

Commands and Responses

This section describes commands and response in detail. The conventions used in this section and data restrictions are as follows:

- Data is expressed in 1-byte units and in ASCII code.
- When the read or write data is a numerical value, the data to be set must conform to the following conditions:

(1) The decimal point “.” is not indicated in fractions.

(2) The leftmost bit of minus numerical data must be expressed as follows:

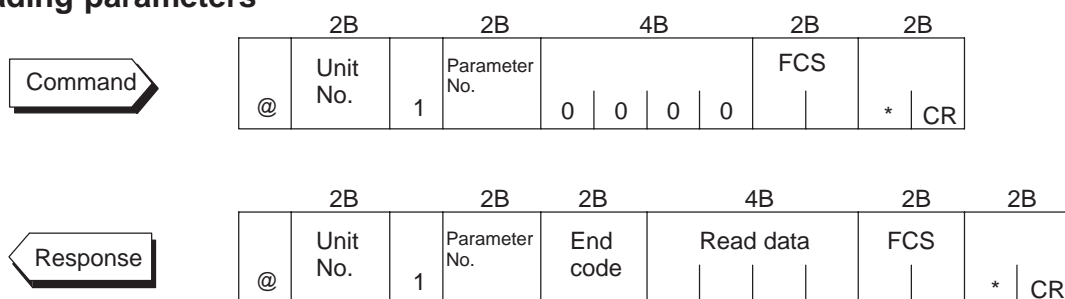
A: -1, F: - (minus)

[example]

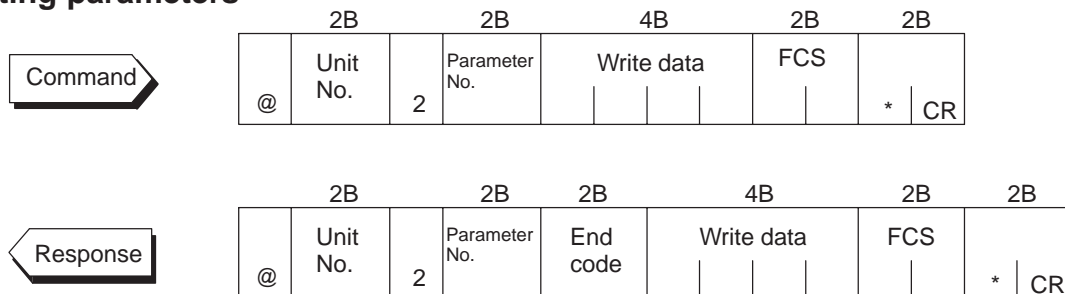
10.0=[0100], -150.0=[A500], -15=[F015]

Reading/writing parameters

Reading parameters



Writing parameters



Parameters of a specified controller are read or written.

- Writing is possible only during remote operation.
- Reading is impossible during execution of auto-tuning.
- The following are set aside as special commands. For details, see below.
- AT execute/cancel”, “Hold/Hold cancel” and “Advance”
- For details on parameters in each setting level, see the tables below.

| Parameter No. | Parameter | Data Setting and Monitor Range | Mode |
|---------------|---------------------------------|--|---------|
| 00 | PV monitor *1 *2 | Scaling lower limit -10% to scaling upper limit +10% | Level 0 |
| 01 | Set point *1 | Set point lower limit to set point upper limit | |
| 04 | MV monitor (heat) *1 | -5.0 to 105.0 *3 | |
| 42 | MV monitor (cool) *1 | 0.0 to 105.0 | |
| 14 | Valve opening monitor *1 | -10.0 to 110.0 | |
| 02 | Alarm value 1 | -1999 to 9999 | Program |
| 03 | Alarm value 2 | -1999 to 9999 | |
| 41 | Alarm value 3 | -1999 to 9999 | |
| 19 | Proportional band | 0.1 to 999.9 | Level 1 |
| 20 | Integral time | 0 to 3999 *5 | |
| 21 | Derivative time | 0 to 3999 | |
| 22 | Cooling coefficient | 0.01 to 99.99 | |
| 09 | Dead band | -19.99 to 99.99 | |
| 87 | Position-proportional dead band | 0.1 to 10.0 | |
| 23 | Manual reset value | 0.0 to 100.0 | |
| 06 | Hysteresis (heat) | 0.01 to 99.99 | |
| 43 | Hysteresis (cool) | 0.01 to 99.99 | |
| 07 | Control period (heat) | 1 to 99 | |
| 08 | Control period (cool) | 1 to 99 | |
| 17 | Heater current monitor *1 | 0.0 to 55.0 | |
| 18 | Heater burnout alarm | 0.0 to 50.0 | |
| 46 | LBA detection time | 0 to 9999 | |
| 47 | MV at reset *6 | -5.0 to 105.0 | Level 2 |
| 48 | MV at PV error *6 | -5.0 to 105.0 | |
| 50 | MV upper limit *3 | MV lower limit +0.1 to 105.0 | |
| 49 | MV lower limit *4 | -5.0 to MV upper limit -0.1 | |
| 51 | MV change rate limit | 0.0 to 100.0 | |
| 56 | Input digital filter | 0 to 9999 | |
| 88 | Open/close hysteresis | 0.1 to 20.0 | |
| 25 | Alarm 1 hysteresis | 0.01 to 99.99 | |
| 26 | Alarm 2 hysteresis | 0.01 to 99.99 | |
| 52 | Alarm 3 hysteresis | 0.01 to 99.99 | |
| 53 | Input shift upper limit | -199.9 to 999.9 | |
| 54 | Input shift lower limit | -199.9 to 999.9 | |

*1 Possible only during reading

*2 During temperature input, the range becomes the range of use of the selected sensor.

*3 During heating and cooling control, the range becomes 0.0 to 105.0.

*4 During heating and cooling control, the range becomes -105.0 to 0.0.

*5 During position-proportional control, the range becomes 1 to 3999.

*6 During heating and cooling control, the range becomes -105.0 to 105.0.

During position-proportional control, you can select between 0: Hold/1: Open/2: Close. (Defaults is "0 : hold".)

| Parameter No. | Parameter | Data Setting Range | Mode |
|---------------|----------------------------------|---|-----------|
| 57 | Input type | 0 to 21 *7 | Set up |
| 59 | Scaling upper limit | Scaling lower limit +1 to 9999 | |
| 58 | Scaling lower limit | -1999 to scaling upper limit -1 | |
| 60 | Decimal point | 0 to 3 | |
| 30 | °C/°F selection | 0: °C, 1: °F | |
| 61 | Control output 1 assignment | 0 to 6, 10 to *8 | |
| 62 | Control output 2 assignment | 0 to 6, 10 to *8 | |
| 63 | Auxiliary output 1 assignment | 2 to 8, 10 to *8 | |
| 64 | Auxiliary output 2 assignment | 2 to 8, 10 to *8 | |
| 65 | Alarm 1 type | 1 to 11 | |
| 66 | Alarm 1 open in alarm | 0: Closed in alarm, 1: Open in alarm | |
| 67 | Alarm 2 type | 1 to 11 | |
| 68 | Alarm 2 open in alarm | 0: Closed in alarm, 1: Open in alarm | |
| 69 | Alarm 3 type | 1 to 11 | |
| 70 | Alarm 3 open in alarm | 0: Closed in alarm, 1: Open in alarm | |
| 71 | Direct/Reverse operation | 0: Reverse operation, 1: Direct operation | |
| 28 | Set point upper limit *1 | Set point lower limit +1 to scaling upper limit | Expansion |
| 27 | Set point lower limit *1 | Scaling lower limit to Set point upper limit -1 | |
| 72 | PID / ON/OFF | 0: Advanced PID, 1: ON/OFF | |
| 35 | α | 0.00 to 1.00 | |
| 85 | AT calculated gain | 0.1 to 10.0 | |
| 36 | Automatic return of display mode | 0 to 99 | |
| 93 | AT hysteresis | 0.1 to 9.9 | |
| 55 | LBA detection width | 0.0 to 999.9 | Option |
| 82 | HBA latch | 0: OFF, 1: ON | |
| 89 | Travel time | 1 to 999 | |
| 38 | PV dead band | 0 to 9999 | |

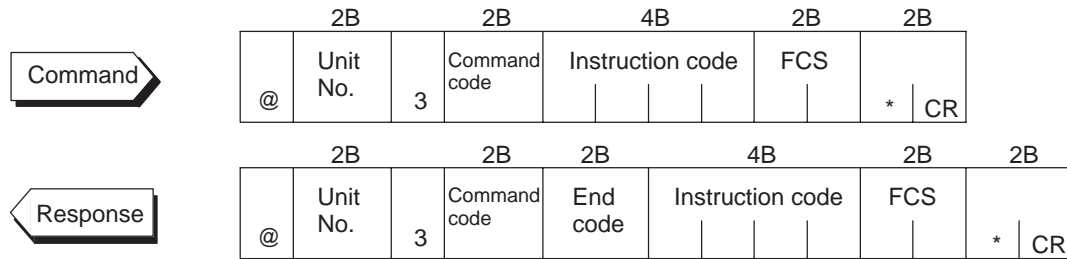
*7 See Section 5–8 Setup Mode.

*8 0: Control output (heat), 1: Control output (cool), 2 to 4: Alarms 1 to 3, 5: HBA, 6: LBA, 7 and 8: Errors 1 to 2, 10 to 11: Time signal 1 to 2, 12: Program end, 13: Stage output

*9 See Section 5–8 Setup Mode

*10 During temperature input, the range becomes the range of use of the selected sensor instead of the scaling upper/lower limit values.

Issuing special commands



The following functions are issued as special commands.

- **Run/Reset**
Runs or stops programs. This command cannot be issued in setting level 1.
- **AT Execute/Cancel**
Executes or cancels auto-tuning. This command cannot be issued in setting level 1.
- **Move to setting level 1**
Issue this command when writing parameters in the setup, expansion and option modes. On the E5EK-T, the parameter switches to the top parameter “ $\bar{\iota}\eta\text{-}\bar{\iota}$: input type” of the setup mode, and control is stopped.
- **Software reset**
Resets E5EK-T operation (same as turning power ON) by communications. A response is not returned to this command. Also, communications with the E5EK-T cannot be carried out for five seconds after reset.
- **Status**
Monitors the status of the E5EK-T. Two command groups are available, A and B, depending on the instruction code. The response is returned in bit units to the instruction code (4B) of the response frame. For details on the monitoring details of each group, see below.
- **Hold**
Holds program execution or cancels hold. This command cannot be issued in setting level 1.
- **Advance**
Advances execution of steps in the program. This command cannot be issued in setting level 1.

| | | |
|----|-------------------------|---|
| 00 | Run/Reset | 0000: Run, 0001: Reset |
| 02 | Remote/Local | 0000: Local, 0001: Remote |
| 07 | AT Execute/Cancel | 0000: Cancel, 0001: 40% AT execution, 0002: 100% AT execution |
| 09 | Move to setting level 1 | 0000 |
| 11 | Software reset | 0000 |
| 14 | Status | 0000: A group, 0001: B group |
| 15 | Hold | 0000: Hold cancel, 0001: Hold |
| 16 | Advance | 0000 |

In the case of the “Run/Reset” or “Advance” command, issue command when the response of the previous command was returned and passed for 0.5 seconds.

A group

| Bit | Description | [1] | [0] |
|-----|---------------------------|--------------|--------|
| 0 | Heating side output *3 | ON | OFF *1 |
| 1 | Cooling side output *4 | ON | OFF *1 |
| 2 | Alarm output 1 | ON | OFF *2 |
| 3 | Alarm output 2 | ON | OFF *2 |
| 4 | Alarm output 3 | ON | OFF *2 |
| 5 | LBA output | ON | OFF *2 |
| 6 | HBA output | ON | OFF *2 |
| 7 | Run/Reset | Reset | Run |
| 8 | Auto/Manual | Manual | Auto |
| 9 | Remote/Local | Remote | Local |
| 10 | | | |
| 11 | AT | AT execution | OFF |
| 12 | Hold | During hold | OFF |
| 13 | Wait | During wait | OFF |
| 14 | | | |
| 15 | | | |

B group

| Bit | Description | [1] | [0] |
|-----|-----------------------|--------|--------|
| 0 | Setting level | 1 | 0 |
| 1 | | | |
| 2 | Control output 1 type | Linear | Pulse |
| 3 | Control output 2 type | Linear | Pulse |
| 4 | | | |
| 5 | Input error | ON | OFF |
| 6 | A/D converter error | ON | OFF |
| 7 | CT overflow | ON | OFF |
| 8 | CT hold | ON | OFF *5 |
| 9 | Potentiometer error | ON | OFF |
| 10 | | | |
| 11 | Time signal 1 output | ON | OFF *2 |
| 12 | Time signal 2 output | ON | OFF *2 |
| 13 | Ramp/soak | Ramp | Soak |
| 14 | Program end | ON | OFF *6 |
| 15 | During standby | ON | OFF |

*1 Always “OFF” at linear output

*2 Always “OFF” when output is not assigned

*3 During position-proportional control, output is Open.

*4 During position-proportional control, output is Close.

*5 When the ON time during control output is less than 190 ms, the heater current to which

“ 1” is set and the previous current value is held.

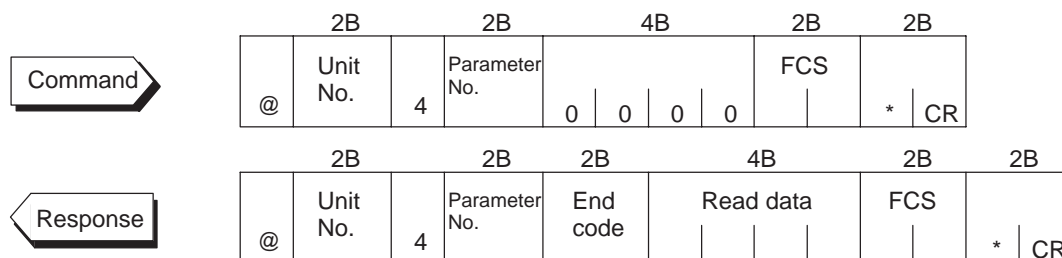
*6 “ON” while the No.2 display indicates [PEnd]. For details on the [PEnd] indication, see Section 4–4 Program Operation.

About Setting Levels

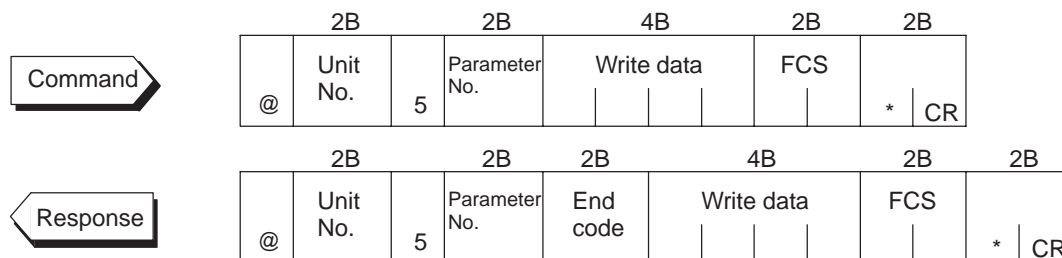
To return to setting level 0 from setting level 1, issue the “software reset” command. If the parameter write command is issued for the setup, expansion and option menu in setting level 0, an error occurs, and the end code (0D = Command cannot be executed) is returned.

Reading/writing program parameters

Reading parameters



Writing parameters



Parameters relating to the program of the specified unit are read or written.

- Writing is possible only during remote operation.
- Reading is impossible during execution of auto-tuning.
- For details on parameters in each setting level, see the lists for each setting level below.

| Parameter No. | Parameter | Data Setting and Monitor Range | Mode |
|---------------|------------------------------------|----------------------------------|---------|
| 00 | Pattern No. *2 | 0 to 3 | *2 |
| 01 | Step No. monitor *1 | 0 to number of steps -1 | Level 0 |
| 63 | Standby time monitor *1 | 0.00 to 99.59 | |
| 02 | Pattern elapsing time monitor *1 | 0.00 to 99.59 | |
| 03 | Pattern execution count monitor *1 | 0 to 9999 | |
| 60 | Number of steps | 1 to 16 | |
| 05 | Step 0 SP/Target SP 0 | SP lower limit to SP upper limit | Program |
| 06 | Ramp rate 0 | 0 to 9999 | |
| 07 | Step 0 time/Soak time 0 | 0.00 to 99.59 | |
| 08 | Step 1 SP/Target SP 1 | SP lower limit to SP upper limit | |
| 09 | Ramp rate 1 | 0 to 9999 | |
| 10 | Step 1 time/Soak time 1 | 0.00 to 99.59 | |
| 11 | Step 2 SP/Target SP 2 | SP lower limit to SP upper limit | |
| 12 | Ramp rate 2 | 0 to 9999 | |
| 13 | Step 2 time/Soak time 2 | 0.00 to 99.59 | |
| 14 | Step 3 SP/Target SP 3 | SP lower limit to SP upper limit | |
| 15 | Ramp rate 3 | 0 to 9999 | |
| 16 | Step 3 time/Soak time 3 | 0.00 to 99.59 | |
| 17 | Step 4 SP/Target SP 4 | SP lower limit to SP upper limit | |
| 18 | Ramp rate 4 | 0 to 9999 | |
| 19 | Step 4 time/Soak time 4 | 0.00 to 99.59 | |
| 20 | Step 5 SP/Target SP 5 | SP lower limit to SP upper limit | |
| 21 | Ramp rate 5 | 0 to 9999 | |
| 22 | Step 5 time/Soak time 5 | 0.00 to 99.59 | |
| 23 | Step 6 SP/Target SP 6 | SP lower limit to SP upper limit | |
| 24 | Ramp rate 6 | 0 to 9999 | |
| 25 | Step 6 time/Soak time 6 | 0.00 to 99.59 | |
| 26 | Step 7 SP/Target SP 7 | SP lower limit to SP upper limit | |
| 27 | Ramp rate 7 | 0 to 9999 | |
| 28 | Step 7 time/Soak time 7 | 0.00 to 99.59 | |
| 29 | Step 8 SP | SP lower limit to SP upper limit | |
| 30 | Step 8 time | 0.00 to 99.59 | |
| 31 | Step 9 SP | SP lower limit to SP upper limit | |
| 32 | Step 9 time | 0.00 to 99.59 | |
| 33 | Step 10 SP | SP lower limit to SP upper limit | |
| 34 | Step 10 time | 0.00 to 99.59 | |
| 35 | Step 11 SP | SP lower limit to SP upper limit | |
| 36 | Step 11 time | 0.00 to 99.59 | |
| 37 | Step 12 SP | SP lower limit to SP upper limit | |
| 38 | Step 12 time | 0.00 to 99.59 | |
| 39 | Step 13 SP | SP lower limit to SP upper limit | |
| 40 | Step 13 time | 0.00 to 99.59 | |

*1 Reading only is possible.

*2 Can be used in either the level 0 or program modes.
Read only during program run

| Parameter No. | Parameter | Data Setting and Monitor Range | Mode |
|---------------|------------------------------------|---|-----------|
| 41 | Step 14 SP | SP lower limit to SP upper limit | Program |
| 42 | Step 14 time | 0.00 to 99.59 | |
| 43 | Step 15 SP | SP lower limit to SP upper limit | |
| 44 | Step 15 time | 0.00 to 99.59 | |
| 04 | Pattern execution count | 0 to 9999 | |
| 45 | Time signal 1 enabled step | 0 to 15 | |
| 46 | Time signal 1 ON time | 0.00 to 99.59 | |
| 47 | Time signal 1 OFF time | 0.00 to 99.59 | |
| 48 | Time signal 2 enabled step | 0 to 15 | |
| 49 | Time signal 2 ON time | 0.00 to 99.59 | |
| 50 | Time signal 2 OFF time | 0.00 to 99.59 | |
| 62 | Standby time | 0.00 to 99.59 | Level 2 |
| 54 | Operation at power ON | *3 | Expansion |
| 55 | End condition | 0: Reset, 1: Final step SP | |
| 51 | Program time unit | 0: Hour, minute, 1: Minute, second | |
| 56 | Step time/Rate of rise programming | 0: Step time, 1: Rate of rise programming | |
| 57 | Time unit of ramp rate | 0: Minute, 1: Hour | |
| 58 | PV start | 0: SP start, 1: PV start | |
| 59 | Wait width | 0 to 9999 | |
| 52 | Alarm during ramp step enable | 0 : OFF, 1 : ON | |
| 53 | Run all enable | 0 : OFF, 1 : ON | |

*3 0: Continue, 1: Reset, 2: Run, 3: Manual