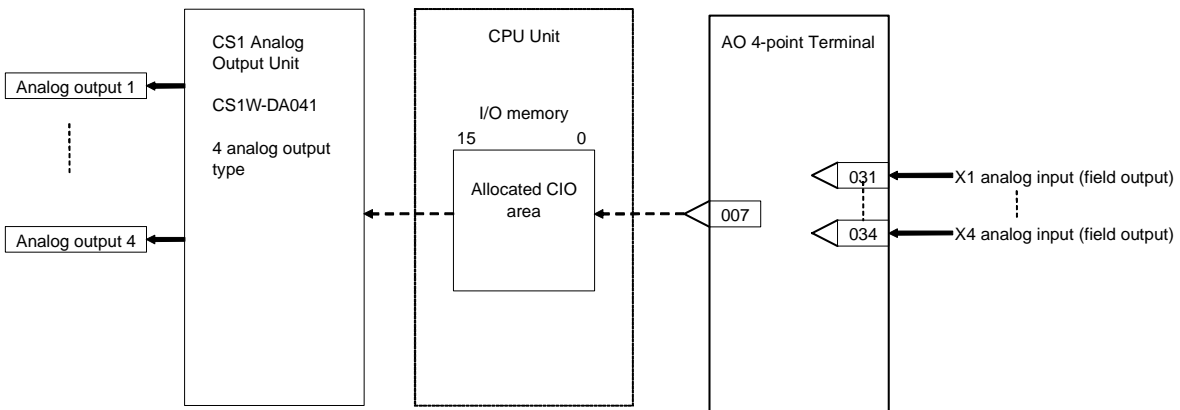
This function block is the Field Terminal for outputting four analog signals from the CS-series 4-point Analog Output Unit (C1W-DA041).

Note1: Prevent the output hold function of the Analog Output Unit from duplicating the functions of the function blocks on the Loop Control Unit.

Note2: For details on how to set the Analog Output Unit, see the Analog I/O Unit User's Manual (Cat. No. SBCC-820).

Note3: 000F Hex is automatically set to the 1st word (n) of the allocated relay area of C1W-DA041. As a result of this, the Conversion Enabled flag for each of the analog output points is always 1 (start of conversion output). For this reason, conversion output of the Analog Output Unit cannot be stopped.

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|-------------------------------------|------|--------|---|-------------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|------------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: AO 4-point Terminal (DA041) | 587 | 587 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameter | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| | 007 | | Unit number | 0 to 95 | 95 | - | R/W(S) | - | - | - | 2 |
| | 011 | | No.1 output range (0: 1 to 5V/0 to 5V/ 0 to 10V, 1: -10 to +10V) | 0, 1 | 0 | - | R/W(S) | - | - | - | 2 |
| | 014 | | No.4 output range (0: 1 to 5V/0 to 5V/ 0 to 10V, 1: -10 to +10V) | 0, 1 | 0 | - | R/W(S) | - | - | - | 2 |
| Analog input connection information | 021 | U1 | X1 source designation BBB: Block No., III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| | 024 | U4 | X4 source designation BBB: Block No., III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| Analog input (field output) | 031 | X1 | Analog input (field output) | -5.00 to +105.00% | 0.00 | Yes | r | - | - | - | 2 |
| | 034 | X4 | Analog input (field output) | -5.00 to +105.00% | 0.00 | Yes | r | - | - | - | 2 |

19 Field Terminal Block

<588> AI 4-point Terminal (DRT1-AD04) 901 to 980

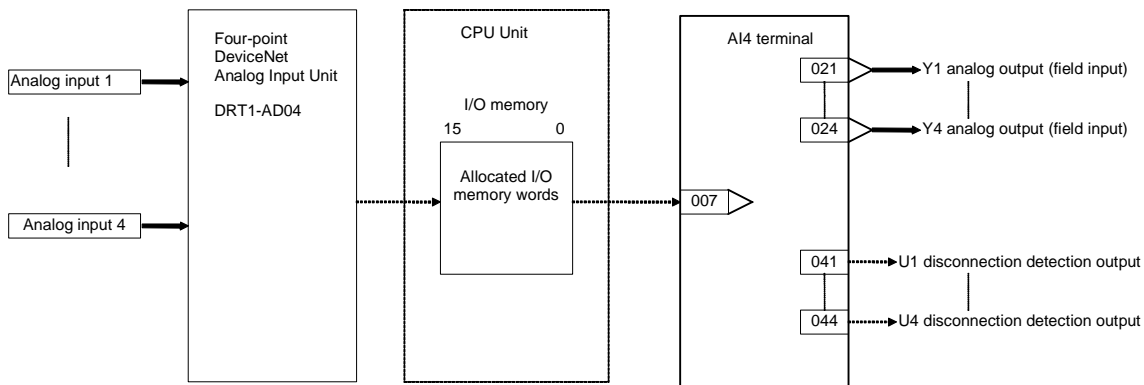
| Block Model | Block Name | Block Address |
|-------------|---------------------------------|---------------|
| <588> | AI 4-point Terminal (DRT1-AD04) | 901 to 980 |

Outline

This function block is the Field Terminal block for a DRT1-AD04 DeviceNet Analog Input Unit. It enables directly inputting from the ladder program in the Loop Control Unit values input to the DRT1-AD04 without conversion (MSB (15) is the sign bit).

Note: Use an AI Terminal from CPU Unit or Expanded AI Terminal from CPU Unit Block for the DRT1-AD04H and other DeviceNet Analog Output Terminals except the DRT1-AD04.

Block diagram



ITEM list

*1:On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | | | | Data Length (bytes) |
|-------------------------------------|------|--------|--|-------------------|------------|---------------------------|---|------------------------------------|---------------------------------|----------------------------------|---------------------|
| | | | | | | | According to CX-Process Tool | According to CX-Process Monitor *1 | According to ITEM Setting block | According to Step Ladder Program | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: Ai 4-point Terminal (DRT1-AD04) | 587 | 587 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameters | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| | 007 | | CPU Unit I/O memory area type 0: CIO (Channel I/O) Area, 1: W (Work Area), 2: H (Holding Area), 3: D (Data Memory), 4: E0 (Extended Data Memory [E] bank No.) | 0 to 4 | 3 | - | R/W(S) | - | - | - | 1 |
| | 008 | | Leading Address | 0 to 32767 | 32767 | - | R/W(S) | - | - | - | 2 |
| | 011 | | No. 1 input range (: 1 to 5 V/0 to 5 V/ 0 to 10 V/4 to 20 mA/0 to 20 mA, 1: -10 to 10 V) | 0, 1 | 0 | - | R/W(S) | - | - | - | 2 |
| | to | to | | | | - | | | | | |
| | 014 | | No. 4 input range (: 1 to 5 V/0 to 5 V/ 0 to 10 V/4 to 20 mA/0 to 20 mA, 1: -10 to 10 V) | 0, 1 | 0 | - | R/W(S) | - | - | - | 2 |
| Analog output values (field inputs) | 021 | Y1 | Analog output value (field input) | -5.00 to +105.00% | 0.00 | Yes | r/w | - | - | - | 2 |
| | to | to | | | | Yes | | | | | |
| | 024 | Y4 | Analog output value (field input) | -5.00 to +105.00% | 0.00 | Yes | r/w | - | - | - | 2 |
| Contact output | 031 | U1 | Output from disconnected line detection contact (0: No error, 1: Disconnected line) | 0, 1 | 0 | Yes | - | - | - | R | 1 |
| | to | to | | | | Yes | | | | | |
| | 034 | U4 | Output from disconnected line detection contact (0: No error, 1: Disconnected line) | 0, 1 | 0 | Yes | - | - | - | R | 1 |

19 Field Terminal Block

<589> AO 2-point Terminal (DRT1-DA02) 901 to 980

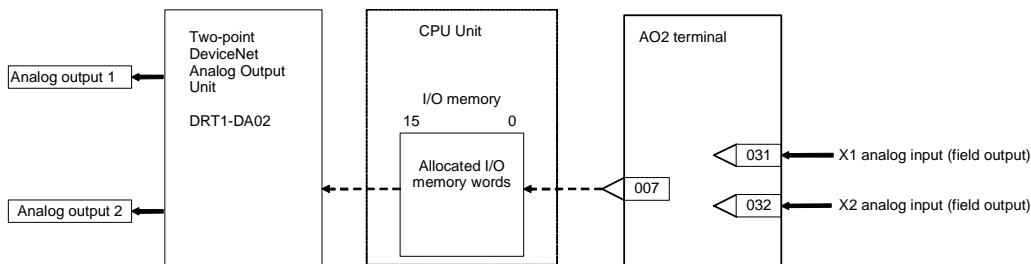
| Block Model | Block Name | Block Address |
|-------------|---------------------------------|---------------|
| <589> | AO 2-point Terminal (DRT1-DA02) | 901 to 980 |

Outline

This function block is the Field Terminal block for a DRT1-DA02 DeviceNet Analog Output Unit. It enables directly outputting from the ladder program in the Loop Control Unit values to be output from the DRT1-DA02 without conversion (MSB (15) is the sign bit).

Note: Use an AO Terminal to CPU Unit or Expanded AO Terminal to CPU Unit Block for DeviceNet Analog Output Terminals other than DRT1-DA02.

Block diagram



ITEM list

*1: On the CX-Process Monitor, the R/W mode is indicated in the Tuning screen or in the Control screen.

| ITEM TYPE | ITEM | Symbol | Data Description | Data Range | Default | COLD start initialization | R/W Mode | | | | Data Length (bytes) |
|--|------|--------|--|-------------------|------------|---------------------------|--|--|------------------------------|------------------------------------|---------------------|
| | | | | | | | R: Read, W: Write, R/W: R/W-enabled, -: R/W-disabled | Note: r and r/w: Read and read/write for validate action or monitor run status by CX-Process Tool or Monitor, (S): Initial setting data, (O): Operation data | According to CX-Process Tool | According to CX-Process Monitor *1 | |
| Contact input | 000 | | Stop block operation command (0: Cancel stop, 1: Stop) | 0, 1 | 0 | - | - | - | - | - | 1 |
| Parameter | 001 | | Comment | 23 characters | Block name | - | R/W(S) | - | - | - | 24 |
| | 002 | | Block Model: Ao 2-point Terminal (DRT1-DA02) | 589 | 589 | - | R/W(S) | - | - | - | 2 |
| Special | 003 | | Execution error display 0: Normal, Other: Error (See Appendix "Execution Error Code List.") | | 0000 | - | r | - | - | - | 2 |
| Parameters | 004 | | Operation cycle (sec) 0: Common, 1: 0.1, 2: 0.2, 3: 0.5, 4: 1, 5: 2 | 0 to 5 | 0 | - | R/W(S) | - | - | - | 2 |
| | 007 | | CPU Unit I/O memory area type 0: CIO (Channel I/O) Area, 1: W (Work Area), 2: H (Holding Area), 3: D (Data Memory), 4: E0 (Extended Data Memory [E] bank No.) | 0 to 4 | 3 | - | R/W(S) | - | - | - | 1 |
| | 008 | | Leading address | 0 to 32767 | 32767 | - | R/W(S) | - | - | - | 2 |
| | 011 | | No. 1 output range (0: 1 to 5 V/0 to 10 V /4 to 20 mA/0 to 20 mA, 1: -10 to +10 V) | 0, 1 | 0 | - | R/W(S) | - | - | - | 2 |
| Analog input connection information | 012 | | No. 2 output range (0: 1 to 5 V/0 to 10 V /4 to 20 mA/0 to 20 mA, 1: -10 to +10 V) | 0, 1 | 0 | - | R/W(S) | - | - | - | 2 |
| | 021 | | X1 source designation BBB: Block No., III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| Analog input values (field outputs values) | 022 | | X2 source designation BBB: Block No., III: ITEM No. | BBBIII | 000000 | - | R/W(S) | - | - | - | 4 |
| | 031 | X1 | Analog input value (field output value) | -5.00 to +105.00% | 0.00 | Yes | r | - | - | - | 2 |
| | 032 | X2 | Analog input value (field output value) | -5.00 to +105.00% | 0.00 | Yes | r | - | - | - | 2 |

Appendix A

Execution Error Code List

- The execution error codes shown in the list below are stored in ITEM003 of each function block.
- When there are function blocks containing an error other than 0 (normal), the smallest block number in these function block numbers is stored to ITEM093 of the System Common block (Block Model 000).
- The following information can be checked in the Monitor Run Status screen on CX-Process Tool ([Execute]-[Run]-[Validate Action]):
 - Smallest block address where execution error occurred (ITEM093 of System Common block)
 - Execution error codes that occurred at each function block address (smallest code No. when multiple execution errors occur at a single function block) in the Detailed display screen

| Code | Description | Explanation | Operation at Error | Remedy |
|------|--|---|---|---|
| 0 | Normal | | | |
| 1 | Connection terminal/output terminal connection not defined | Either the function block is not registered to the block address of the source designation or the destination, or the ITEM number does not exist. | Running of the function block in question is stopped, and the functions in question do not operate normally. | Check the block address and ITEM number of the source designation or destination designation. |
| 2 | Default error | When run/stop command S1 turned ON in the ramp program or segment program, the reference input was outside the rise ramp range. | The program is not started. | Check the connection of the reference input and program settings. |
| 10 | Operation process: Division by "0" | An attempt was made to execute division by a "0" denominator in the operation process. | In the case of Multiplication, DI/AI Terminal from CPU Unit, Expanded DI/AI Terminal from CPU Unit or Field Terminal blocks, the maximum value is output. In the case of the Segment Linearizer or Temperature and Pressure Correction blocks, the previous data is retained. | In the case of DI/AI Terminal from CPU Unit, Expanded DI/AI Terminal from CPU Unit or Field Terminal blocks, check the scaling value, and in the case of the Segment Linearizer block, check the setting value of the input coordinate side. In the case of temperature and pressure correction, check the gain bias value. |
| | | An attempt was made to execute division by a "0" denominator in Arithmetic Operation block (Block Model 126). | Execution of the Arithmetic Operation block will be stopped. | Check the contents of the conditional statement and calculation expressions for division by 0. |
| 11 | Operation process: Operation out of restricted value | The output value of the operation result exceeded the data length of two bytes. Note: An error does not occur even if the output range (± 320.00 , e.g) is exceeded if the data length of two bytes is not exceeded. | Output becomes the maximum value or minimum value of the output range. (For example, when the output range is ± 320.00 , the output becomes +320.00 or 320.00.) | If there is a problem, review the settings of related ITEMS. |
| | | The arguments or results for a Arithmetic Operation block exceed the defined limits. | Execution of the Arithmetic Operation block will be stopped. | Check the contents of the conditional statement and calculation expressions and correct the mistake. |
| 12 | Argument beyond definition | An argument used in Arithmetic Operation (Block Model 126) is beyond the definition. | Execution of the Arithmetic Operation block will be stopped. | Check the range of the arguments and correct the conditional statement or calculation expressions. |

Appendix A

Execution Error Code List

| Code | Description | Explanation | Operation at Error | Remedy |
|------|---------------------------------------|--|---|--|
| 15 | AT error | A limit cycle cannot be generated for Basic PID (Block Model 011) or Advanced PID (Block Model 012) or suitable PID constants cannot be calculated. | Execution of the relevant block will be stopped. | Check the following AT parameters: ITEM 036 to ITEM 040. Also, set ITEM 051 to 2 s or less. |
| 19 | Inappropriate operation | Two or more S1 to S3 select switches are set to 1 (ON) at the same time in the 3-output Selector block (Block Model 163) or 3-input Selector block (Block Model 164). | The output value that was active before the error occurred is held. | Re-program the Step Ladder Program block so that S1 to S3 select switches are set to 1 (ON) independent of each other. |
| | | There is a syntax error in Arithmetic Operation (Block Model 126), the THEN or ELSE expression is not defined, or the output reverse scaling limits are not set. | Execution of the Arithmetic Operation block will be stopped. | Check the contents of the conditional statement and calculation expressions and check the settings of the output reverse scaling limits. |
| | | There is a syntax error in a Fuzzy Logic block (Block Model 016) that prevents operation. 1) There is not one sign character and 5 numeric characters maximum (e.g., a + sign is specified). 2) Values are not separated by colons. 3) The values that are set are not sufficient. 4) More than two inflection points in membership functions are the same. 5) Inflection points in membership functions do not increase to the right. 6) A membership function (NL, NS, ZR, PS, or PL) used in a rule has not been defined. | Fuzzy logic block will be stopped. | Check the membership functions and rules. The number of the ITEM causing the problem will be provided in ITEM 006 (operation error details). |
| 20 | Download terminal data exchange error | Data exchange with the CPU Unit is not being executed correctly on the CPU Unit Terminal, Expanded CPU Unit Terminal, Node Terminals and Field Terminal blocks. | The data of the function block in question is not updated. | If a malfunction has occurred on the CPU Unit, follow the remedy for that error. If the CPU Unit is normal, turn ON the power supply again. |
| 21 | I/O memory address out-of-range | An address out of the I/O memory address range has been specified on the CPU Unit Terminal, Expanded CPU Unit Terminal, Node Terminals and Field Terminal blocks. | Operation of the function block in question is stopped. | On the CPU Unit Terminal and Expanded CPU Unit Terminal blocks, check the leading address, and on field terminals check the setting of the CIO (channel I/O) Area number setting. In the case of Node Terminals, check the setting of the "leading address of the memory for the node terminals" specified by System Common block ITEM043. |

Appendix A
Execution Error Code List

| Code | Description | Explanation | Operation at Error | Remedy |
|------|---|---|---|--|
| 29 | Reception error for external device | A communications frame error was generated by the data received from an ES100X Controller for an ES100X Controller Terminal (Block Model 045). (An FCS check error or frame error occurred 3 times in a row.) | Communications will be stopped with the specified ES100X and tried with another ES100X. | Check the communications path and the communications settings (7 data bits, even parity, and 2 stop bits). |
| 30 | Response timeout | A response was not returned after sending data to the Controller for an ES100X Controller Terminal (Block Model 045). (Response was not returned for 5 s 3 times.) | Communications will be stopped with the specified ES100X and tried with another ES100X. | Check the communications path, the communications settings (7 data bits, even parity, and 2 stop bits), and other required settings in the ES100X (parameter setting mode, unit number, etc.). |
| 31 | Controller unit number duplicated | The unit number set in ITEM 006 for an ES100X Controller Terminal (Block Model 045) is the same as another ES100X Controller Terminal. (A response timeout will occur if the unit number does not exist.) | Communications will be stopped with the ES100X Controllers. | Change the unit number settings (ITEM 006) so that each is used only once. |
| 70 | Illegal combination of function blocks | The function block on the primary loop side is not basic PID or advanced PID when bumpless processing between primary/secondary loops was specified in basic PID or advanced PID. | Running of the function block in question is stopped. | Check the function block model number on the primary loop side. |
| 71 | Inappropriate parameter | a) When restricted conditions are applied across two ITEMS: (Example: when the unit pulse output is equal to or greater than the operation cycle when there is unit pulse output in run time accumulation) b) An attempt has been made to write out-of-range data at the ITEM Setting block. | a) The function block in question is not executed. b) Data cannot be written. | Check the settings of the ITEMS. |
| 80 | Step Ladder Program command error | There is an irrelevant command in the Step Ladder Program, or the method of use of commands is wrong, for example, there is an AND command even though there is no input command. | The command in question and onwards are not executed. | Check the program within the Step Ladder Program block. |
| 81 | Step Ladder Program source designation not defined | Either the function block is not registered to the block address currently specified by each command in the Step Ladder Program, or the ITEM number does not exist. | The command in question and onwards are not executed. | Check the block address and ITEM number. |
| 89 | Overuse of Step Ladder Program differentiated instruction | The number of differentiated instructions to be simultaneously executed has exceeded 256. | Differentiated instructions exceeding 256 instructions are not executed. | Reduce the number of differentiated instructions to be executed simultaneously. |

Appendix B

ITEM Allocations for Send/Receive All Blocks

- The following tables list the word allocations for ITEMS transferred by Send All Blocks (Block Model: 462) and Receive All Blocks (Block Model: 461).
- Each function block is allocated 20 words.
- The left column in each table gives the offset in words from the first word. Offsets +0 to +17 are analog data and offsets +18 and +19 are bit data.

Appendix B

ITEM Allocations for Send/Receive All Blocks

Block Model 001: 2-position ON/OFF

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 007 | PV | PV input | S |
| +1 | 029 | SP | Current Set Point output | S |
| | 023 | SP | Local Set Point setting | R |
| +3 | 008 | HH_SP | High/high alarm setting | S/R |
| +4 | 009 | H_SP | High alarm setting | S/R |
| +5 | 010 | L_SP | Low alarm setting | S/R |
| +6 | 011 | LL_SP | Low/low alarm setting | S/R |
| +7 | 041 | DVA_SP | Deviation alarm setting | S/R |
| +15 | 003 | ERR | Execution error display | S |
| +17 | 099 | OP_MK | Label | S/R |
| +18, bit 00 | 026 | R/L_SW | Remote/Local switch | S/R |
| +18, bit 01 | 086 | A/M_SW | Auto/Manual switch | S/R |
| +18, bit 02 | 017 | AOF | Alarm stop switch | S/R |
| +18, bit 03 | 024 | CAS_SET | Set Point setting mode | S/R |
| +18, bit 08 | 093 | MV | Host display of MV | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 013 | HH | High/high alarm output | S |
| +19, bit 01 | 014 | H | High alarm output | S |
| +19, bit 02 | 015 | L | Low/low alarm output | S |
| +19, bit 03 | 016 | LL | Low alarm output | S |
| +19, bit 04 | 042 | DVA | Deviation alarm output | S |
| +19, bit 05 | 019 | PV_ABN | PV error display | S |

Block Model 002: System 3-position ON/OFF

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|--|--------------|
| +0 (first word) | 007 | PV | PV input | S |
| +1 | 029 | SP | Current Set Point output | S |
| | 023 | SP | Local Set Point setting | R |
| +3 | 008 | HH_SP | High/high alarm setting | S/R |
| +4 | 009 | H_SP | High alarm setting | S/R |
| +5 | 010 | L_SP | Low/low alarm setting | S/R |
| +6 | 011 | LL_SP | Low/low alarm setting | S/R |
| +7 | 041 | DVA_SP | Deviation alarm setting | S/R |
| +15 | 003 | ERR | Execution error display | S |
| +17 | 099 | OP_MK | Label | S/R |
| +18, bit 00 | 026 | R/L_SW | Remote/Local switch | S/R |
| +18, bit 01 | 086 | A/M_SW | Auto/Manual switch | S/R |
| +18, bit 02 | 017 | AOF | Alarm stop switch | S/R |
| +18, bit 03 | 024 | CAS_SET | Set Point setting mode | S/R |
| +18, bit 08 | 093 | MVH | Host display of MVH | S/R |
| +18, bit 09 | 095 | MVL | Host display of MVL | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 013 | HH | High/high alarm output | S |
| +19, bit 01 | 014 | H | High alarm output | S |
| +19, bit 02 | 015 | L | Low alarm output | S |
| +19, bit 03 | 016 | LL | Low/low alarm output | S |
| +19, bit 04 | 042 | DVA | Deviation alarm output | S |
| +19, bit 05 | 019 | PV_ABN | PV error display 0: Normal, 1: Error → MANUAL mode | S |

ITEM Allocations for Send/Receive All Blocks**Block Model 011: Basic PID**

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 007 | PV | PV input | S |
| +1 | 029 | SP | Current Set Point output | S |
| | 023 | SP | Local Set Point setting | R |
| +2 | 089 | MV | Host display of MV | S/R |
| +3 | 008 | HH_SP | High/high alarm setting | S/R |
| +4 | 009 | H_SP | High alarm setting | S/R |
| +5 | 010 | L_SP | Low alarm setting | S/R |
| +6 | 011 | LL_SP | Low/low alarm setting | S/R |
| +7 | 041 | DVA_SP | Deviation alarm setting | S/R |
| +8 | 044 | DV | Deviation output | S |
| +9 | 054 | P | Proportional band | S/R |
| +10 | 055 | I | Integral time | S/R |
| +11 | 056 | D | Differential time | S/R |
| +12 | 076 | MH_LMT | High MV limit | S/R |
| +13 | 077 | ML_LMT | Low MV limit | S/R |
| +15 | 003 | ERR | Execution error display | S |
| +16 | 098 | MV_IDX | MV index position | S/R |
| +17 | 099 | OP_MK | Label | S/R |
| +18, bit 00 | 026 | R/L_SW | Remote/Local switch | S/R |
| +18, bit 01 | 086 | A/M_SW | Auto/Manual switch | S/R |
| +18, bit 02 | 017 | AOF | Alarm stop switch | S/R |
| +18, bit 03 | 024 | CAS_SET | Set Point setting mode | S/R |
| +18, bit 14 | 035 | AT | AT command/AT Executing | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 013 | HH | High/high alarm output | S |
| +19, bit 01 | 014 | H | High alarm output | S |
| +19, bit 02 | 015 | L | Low alarm output | S |
| +19, bit 03 | 016 | LL | Low/low alarm output | S |
| +19, bit 04 | 042 | DVA | Deviation alarm output | S |
| +19, bit 05 | 019 | PV_ABN | PV execution error display | S |
| +19, bit 06 | 091 | MV_ABN | MV error display | S |
| +19, bit 07 | 078 | MHA | MV upper limit output | S |
| +19, bit 08 | 079 | MLA | MV lower limit output | S |

Appendix B

ITEM Allocations for Send/Receive All Blocks

Block Model 012: Advanced PID

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|----------------------------------|--------------|
| +0 (first word) | 007 | PV | PV input | S |
| +1 | 029 | SP | Current SP output | S |
| | 023 | SP | Local Set Point setting | R |
| +2 | 089 | MV | Host display of MV | S/R |
| +3 | 008 | HH_SP | High/high alarm setting | S/R |
| +4 | 009 | H_SP | High alarm setting | S/R |
| +5 | 010 | L_SP | Low alarm setting | S/R |
| +6 | 011 | LL_SP | Low/low alarm setting | S/R |
| +7 | 041 | DVA_SP | Deviation alarm setting | S/R |
| +8 | 044 | DV | Deviation output | S |
| +9 | 054 | P | Proportional band | S/R |
| +10 | 055 | I | Integral | S/R |
| +11 | 056 | D | Differential time | S/R |
| +12 | 076 | MH_LMT | High MV limit | S/R |
| +13 | 077 | ML_LMT | Low MV limit | S/R |
| +14 | 057 | MRT | Manual reset | S/R |
| +15 | 003 | ERR | Execution error display | S |
| +16 | 098 | MV_IDX | MV index position | S/R |
| +17 | 099 | OP_MK | Label | S/R |
| +18, bit 00 | 026 | R/L_SW | Remote/Local switch | S/R |
| +18, bit 01 | 086 | A/M_SW | Auto/Manual switch | S/R |
| +18, bit 02 | 017 | AOF | Alarm stop switch | S/R |
| +18, bit 03 | 024 | CAS_SET | Set Point setting mode | S/R |
| +18, bit 04 | 027 | S2 | PV tracking switch | S/R |
| +18, bit 05 | 046 | S3 | PV compensation ON/OFF switch | S/R |
| +18, bit 06 | 059 | S4 | Input of accumulator stop switch | S/R |
| +18, bit 07 | 073 | S5 | MV compensation ON/OFF switch | S/R |
| +18, bit 08 | 080 | S6 | Preset MV switch | S/R |
| +18, bit 09 | 082 | S7 | MV hold switch | S/R |
| +18, bit 10 | 085 | S8 | MV tracking switch | S/R |
| +18, bit 14 | 035 | AT | AT command/AT Executing | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 013 | HH | High/high alarm output | S |
| +19, bit 01 | 014 | H | High alarm output | S |
| +19, bit 02 | 015 | L | Low alarm output | S |
| +19, bit 03 | 016 | LL | Low/low alarm output | S |
| +19, bit 04 | 042 | DVA | Deviation alarm output | S |
| +19, bit 05 | 019 | PV_ABN | PV execution error display | S |
| +19, bit 06 | 091 | MV_ABN | MV error display | S |
| +19, bit 07 | 078 | MHA | High MV limit arrival output | S |
| +19, bit 08 | 079 | MLA | Low MV limit arrival output | S |

ITEM Allocations for Send/Receive All Blocks

Block Model 013: Blended PID

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|--|--------------|
| +0 (first word) | 007 | P1 | Input | S |
| +1 | 029 | Y2 | Current SP instantaneous value output | S |
| +2 | 089 | MV | Host display of MV | S/R |
| +3 | 012 | Q1 | Accumulated value (lower 4 digits) | S |
| +4 | 013 | Q2 | Accumulated value (upper 4 digits) | S |
| +5 | 016 | Y1 | Instantaneous value output | S |
| +6 | 027 | K1 | Ratio | S/R |
| +7 | 044 | DEV_Q | Cumulative deviation output | S |
| +9 | 054 | P | Proportional band | S/R |
| +10 | 055 | I | Integral time | S/R |
| +11 | 056 | D | Differential time | S/R |
| +12 | 076 | MH_LMT | High MV limit | S/R |
| +13 | 077 | ML_LMT | Low MV limit | S/R |
| +15 | 003 | ERR | Execution error display | S |
| +16 | 098 | MV_IDX | MV index position | S/R |
| +17 | 099 | OP_MK | Label | S/R |
| +18, bit 01 | 086 | A/M_SW | Auto/Manual switch | S/R |
| +18, bit 02 | 017 | AOF | Alarm stop switch | S/R |
| +18, bit 08 | 014 | S1 | Accumulation counter reset switch (1: Reset) | S/R |
| +18, bit 09 | 043 | S2 | Cumulative deviation reset switch | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command (0: Cancel stop, 1: Stop) | S/R |
| +19, bit 00 | 036 | DHH | Cumulative deviation High/high alarm output | S |
| +19, bit 01 | 037 | DH | Cumulative deviation High alarm output | S |
| +19, bit 02 | 038 | DL | Cumulative deviation Low alarm output | S |
| +19, bit 03 | 039 | DLL | Cumulative deviation Low/low alarm output | S |
| +19, bit 06 | 091 | MV_ABN | MV error display 0: Normal, 1: Error | S |
| +19, bit 07 | 078 | MHA | High MV limit arrival (1: Limit or more) | S |
| +19, bit 08 | 079 | MLA | Low MV limit arrival (1: Limit or less) | S |

Appendix B

ITEM Allocations for Send/Receive All Blocks

Block Model 014: Batch Flowrate Capture

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|---|--------------|
| +0 (first word) | 007 | P1 | Input | S |
| +1 | 029 | SP | Current SP output (lower 4 digits) | S |
| | 023 | SP | Local SP setting (lower 4 digits) | R |
| +2 | 089 | MV | Host display of MV | S/R |
| +3 | 030 | SPU | Current SP output (upper 4 digits) | S |
| | 024 | SPU-W | Local SP setting (upper 4 digits) | R |
| +4 | 035 | SM | Batch accumulated value (lower 4 digits) Fixed value | S |
| +5 | 032 | B0 | Overrun setting (value subtracted from BM) | S/R |
| +6 | 033 | BP | Pre-batch setting (value subtracted from BM) | S/R |
| +7 | 034 | B1 | Flowrate limitation | S/R |
| +8 | 061 | BMU | Preset value (upper 4 digits) (current SP is entered) | S |
| +9 | 065 | SMU | Batch accumulated value (upper 4 digits) | S |
| +10 | 012 | Q1 | Accumulated value (lower 4 digits) | S |
| +11 | 013 | Q2 | Accumulated value (upper 4 digits) | S |
| +12 | 016 | Y1 | Instantaneous value output | S |
| +13 | 017 | PR | Pulse rate (for host display: scale unit/pulse) | S/R |
| +14 | 031 | BM | Preset value (lower 4 digits) (current SP is entered) | S |
| +15 | 003 | ERR | Execution error display | S |
| +16 | 098 | MV_IDX | MV index position | S/R |
| +17 | 099 | OP_MK | Label | S/R |
| +18, bit 00 | 026 | R/L_SW | Remote/Local switching | S/R |
| +18, bit 01 | 086 | A/M_SW | Auto/Manual switch | S/R |
| +18, bit 08 | 036 | S1 | Run/stop command | S/R |
| +18, bit 09 | 037 | S2 | Control interrupt switch | S/R |
| +18, bit 10 | 014 | S3 | Accumulation counter reset | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation | S/R |
| +19, bit 00 | 038 | U1 | Main batch output | S |
| +19, bit 01 | 039 | U2 | Pre-batch output | S |
| +19, bit 06 | 091 | MV_ABN | MV error display | S |

Block Model 016: Fuzzy Logic

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|---|--------------|
| +0 (first word) | 015 | X1 | X1 input value | S |
| +1 | 016 | X2 | X2 input value | S |
| +2 | 017 | X3 | X3 input value | S |
| +3 | 018 | X4 | X4 input value | S |
| +4 | 019 | X5 | X5 input value | S |
| +5 | 020 | X6 | X6 input value | S |
| +6 | 021 | X7 | X7 input value | S |
| +7 | 022 | X8 | X8 input value | S |
| +8 | 027 | A1 | Fixed value for output 1 when rules are not fulfilled | S/R |
| +9 | 028 | A2 | Fixed value for output 2 when rules are not fulfilled | S/R |
| +10 | 035 | FN | Read rule numbers for fulfilled rules | S/R |
| +11 | 036 | FT | Applicability for each rule | S |
| +12 | 031 | Y1 | Y1 output value | S |
| +13 | 032 | Y2 | Y2 output value | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 023 | S1 | Output value selection switch for output 2 when rules are not fulfilled | S/R |
| +18, bit 01 | 024 | S2 | Output value selection switch for output 2 when rules are not fulfilled | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

Block Model 031: Indication and Setting

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 007 | PV | PV input | S |
| +1 | 029 | SP | Current SP setting | S |
| | 023 | SP | Local Set Point setting | R |
| +3 | 008 | HH_SP | High/high alarm setting | S/R |
| +4 | 009 | H_SP | High alarm setting | S/R |
| +5 | 010 | L_SP | Low alarm setting | S/R |
| +6 | 011 | LL_SP | Low/low alarm setting | S/R |
| +15 | 003 | ERR | Execution error display | S |
| +17 | 099 | OP_MK | Label | S/R |
| +18, bit 00 | 026 | R/L_SW | Remote/Local switch | S/R |
| +18, bit 02 | 017 | AOF | Alarm stop switch | S/R |
| +18, bit 03 | 024 | CAS_SET | SP setting mode (default) | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 013 | HH | High/high alarm output | S |
| +19, bit 01 | 014 | H | High alarm output | S |
| +19, bit 02 | 015 | L | Low/low alarm output | S |
| +19, bit 03 | 016 | LL | Low alarm output | S |
| +19, bit 05 | 019 | PV_ABN | PV error display | S |

Appendix B

ITEM Allocations for Send/Receive All Blocks

Block Model 032: Indication and Operation

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 007 | PV | PV input | S |
| +1 | 084 | X1 | Auto input | S |
| +2 | 089 | MV | Host display of MV | S/R |
| +3 | 008 | HH_SP | High/high alarm setting | S/R |
| +4 | 009 | H_SP | High alarm setting | S/R |
| +5 | 010 | L_SP | Low alarm setting | S/R |
| +6 | 011 | LL_SP | Low/low alarm setting | S/R |
| +12 | 076 | MH_LMT | High MV limit | S/R |
| +13 | 077 | ML_LMT | Low MV limit | S/R |
| +15 | 003 | ERR | Execution error display | S |
| +16 | 098 | MV_IDX | MV index position | S/R |
| +17 | 099 | OP_MK | Label | S/R |
| +18, bit 01 | 086 | A/M_SW | Auto/Manual switch | S/R |
| +18, bit 02 | 017 | AOF | Alarm stop switch | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 013 | HH | High/high alarm output | S |
| +19, bit 01 | 014 | H | High alarm output | S |
| +19, bit 02 | 015 | L | Low alarm output | S |
| +19, bit 03 | 016 | LL | Low/low alarm output | S |
| +19, bit 05 | 019 | PV_ABN | PV error display | S |
| +19, bit 06 | 091 | MV_ABN | MV error display | S |
| +19, bit 07 | 078 | MHA | MV upper limit output | S |
| +19, bit 08 | 079 | MLA | MV lower limit output | S |

Block Model 033: Ratio Setting

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 007 | PV | Reference input | S |
| +1 | 029 | SP | Current SP output | S |
| | 023 | SP | Local ratio setting | R |
| +2 | 089 | MV | Host display of MV | S/R |
| +9 | 054 | K1 | Ratio range | S/R |
| +10 | 055 | A1 | Input bias | S/R |
| +11 | 056 | B1 | Output bias | S/R |
| +12 | 076 | MH_LMT | High MV limit | S/R |
| +13 | 077 | ML_LMT | Low MV limit | S/R |
| +15 | 003 | ERR | Execution error display | S |
| +16 | 098 | MV_IDX | MV index position | S/R |
| +17 | 099 | OP_MK | Label | S/R |
| +18, bit 00 | 026 | R/L_SW | Remote/Local switch | S/R |
| +18, bit 01 | 086 | A/M_SW | Auto/Manual switch | S/R |
| +18, bit 03 | 024 | CAS_SET | Ratio setting mode (default) | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 05 | 019 | PV_ABN | PV error display | S |
| +19, bit 06 | 091 | MV_ABN | MV error display | S |
| +19, bit 07 | 078 | MHA | MV upper limit output | S |
| +19, bit 08 | 079 | MLA | MV lower limit output | S |

Block Model 034: Indicator

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 007 | PV | PV input | S |
| +3 | 008 | HH_SP | High/high alarm setting | S/R |
| +4 | 009 | H_SP | High alarm setting | S/R |
| +5 | 010 | L_SP | Low alarm setting | S/R |
| +6 | 011 | LL_SP | Low/low alarm setting | S/R |
| +15 | 003 | ERR | Execution error display | S |
| +17 | 099 | OP_MK | Label | S/R |
| +18, bit 02 | 017 | AOF | Alarm stop switch | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 013 | HH | High/high alarm output | S |
| +19, bit 01 | 014 | H | High alarm output | S |
| +19, bit 02 | 015 | L | Low/low alarm output | S |
| +19, bit 03 | 016 | LL | Low alarm output | S |
| +19, bit 05 | 019 | PV_ABN | PV error display | S |

Block Model 045: ES100X Controller Terminal

ITEM Allocations for Send/Receive All Blocks

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|--|--------------|
| +0 (first word) | 021 | PV | PV | S |
| +1 | 029 | SP | Current SP output | S |
| | 072 | SP | Current SP setting | R |
| +2 | 089 | MV | MV (Manipulated variable) | S/R |
| +3 | 040 | HH_SP | PV high/high alarm setting | S/R |
| +4 | 041 | H_SP | PV high alarm setting | S/R |
| +5 | 042 | L_SP | PV low alarm setting | S/R |
| +6 | 043 | LL_SP | PV low/low alarm setting | S/R |
| +7 | 039 | DVA_SP | Deviation alarm setting | S/R |
| +8 | 010 | RES | Response code | S |
| +9 | 024 | P | P (proportional band) (for display) | S |
| | 056 | P | P (proportional band) (for setting) | R |
| +10 | 025 | I | I (integral time) (for display) | S |
| | 057 | I | I (integral time) (for setting) | R |
| +11 | 026 | D | D (derivative time) (for display) | S |
| | 058 | D | D (derivative time) (for setting) | R |
| +12 | 027 | MH | MV upper limit (for display) | S |
| | 052 | MH | MV upper limit (for setting) | R |
| +13 | 028 | ML | MV lower limit (for display) | S |
| | 053 | ML | MV lower limit (for setting) | R |
| +14 | 009 | ERR1 | Controller error level display | S |
| +15 | 003 | ERR | Execution error display | S |
| +16 | 098 | MV_IDX | Operating status display | S/R |
| +17 | 099 | OP_MK | Label | S/R |
| +18, bit 00 | 030 | RUN | Operating status display | S |
| | 080 | RUN | ES100X operation command | R |
| +18, bit 01 | 031 | A/M_SW | A/M switch display | S |
| | 081 | A/M_SW | A/M switch | R |
| +18, bit 02 | 032 | RMT | EX100 parameter setting method display | S |
| | 082 | RMT | EX100 parameter setting method Setting | R |
| +18, bit 03 | 033 | AT | AT display | S |
| | 083 | AT | AT command | R |
| +18, bit 04 | 084 | R/L_SW | RSP/LSP switch in this block | S/R |
| +18, bit 05 | 085 | CAS_SE T | SP setting method | S/R |
| +18, bit 06 | 050 | AOF | Alarm stop switch | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 04 | 045 | DVA | Deviation alarm value | S |
| +19, bit 05 | 046 | HH | PV high/high alarm setting | S |
| +19, bit 06 | 047 | H | PV high alarm value | S |
| +19, bit 07 | 048 | L | PV low alarm value | S |
| +19, bit 08 | 049 | LL | PV low/low alarm value | S |
| +19, bit 09 | 054 | MHA | MV upper limit output | S |
| +19, bit 10 | 055 | MLA | MV lower limit output | S |

Appendix B

ITEM Allocations for Send/Receive All Blocks

Block Model 110: 4-point Warning Indicator

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 007 | PV | PV input | S |
| +3 | 008 | HH_SP | High/high alarm setting | S/R |
| +4 | 009 | H_SP | High alarm setting | S/R |
| +5 | 010 | L_SP | Low alarm setting | S/R |
| +6 | 011 | LL_SP | Low/low alarm setting | S/R |
| +15 | 003 | ERR | Execution error display | S |
| +17 | 099 | OP_MK | Label | S/R |
| +18, bit 02 | 017 | AOF | Alarm stop switch | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 013 | HH | High/high alarm output | S |
| +19, bit 01 | 014 | H | High/high alarm output | S |
| +19, bit 02 | 015 | L | Low alarm output | S |
| +19, bit 03 | 016 | LL | Low/low alarm output | S |
| +19, bit 05 | 019 | PV_ABN | PV error display | S |

Block Model 111: High/Low Alarm

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 008 | X1 | Input | S |
| +4 | 009 | A1 | High setting | S/R |
| +5 | 010 | A2 | Low setting | S/R |
| +6 | 011 | A3 | Hysteresis setting | S/R |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 012 | U1 | High alarm output | S |
| +19, bit 01 | 013 | U2 | Low alarm output | S |

Block Model 112: Deviation Alarm

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 009 | X1 | Reference input | S |
| +1 | 010 | X2 | Input | S |
| +4 | 011 | A1 | Deviation high setting | S/R |
| +5 | 012 | A2 | Deviation low setting | S/R |
| +6 | 013 | A3 | Hysteresis | S/R |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 014 | U1 | Deviation high alarm output | S |
| +19, bit 01 | 015 | U2 | Deviation low alarm output | S |

Block Model 113: Rate-of-change Operation and Alarm

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|-------------------------------------|--------------|
| +0 (first word) | 008 | X1 | Input | S |
| +4 | 012 | A1 | Positive direction alarm setting | S/R |
| +5 | 013 | A2 | Negative direction alarm setting | S/R |
| +6 | 014 | A3 | Hysteresis setting | S/R |
| +8 | 009 | H | Sampling cycle (0: Operation cycle) | S/R |
| +9 | 010 | N | Number of samples | S/R |
| +10 | 011 | TM | Unit (0:%/s, 1:%/min, 2:%/h) | S/R |
| +12 | 015 | Y1 | Output rate-of-change | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 016 | U1 | Positive direction alarm output | S |
| +19, bit 01 | 017 | U2 | Negative direction alarm output | S |

ITEM Allocations for Send/Receive All Blocks**Block Model 115: High/Low Limit**

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 008 | X1 | Input | S |
| +4 | 009 | A1 | High limit | S/R |
| +5 | 010 | A2 | Low limit | S/R |
| +12 | 011 | Y1 | Output | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

Block Model 116: Deviation Limit

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 009 | X1 | Input | S |
| +1 | 010 | X2 | Reference input | S |
| +4 | 011 | A1 | High deviation limit | S/R |
| +5 | 012 | A2 | Low deviation limit | S/R |
| +12 | 013 | Y1 | Output | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

Block Model 118: Analog Signal Hold

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|---|--------------|
| +0 (first word) | 008 | X1 | Input | S |
| +4 | 006 | KN | Hold mode (1: Maximum value, 2: Instantaneous value, 3: Minimum value) | S/R |
| +12 | 010 | Y1 | Output | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 009 | S1 | Reset switch Contact inputs and parameters are reset when set to 1. When the switch setting changes to 0 from 1 when ITEM006 is set to 2, inputs and parameters are held. When ITEM006 is set to either 1 or 3, contacts and parameters are held when the switch setting is 1 and are not held when the switch setting is 0. | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

Block Model 121: Addition or Subtraction

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|--|--------------|
| +0 (first word) | 011 | X1 | Input | S |
| +1 | 012 | X2 | Input | S |
| +2 | 013 | X3 | Input | S |
| +3 | 014 | X4 | Input | S |
| +4 | 015 | K1 | K1 gain | S/R |
| +5 | 016 | K2 | K2 gain | S/R |
| +6 | 017 | K3 | K3 gain | S/R |
| +7 | 018 | K4 | K4 gain | S/R |
| +8 | 019 | A1 | A1 bias | S/R |
| +12 | 020 | Y1 | Output | S |
| +15 | 003 | ERR | Execution error display 0: Normal, Other: Error | S |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

Appendix B

ITEM Allocations for Send/Receive All Blocks

Block Model 122: Multiplication

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 009 | X1 | Input | S |
| +1 | 010 | X2 | Input | S |
| +4 | 011 | K1 | K1 gain | S/R |
| +5 | 012 | K2 | K2 gain | S/R |
| +6 | 013 | A1 | A1 bias | S/R |
| +7 | 014 | A2 | A2 bias | S/R |
| +8 | 015 | A3 | A3 bias | S/R |
| +12 | 016 | Y1 | Output | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

Block Model 123: Division

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 009 | X1 | Input | S |
| +1 | 010 | X2 | Input | S |
| +4 | 011 | K1 | K1 gain | S/R |
| +5 | 012 | K2 | K2 gain | S/R |
| +6 | 013 | A1 | A1 bias | S/R |
| +7 | 014 | A2 | A2 bias | S/R |
| +8 | 015 | A3 | A3 bias | S/R |
| +12 | 016 | Y1 | Output | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

Block Model 126: Arithmetic Operation

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|--|--------------|
| +0 (first word) | 021 | X1 | X1 input value | S |
| +1 | 022 | X2 | X2 input value | S |
| +2 | 023 | X3 | X3 input value | S |
| +3 | 024 | X4 | X4 input value | S |
| +4 | 025 | X5 | X5 input value | S |
| +5 | 026 | X6 | X6 input value | S |
| +6 | 027 | X7 | X7 input value | S |
| +7 | 028 | X8 | X8 input value | S |
| +12 | 093 | Y1 | Normalized output value | S |
| +13 | 094 | Y2 | Floating-point decimal output value (upper digits of Y0) | S |
| +14 | 095 | Y3 | Floating-point decimal output value (lower digits of Y0) | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 010 | S0 | Criteria mode | S/R |
| +18, bit 01 | 062 | S2 | Operation reset command | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 080 | U0 | Judgement | S |
| +19, bit 08 | 061 | S1 | Contact input | S/R |

Block Model 127: Range Conversion)

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|-------------------------|--------------|
| +0 (first word) | 021 | X1 | Input value | S |
| +1 | 022 | X2 | Input value | S |
| +2 | 023 | X3 | Input value | S |
| +3 | 024 | X4 | Input value | S |
| +4 | 025 | X5 | Input value | S |
| +5 | 026 | X6 | Input value | S |
| +6 | 027 | X7 | Input value | S |
| +7 | 028 | X8 | Input value | S |
| +8 | 071 | Y1 | Output value | S |
| +9 | 072 | Y2 | Output value | S |
| +10 | 073 | Y3 | Output value | S |
| +11 | 074 | Y4 | Output value | S |
| +12 | 075 | Y5 | Output value | S |
| +13 | 076 | Y6 | Output value | S |
| +14 | 077 | Y7 | Output value | S |
| +15 | 003 | ERR | Execution error display | S |
| +16 | 078 | Y8 | Output value | S |

ITEM Allocations for Send/Receive All Blocks**Block Model 131: Square Root**

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 008 | X1 | Input | S |
| +4 | 009 | K1 | Gain | S/R |
| +5 | 010 | A1 | Input low-end cutout setting | S/R |
| +12 | 011 | Y1 | Output | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

Block Model 132: Absolute Value

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 008 | X1 | Input | S |
| +12 | 009 | Y1 | Output | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

Block Model 133: Non-linear Gain (Dead Band)

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 008 | X1 | Input | S |
| +4 | 009 | K1 | K1 gain | S/R |
| +5 | 010 | K2 | K2 gain | S/R |
| +6 | 011 | K3 | K3 gain | S/R |
| +7 | 012 | A1 | Segment point | S/R |
| +12 | 013 | Y1 | Output | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

Block Model 134: Low-end Cutout

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 008 | X1 | Input | S |
| +4 | 009 | A1 | Low-end cutout setting | S/R |
| +12 | 010 | Y1 | Output | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

Block Model 135: Segment Linearizer

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 007 | X1 | Input | S |
| +12 | 008 | Y1 | Output | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

Appendix B

ITEM Allocations for Send/Receive All Blocks

Block Model 136: Temperature and Pressure Correction

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 010 | X1 | Flow input | S |
| +1 | 011 | X2 | Pressure input | S |
| +2 | 012 | X3 | Temperature input | S |
| +4 | 013 | K1 | K1 gain | S/R |
| +5 | 014 | K2 | K2 gain | S/R |
| +6 | 015 | K3 | K3 gain | S/R |
| +7 | 016 | A2 | A2 gain | S/R |
| +8 | 017 | A3 | A3 gain | S/R |
| +12 | 018 | Y1 | Output | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

Block Model 141: First-order Lag

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 008 | X1 | Input | S |
| +4 | 009 | T | Time constant (0: No delay) | S/R |
| +12 | 011 | Y1 | Output | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 010 | S1 | Reset switch (1: Y1=X1) | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

Block Model 143: Rate-of-change Limit

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|---|--------------|
| +0 (first word) | 008 | X1 | Input | S |
| +4 | 009 | A1 | Positive ramp rate (Rate-of-change limit OFF when 0.00) | S/R |
| +5 | 010 | A2 | Negative ramp rate (Rate-of-change limit OFF when 0.00) | S/R |
| +6 | 013 | TMU | Time unit | S/R |
| +12 | 012 | Y1 | Output | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 011 | S1 | Reset Switch (1: Y1=X1) | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

Block Model 145: Moving Average

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|---|--------------|
| +0 (first word) | 008 | X1 | Input | S |
| +4 | 009 | H | Sampling cycle 0: Same as operation cycle | S/R |
| +5 | 010 | N | Number of samples | S/R |
| +12 | 013 | Y1 | Output | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 011 | S1 | Reset switch (1: Y1=X1) | S/R |
| +18, bit 01 | 012 | S2 | External sync contact (DIFU/DIFD commands used) | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

Block Model 147: Lead/Delay

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 008 | X1 | Input | S |
| +4 | 009 | K1 | Gain | S/R |
| +5 | 010 | T1 | Time constant (0: No Lead) | S/R |
| +6 | 011 | T2 | Time constant (0: No delay) | S/R |
| +12 | 013 | Y1 | Output | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 012 | S1 | Reset switch (1:Y1=X1) | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

Block Model 148: Dead Time

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|-------------------------------------|--------------|
| +0 (first word) | 008 | X1 | Input | S |
| +4 | 009 | T | Time constant (0: No delay) | S/R |
| +5 | 010 | H | Sampling cycle (0: Operation cycle) | S/R |
| +6 | 011 | N | Number of samples | S/R |
| +12 | 013 | Y1 | Output | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 012 | S1 | Reset switch (1:Y1=X1) | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

Block Model 149: Dead Time Compensation

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 008 | X1 | Input | S |
| +4 | 009 | K | Gain | S/R |
| +5 | 010 | T | Time constant | S/R |
| +6 | 011 | H | Sampling cycle | S/R |
| +7 | 012 | N | Number of samples | S/R |
| +12 | 014 | Y1 | Output | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 013 | S1 | Reset switch (1:Y1=X1) | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

Block Model 150: Accumulator for Instantaneous Value Input

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|--|--------------|
| +0 (first word) | 008 | X1 | Input | S |
| +4 | 012 | Q1 | Accumulated value (lower 4 digits) | S |
| +5 | 013 | Q2 | Accumulated value (upper 4 digits) | S |
| +6 | 022 | Q3 | Batch accumulated value | S |
| +7 | 010 | TU | Time unit | S/R |
| +8 | 021 | BM | Preset value | S/R |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 014 | S1 | Reset switch (1: Reset) | S/R |
| +18, bit 01 | 015 | S2 | Interrupt switch (1: Interrupt) | S/R |
| +18, bit 02 | 023 | S3 | Batch controller reset switch (1: Reset) | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 024 | U1 | Arrival at preset value | S |

Appendix B

ITEM Allocations for Send/Receive All Blocks

Block Model 151: Run Time Accumulator

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|----------------|------|----------|---|--------------|
| +4 | 008 | Q1 | Accumulated time (lower 4 digits) | S |
| +5 | 009 | Q2 | Accumulated time (upper 4 digits) | S |
| +6 | 007 | PT | Pulse unit (0: s, 1: 10s, 2: min, 3: 10min, 4: h) | S/R |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 010 | S1 | Input | S/R |
| +18, bit 01 | 011 | S2 | Stop | S/R |
| +18, bit 02 | 012 | S3 | Reset | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 013 | U1 | Unit pulse output | S |

Block Model 153: Time Sequence Data Statistics

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 008 | X1 | Input | S |
| +4 | 009 | H | Sampling cycle | S/R |
| +5 | 010 | A | First data number in range | S/R |
| +6 | 011 | N | Number of samples | S/R |
| +7 | 021 | Y1 | Average | S |
| +8 | 022 | Y2 | Smallest value | S |
| +9 | 023 | Y3 | Largest value | S |
| +10 | 024 | Y4 | Lower 4 digits of range | S |
| +11 | 025 | Y5 | Upper 4 digits of range | S |
| +12 | 026 | Y6 | Average deviation | S |
| +13 | 027 | Y7 | Lower 4 digits of variance | S |
| +14 | 028 | Y8 | Upper 4 digits of variance | S |
| +15 | 003 | ERR | Execution error display | S |
| +16 | 029 | Y9 | Standard deviation | S |
| +18, bit 00 | 012 | S1 | Reset command | S/R |
| +18, bit 01 | 013 | S2 | External sync contact | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

Block Model 155: Ramp Program

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|--|--------------|
| +0 (first word) | 007 | X1 | Reference input (input for external setting of start point) | S |
| +4 | 010 | H0 | Elapsed time unit | S/R |
| +5 | 020 | A0 | Default (Note, however, that reference input X1 is given priority and this value is invalid when the source designation of X1 is specified.) | S/R |
| +6 | 096 | WB | Wait width (0: No wait operation) | S/R |
| +7 | 097 | WT | Max. wait time (0.0: Unlimited) | S/R |
| +12 | 008 | Y1 | Program output | S |
| +13 | 009 | Y2 | Elapsed time output | S |
| +14 | 011 | Y3 | Process output (Process distinguishes between ramp and soak.) | S/R |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 012 | S1 | Run/stop command (0: Reset, 1: Run) | S/R |
| +18, bit 01 | 013 | S2 | Hold switch (1: Hold) | S/R |
| +18, bit 02 | 014 | S3 | Move to next step command | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 015 | U1 | X1 input error | S |
| +19, bit 01 | 016 | U2 | Arrival at final step | S |
| +19, bit 02 | 017 | U3 | Holding | S |
| +19, bit 03 | 019 | U4 | Waiting (0: Not waiting, 1: Waiting) | S |

Block Model 156: Segment Program

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|----------------|------|----------|------------------------|--------------|
| +0 | 007 | X1 | Reference input (input | S |

ITEM Allocations for Send/Receive All Blocks

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|----------------|------|----------|---|--------------|
| (first word) | | | for external setting of start point) | |
| +4 | 012 | H1 | Time axis unit | S/R |
| +12 | 008 | Y1 | Program output | S |
| +13 | 009 | Y2 | Time axis output | S/R |
| +14 | 011 | Y3 | Step output | S/R |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 013 | S1 | Run/stop command | S/R |
| +18, bit 01 | 014 | S2 | Hold switch | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 015 | U1 | X1 input (1: Error. Output is 0 when reference input X1 is not matching between No.1 segment B0 and B1.) | S |
| +19, bit 01 | 016 | U2 | Arrival at final segment | S |

Model Number 157: Segment Program 2

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|---|--------------|
| +0 (first word) | 007 | X1 | Reference input (input for external setting of start point) | S |
| +4 | 012 | H1 | Elapsed time unit | S/R |
| +12 | 008 | Y1 | Program output | S |
| +13 | 009 | Y2 | Elapsed time output | S |
| +14 | 011 | Y3 | Step output | S/R |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 013 | S1 | Run/stop command | S/R |
| +18, bit 01 | 014 | S2 | Hold switch (1: Stop) | S/R |
| +18, bit 02 | 017 | S3 | Move to next wait command | S/R |
| +18, bit 03 | 018 | S4 | Move to next step command | S/R |
| +18, bit 04 | 020 | S5 | Reference input disable switch | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 015 | U1 | X1 input error | S |
| +19, bit 01 | 016 | U2 | Arrival at final segment | S |
| +19, bit 02 | 019 | U10 | Waiting (0: Not waiting, 1: Waiting) | S |

Block Model 161: Rank Selector

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 021 | X1 | Input | S |
| +1 | 022 | X2 | Input | S |
| +2 | 023 | X3 | Input | S |
| +3 | 024 | X4 | Input | S |
| +4 | 025 | X5 | Input | S |
| +5 | 026 | X6 | Input | S |
| +6 | 027 | X7 | Input | S |
| +7 | 028 | X8 | Input | S |
| +12 | 007 | Y1 | Output | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 031 | U1 | X1 selected | S |
| +19, bit 01 | 032 | U2 | X2 selected | S |
| +19, bit 02 | 033 | U3 | X3 selected | S |
| +19, bit 03 | 034 | U4 | X4 selected | S |
| +19, bit 04 | 035 | U5 | X5 selected | S |
| +19, bit 05 | 036 | U6 | X6 selected | S |
| +19, bit 06 | 037 | U7 | X7 selected | S |
| +19, bit 07 | 038 | U8 | X8 selected | S |

Appendix B

ITEM Allocations for Send/Receive All Blocks

Block Model 162: Input Selector

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 021 | X1 | Input | S |
| +1 | 022 | X2 | Input | S |
| +2 | 023 | X3 | Input | S |
| +3 | 024 | X4 | Input | S |
| +4 | 025 | X5 | Input | S |
| +5 | 026 | X6 | Input | S |
| +6 | 027 | X7 | Input | S |
| +7 | 028 | X8 | Input | S |
| +12 | 007 | Y1 | Output | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 031 | S1 | X1 select switch | S/R |
| +18, bit 01 | 032 | S2 | X2 select switch | S/R |
| +18, bit 02 | 033 | S3 | X3 select switch | S/R |
| +18, bit 03 | 034 | S4 | X4 select switch | S/R |
| +18, bit 04 | 035 | S5 | X5 select switch | S/R |
| +18, bit 05 | 036 | S6 | X6 select switch | S/R |
| +18, bit 06 | 037 | S7 | X7 select switch | S/R |
| +18, bit 07 | 038 | S8 | X8 select switch | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

Block Model 163: 3-Input Selector

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|--|--------------|
| +0 (first word) | 021 | X1 | Input | S |
| +1 | 022 | X2 | Input | S |
| +2 | 023 | X3 | Input | S |
| +3 | 024 | X4 | Input | S |
| +4 | 025 | X5 | Input | S |
| +5 | 026 | X6 | Input | S |
| +6 | 027 | X7 | Input | S |
| +7 | 028 | X8 | Input | S |
| +8 | 029 | X9 | Input | S |
| +12 | 006 | Y1 | Output | S |
| +13 | 007 | Y2 | Output | S |
| +14 | 008 | Y3 | Output | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 031 | S1 | S1 select switch | S/R |
| +18, bit 01 | 032 | S2 | S2 select switch | S/R |
| +18, bit 02 | 033 | S3 | S3 select switch | S/R |
| +18, bit 03 | 034 | S4 | Output hold switch --- Output is held when set to ON. | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

Block Model 164: 3-Output Selector

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|--|--------------|
| +0 (first word) | 014 | X1 | X1 input | S |
| +1 | 015 | X2 | X2 input | S |
| +2 | 016 | X3 | X3 input | S |
| +3 | 024 | Y4 | Output | S |
| +4 | 025 | Y5 | Output | S |
| +5 | 026 | Y6 | Output | S |
| +6 | 027 | Y7 | Output | S |
| +7 | 028 | Y8 | Output | S |
| +8 | 029 | Y9 | Output | S |
| +12 | 021 | Y1 | Output | S |
| +13 | 022 | Y2 | Output | S |
| +14 | 023 | Y3 | Output | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 031 | S1 | S1 select switch | S/R |
| +18, bit 01 | 032 | S2 | S2 select switch | S/R |
| +18, bit 02 | 033 | S3 | S3 select switch | S/R |
| +18, bit 03 | 034 | S4 | Output hold switch --- Output is held when set to ON. | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

Block Model 165: Constant Selector

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|-----------|-------------------------|--------------|
| +0 (first word) | 011 | A1 | A1 constant | S/R |
| +1 | 012 | A2 | A2 constant | S/R |
| +2 | 013 | A3 | A3 constant | S/R |
| +3 | 014 | A4 | A4 constant | S/R |
| +4 | 015 | A5 | A5 constant | S/R |
| +5 | 016 | A6 | A6 constant | S/R |
| +6 | 017 | A7 | A7 constant | S/R |
| +7 | 018 | A8 | A8 constant | S/R |
| +12 | 006 | Y1 | Output | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 021 | S1 | A1 select switch | S/R |
| +18, bit 01 | 022 | S2 | A2 select switch | S/R |
| +18, bit 02 | 023 | S3 | A3 select switch | S/R |
| +18, bit 03 | 024 | S4 | A4 select switch | S/R |
| +18, bit 04 | 025 | S5 | A5 select switch | S/R |
| +18, bit 05 | 026 | S6 | A6 select switch | S/R |
| +18, bit 06 | 027 | S7 | A7 select switch | S/R |
| +18, bit 07 | 028 | S8 | A8 select switch | S/R |
| +18, bit 15 | 000 | MT_S T | Stop block operation | S/R |

Block Model 166: Constant Generator

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 011 | A1 | A1 constant | S/R |
| +1 | 012 | A2 | A2 constant | S/R |
| +2 | 013 | A3 | A3 constant | S/R |
| +3 | 014 | A4 | A4 constant | S/R |
| +4 | 015 | A5 | A5 constant | S/R |
| +5 | 016 | A6 | A6 constant | S/R |
| +6 | 017 | A7 | A7 constant | S/R |
| +7 | 018 | A8 | A8 constant | S/R |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

Block Model 167: Ramped Switch

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 015 | X1 | Input value | S |
| +1 | 016 | X2 | Input value | S |
| +4 | 025 | T | Time width | S/R |
| +5 | 026 | TU | Time Unit | S/R |
| +12 | 030 | Y1 | Output value | S |
| +13 | 031 | Y2 | Remaining time | S |
| +15 | 003 | ERR | Execution error display | S/R |
| +18, bit 00 | 027 | S1 | Input change command | S/R |
| +18, bit 01 | 028 | S2 | Reset command | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

Appendix B

ITEM Allocations for Send/Receive All Blocks

Block Model 171: Constant ITEM Setting

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 021 | E1 | E1 setting | S/R |
| +1 | 022 | E2 | E2 setting | S/R |
| +2 | 023 | E3 | E3 setting | S/R |
| +3 | 024 | E4 | E4 setting | S/R |
| +4 | 025 | E5 | E5 setting | S/R |
| +5 | 026 | E6 | E6 setting | S/R |
| +6 | 027 | E7 | E7 setting | S/R |
| +7 | 028 | E8 | E8 setting | S/R |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 031 | S1 | E1 send switch | S/R |
| +18, bit 01 | 032 | S2 | E2 send switch | S/R |
| +18, bit 02 | 033 | S3 | E3 send switch | S/R |
| +18, bit 03 | 034 | S4 | E4 send switch | S/R |
| +18, bit 04 | 035 | S5 | E5 send switch | S/R |
| +18, bit 05 | 036 | S6 | E6 send switch | S/R |
| +18, bit 06 | 037 | S7 | E7 send switch | S/R |
| +18, bit 07 | 038 | S8 | E8 send switch | S/R |
| +18, bit 08 | 039 | S9 | Batch send switch | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

Block Model 172: Variable ITEM Setting

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 021 | X1 | Input | S |
| +1 | 022 | X2 | Input | S |
| +2 | 023 | X3 | Input | S |
| +3 | 024 | X4 | Input | S |
| +4 | 025 | X5 | Input | S |
| +5 | 026 | X6 | Input | S |
| +6 | 027 | X7 | Input | S |
| +7 | 028 | X8 | Input | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 041 | S1 | E1 send switch | S/R |
| +18, bit 01 | 042 | S2 | E2 send | S/R |
| +18, bit 02 | 043 | S3 | E3 send switch | S/R |
| +18, bit 03 | 044 | S4 | E4 send switch | S/R |
| +18, bit 04 | 045 | S5 | E5 send | S/R |
| +18, bit 05 | 046 | S6 | E6 send switch | S/R |
| +18, bit 06 | 047 | S7 | E7 send switch | S/R |
| +18, bit 07 | 048 | S8 | E8 send | S/R |
| +18, bit 08 | 049 | S9 | Batch send switch | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

Block Model 174: Batch Data Collector

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|---|--------------|
| +0 (first word) | 021 | D1 | D1 | S |
| +1 | 022 | D2 | D2 input | S |
| +2 | 023 | D3 | D3 input | S |
| +3 | 024 | D4 | D4 input | S |
| +4 | 025 | D5 | D5 input | S |
| +5 | 026 | D6 | D6 input | S |
| +6 | 027 | D7 | D7 input | S |
| +7 | 028 | D8 | D8 input | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 031 | S1 | D1 input switch | S/R |
| +18, bit 01 | 032 | S2 | D2 input switch | S/R |
| +18, bit 02 | 033 | S3 | D3 input switch | S/R |
| +18, bit 03 | 034 | S4 | D4 input switch | S/R |
| +18, bit 04 | 035 | S5 | D5 input switch | S/R |
| +18, bit 05 | 036 | S6 | D6 input switch | S/R |
| +18, bit 06 | 037 | S7 | D7 input switch | S/R |
| +18, bit 07 | 038 | S8 | D8 input switch | S/R |
| +18, bit 08 | 039 | S9 | Batch input switch | S/R |
| +18, bit 09 | 040 | S10 | Batch clear buffer switch --- Contents (held values) of D1 to D8 buffers area batch-cleared when switch state changes from 0 to 1. | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

ITEM Allocations for Send/Receive All Blocks**Model Number 182: Accumulated Value Input Adder**

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|--|--------------|
| +0 (first word) | 011 | P1 | Input | S |
| +1 | 012 | P2 | Input | S |
| +2 | 013 | P3 | Input | S |
| +3 | 014 | P4 | Input | S |
| +4 | 024 | Q1 | Accumulated value (lower 4 digits) | S |
| +5 | 025 | Q2 | Accumulated value (upper 4 digits) | S |
| +10 | 020 | N | Sample number for moving average in instantaneous value conversion | S/R |
| +12 | 023 | Y1 | Instantaneous value output | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 021 | S1 | Counter reset switch | S/R |
| +18, bit 01 | 022 | S2 | Interrupt switch | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

Model Number 183: Accumulated Value Analog Multiplier

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|--|--------------|
| +0 (first word) | 012 | X1 | Input | S |
| +1 | 011 | P1 | Input | S |
| +4 | 021 | Q1 | Accumulated value (lower 4 digits) | S |
| +5 | 022 | Q2 | Accumulated value (upper 4 digits) | S |
| +8 | 014 | K1 | Gain | S/R |
| +9 | 015 | A1 | Bias | S/R |
| +10 | 017 | N | Sample number for moving average in instantaneous value conversion | S/R |
| +12 | 020 | Y1 | Instantaneous value output | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 018 | S1 | Counter reset switch | S/R |
| +18, bit 01 | 019 | S2 | Interrupt switch | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

Block Model 184: Accumulator for Accumulated Value Input

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------------|--------------|
| +0 (first word) | 008 | P1 | Input | S |
| +4 | 012 | Q1 | Accumulated value (lower 4 digits) | S |
| +5 | 013 | Q2 | Accumulated value (upper 4 digits) | S |
| +6 | 022 | Q3 | Batch accumulated value | S |
| +8 | 021 | BM | Preset value | S/R |
| +12 | 016 | Y1 | Instantaneous value output | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 014 | S1 | Counter reset switch | S/R |
| +18, bit 01 | 015 | S2 | Interrupt switch | S/R |
| +18, bit 02 | 023 | S3 | Batch controller reset switch | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 024 | U1 | Arrival at preset value | S |

Appendix B

ITEM Allocations for Send/Receive All Blocks

Block Model 185: Contact Input/Accumulated Value Output

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|----------------|------|----------|------------------------------------|--------------|
| +4 | 011 | Q1 | Accumulated value (lower 4 digits) | S |
| +5 | 012 | Q2 | Accumulated value (upper 4 digits) | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 008 | S1 | Contact input | S/R |
| +18, bit 01 | 009 | S2 | Reset switch | S/R |
| +18, bit 02 | 010 | S3 | Interrupt switch | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |

Block Model 186: Accumulated Value Input/Contact Output

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 008 | P1 | Input | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 010 | S1 | Counter reset switch | S/R |
| +18, bit 01 | 011 | S2 | Interrupt switch | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 012 | U1 | Contact output | S |

Block Model 192: Analog/Pulse Width Converter

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 008 | X1 | Input | S |
| +4 | 009 | CT | Pulse cycle time | S/R |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 010 | S1 | Reset switch | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 011 | U1 | Contact output | S |

Model Number 202: Constant Comparator

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 051 | X1 | X1 input value | S |
| +1 | 052 | X2 | X2 input value | S |
| +2 | 053 | X3 | X3 input value | S |
| +3 | 054 | X4 | X4 input value | S |
| +4 | 055 | X5 | X5 input value | S |
| +5 | 056 | X6 | X6 input value | S |
| +6 | 057 | X7 | X7 input value | S |
| +7 | 058 | X8 | X8 input value | S |
| +8 | 008 | R1 | R1 constant | S/R |
| +9 | 012 | R2 | R2 constant | S/R |
| +10 | 016 | R3 | R3 constant | S/R |
| +11 | 020 | R4 | R4 constant | S/R |
| +12 | 024 | R5 | R5 constant | S/R |
| +13 | 028 | R6 | R6 constant | S/R |
| +14 | 032 | R7 | R7 constant | S/R |
| +15 | 003 | ERR | Execution error display | S |
| +16 | 036 | R8 | R8 constant | S/R |
| +18, bit 00 | 041 | S1 | Comparison stop command | S/R |
| +18, bit 01 | 042 | S2 | Forced 0 output command | S/R |
| +18, bit 02 | 043 | S3 | Forced 1 output command | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 010 | U1 | Comparison result | S |
| +19, bit 01 | 014 | U2 | Comparison result | S |
| +19, bit 02 | 018 | U3 | Comparison result | S |
| +19, bit 03 | 022 | U4 | Comparison result | S |
| +19, bit 04 | 026 | U5 | Comparison result | S |
| +19, bit 05 | 030 | U6 | Comparison result | S |
| +19, bit 06 | 034 | U7 | Comparison result | S |
| +19, bit 07 | 038 | U8 | Comparison result | S |

Model Number 203: Variable Comparator

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|----------------|--------------|
| +0 (first word) | 051 | X1 | X1 input value | S |

ITEM Allocations for Send/Receive All Blocks

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|----------------|------|----------|------------------------------|--------------|
| +1 | 052 | X2 | X2 input value | S |
| +2 | 053 | X3 | X3 input value | S |
| +3 | 054 | X4 | X4 input value | S |
| +4 | 055 | X5 | X5 input value | S |
| +5 | 056 | X6 | X6 input value | S |
| +6 | 057 | X7 | X7 input value | S |
| +7 | 058 | X8 | X8 input value | S |
| +8 | 061 | R1 | R1 input value | S |
| +9 | 062 | R2 | R2 input value | S |
| +10 | 063 | R3 | R3 input value | S |
| +11 | 064 | R4 | R4 input value | S |
| +12 | 065 | R5 | R5 input value | S |
| +13 | 066 | R6 | R6 input value | S |
| +14 | 067 | R7 | R7 input value | S |
| +15 | 003 | ERR | Execution error display | S |
| +16 | 068 | R8 | R8 input value | S |
| +18, bit 00 | 041 | S1 | Comparison stop command | S/R |
| +18, bit 01 | 042 | S2 | Forced 0 output command | S/R |
| +18, bit 02 | 043 | S3 | Forced 1 output command | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 010 | U1 | Comparison result | S |
| +19, bit 01 | 014 | U2 | Comparison result | S |
| +19, bit 02 | 018 | U3 | Comparison result | S |
| +19, bit 03 | 022 | U4 | Comparison result | S |
| +19, bit 04 | 026 | U5 | Comparison result | S |
| +19, bit 05 | 030 | U6 | Comparison result | S |
| +19, bit 06 | 034 | U7 | Comparison result | S |
| +19, bit 07 | 038 | U8 | Comparison result | S |

Block Model 205: Timer

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|----------------|------|----------|--------------------------------------|--------------|
| +4 | 008 | PRS | Prediction (subtracted from setting) | S/R |
| +5 | 010 | TMU | Time unit | S/R |
| +8 | 007 | SP | Setting | S/R |
| +12 | 009 | Y1 | Time elapsed | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 011 | S1 | Count switch | S/R |
| +18, bit 01 | 012 | S2 | Interrupt switch | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 013 | U1 | Arrival at setting | S |
| +19, bit 01 | 014 | U2 | Arrival at prediction | S |

Block Model 206: ON/OFF Timer

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|----------------|------|----------|------------------------------|--------------|
| +4 | 007 | T1 | ON time setting | S/R |
| +5 | 008 | T2 | OFF time setting | S/R |
| +6 | 009 | TMU | Time unit | S/R |
| +12 | 010 | Y1 | Elapsed ON time | S |
| +13 | 011 | Y2 | Elapsed OFF time | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 012 | S1 | Run/stop command | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 013 | U1 | Contact output | S |

Model Number 207: Clock Pulse

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|----------------|------|----------|--|--------------|
| +4 | 007 | TS | Ts setting (unit: s) | S/R |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 008 | S1 | Operation command (1: Clock pulse output ON) | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 009 | U1 | Clock pulse output | S |

Appendix B

ITEM Allocations for Send/Receive All Blocks

Block Model 208: Counter

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|----------------|------|----------|--------------------------------------|--------------|
| +4 | 008 | PRS | Prediction (subtracted from setting) | S/R |
| +8 | 007 | SP | Setting | S/R |
| +12 | 009 | Y1 | Count | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 00 | 010 | S1 | Run/stop command | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 012 | U1 | Arrival at setting | S |
| +19, bit 01 | 013 | U2 | Arrival at prediction | S |

Block Model 209: Internal Switch

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------------|--------------|--------------------------------|--------------|
| +0 (first word) | 011 to 026 | S1 to S16 | Internal switches S1 to S16 | S/R |
| +1 | 027 to 042 | S17 to S32 | Internal switches S17 to S32 | S/R |
| +2 | 043 to 058 | S33 to S48 | Internal switches S33 to S48 | S/R |
| +3 | 059 to 074 | S49 to S64 | Internal switches S49 to S64 | S/R |
| +4 | 075 to 090 | S65 to S80 | Internal switches S65 to S80 | S/R |
| +5 | 091 to 106 | S81 to S96 | Internal switches S81 to S96 | S/R |
| +6 | 107 to 122 | S97 to S112 | Internal switches S97 to S112 | S/R |
| +7 | 123 to 138 | S113 to S128 | Internal switches S113 to S128 | S/R |
| +8 | 139 to 154 | S129 to S144 | Internal switches S129 to S144 | S/R |
| +9 | 155 to 170 | S145 to S160 | Internal switches S145 to S160 | S/R |
| +10 | 171 to 186 | S161 to S176 | Internal switches S161 to S176 | S/R |
| +11 | 187 to 202 | S177 to S192 | Internal switches S177 to S192 | S/R |
| +12 | 203 to 218 | S193 to S208 | Internal switches S193 to S208 | S/R |
| +13 | 219 to 234 | S209 to S224 | Internal switches S209 to S224 | S/R |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 15 | 000 | MT_ST | Stop block operation | S/R |

Block Model 210: Level Check

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|------------------------------|--------------|
| +0 (first word) | 007 | X1 | Input value | S |
| +1 | 010 | A0 | Lower limit | S/R |
| +2 | 011 | A1 | Level 1 upper limit | S/R |
| +3 | 012 | A2 | Level 2 upper limit | S/R |
| +4 | 013 | A3 | Level 3 upper limit | S/R |
| +5 | 014 | A4 | Level 4 upper limit | S/R |
| +6 | 015 | A5 | Level 5 upper limit | S/R |
| +7 | 016 | A6 | Level 6 upper limit | S/R |
| +8 | 017 | A7 | Level 7 upper limit | S/R |
| +9 | 018 | A8 | Level 8 upper limit | S/R |
| +10 | 019 | A9 | Upper hysteresis | S/R |
| +11 | 020 | A10 | Lower hysteresis | S/R |
| +12 | 030 | Y1 | Level No. | S |
| +15 | 003 | ERR | Execution error display | S |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 031 | U1 | Level 1 | S |
| +19, bit 01 | 032 | U2 | Level 2 | S |
| +19, bit 02 | 033 | U3 | Level 3 | S |
| +19, bit 03 | 034 | U4 | Level 4 | S |
| +19, bit 04 | 035 | U5 | Level 5 | S |
| +19, bit 05 | 036 | U6 | Level 6 | S |
| +19, bit 06 | 037 | U7 | Level 7 | S |

ITEM Allocations for Send/Receive All Blocks

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|----------------|------|----------|-----------|--------------|
| +19, bit 07 | 038 | U8 | Level 8 | S |

Model Number 221: ON/OFF Valve Manipulator

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|----------------|------|----------|--|--------------|
| +4 | 007 | TO | Open time setting | S/R |
| +5 | 009 | TC | Close time setting | S/R |
| +15 | 003 | ERR | Execution error display | S |
| +17 | 099 | OP_MK | Label | S/R |
| +18, bit 00 | 086 | S1 | Auto/Manual switching | S/R |
| +18, bit 02 | 013 | S3 | Manual input | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 021 | U1 | Manipulation output | S |
| +19, bit 01 | 022 | U2 | Valve action time error (1: Error) | S |
| +19, bit 02 | 023 | U3 | Valve open midway (1: Open midway) | S |
| +19, bit 07 | 012 | S2 | Auto input | S |
| +19, bit 08 | 085 | S4 | Site manipulation switch input (1: Site, 0: Central) | S |
| +19, bit 09 | 015 | S5 | Open limit switch input | S |
| +19, bit 10 | 016 | S6 | Close limit switch input | S |

Model Number 222: Motor Manipulator

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|---|--------------|
| +0 (first word) | 032 | X1 | CT input | S |
| +4 | 033 | H_SP | CT input high alarm setting | S/R |
| +6 | 035 | HS | Hysteresis setting | S/R |
| +7 | 006 | ANS | Answer check time (unit: s) | S/R |
| +15 | 003 | ERR | Execution error display | S |
| +17 | 099 | OP_MK | Label | S/R |
| +18, bit 00 | 086 | S1 | Auto/Manual switching 0: Manual, 1: Auto | S/R |
| +18, bit 02 | 013 | S3 | Manual input | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command (0: Cancel stop, 1: Stop) | S/R |
| +19, bit 00 | 021 | U1 | Manipulation output | S |
| +19, bit 01 | 022 | U2 | Answer error (1: Error, 0: Normal) | S |
| +19, bit 04 | 036 | CTH | CT input high alarm output | S |
| +19, bit 07 | 012 | S2 | Auto input | S |
| +19, bit 08 | 085 | S4 | Site manipulation switch input (1: Site, 0: Central) | S |
| +19, bit 09 | 015 | S5 | Answer input | S |

Appendix B

ITEM Allocations for Send/Receive All Blocks

Model Number 223: Reversible Motor Manipulator

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|---|--------------|
| +0 (first word) | 032 | X1 | CT input | S |
| +4 | 033 | H_SP | CT input high alarm setting | S/R |
| +6 | 035 | HS | Hysteresis setting | S/R |
| +7 | 006 | ANS | Answer check time (unit: s) | S/R |
| +8 | 007 | OFT | OFF time during FWD/REV switching (unit: s) | S/R |
| +15 | 003 | ERR | Execution error display | S |
| +17 | 099 | OP_MK | Label | S/R |
| +18, bit 00 | 086 | S1 | Auto/Manual switching 0: Manual, 1: Auto | S/R |
| +18, bit 03 | 014 | S4 | MAN-FWD input | S/R |
| +18, bit 05 | 016 | S6 | MAN-REV input | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 021 | U1 | FWD manipulation output | S |
| +19, bit 01 | 022 | U2 | REV manipulation output | S |
| +19, bit 02 | 023 | U3 | Answer error (1: Error, 0: Normal) | S |
| +19, bit 03 | 024 | U4 | Motor OFF state output (1: OFF) | S |
| +19, bit 04 | 036 | CTH | CT input high alarm output | S |
| +19, bit 08 | 012 | S2 | AUTO-FWD input | S |
| +19, bit 09 | 013 | S3 | AUTO-REV input | S |
| +19, bit 10 | 085 | S7 | Site manipulation switch input | S |
| +19, bit 11 | 018 | S8 | FWD answer input | S |
| +19, bit 12 | 019 | S9 | REV answer input | S |

Model Number 224: Motor Opening Manipulator

| Offset (words) | ITEM | Tag ITEM | Data name | Send/Receive |
|-----------------|------|----------|--|--------------|
| +0 (first word) | 032 | X1 | Opening input | S |
| +1 | 014 | SP | Current SP output | S |
| | 013 | SP | Manual input target opening setting | R |
| +2 | 012 | X2 | Auto input target opening | S |
| +4 | 033 | H_SP | Opening input high limit alarm setting | S/R |
| +5 | 034 | L_SP | Opening input low limit alarm setting | S/R |
| +6 | 035 | HS | Hysteresis setting | S/R |
| +7 | 017 | DB | Dead-band | S/R |
| +8 | 015 | T1 | Full-stroke time (unit: s) | S/R |
| +9 | 016 | T2 | Restart control time | S/R |
| +15 | 003 | ERR | Execution error display | S |
| +17 | 099 | OP_MK | Label | S/R |
| +18, bit 00 | 086 | S1 | Auto/Manual switching | S/R |
| +18, bit 15 | 000 | MT_ST | Stop block operation command | S/R |
| +19, bit 00 | 021 | U1 | Open manipulation output | S |
| +19, bit 01 | 022 | U2 | Close manipulation output | S |
| +19, bit 02 | 036 | H | Opening input high limit alarm output | S |
| +19, bit 03 | 037 | L | Opening input low limit alarm output | S |
| +19, bit 08 | 085 | S2 | Site manipulation switch input (1: Site, 1: Central) | S |
| +19, bit 09 | 019 | S3 | Open monitor switch thermal relay operation (1: ON) | S |
| +19, bit 10 | 020 | S4 | Close monitor switch thermal relay operation (1: ON) | S |

Appendix C

List of Data Memory Allocations of Node Terminal Blocks

The following describes how Node Terminals Send to Computer blocks and Send Terminal to All Nodes blocks are allocated to Data Memory area for Node Terminals on the CPU Unit.

| | |
|------------------------------------|---|
| Send to Computer blocks: | 1-Block Send Terminal to Computer (Block Model 403) 4-Block Send Terminal to Computer (Block Model 404) DO to Computer (Block Model 401) AO to Computer (Block Model 402) |
| Send Terminal to All Nodes blocks: | DO Terminal to All Nodes (Block Model 407) AO Terminal to All Nodes (Block Model 408) DO Terminal Settings from Computer (Block Model 409) AO Terminal Settings from Computer (Block Model 410) (Ao/DO Terminal Settings from Computer blocks [modes 409 and 410] are allocated for use only when re-issuing FINS commands to the network.) |

When the leading address of the Data Memory for Node Terminals is taken to be S

With Send to Computer blocks, S+24 is taken to be the lowermost word, and the number of words occupied per single Send to Computer block is fixed to 16 words (16 words are occupied even if the data is less than 16 words), and these 16 words are allocated in order to block addresses in ascending order from 501 to 532.

With Send Terminal to All Nodes blocks, S+536 is taken to be the lowermost word, and the number of words occupied per single Send Terminal to All Nodes block is fixed to two words, and these two words are allocated in order to block addresses in ascending order from 550 to 599.

| Data Memory (D) for Node Terminals | |
|------------------------------------|--|
| | 15 00 |
| S | System information |
| S+1 | |
| } | |
| S+23 | |
| S+24 | Terminal to Computer Send Block at block address 501 |
| } | |
| S+40 | Terminal to Computer Send Block at block address 502 |
| S+41 | |
| } | |
| S+56 | Terminal to Computer Send Block at block address 531 |
| } | |
| S+535 | Send Terminal to All Nodes at block address 550 |
| S+536 | |
| S+537 | Send Terminal to All Nodes at block address 599 |
| } | |
| S+634 | |
| S+635 | |

Allocation of Each ITEM in Function Blocks by Block Send to Computer

When function blocks are to be sent to Data Memory for Node Terminals by 1-Block Send Terminal to Computer (Block Model 403) and 4-Block Send Terminal to Computer (Block Model 404), the locations on Data Memory to which the data of each ITEM are to be allocated are as follows.

When data is to be read from the Loop Control Unit by a host monitoring system such as SCADA software other than CX-Process Monitor, perform data acquisition according to the following allocation locations.

List of Data Memory Allocations of Node Terminal Blocks

2-position ON/OFF (Block Model 001)

Note +0 word is the leading word allocated to the 1-Block Send Terminal to Computer block or the 4-Block Send Terminal to Computer block.

| ITEM | Tag ITEM | Data name | 1-Block Send Terminal to Computer | 4-Block Send Terminal to Computer | | | | Data range |
|------|----------|---|-----------------------------------|-----------------------------------|--------------------|---------------------|---------------------|---|
| | | | | No.1 | No.2 | No.3 | No.4 | |
| 007 | PV | PV input | +0 word | +0 word | +4 words | +8 words | +12 words | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 029 | SP | Current Set Point output | +1 word | +1 word | +5 words | +9 words | +13 words | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 008 | HH_SP | High/high alarm setting | +3 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 009 | H_SP | High alarm setting | +4 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 010 | L_SP | Low alarm setting | +5 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 011 | LL_SP | Low/low alarm setting | +6 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 041 | DVA_SP | Deviation alarm setting (Hysteresis is set at ITEM012.) | +7 words | — | — | — | — | 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 099 | OP_MK | Label | +8 words | — | — | — | — | 0000 to 000F Hex (0 to 15) |
| 026 | R/L_SW | Remote/Local switch 0: Local 1: Remote Note: Valid only when ITEM024 is 1 | +14 words bit 00 | +3 words bit 00 | +7 words bit 00 | +11 words bit 00 | +15 words bit 00 | 0, 1 |
| 086 | A/M_SW | Auto/Manual switch 0: Manual, 1: Auto | +14 words bit 01 | +3 words bit 01 | +7 words bit 01 | +11 words bit 01 | +15 words bit 01 | 0, 1 |
| 013 | HH | High/high alarm output | +14 words bit 02 | +3 words bit 02 | +7 words bit 02 | +11 words bit 02 | +15 words bit 02 | 0, 1 |
| 014 | H | High alarm output | +14 words bit 03 | +3 words bit 03 | +7 words bit 03 | +11 words bit 03 | +15 words bit 03 | 0, 1 |
| 015 | L | Low alarm output | +14 words bit 04 | +3 words bit 04 | +7 words bit 04 | +11 words bit 04 | +15 words bit 04 | 0, 1 |
| 016 | LL | Low/low alarm output | +14 words bit 05 | +3 words bit 05 | +7 words bit 05 | +11 words bit 05 | +15 words bit 05 | 0, 1 |
| 042 | DVA | Deviation alarm output | +14 words bit 06 | +3 words bit 06 | +7 words bit 06 | +11 words bit 06 | +15 words bit 06 | 0, 1 |
| 017 | ALM_OFF | Alarm stop switch 0: Alarm, 1: Stop | +14 words bit 09 | +3 words bit 09 | +7 words bit 09 | +11 words bit 09 | +15 words bit 09 | 0, 1 |
| 000 | MT_ST | Stop block operation command (0: Run, 1: Stop) | +14 words bit 10 | +3 words bit 10 | +7 words bit 10 | +11 words bit 10 | +15 words bit 10 | 0, 1 |
| 019 | PV_ABN | PV execution error display 0: Normal, 1: Error → MANUAL mode | +14 words bit 11 | +3 words bit 11 | +7 words bit 11 | +11 words bit 11 | +15 words bit 11 | 0, 1 |
| 024 | CAS_SET | Set Point setting mode (default) 0: Local only 1: Remote/Local Note: Setting to 0 invalidates ITEM026. | +14 words bit 13 | +3 words bit 13 | +7 words bit 13 | +11 words bit 13 | +15 words bit 13 | 0, 1 |
| 093 | MV | Output | +14 words bit 14 | +3 words bit 14 | +7 words bit 14 | +11 words bit 14 | +15 words bit 14 | 0, 1 |

Appendix C

List of Data Memory Allocations of Node Terminal Blocks

3-position ON/OFF (Block Model 002)

Note +0 word is the leading word allocated to the 1-Block Send Terminal to Computer block or the 4-Block Send Terminal to Computer block.

| ITEM | Tag ITEM | Data name | 1-Block Send Terminal to Computer | 4-Block Send Terminal to Computer | | | | Data range |
|------|----------|---|-----------------------------------|-----------------------------------|--------------------|---------------------|---------------------|---|
| | | | | No.1 | No.2 | No.3 | No.4 | |
| 007 | PV | PV input | +0 word | +0 word | +4 words | +8 words | +12 words | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 029 | SP | Current Set Point output | +1 word | +1 word | +5 words | +9 words | +13 words | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 008 | HH_SP | High/high alarm setting | +3 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 009 | H_SP | High alarm setting | +4 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 010 | L_SP | Low alarm setting | +5 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 011 | LL_SP | Low/low alarm setting | +6 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 041 | DVA_SP | Deviation alarm setting (Hysteresis is set at ITEM012.) | +7 words | — | — | — | — | 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 099 | OP_MK | Label | +8 words | — | — | — | — | 0000 to 000F Hex (0 to 15) |
| 026 | R/L_SW | Remote/Local switch 0: Local 1: Remote Note: Valid only when ITEM024 is 1 | +14 words bit 00 | +3 words bit 00 | +7 words bit 00 | +11 words bit 00 | +15 words bit 00 | 0, 1 |
| 086 | A/M_SW | Auto/Manual switch 0: Manual, 1: Auto | +14 words bit 01 | +3 words bit 01 | +7 words bit 01 | +11 words bit 01 | +15 words bit 01 | 0, 1 |
| 013 | HH | High/high alarm output | +14 words bit 02 | +3 words bit 02 | +7 words bit 02 | +11 words bit 02 | +15 words bit 02 | 0, 1 |
| 014 | H | High alarm output | +14 words bit 03 | +3 words bit 03 | +7 words bit 03 | +11 words bit 03 | +15 words bit 03 | 0, 1 |
| 015 | L | Low alarm output | +14 words bit 04 | +3 words bit 04 | +7 words bit 04 | +11 words bit 04 | +15 words bit 04 | 0, 1 |
| 016 | LL | Low/low alarm output | +14 words bit 05 | +3 words bit 05 | +7 words bit 05 | +11 words bit 05 | +15 words bit 05 | 0, 1 |
| 042 | DVA | Deviation alarm output | +14 words bit 06 | +3 words bit 06 | +7 words bit 06 | +11 words bit 06 | +15 words bit 06 | 0, 1 |
| 017 | ALM_OFF | Alarm stop switch 0: Alarm, 1: Stop | +14 words bit 09 | +3 words bit 09 | +7 words bit 09 | +11 words bit 09 | +15 words bit 09 | 0, 1 |
| 000 | MT_ST | Stop block operation command (0: Cancel stop, 1: Stop) | +14 words bit 10 | +3 words bit 10 | +7 words bit 10 | +11 words bit 10 | +15 words bit 10 | 0, 1 |
| 019 | PV_ABN | PV execution error display 0: Normal, 1: Error → MANUAL mode | +14 words bit 11 | +3 words bit 11 | +7 words bit 11 | +11 words bit 11 | +15 words bit 11 | 0, 1 |
| 024 | CAS_SET | Set Point setting mode (default) 0: Local only 1: Remote/Local Note: Setting to 0 invalidates ITEM026. | +14 words bit 13 | +3 words bit 13 | +7 words bit 13 | +11 words bit 13 | +15 words bit 13 | 0, 1 |
| 093 | MVH | MVH output | +14 words bit 14 | +3 words bit 14 | +7 words bit 14 | +11 words bit 14 | +15 words bit 14 | 0, 1 |
| 095 | MVL | MVH output | +14 words bit 15 | +3 words bit 15 | +7 words bit 15 | +11 words bit 15 | +15 words bit 15 | 0, 1 |

List of Data Memory Allocations of Node Terminal Blocks

Basic PID (Block Model 011)

Note +0 word is the leading word allocated to the 1-Block Send Terminal to Computer block or the 4-Block Send Terminal to Computer block.

| ITEM | Tag ITEM | Data name | 1-Block Send Terminal to Computer | 4-Block Send Terminal to Computer | | | | Data range |
|------|----------|--|-----------------------------------|-----------------------------------|--------------------|---------------------|---------------------|---|
| | | | | No.1 | No2 | No.3 | No.4 | |
| 007 | PV | PV input | +0 word | +0 word | +4 words | +8 words | +12 words | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 029 | SP | Current Set Point output | +1 word | +1 word | +5 words | +9 words | +13 words | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 089 | MV | host display of MV | +2 words | +2 words | +6 words | +10 words | +14 words | 8300 to FFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 008 | HH_SP | High/high alarm setting | +3 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 009 | H_SP | High alarm setting | +4 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 010 | L_SP | Low alarm setting | +5 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 011 | LL_SP | Low/low alarm setting | +6 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 041 | DVA_SP | Deviation alarm setting (Hysteresis is set at ITEM012.) | +7 words | — | — | — | — | 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 099 | OP_MK | Label | +8 words | — | — | — | — | 0000 to 000F Hex (0 to 15) |
| 054 | P | Proportional band | +9 words | — | — | — | — | 0001 to 270F Hex (0.1 to 999.9%) |
| 055 | I | Integral time (0: No integral action) | +10 words | — | — | — | — | 0000 to 270F Hex (0000 to 270F Hex (0 to 9999) sec.)) |
| 056 | D | Differential time (0: No differential action) | +11 words | — | — | — | — | 0000 to 270F Hex (0000 to 270F Hex (0 to 9999) sec.) |
| 076 | MH_LMT | High MV limit output | +12 words | — | — | — | — | 8300 to FFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 077 | ML_LMT | Low MV limit output | +13 words | — | — | — | — | 8300 to FFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 026 | R/L_SW | Remote/Local switch 0: Local 1: Remote Note: Valid only when ITEM024 is 1 | +14 words bit 00 | +3 words bit 00 | +7 words bit 00 | +11 words bit 00 | +15 words bit 00 | 0, 1 |
| 086 | A/M_SW | Auto/Manual switch 0: Manual, 1: Auto | +14 words bit 01 | +3 words bit 01 | +7 words bit 01 | +11 words bit 01 | +15 words bit 01 | 0, 1 |
| 013 | HH | High/high alarm output | +14 words bit 02 | +3 words bit 02 | +7 words bit 02 | +11 words bit 02 | +15 words bit 02 | 0, 1 |
| 014 | H | High alarm output | +14 words bit 03 | +3 words bit 03 | +7 words bit 03 | +11 words bit 03 | +15 words bit 03 | 0, 1 |
| 015 | L | Low alarm output | +14 words bit 04 | +3 words bit 04 | +7 words bit 04 | +11 words bit 04 | +15 words bit 04 | 0, 1 |
| 016 | LL | Low/low alarm output | +14 words bit 05 | +3 words bit 05 | +7 words bit 05 | +11 words bit 05 | +15 words bit 05 | 0, 1 |
| 042 | DVA | Deviation alarm output | +14 words bit 06 | +3 words bit 06 | +7 words bit 06 | +11 words bit 06 | +15 words bit 06 | 0, 1 |

Appendix C

List of Data Memory Allocations of Node Terminal Blocks

| ITEM | Tag ITEM | Data name | 1-Block Send Terminal to Computer | 4-Block Send Terminal to Computer | | | | Data range |
|------|----------|---|-----------------------------------|-----------------------------------|--------------------|---------------------|---------------------|--|
| | | | | No.1 | No.2 | No.3 | No.4 | |
| 078 | MHA | High MV limit output | +14 words bit 07 | +3 words bit 07 | +7 words bit 07 | +11 words bit 07 | +15 words bit 07 | 0, 1 |
| 079 | MLA | Low MV limit output | +14 words bit 08 | +3 words bit 08 | +7 words bit 08 | +11 words bit 08 | +15 words bit 08 | 0, 1 |
| 017 | ALM_OFF | Alarm stop switch 0: Alarm, 1: Stop | +14 words bit 09 | +3 words bit 09 | +7 words bit 09 | +11 words bit 09 | +15 words bit 09 | 0, 1 |
| 000 | MT_ST | Stop block operation command (0: Run, 1: Stop) | +14 words bit 10 | +3 words bit 10 | +7 words bit 10 | +11 words bit 10 | +15 words bit 10 | 0, 1 |
| 019 | PV_ABN | PV execution error display 0: Normal, 1: Error → MANUAL mode | +14 words bit 11 | +3 words bit 11 | +7 words bit 11 | +11 words bit 11 | +15 words bit 11 | 0, 1 |
| 091 | MV_ABN | MV execution error display 0: Normal, 1: Error | +14 words bit 12 | +3 words bit 12 | +7 words bit 12 | +11 words bit 12 | +15 words bit 12 | 0, 1 |
| 024 | CAS_SET | Set Point setting mode (default) 0: Local only 1: Remote/Local Note: Setting to 0 invalidates ITEM026. | +14 words bit 13 | +3 words bit 13 | +7 words bit 13 | +11 words bit 13 | +15 words bit 13 | 0, 1 |
| 035 | AT | AT command/AT being executed | +14 words bit 14 | +3 words bit 14 | +7 words bit 14 | +11 words bit 14 | +15 words bit 14 | 0, 1 |
| 098 | MV_IDX | MV index position | +15 words | — | — | — | — | FA24 toFFFF to 0000 to 2CEC Hex (-15.00 to +115.00%) |

List of Data Memory Allocations of Node Terminal Blocks

Advanced PID (Block Model 012)

Note +0 word is the leading word allocated to the 1-Block Send Terminal to Computer block or the 4-Block Send Terminal to Computer block.

| ITEM | Tag ITEM | Data name | 1-Block Send Terminal to Computer | 4-Block Send Terminal to Computer | | | | Data range |
|------|----------|--|-----------------------------------|-----------------------------------|--------------------|---------------------|---------------------|---|
| | | | | No.1 | No2 | No.3 | No.4 | |
| 007 | PV | PV input | +0 word | +0 word | +4 words | +8 words | +12 words | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 029 | SP | Current Set Point output | +1 word | +1 word | +5 words | +9 words | +13 words | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 089 | MV | Host display of MV | +2 words | +2 words | +6 words | +10 words | +14 words | 8300 to FFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 008 | HH_SP | High/high alarm setting | +3 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 009 | H_SP | High alarm setting | +4 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 010 | L_SP | Low alarm setting | +5 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 011 | LL_SP | Low/low alarm setting | +6 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 041 | DVA_SP | Deviation alarm setting (Hysteresis is set at ITEM012.) | +7 words | — | — | — | — | 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 099 | OP_MK | Label | +8 words | — | — | — | — | 0000 to 000F Hex (0 to 15) |
| 054 | P | Proportional band | +9 words | — | — | — | — | 0001 to 270F Hex (0.1 to 999.9%) |
| 055 | I | Integral time (0: No integral action) | +10 words | — | — | — | — | 0000 to 270F Hex (0000 to 270F Hex (0 to 9999) sec.)) |
| 056 | D | Differential time (0: No differential action) | +11 words | — | — | — | — | 0000 to 270F Hex (0000 to 270F Hex (0 to 9999) sec.) |
| 076 | MH_LMT | High MV limit | +12 words | — | — | — | — | 8300 to FFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 077 | ML_LMT | Low MV limit | +13 words | — | — | — | — | 8300 to FFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 026 | R/L_SW | Remote/Local switch 0: Local 1: Remote Note: Valid only when ITEM024 is 1 | +14 words bit 00 | +3 words bit 00 | +7 words bit 00 | +11 words bit 00 | +15 words bit 00 | 0, 1 |
| 086 | A/M_SW | Auto/Manual switch 0: Manual, 1: Auto | +14 words bit 01 | +3 words bit 01 | +7 words bit 01 | +11 words bit 01 | +15 words bit 01 | 0, 1 |
| 013 | HH | High/high alarm output | +14 words bit 02 | +3 words bit 02 | +7 words bit 02 | +11 words bit 02 | +15 words bit 02 | 0, 1 |
| 014 | H | High alarm output | +14 words bit 03 | +3 words bit 03 | +7 words bit 03 | +11 words bit 03 | +15 words bit 03 | 0, 1 |
| 015 | L | Low alarm output | +14 words bit 04 | +3 words bit 04 | +7 words bit 04 | +11 words bit 04 | +15 words bit 04 | 0, 1 |
| 016 | LL | Low/low alarm output | +14 words bit 05 | +3 words bit 05 | +7 words bit 05 | +11 words bit 05 | +15 words bit 05 | 0, 1 |
| 042 | DVA | Deviation alarm output | +14 words bit 06 | +3 words bit 06 | +7 words bit 06 | +11 words bit 06 | +15 words bit 06 | 0, 1 |

Appendix C

List of Data Memory Allocations of Node Terminal Blocks

| ITEM | Tag ITEM | Data name | 1-Block Send Terminal to Computer | 4-Block Send Terminal to Computer | | | | Data range |
|------|----------|---|-----------------------------------|-----------------------------------|--------------------|---------------------|---------------------|--|
| | | | | No.1 | No.2 | No.3 | No.4 | |
| 078 | MHA | High MV limit arrival output 1: Limit or more, 0: Less than limit | +14 words bit 07 | +3 words bit 07 | +7 words bit 07 | +11 words bit 07 | +15 words bit 07 | 0, 1 |
| 079 | MLA | Low MV limit arrival output 1: Limit or less, 0: Not limit or less | +14 words bit 08 | +3 words bit 08 | +7 words bit 08 | +11 words bit 08 | +15 words bit 08 | 0, 1 |
| 017 | ALM_OFF | Alarm stop switch 0: Alarm, 1: Stop | +14 words bit 09 | +3 words bit 09 | +7 words bit 09 | +11 words bit 09 | +15 words bit 09 | 0, 1 |
| 000 | MT_ST | Stop block operation command (0: Run, 1: Stop) | +14 words bit 10 | +3 words bit 10 | +7 words bit 10 | +11 words bit 10 | +15 words bit 10 | 0, 1 |
| 019 | PV_ABN | PV execution error display 0: Normal, 1: Error → MANUAL mode | +14 words bit 11 | +3 words bit 11 | +7 words bit 11 | +11 words bit 11 | +15 words bit 11 | 0, 1 |
| 091 | MV_ABN | MV execution error display 0: Normal, 1: Error | +14 words bit 12 | +3 words bit 12 | +7 words bit 12 | +11 words bit 12 | +15 words bit 12 | 0, 1 |
| 024 | CAS_SET | Set Point setting mode (default) 0: Local only 1: Remote/Local Note: Setting to 0 invalidates ITEM026. | +14 words bit 13 | +3 words bit 13 | +7 words bit 13 | +11 words bit 13 | +15 words bit 13 | 0, 1 |
| 035 | AT | AT command/AT executing | +14 words bit 14 | +3 words bit 14 | +7 words bit 14 | +11 words bit 14 | +15 words bit 14 | 0, 1 |
| 098 | MV_IDX | MV index position | +15 words | — | — | — | — | FA24 to FFFF to 0000 to 2CEC Hex (-15.00 to +115.00%) |

List of Data Memory Allocations of Node Terminal Blocks

Blended PID (Block Model 013)

Note +0 word is the leading word allocated to the 1-Block Send Terminal to Computer block or the 4-Block Send Terminal to Computer block.

| ITEM | Tag ITEM | Data name | 1-Block Send Terminal to Computer | 4-Block Send Terminal to Computer | | | | Data range |
|------|-------------|---|-----------------------------------|-----------------------------------|------|------|------|--|
| | | | | No.1 | No.2 | No.3 | No.4 | |
| 007 | P1 | PV input | +0 word | — | — | — | — | 0000 to 270F Hex (0 to 9999) |
| 027 | K1 | Ratio | +1 word | — | — | — | — | 0000 to 7D00 Hex (0 to 3.2000) |
| 089 | MV | host display of MV | +2 words | — | — | — | — | 8300 to FFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 012 | Q1 | Accumulated value (lower 4 digits) | +3 words | — | — | — | — | 0000 to 270F Hex (0 to 9999) |
| 013 | Q2 | Accumulated value (upper 4 digits) | +4 words | — | — | — | — | 0000 to 270F Hex (0 to 9999) |
| 016 | Y1 | Instantaneous value output | +5 words | — | — | — | — | 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 029 | Y2 | Current Set Point instantaneous value output | +6 words | — | — | — | — | 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 044 | DEV_Q | Cumulative deviation output | +7 words | | | | | 8300 to FFFF, 0000 to 7D00 Hex (± 32000) |
| 099 | OP_MK | Label | +8 words | — | — | — | — | 0000 to 000F Hex (0 to 15) |
| 054 | P | Proportional band | +9 words | — | — | — | — | 0001 to 270F Hex (0.1 to 999.9%) |
| 055 | I | Integral time (0: No integral action) | +10 words | — | — | — | — | 0000 to 270F Hex (0000 to 270F Hex (0000 to 9999) sec.)) |
| 056 | D | Differential time (0: No differential action) | +11 words | — | — | — | — | 0000 to 270F Hex (0000 to 270F Hex (0000 to 9999) sec.)) |
| 076 | MH_LMT | High MV limit | +12 words | — | — | — | — | 8300 to FFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 077 | ML_LMT | Low MV limit | +13 words | — | — | — | — | 8300 to FFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 086 | A/M_SW | Auto/Manual switch 0: Manual, 1: Auto | +14 words bit 01 | — | — | — | — | 0, 1 |
| 036 | DHH | Cumulative deviation High/high alarm output | +14 words bit 02 | — | — | — | — | 0, 1 |
| 037 | DH | Cumulative deviation High alarm output | +14 words bit 03 | — | — | — | — | 0, 1 |
| 038 | DL | Cumulative deviation Low alarm output | +14 words bit 04 | — | — | — | — | 0, 1 |
| 039 | DLL | Cumulative deviation Low/low alarm output | +14 words bit 05 | — | — | — | — | 0, 1 |
| 078 | MHA | High MV limit arrival | +14 words bit 07 | — | — | — | — | 0, 1 |
| 079 | MLA | Low MV limit arrival | +14 words bit 08 | — | — | — | — | 0, 1 |
| 017 | ALM_OF F | Alarm stop switch 0: Alarm, 1: Stop | +14 words bit 09 | — | — | — | — | 0, 1 |
| 000 | MT_ST | Stop block operation command (0: Run, 1: Stop) | +14 words bit 10 | — | — | — | — | 0, 1 |
| 091 | MV_ABN | MV execution error display 0: Normal, 1: Error | +14 words bit 12 | — | — | — | — | 0, 1 |
| 014 | S1 | Accumulation counter reset switch | +14 words bit 13 | — | — | — | — | 0, 1 |
| 043 | S2 | Cumulative deviation reset switch | +14 words bit 14 | — | — | — | — | 0, 1 |
| 098 | MV_IDX | MV index position | +15 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 015 | PR | Pulse rate | Note 1 | | | | | 0000 to 2710 Hex (0 to 10.000) |

Note1: This ITEM is written when new screens are displayed and when data is updated.

Appendix C

List of Data Memory Allocations of Node Terminal Blocks

Batch Flowrate Capture (Block Model 014)

Note +0 word is the leading word allocated to the 1-Block Send Terminal to Computer block or the 4-Block Send Terminal to Computer block.

| ITEM | Tag ITEM | Data name | 1-Block Send Terminal to Computer | 4-Block Send Terminal to Computer | | | | Data range |
|------|----------|---|-----------------------------------|-----------------------------------|------|------|------|---|
| | | | | No.1 | No.2 | No.3 | No.4 | |
| 007 | P1 | PV input | +0 word | — | — | — | — | 0000 to 270F Hex (0 to 9999) |
| 029 | SP | Current Set Point output (lower 4 digits) | +1 word | — | — | — | — | 0000 to 270F Hex (0 to 9999) |
| 089 | MV | Host display of MV | +2 words | — | — | — | — | 8300 to FFFF, 0000 to 7D00 Hex ($\pm 230.00\%$) |
| 030 | SPU | Current Set Point output (upper 4 digits) | +3 words | — | — | — | — | 0000 to 270F Hex (0 to 9999) |
| 035 | SM | Batch accumulated value (lower 4 digits) | +4 words | — | — | — | — | 0000 to 270F Hex (0 to 9999) |
| 032 | B0 | Overrun setting (value subtracted from BM) | +5 words | — | — | — | — | 0000 to 270F Hex (0 to 9999) |
| 033 | BP | Pre-batch setting (value subtracted from BM) | +6 words | — | — | — | — | 0000 to 270F Hex (0 to 9999) |
| 034 | B1 | Flowrate limitation | +7 words | — | — | — | — | 0000 to 270F Hex (0 to 9999) |
| 099 | OP_MK | Label | +8 words | — | — | — | — | 0000 to 000F Hex (0 to 15) |
| 065 | SMU | Batch accumulated value (upper 4 digits) | +9 words | — | — | — | — | 0000 to 270F Hex (0 to 9999) |
| 012 | Q1 | Accumulated value (lower 4 digits) | +10 words | — | — | — | — | 0000 to 270F Hex (0 to 9999) |
| 013 | Q2 | Accumulated value (upper 4 digits) | +11 words | — | — | — | — | 0000 to 270F Hex (0 to 9999) |
| 016 | Y1 | Instantaneous value output | +12 words | — | — | — | — | 0000 to 7D00 Hex (0 to 320.00%) |
| 017 | PR | Pulse rate (for host indication: scale unit/pulse) | +13 words | — | — | — | — | 0000 to 2710 Hex (0 to 10.000) |
| 026 | R/L_SW | Remote/Local switch 0: Local 1: Remote | +14 words bit 00 | — | — | — | — | 0, 1 |
| 086 | A/M_SW | SW 0: Manual, 1: Auto | +14 words bit 01 | — | — | — | — | 0, 1 |
| 036 | S1 | Run switch (0: Reset, 1: Run) | +14 words bit 02 | — | — | — | — | 0, 1 |
| 037 | S2 | Control interrupt switch (1: Interrupt) | +14 words bit 03 | — | — | — | — | 0, 1 |
| 014 | S3 | Accumulation counter reset switch (1: Reset) | +14 words bit 04 | — | — | — | — | 0, 1 |
| 038 | U1 | Main batch output | +14 words bit 05 | — | — | — | — | 0, 1 |
| 039 | U2 | Pre-batch output | +14 words bit 06 | — | — | — | — | 0, 1 |
| 000 | MT_ST | Stop block operation command (0: Cancel stop, 1: Stop) | +14 words bit 10 | — | — | — | — | 0, 1 |
| 098 | MV_IDX | MV index position | +15 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to 115.00%) |

Note 1 This ITEM is written when new screens are displayed and when data is updated.

List of Data Memory Allocations of Node Terminal Blocks

Fuzzy Logic (Block Model 016)

Note +0 word is the leading word allocated to the 1-Block Send Terminal to Computer block or the 4-Block Send Terminal to Computer block.

| ITEM | Tag ITEM | Data name | 1-Block Send Terminal to Computer | 4-Block Send Terminal to Computer | | | | Data range |
|------|----------|--|-----------------------------------|-----------------------------------|------|------|------|--|
| | | | | No.1 | No.2 | No.3 | No.4 | |
| 015 | X1 | X1 input value | +0 word | — | — | — | — | 8300 to FFFF, 0000 to 7D00Hex ($\pm 320.00\%$) |
| 016 | X2 | X2 input value | +1 word | — | — | — | — | 8300 to FFFF, 0000 to 7D00Hex ($\pm 320.00\%$) |
| 017 | X3 | X3 input value | +2 words | — | — | — | — | 8300 to FFFF, 0000 to 7D00Hex ($\pm 320.00\%$) |
| 018 | X4 | X4 input value | +3 words | — | — | — | — | 8300 to FFFF, 0000 to 7D00Hex ($\pm 320.00\%$) |
| 019 | X5 | X5 input value | +4 words | — | — | — | — | 8300 to FFFF, 0000 to 7D00Hex ($\pm 320.00\%$) |
| 020 | X6 | X6 input value | +5 words | — | — | — | — | 8300 to FFFF, 0000 to 7D00Hex ($\pm 320.00\%$) |
| 021 | X7 | X7 input value | +6 words | — | — | — | — | 8300 to FFFF, 0000 to 7D00Hex ($\pm 320.00\%$) |
| 022 | X8 | X8 input value | +7 words | — | — | — | — | 8300 to FFFF, 0000 to 7D00Hex ($\pm 320.00\%$) |
| 031 | Y1 | Y1 output value | +8 words | — | — | — | — | 8300 to FFFF, 0000 to 7D00Hex ($\pm 320.00\%$) |
| 032 | Y2 | Y2 output value | +9 words | — | — | — | — | 8300 to FFFF, 0000 to 7D00Hex ($\pm 320.00\%$) |
| 035 | FN | Read rule numbers for fulfilled rules | +10 words | — | — | — | — | 0001 to 0040 Hex (1 to 64) |
| 036 | FT | Applicability for each rule | +11 words | — | — | — | — | 0000 to 2710 Hex (0 to 10000) |
| 000 | MT_ST | Stop block operation command (0: Cancel stop, 1: Stop) | +14 words, bit 10 | — | — | — | — | 0, 1 |

Appendix C

List of Data Memory Allocations of Node Terminal Blocks

Indication and Setting (Block Model 031)

Note +0 word is the leading word allocated to the 1-Block Send Terminal to Computer block or the 4-Block Send Terminal to Computer block.

| ITEM | Tag ITEM | Data name | 1-Block Send Terminal to Computer | 4-Block Send Terminal to Computer | | | | Data range |
|------|----------|---|-----------------------------------|-----------------------------------|--------------------|---------------------|---------------------|---|
| | | | | No.1 | No.2 | No.3 | No.4 | |
| 007 | PV | PV input | +0 word | +0 word | +4 words | +8 words | +12 words | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 029 | SP | Current Set Point output | +1 word | +1 word | +5 words | +9 words | +13 words | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 008 | HH_SP | High/high alarm setting | +3 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 009 | H_SP | High alarm setting | +4 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 010 | L_SP | Low alarm setting | +5 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 011 | LL_SP | Low/low alarm setting | +6 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 099 | OP_MK | Label | +8 words | — | — | — | — | 0000 to 000F Hex (0 to 15) |
| 026 | R/L_SW | Remote/Local switch 0: Local 1: Remote Note: Valid only when ITEM024 is 1 | +14 words bit 00 | +3 words bit 00 | +7 words bit 00 | +11 words bit 00 | +15 words bit 00 | 0, 1 |
| 013 | HH | High/high alarm output | +14 words bit 02 | +3 words bit 02 | +7 words bit 02 | +11 words bit 02 | +15 words bit 02 | 0, 1 |
| 014 | H | High alarm output | +14 words bit 03 | +3 words bit 03 | +7 words bit 03 | +11 words bit 03 | +15 words bit 03 | 0, 1 |
| 015 | L | Low alarm output | +14 words bit 04 | +3 words bit 04 | +7 words bit 04 | +11 words bit 04 | +15 words bit 04 | 0, 1 |
| 016 | LL | Low/low alarm output | +14 words bit 05 | +3 words bit 05 | +7 words bit 05 | +11 words bit 05 | +15 words bit 05 | 0, 1 |
| 017 | ALM_OFF | Alarm stop switch 0: Alarm, 1: Stop | +14 words bit 09 | +3 words bit 09 | +7 words bit 09 | +11 words bit 09 | +15 words bit 09 | 0, 1 |
| 000 | MT_ST | Stop block operation command (0: Run, 1: Stop) | +14 words bit 10 | +3 words bit 10 | +7 words bit 10 | +11 words bit 10 | +15 words bit 10 | 0, 1 |
| 019 | PV_ABN | PV error display | +14 words bit 11 | +3 words bit 11 | +7 words bit 11 | +11 words bit 11 | +15 words bit 11 | 0, 1 |
| 024 | CAS_SET | Set Point setting mode (default) 0: Local only 1: Remote/Local Note: Setting to 0 invalidates ITEM026. | +14 words bit 13 | +3 words bit 13 | +7 words bit 13 | +11 words bit 13 | +15 words bit 13 | 0, 1 |

List of Data Memory Allocations of Node Terminal Blocks

Indication and Operation (Block Model 032)

Note +0 word is the leading word allocated to the 1-Block Send Terminal to Computer block or the 4-Block Send Terminal to Computer block.

| ITEM | Tag ITEM | Data name | 1-Block Send Terminal to Computer | 4-Block Send Terminal to Computer | | | | Data range |
|------|----------|--|-----------------------------------|-----------------------------------|--------------------|---------------------|---------------------|---|
| | | | | No.1 | No.2 | No.3 | No.4 | |
| 007 | PV | PV input | +0 word | +0 word | +4 words | +8 words | +12 words | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 084 | X1 | Auto input | +1 word | +1 word | +5 words | +9 words | +13 words | 8300 to FFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 089 | MV | Host display of MV | +2 words | +2 words | +6 words | +10 words | +14 words | 8300 to FFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 008 | HH_SP | High/high alarm setting | +3 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 009 | H_SP | High alarm setting | +4 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 010 | L_SP | Low alarm setting | +5 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 011 | LL_SP | Low/low alarm setting | +6 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 099 | OP_MK | Label | +8 words | — | — | — | — | 0000 to 000F Hex (0 to 15) |
| 076 | MH_LMT | High MV limit | +12 words | — | — | — | — | 8300 to FFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 077 | ML_LMT | Low MV limit | +13 words | — | — | — | — | 8300 to FFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 086 | A/M_SW | Auto/Manual switch 0: Manual, 1: Auto | +14 words bit 01 | +3 words bit 00 | +7 words bit 00 | +11 words bit 00 | +15 words bit 00 | 0, 1 |
| 013 | HH | High/high alarm output | +14 words bit 02 | +3 words bit 02 | +7 words bit 02 | +11 words bit 02 | +15 words bit 02 | 0, 1 |
| 014 | H | High alarm output | +14 words bit 03 | +3 words bit 03 | +7 words bit 03 | +11 words bit 03 | +15 words bit 03 | 0, 1 |
| 015 | L | Low alarm output | +14 words bit 04 | +3 words bit 04 | +7 words bit 04 | +11 words bit 04 | +15 words bit 04 | 0, 1 |
| 016 | LL | Low/low alarm output | +14 words bit 05 | +3 words bit 05 | +7 words bit 05 | +11 words bit 05 | +15 words bit 05 | 0, 1 |
| 078 | MHA | High MV limit output | +14 words bit 07 | +3 words bit 07 | +7 words bit 07 | +11 words bit 07 | +15 words bit 07 | 0, 1 |
| 079 | MLA | Low MV limit output | +14 words bit 08 | +3 words bit 08 | +7 words bit 08 | +11 words bit 08 | +15 words bit 08 | 0, 1 |
| 017 | ALM_OFF | Alarm stop switch 0: Alarm, 1: Stop | +14 words bit 09 | +3 words bit 09 | +7 words bit 09 | +11 words bit 09 | +15 words bit 09 | 0, 1 |
| 000 | MT_ST | Stop block operation command (0:Run, 1: Stop) | +14 words bit 10 | +3 words bit 10 | +7 words bit 10 | +11 words bit 10 | +15 words bit 10 | 0, 1 |
| 019 | PV_ABN | PV error display | +14 words bit 11 | +3 words bit 11 | +7 words bit 11 | +11 words bit 11 | +15 words bit 11 | 0, 1 |
| 091 | MV_ABN | MV error display | +14 words bit 12 | +3 words bit 12 | +7 words bit 12 | +11 words bit 12 | +15 words bit 12 | 0, 1 |
| 098 | MV_IDX | MV index position | +15 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (15.00 to +115.00%) |

Appendix C

List of Data Memory Allocations of Node Terminal Blocks

Ratio Setting (Block Model 033)

Note +0 word is the leading word allocated to the 1-Block Send Terminal to Computer block or the 4-Block Send Terminal to Computer block.

| ITEM | Tag ITEM | Data name | 1-Block Send Terminal to Computer | 4-Block Send Terminal to Computer | | | | Data range |
|------|----------|---|-----------------------------------|-----------------------------------|--------------------|---------------------|---------------------|---|
| | | | | No.1 | No.2 | No.3 | No.4 | |
| 007 | PV | Reference input | +0 word | +0 word | +4 words | +8 words | +12 words | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 029 | SP | Current SP output | +1 word | +1 word | +5 words | +9 words | +13 words | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 089 | MV | Host display of MV | +2 words | +2 words | +6 words | +10 words | +14 words | 8300 to FFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 099 | OP_MK | Label | +8 words | — | — | — | — | 0000 to 000F Hex (0 to 15) |
| 054 | K1 | Ratio range (sets signal ratio range corresponding to Set Point=100%) | +9 words | — | — | — | — | D8F0 to FFFF, 0000 to 2710 Hex ($\pm 10.00\%$) |
| 055 | A1 | Input bias | +10 words | — | — | — | — | 8300 to FFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 056 | B1 | Output bias | +11 words | — | — | — | — | 8300 to FFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 076 | MH_LMT | High MV limit | +12 words | — | — | — | — | 8300 to FFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 077 | ML_LMT | Low MV limit | +13 words | — | — | — | — | 8300 to FFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 026 | R/L_SW | Remote/Local switch 0: Local, 1: Remote Note: Valid only when ITEM024 is 1 | +14 words bit 00 | +3 words bit 00 | +7 words bit 00 | +11 words bit 00 | +15 words bit 00 | 0, 1 |
| 086 | A/M_SW | Auto/Manual switch 0: Manual, 1: Auto | +14 words bit 01 | +3 words bit 01 | +7 words bit 01 | +11 words bit 01 | +15 words bit 01 | 0, 1 |
| 078 | MHA | High MV limit output | +14 words bit 07 | +3 words bit 07 | +7 words bit 07 | +11 words bit 07 | +15 words bit 07 | 0, 1 |
| 079 | MLA | Low MV limit output | +14 words bit 08 | +3 words bit 08 | +7 words bit 08 | +11 words bit 08 | +15 words bit 08 | 0, 1 |
| 000 | MT_ST | Stop block operation command (0: Run, 1: Stop) | +14 words bit 10 | +3 words bit 10 | +7 words bit 10 | +11 words bit 10 | +15 words bit 10 | 0, 1 |
| 019 | PV_ABN | PV error display | +14 words bit 11 | +3 words bit 11 | +7 words bit 11 | +11 words bit 11 | +15 words bit 11 | 0, 1 |
| 091 | MV_ABN | MV error display | +14 words bit 12 | +3 words bit 12 | +7 words bit 12 | +11 words bit 12 | +15 words bit 12 | 0, 1 |
| 024 | CAS_SET | Ratio setting mode (default) 0: Local only 1: Remote/Local Note: Setting to 0 invalidates ITEM026. | +14 words bit 13 | +3 words bit 13 | +7 words bit 13 | +11 words bit 13 | +15 words bit 13 | 0, 1 |
| 098 | MV_IDX | MV index position | +15 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |

List of Data Memory Allocations of Node Terminal Blocks

Indicator (Block Model 034)

Note +0 word is the leading word allocated to the 1-Block Send Terminal to Computer block or the 4-Block Send Terminal to Computer block.

| ITEM | Tag ITEM | Data name | 1-Block Send Terminal to Computer | 4-Block Send Terminal to Computer | | | | Data range |
|------|----------|---|-----------------------------------|-----------------------------------|-----------------|------------------|------------------|---|
| | | | | No.1 | No.2 | No.3 | No.4 | |
| 007 | PV | PV input | +0 word | +0 word | +4 words | +8 words | +12 words | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 008 | HH_SP | High/high alarm setting | +3 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 009 | H_SP | High alarm setting | +4 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 010 | L_SP | Low alarm setting | +5 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 011 | LL_SP | Low/low alarm setting | +6 words | — | — | — | — | FA24 to FFFF, 0000 to 2CEC Hex (-15.00 to +115.00%) |
| 099 | OP_MK | Label | +8 words | — | — | — | — | 0000 to 000F Hex (0 to 15) |
| 013 | HH | High/high alarm output | +14 words bit 02 | +3 words bit 02 | +7 words bit 02 | +11 words bit 02 | +15 words bit 02 | 0, 1 |
| 014 | H | High alarm output | +14 words bit 03 | +3 words bit 03 | +7 words bit 03 | +11 words bit 03 | +15 words bit 03 | 0, 1 |
| 015 | L | Low alarm output | +14 words bit 04 | +3 words bit 04 | +7 words bit 04 | +11 words bit 04 | +15 words bit 04 | 0, 1 |
| 016 | LL | Low/low alarm output | +14 words bit 05 | +3 words bit 05 | +7 words bit 05 | +11 words bit 05 | +15 words bit 05 | 0, 1 |
| 017 | ALM_OFF | Alarm stop switch 0: Alarm, 1: Stop | +14 words bit 09 | +3 words bit 09 | +7 words bit 09 | +11 words bit 09 | +15 words bit 09 | 0, 1 |
| 000 | MT_ST | Stop block operation command (0: Run, 1: Stop) | +14 words bit 10 | +3 words bit 10 | +7 words bit 10 | +11 words bit 10 | +15 words bit 10 | 0, 1 |
| 019 | PV_ABN | PV error display | +14 words bit 11 | +3 words bit 11 | +7 words bit 11 | +11 words bit 11 | +15 words bit 11 | 0, 1 |

Appendix C

List of Data Memory Allocations of Node Terminal Blocks

High/Low Alarm (Block Model 111)

The high/low alarm cannot be sent by the 1-Block Send Terminal to Computer block.

Note +0 word is the leading word allocated to the 1-Block Send Terminal to Computer block or the 4-Block Send Terminal to Computer block.

| ITEM | Tag ITEM | Data name | 1-Block Send Terminal to Computer | 4-Block Send Terminal to Computer | | | | Data range |
|------|----------|-------------------|-----------------------------------|-----------------------------------|-----------------|------------------|------------------|---|
| | | | | No.1 | No2 | No.3 | No.4 | |
| 008 | PV | Input | — | +0 word | +4 words | +8 words | +12 words | 8300 to FFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 009 | H_SP | High setting | — | +1 word | +5 words | +9 words | +13 words | 8300 to FFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 010 | L_SP | Low setting | — | +2 words | +6 words | +10 words | +14 words | 8300 to FFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 012 | H | High alarm output | — | +3 words bit 00 | +7 words bit 00 | +11 words bit 00 | +15 words bit 00 | 0, 1 |
| 013 | L | Low alarm output | — | +3 words bit 01 | +7 words bit 01 | +11 words bit 01 | +15 words bit 01 | 0, 1 |

Segment Program 2 (Block Model 157)

Note +0 word is the leading word allocated to the 1-Block Send Terminal to Computer block or the 4-Block Send Terminal to Computer block.

| ITEM | Tag ITEM | Data name | 1-Block Send Terminal to Computer | 4-Block Send Terminal to Computer | | | | Data range |
|------|----------|--------------------------------|-----------------------------------|-----------------------------------|-----------------|------------------|------------------|---|
| | | | | No.1 | No2 | No.3 | No.4 | |
| 007 | X1 | Reference input | — | +0 word | +4 words | +8 words | +12 words | 8300 to FFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 008 | Y1 | Program output | — | +1 word | +5 words | +9 words | +13 words | 8300 to FFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 011 | Y3 | Step output | — | +2 words | +6 words | +10 words | +14 words | 0 to 30 |
| 019 | U10 | Waiting | — | +3 words bit 00 | +7 words bit 00 | +11 words bit 00 | +15 words bit 00 | 0, 1 |
| 015 | U1 | X1 input error | — | +3 words bit 01 | +7 words bit 01 | +11 words bit 01 | +15 words bit 01 | 0, 1 |
| 016 | U2 | Arrival at final segment | — | +3 words bit 02 | +7 words bit 02 | +11 words bit 02 | +15 words bit 02 | 0, 1 |
| 013 | S1 | Run/stop command | — | +3 words bit 03 | +7 words bit 03 | +11 words bit 03 | +15 words bit 03 | 0, 1 |
| 014 | S2 | Time axis hold switch | — | +3 words bit 04 | +7 words bit 04 | +11 words bit 04 | +15 words bit 04 | 0, 1 |
| 017 | S3 | Move to next wait command | — | +3 words bit 05 | +7 words bit 05 | +11 words bit 05 | +15 words bit 05 | 0, 1 |
| 018 | S4 | Move to next step command | — | +3 words bit 06 | +7 words bit 06 | +11 words bit 06 | +15 words bit 06 | 0, 1 |
| 020 | S5 | Reference input disable switch | — | +3 words bit 07 | +7 words bit 07 | +11 words bit 07 | +15 words bit 07 | 0, 1 |
| 000 | | Stop block operation command | — | +3 words bit 10 | +7 words bit 10 | +11 words bit 10 | +15 words bit 10 | 0, 1 |

List of Data Memory Allocations of Node Terminal Blocks

Timer (Block Model 205)

The timer cannot be sent by the 1-Block Send Terminal to Computer block.

Note +0 word is the leading word allocated to the 1-Block Send Terminal to Computer block or the 4-Block Send Terminal to Computer block.

| ITEM | Tag ITEM | Data name | 1-Block Send Terminal to Computer | 4-Block Send Terminal to Computer | | | | Data range |
|------|----------|--------------------------------------|-----------------------------------|-----------------------------------|-----------------|------------------|------------------|--------------------------------|
| | | | | No.1 | No.2 | No.3 | No.4 | |
| 009 | PV | Time elapsed | — | +0 word | +4 words | +8 words | +12 words | 0000 to 7D00 Hex (0 to 3200.0) |
| 007 | SP | Setting | — | +1 word | +5 words | +9 words | +13 words | 0000 to 7D00 Hex (0 to 3200.0) |
| 008 | PRESET | Prediction (subtracted from setting) | — | +2 words | +6 words | +10 words | +14 words | 0000 to 7D00 Hex (0 to 3200.0) |
| 013 | U1 | Setting reached | — | +3 words bit 00 | +7 words bit 00 | +11 words bit 00 | +15 words bit 00 | 0, 1 |
| 014 | U2 | Prediction reached | — | +3 words bit 01 | +7 words bit 01 | +11 words bit 01 | +15 words bit 01 | 0, 1 |
| 011 | S1 | Run switch | — | +3 words bit 02 | +7 words bit 02 | +11 words bit 02 | +15 words bit 02 | 0, 1 |
| 012 | S2 | Interrupt switch | — | +3 words bit 03 | +7 words bit 03 | +11 words bit 03 | +15 words bit 03 | 0, 1 |

Counter (Block Model 208)

The counter cannot be sent by the 1-Block Send Terminal to Computer block.

Note +0 word is the leading word allocated to the 1-Block Send Terminal to Computer block or the 4-Block Send Terminal to Computer block.

| ITEM | Tag ITEM | Data name | 1-Block Send Terminal to Computer | 4-Block Send Terminal to Computer | | | | Data range |
|------|----------|--------------------------------------|-----------------------------------|-----------------------------------|-----------------|------------------|------------------|------------------------------|
| | | | | No.1 | No.2 | No.3 | No.4 | |
| 009 | PV | Count | — | +0 word | +4 words | +8 words | +12 words | 0000 to 270F Hex (0 to 9999) |
| 007 | SP | Setting | — | +1 word | +5 words | +9 words | +13 words | 0000 to 270F Hex (0 to 9999) |
| 008 | PRESET | Prediction (subtracted from setting) | — | +2 words | +6 words | +10 words | +14 words | 0000 to 270F Hex (0 to 9999) |
| 012 | U1 | Setting reached | — | +3 words bit 00 | +7 words bit 00 | +11 words bit 00 | +15 words bit 00 | 0, 1 |
| 013 | U2 | Prediction reached | — | +3 words bit 01 | +7 words bit 01 | +11 words bit 01 | +15 words bit 01 | 0, 1 |
| 010 | S1 | Run switch | — | +3 words bit 02 | +7 words bit 02 | +11 words bit 02 | +15 words bit 02 | 0, 1 |

Appendix C

List of Data Memory Allocations of Node Terminal Blocks

ON/OFF Valve Manipulator (Block Model 221)

Note +0 word is the leading word allocated to the 1-Block Send Terminal to Computer block or the 4-Block Send Terminal to Computer block.

| ITEM | Tag ITEM | Data name | 1-Block Send Terminal to Computer | 4-Block Send Terminal to Computer | | | | Data range |
|------|----------|--------------------------------|-----------------------------------|-----------------------------------|--------------------|---------------------|---------------------|----------------------------|
| | | | | No.1 | No.2 | No.3 | No.4 | |
| 099 | OP_MK | Label | — | +2 words | +6 words | +10 words | +14 words | 0000 to 000F Hex (0 to 15) |
| 086 | S1 | Auto/Manual switching | — | +3 words bit 00 | +7 words bit 00 | +11 words bit 00 | +15 words bit 00 | 0, 1 |
| 012 | S2 | Auto input | — | +3 words bit 01 | +7 words bit 01 | +11 words bit 01 | +15 words bit 01 | 0, 1 |
| 013 | S3 | Manual input | — | +3 words bit 02 | +7 words bit 02 | +11 words bit 02 | +15 words bit 02 | 0, 1 |
| 085 | S4 | Site manipulation switch input | — | +3 words bit 03 | +7 words bit 03 | +11 words bit 03 | +15 words bit 03 | 0, 1 |
| 015 | S5 | Open limit switch input | — | +3 words bit 04 | +7 words bit 04 | +11 words bit 04 | +15 words bit 04 | 0, 1 |
| 016 | S6 | Close limit switch input | — | +3 words bit 05 | +7 words bit 05 | +11 words bit 05 | +15 words bit 05 | 0, 1 |
| 021 | U1 | Manipulation output | — | +3 words bit 06 | +7 words bit 06 | +11 words bit 06 | +15 words bit 06 | 0, 1 |
| 022 | U2 | Valve action time error | — | +3 words bit 07 | +7 words bit 07 | +11 words bit 07 | +15 words bit 07 | 0, 1 |
| 023 | U3 | Valve open midway | — | +3 words bit 08 | +7 words bit 08 | +11 words bit 08 | +15 words bit 08 | 0, 1 |

Motor Manipulator (Block Model 222)

Note +0 word is the leading word allocated to the 1-Block Send Terminal to Computer block or the 4-Block Send Terminal to Computer block.

| ITEM | Tag ITEM | Data name | 1-Block Send Terminal to Computer | 4-Block Send Terminal to Computer | | | | Data range |
|------|----------|--------------------------------|-----------------------------------|-----------------------------------|--------------------|---------------------|---------------------|---|
| | | | | No.1 | No.2 | No.3 | No.4 | |
| 032 | X1 | CT input | — | +0 word | +4 words | +8 words | +12 words | 8300 to FFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 033 | H_SP | CT input high alarm setting | — | +1 word | +5 words | +9 words | +13 words | 8300 to FFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 099 | OP_MK | Label | — | +2 words | +6 words | +10 words | +14 words | 0000 to 000F Hex (0 to 15) |
| 086 | S1 | Auto/Manual switching | — | +3 words bit 00 | +7 words bit 00 | +11 words bit 00 | +15 words bit 00 | 0, 1 |
| 012 | S2 | Auto input | — | +3 words bit 01 | +7 words bit 01 | +11 words bit 01 | +15 words bit 01 | 0, 1 |
| 013 | S3 | Manual input | — | +3 words bit 02 | +7 words bit 02 | +11 words bit 02 | +15 words bit 02 | 0, 1 |
| 085 | S4 | Site manipulation switch input | — | +3 words bit 03 | +7 words bit 03 | +11 words bit 03 | +15 words bit 03 | 0, 1 |
| 015 | S5 | Answer input | — | +3 words bit 04 | +7 words bit 04 | +11 words bit 04 | +15 words bit 04 | 0, 1 |
| 021 | U1 | Manipulation output | — | +3 words bit 05 | +7 words bit 05 | +11 words bit 05 | +15 words bit 05 | 0, 1 |
| 022 | U2 | Answer error | — | +3 words bit 06 | +7 words bit 06 | +11 words bit 06 | +15 words bit 06 | 0, 1 |
| 036 | CTH | CT input high alarm output | — | +3 words bit 13 | +7 words bit 13 | +11 words bit 13 | +15 words bit 13 | 0, 1 |

List of Data Memory Allocations of Node Terminal Blocks

Reversible Motor Manipulator (Block Model 223)

Note +0 word is the leading word allocated to the 1-Block Send Terminal to Computer block or the 4-Block Send Terminal to Computer block.

| ITEM | Tag ITEM | Data name | 1-Block Send Terminal to Computer | 4-Block Send Terminal to Computer | | | | Data range |
|------|----------|--------------------------------|-----------------------------------|-----------------------------------|-----------------|------------------|------------------|---|
| | | | | No.1 | No.2 | No.3 | No.4 | |
| 032 | X1 | CT input | — | +0 word | +4 words | +8 words | +12 words | 8300 to FFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 033 | H_SP | CT input high alarm setting | — | +1 word | +5 words | +9 words | +13 words | 8300 to FFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 099 | OP_MK | Label | — | +2 words | +6 words | +10 words | +14 words | 0000 to 000F Hex (0 to 15) |
| 086 | S1 | Auto/Manual switching | — | +3 words bit 00 | +7 words bit 00 | +11 words bit 00 | +15 words bit 00 | 0, 1 |
| 012 | S2 | AUTO-FWD input | — | +3 words bit 01 | +7 words bit 01 | +11 words bit 01 | +15 words bit 01 | 0, 1 |
| 013 | S3 | AUTO-REV input | — | +3 words bit 02 | +7 words bit 02 | +11 words bit 02 | +15 words bit 02 | 0, 1 |
| 014 | S4 | MAN-FWD input | — | +3 words bit 03 | +7 words bit 03 | +11 words bit 03 | +15 words bit 03 | 0, 1 |
| 016 | S6 | MAN-REV input | — | +3 words bit 05 | +7 words bit 05 | +11 words bit 05 | +15 words bit 05 | 0, 1 |
| 085 | S7 | Site manipulation switch input | — | +3 words bit 06 | +7 words bit 06 | +11 words bit 06 | +15 words bit 06 | 0, 1 |
| 018 | S8 | FWD answer input | — | +3 words bit 07 | +7 words bit 07 | +11 words bit 07 | +15 words bit 07 | 0, 1 |
| 019 | S9 | REV answer input | — | +3 words bit 08 | +7 words bit 08 | +11 words bit 08 | +15 words bit 08 | 0, 1 |
| 021 | U1 | FWD manipulation output | — | +3 words bit 09 | +7 words bit 09 | +11 words bit 09 | +15 words bit 09 | 0, 1 |
| 022 | U2 | REV manipulation output | — | +3 words bit 10 | +7 words bit 10 | +11 words bit 10 | +15 words bit 10 | 0, 1 |
| 023 | U3 | Answer error | — | +3 words bit 11 | +7 words bit 11 | +11 words bit 11 | +15 words bit 11 | 0, 1 |
| 024 | U4 | Motor OFF state output | — | +3 words bit 12 | +7 words bit 12 | +11 words bit 12 | +15 words bit 12 | 0, 1 |
| 036 | CTH | CT input high alarm output | — | +3 words bit 13 | +7 words bit 13 | +11 words bit 13 | +15 words bit 13 | 0, 1 |

Appendix C

List of Data Memory Allocations of Node Terminal Blocks

Motor Opening Manipulator (Block Model 224)

Note +0 word is the leading word allocated to the 1-Block Send Terminal to Computer block or the 4-Block Send Terminal to Computer block.

| ITEM | Tag ITEM | Data name | 1-Block Send Terminal to Computer | 4-Block Send Terminal to Computer | | | | Data range |
|------|----------|--|-----------------------------------|-----------------------------------|-----------------|------------------|------------------|---|
| | | | | No.1 | No.2 | No.3 | No.4 | |
| 032 | X1 | Opening input | — | +0 word | +4 words | +8 words | +12 words | 8300 to FFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 014 | SP | Current SP | — | +1 word | +5 words | +9 words | +13 words | 8300 to FFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 099 | OP_MK | Label | — | +2 words | +6 words | +10 words | +14 words | 0000 to 000F Hex (0 to 15) |
| 086 | S1 | Auto/Manual switching | — | +3 words bit 00 | +7 words bit 00 | +11 words bit 00 | +15 words bit 00 | 0, 1 |
| 085 | S2 | Site manipulation switch input | — | +3 words bit 01 | +7 words bit 01 | +11 words bit 01 | +15 words bit 01 | 0, 1 |
| 019 | S3 | Open monitor switch thermal relay operation | — | +3 words bit 02 | +7 words bit 02 | +11 words bit 02 | +15 words bit 02 | 0, 1 |
| 020 | S4 | Close monitor switch thermal relay operation | — | +3 words bit 03 | +7 words bit 03 | +11 words bit 03 | +15 words bit 03 | 0, 1 |
| 021 | U1 | Open manipulation output | — | +3 words bit 04 | +7 words bit 04 | +11 words bit 04 | +15 words bit 04 | 0, 1 |
| 022 | U2 | Close manipulation output | — | +3 words bit 05 | +7 words bit 05 | +11 words bit 05 | +15 words bit 05 | 0, 1 |
| 036 | H | Opening input high limit alarm output | — | +3 words bit 13 | +7 words bit 13 | +11 words bit 13 | +15 words bit 13 | 0, 1 |
| 037 | L | Opening input low limit alarm output | — | +3 words bit 14 | +7 words bit 14 | +11 words bit 14 | +15 words bit 14 | 0, 1 |

List of Data Memory Allocations of Node Terminal Blocks

DO to Computer (Block Model 401)

| ITEM | Tag ITEM | Data name | Data memory (D) area | Data range |
|------|----------|---------------|----------------------|------------|
| 020 | S0 | Contact input | +0 word bit 00 | 0, 1 |
| to | to | | to | |
| 035 | S15 | Contact input | +0 word bit 15 | 0, 1 |
| 036 | S16 | Contact input | +1 word bit 00 | 0, 1 |
| to | to | | to | |
| 051 | S31 | Contact input | +1 word bit 15 | 0, 1 |
| 052 | S32 | Contact input | +2 words bit 00 | 0, 1 |
| to | | | to | |
| 067 | S47 | Contact input | +2 words bit 15 | 0, 1 |
| 068 | S48 | Contact input | +3 words bit 00 | 0, 1 |
| to | | | to | |
| 084 | S64 | Contact input | +3 words bit 15 | 0, 1 |
| to | | | to | |
| 132 | S112 | Contact input | +7 words bit 00 | 0, 1 |
| to | | | to | |
| 147 | S127 | Contact input | +7 words bit 15 | 0, 1 |

AO to Computer (Block Model 402)

| ITEM | Symbol | Data name | Data memory (D) area | Data range |
|------|--------|--------------|----------------------|---|
| 041 | X1 | Analog input | +0 word | 8300 toFFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| to | to | | to | |
| 056 | X16 | Analog input | +15 words | 8300 toFFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |

DO Terminal to All Nodes (Block Model 407)

| ITEM | Symbol | Data name | Data memory (D) area | Data range |
|------|--------|---------------|----------------------|------------|
| 020 | S0 | Contact input | +0 word bit 00 | 0, 1 |
| to | to | | to | |
| 035 | S15 | Contact input | +0 word bit 15 | 0, 1 |
| 036 | S16 | Contact input | +1 word bit 00 | 0, 1 |
| to | to | | to | |
| 051 | S31 | Contact input | +1 word bit 15 | 0, 1 |

AO Terminal to All Nodes (Block Model 408)

| ITEM | Symbol | Data name | Data memory (D) area | Data range |
|------|--------|--------------|----------------------|---|
| 031 | X1 | Analog input | +0 word | 8300 toFFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 032 | X2 | Analog input | +1 word | 8300 toFFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |

Appendix C

List of Data Memory Allocations of Node Terminal Blocks

DO Terminal Settings from Computer (Block Model 409)

The DO Terminal Settings from Computer block is allocated for use only when re-issuing FINS commands to the network.

| ITEM | Symbol | Data name | Data memory (D) area | Data range |
|------|--------|----------------|----------------------|------------|
| 020 | U0 | Contact output | +0 word bit 00 | 0, 1 |
| to | | | to | |
| 035 | U15 | Contact output | +0 word bit 15 | 0, 1 |
| 036 | U16 | Contact output | +1 word bit 00 | 0, 1 |
| to | | | to | |
| 051 | U31 | Contact output | +1 word bit 15 | 0, 1 |

AO Terminal Settings from Computer (Block Model 410)

The AO Terminal Settings from Computer block is allocated for use only when re-issuing FINS commands to the network.

| ITEM | Symbol | Data name | Data memory (D) area | Data range |
|------|--------|---------------|----------------------|---|
| 031 | Y1 | Analog output | +0 word | 8300 toFFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |
| 032 | Y2 | Analog output | +1 word | 8300 toFFFF, 0000 to 7D00 Hex ($\pm 320.00\%$) |

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Revision History

Revision History

A manual revision code appears as a suffix to the catalog number on the front cover of the manual.

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| Man. No. | W375-E1-05 |
|-----------------|-------------------|


 Revision symbol

The following table outlines the changes made to the manual during each revision. Page numbers refer to the previous version.

| Revision code | Data | Revised content |
|---------------|---------------|---|
| 01 | June 1999 | Original production |
| 02 | November 2000 | Addition of the following function blocks and corrections made to errors. <ul style="list-style-type: none"> • ES100X Controller Terminal (Block Model 045) • 4-point Warning Indicator (Block Model 110) • Arithmetic Operation (Block Model 126) • Time Sequence Data Statistics (Block Model 153) • Receive All Blocks (Block Model 461) • Send All Blocks (Block Model 462) Addition of the following function blocks and corrections made to errors <ul style="list-style-type: none"> • DIP switch setting added to enable battery-free operation using flash memory. • RX-232C port application added for connection to ES100X Controller. |
| 03 | July 2001 | Addition of the following function blocks and corrections made to errors. <ul style="list-style-type: none"> • Fuzzy Logic (Block Model 016) • Range Conversion (Block Model 127) • Ramped Switch (Block Model 167) • Level Check (Block Model 210) • Ai4 Terminal (DRT1-AD04) (Block Model 588) • Ao2Terminal (DRT1-DA02) (Block Model 589) Addition of the following function block ITEMS and corrections made to errors <ul style="list-style-type: none"> • Block Registration Flag (ITEM 039) and Tool Version (ITEM 110) in System Common (Block Model 000). • Warning Limit (ITEM 012) in Basic PID (Block Model 011), Advanced PID (Block Model 020), 2-Position ON/OFF (Block Model 001), 3-Position ON/OFF (Block Model 002), Indication and Setting (Block Model 031), Indication and Operation (Block Model 032), Ratio Setting (Block Model 033), Indicator (Block Model 034), and 4-Point Warning Indicator (Block Model 110). • SP Rate-of-change Limit Time Unit (ITEM 030) in Advanced PID (Block Model 012). • Local SP Setting, Upper 4 Digits (ITEM 024), Remote SP Setting, Upper 4 Digits (ITEM 028), Current SP Value, Upper 4 Digits (ITEM 030), Preset Value, Upper 4 Digits (ITEM 061), and Batch Accumulated Value, Upper 4 Digits (ITEM 065) in Batch Flowrate (Block Model 014). • Time Unit (ITEM 013) in Rate-of-change Limit (Block Model 143). • Reference Input Disable Switch (ITEM 020) in Segment Program 2 (Block Model 157). • Output Type (ITEM 006) in Contact Distributor (Block Model 201). • Range settings in AI Terminal from CPU Unit (Block Model 453), AO Terminal to CPU Unit (Block Model 454), Ai4 Terminal (Block Model 561), Pi4 Terminal (Block Model 562), and Ai8 Terminal (Block Model 564). • Receive Disable Switch (ITEM 225) in Expanded DI Terminal from CPU Unit (Block Model 455) and Expanded AI Terminal from CPU Unit (Block Model 457) and Send Disable Switch (ITEM 225) in Expanded DO Terminal from CPU Unit (Block Model 456) and Expanded AO Terminal from CPU Unit (Block Model 458). |
| 04 | October 2002 | corrections made to errors |
| 05 | August 2003 | corrections made to errors |

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