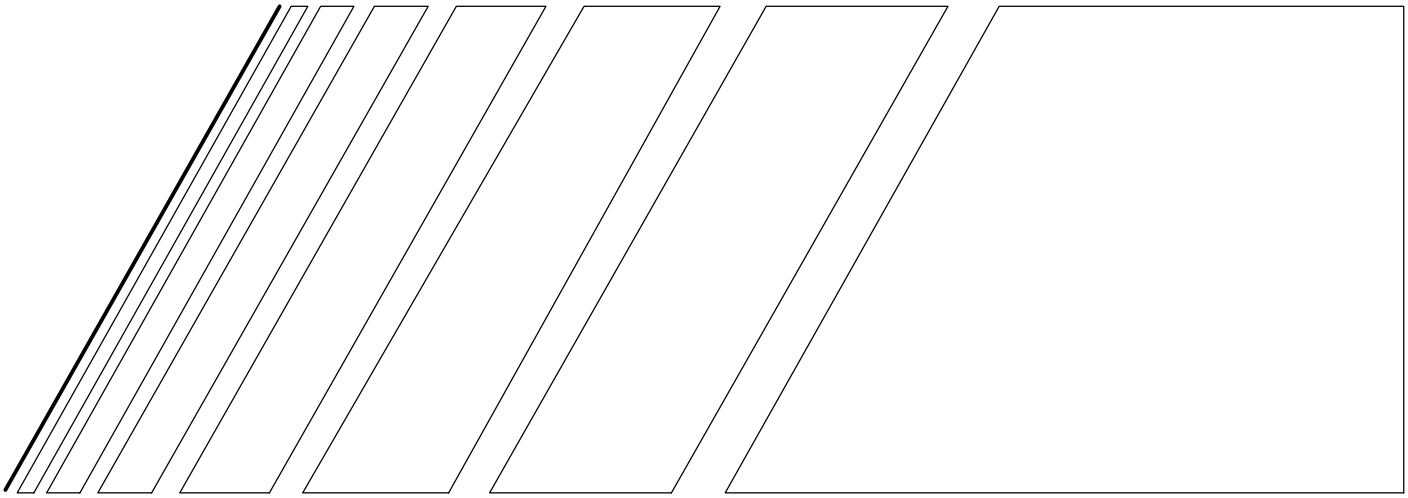
OMRON



USER'S MANUAL

SYSDRIVE 3G3JV SERIES

Compact Simplified Inverter

Table of Contents

Table of Contents

■ Contents of Warning

• For 3G3JV-A2001 to A2007 (0.1 to 0.75 kW)/3G3JV-AB001 to AB004 (0.1 to 0.4 kW)

• For 3G3JV-A2015 to A2022 (1.5 to 2.2 kW)/3G3JV-AB007 to AB015 (0.75 to 1.5 kW)

Checking Before Unpacking

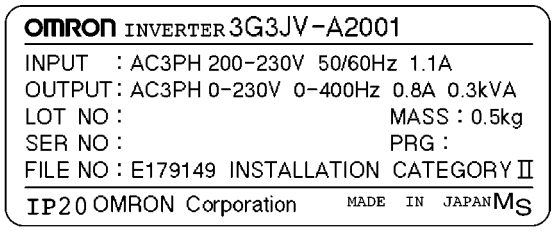
■ Checking the Product

On delivery, always check that the delivered product is the SYSDRIVE 3G3JV Inverter that you ordered.

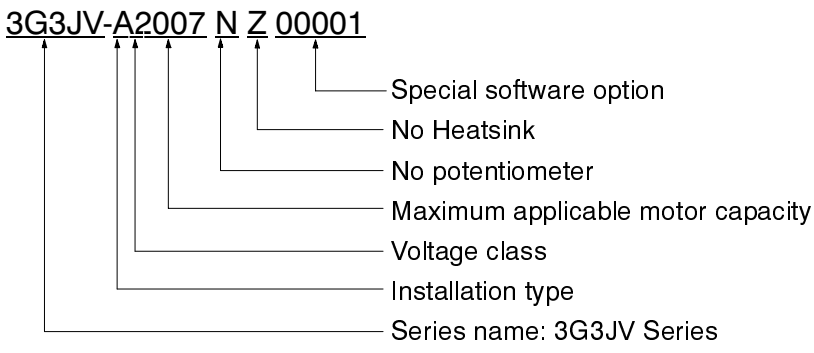
Should you find any problems with the product, immediately contact your nearest local sales representative.

● Checking the Nameplate

Inverter model →
Input specifications →
Output specifications →



● Checking the Model



Installation Type

A	Closed wall mounting

Voltage Class

2	Three-phase 200-VAC input (200-V class)
B	Single-phase 200-VAC input (200-V class)

Maximum Applicable Motor Capacity

001	0.1 (0.1) kW
002	0.2 (0.25) kW
004	0.4 (0.55) kW
007	0.75 (1.1) kW
015	1.5 (1.5) kW
022	2.2 (2.2) kW

Note The figures in parentheses indicate capacities for motors used outside Japan.

Front Cover options

B	Blank cover
N	No potentiometer

Heatsink option

Z	No Heatsink

Software options

0001 – 99999	Special software option

● Checking for Damage

Check the overall appearance and check for damage or scratches resulting from transportation.

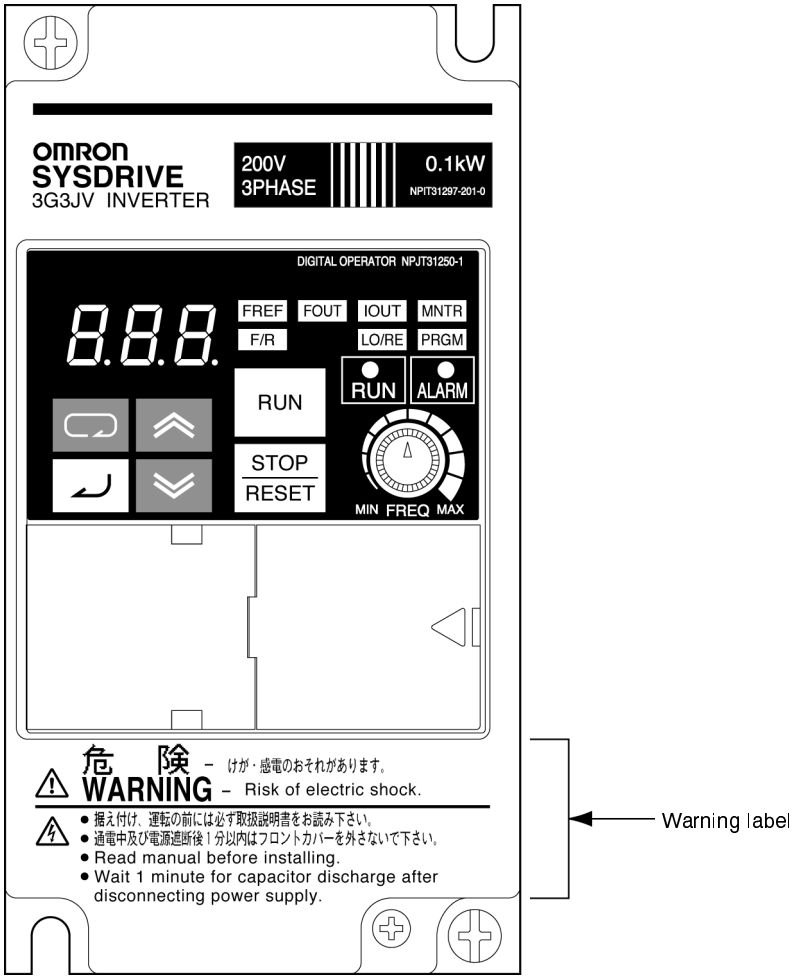
■ Checking the Accessories

Note that this manual is the only accessory provided with the 3G3JV. Set screws and other necessary parts must be provided by the user.

Warning Labels

Warning labels are pasted on the product as shown in the following illustration. Be sure to follow the instructions given there.

■ Warning Labels



⚠**WARNING** Be sure confirm that the RUN signal is turned OFF before turning ON the power supply, resetting the alarm, or switching the LOCAL/REMOTE selector. Doing so while the RUN signal is turned ON may result in injury.

⚠**Caution** Be sure to confirm permissible ranges of motors and machines before operation because the Inverter speed can be easily changed from low to high. Not doing so may result in damage to the product.

⚠**Caution** Provide a separate holding brake when necessary. Not doing so may result in injury.

⚠**Caution** Do not perform a signal check during operation. Doing so may result in injury or damage to the product.

⚠**Caution** Do not carelessly change settings. Doing so may result in injury or damage to the product.

Maintenance and Inspection Precautions

⚠**WARNING** Do not touch the Inverter terminals while the power is being supplied.

⚠**WARNING** Maintenance or inspection must be performed only after turning OFF the power supply, confirming that the CHARGE indicator (or status indicators) is turned OFF, and after waiting for the time specified on the front cover. Not doing so may result in electrical shock.

⚠**WARNING** Maintenance, inspection, or parts replacement must be performed by authorized personnel. Not doing so may result in electrical shock or injury.

⚠**WARNING** Do not attempt to take the Unit apart or repair. Doing either of these may result in electrical shock or injury.

⚠**Caution** Carefully handle the Inverter because it uses semiconductor elements. Careless handling may result in malfunction.

⚠**Caution** Do not change wiring, disconnect connectors or Operator, or replace fans while power is being supplied. Doing so may result in injury or malfunction.

⚠ **Caution** Install external breakers and take other safety measures against short-circuiting in external wiring. Not doing so may result in fire.

⚠ **Caution** Confirm that the rated input voltage of the Inverter is the same as the AC power supply voltage. An incorrect power supply may result in fire, injury, or malfunction.

⚠ **Caution** Connect the Braking Resistor and Braking Resistor Unit as specified in the manual. Not doing so may result in fire.

⚠ **Caution** Be sure to wire correctly and securely. Not doing so may result in injury or damage to the product.

⚠ **Caution** Be sure to firmly tighten the screws on the terminal block. Not doing so may result in fire, injury, or damage to the product.

⚠ **Caution** Do not connect an AC power to the U, V, or W output. Doing so may result in damage to the product or malfunction.

Operation and Adjustment Precautions

⚠ **WARNING** Turn ON the input power supply only after mounting the front cover, terminal covers, bottom cover, Operator, and optional items. Not doing so may result in electrical shock.

⚠ **WARNING** Do not remove the front cover, terminal covers, bottom cover, Operator, or optional items while the power is being supplied. Not doing so may result in electrical shock.

⚠ **WARNING** Do not operate the Operator or switches with wet hands. Doing so may result in electrical shock.

⚠ **WARNING** Do not touch the inside of the Inverter. Doing so may result in electrical shock.

⚠ **WARNING** Do not come close to the machine when using the error retry function because the machine may abruptly start when stopped by an alarm. Doing so may result in injury.

⚠ **WARNING** Do not come close to the machine immediately after resetting momentary power interruption to avoid an unexpected restart (if operation is set to be continued in the processing selection function after momentary power interruption is reset). Doing so may result in injury.

⚠ **WARNING** Provide a separate emergency stop switch because the STOP Key on the Operator is valid only when function settings are performed. Not doing so may result in injury.

Transportation Precautions

⚠ **Caution** Do not hold by front cover or panel , instead, hold by the radiation fin (heat sink) while transporting the product. Doing so may result in injury.

⚠ **Caution** Do not pull on the cables. Doing so may result in damage to the product or malfunction.

⚠ **Caution** Use the eye-bolts only for transporting the Inverter. Using them for transporting the machinery may result in injury or malfunction.

Installation Precautions

⚠ **Caution** Be sure to install the product in the correct direction and provide specified clearances between the Inverter and control panel or with other devices. Not doing so may result in fire or malfunction.

⚠ **Caution** Do not allow foreign objects to enter inside the product. Doing so may result in fire or malfunction.

⚠ **Caution** Do not apply any strong impact. Doing so may result in damage to the product or malfunction.

⚠ **Caution** Provide an appropriate stopping device on the machine side to secure safety. (A holding brake is not a stopping device for securing safety.) Not doing so may result in injury.

⚠ **Caution** Provide an external emergency stopping device that allows an instantaneous stop of operation and power interruption. Not doing so may result in injury.

Wiring Precautions

⚠ **WARNING** Wiring must be performed only after confirming that the power supply has been turned OFF. Not doing so may result in electrical shock.

⚠ **WARNING** Wiring must be performed by authorized personnel. Not doing so may result in electrical shock or fire.

⚠ **WARNING** Be sure to confirm operation only after wiring the emergency stop circuit. Not doing so may result in injury.

⚠ **WARNING** Always connect the ground terminals to a ground of 100 Ω or less for the 200-VAC class, or 10 Ω or less for the 400-VAC class. Not connecting to a proper ground may result in electrical shock.

General Precautions

Observe the following precautions when using the SYSDRIVE Inverters and peripheral devices.

This manual may include illustrations of the product with protective covers removed in order to describe the components of the product in detail. Make sure that these protective covers are on the product before use.

Consult your OMRON representative when using the product after a long period of storage.

⚠ **WARNING** Do not touch the inside of the Inverter. Doing so may result in electrical shock.

⚠ **WARNING** Operation, maintenance, or inspection must be performed after turning OFF the power supply, confirming that the CHARGE indicator (or status indicators) are OFF, and after waiting for the time specified on the front cover. Not doing so may result in electrical shock.

⚠ **WARNING** Do not damage, pull on, apply stress to, place heavy objects on, or pinch the cables. Doing so may result in electrical shock.

⚠ **WARNING** Do not touch the rotating parts of the motor under operation. Doing so may result in injury.

⚠ **WARNING** Do not modify the product. Doing so may result in injury or damage to the product.

⚠ **Caution** Do not store, install, or operate the product in the following places. Doing so may result in electrical shock, fire or damage to the product.

- Locations subject to direct sunlight.
- Locations subject to temperatures 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 exposure to combustibles.
- 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** Do not touch the Inverter radiator, regenerative resistor, or Servomotor while the power is being supplied or soon after the power is turned OFF. Doing so may result in a skin burn due to the hot surface.

⚠ **Caution** Do not conduct a dielectric strength test on any part of the Inverter. Doing so may result in damage to the product or malfunction.

⚠ **Caution** Take appropriate and sufficient countermeasures when installing systems in the following locations. Not doing so may result in equipment damage.

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

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 a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠**Caution** Indicates a potentially 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 word “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.

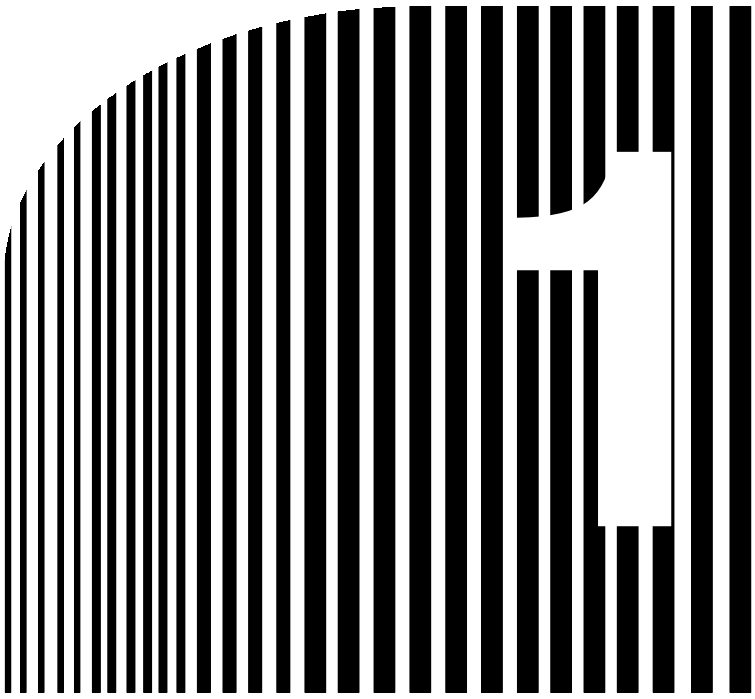
The abbreviation “Ch,” which appears in some displays and on some OMRON products, often means “word” and is abbreviated “Wd” in documentation in this sense.

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.



Chapter 1

· Overview ·

1-1 Function

The compact simple SYSDRIVE 3G3JV-Series Inverter ensures greater ease of use than any conventional model.
The 3G3JV Inverter meets EC Directives and UL/cUL standard requirements for worldwide use.

■ SYSDRIVE 3G3JV Inverter Models

• The following 3- and single-phase 200-VAC-class 3G3JV models are available.

Rated voltage	Protective structure	Maximum applied motor capacity	Model
3-phase 200 VAC	Closed, wall-mounting type (conforming to IP20)	0.1 (0.1) kW	3G3JV-A2001
		0.2 (0.25) kW	3G3JV-A2002
		0.4 (0.55) kW	3G3JV-A2004
		0.75 (1.1) kW	3G3JV-A2007
		1.5 (1.5) kW	3G3JV-A2015
		2.2 (2.2) kW	3G3JV-A2022
Single-phase 200 VAC	Closed, wall-mounting type (conforming to IP20)	0.1 (0.1) kW	3G3JV-AB001
		0.2 (0.25) kW	3G3JV-AB002
		0.4 (0.55) kW	3G3JV-AB004
		0.75 (1.1) kW	3G3JV-AB007
		1.5 (1.5) kW	3G3JV-AB015

Note The figures in parentheses indicate capacities for motors used outside Japan.

■ International Standards (EC Directives and UL/cUL Standards)

The 3G3JV Inverter meets the EC Directives and UL/cUL standard requirements for worldwide use.

Classification		Applicable standard
EC Directives	EMC directive	EN50081-2 and EN5008-2
	Low-voltage directive	prEN50178
UL/cUL		UL508C

■ Versatile Easy-to-use Functions

- Incorporates the functions and operability ensured by the conventional 3G3EV Series.
- Easy to initialize and operate with the FREQ adjuster on the Digital Operator.
- Ease of maintenance. The cooling fan is easily replaceable. The life of the cooling fan can be prolonged by turning on the cooling fan only when the Inverter is in operation.
- Optional RS232 (3G3JV-PSI232J) and RS422/485 MODBUS (3G3JV-PSI485J) interface cards.

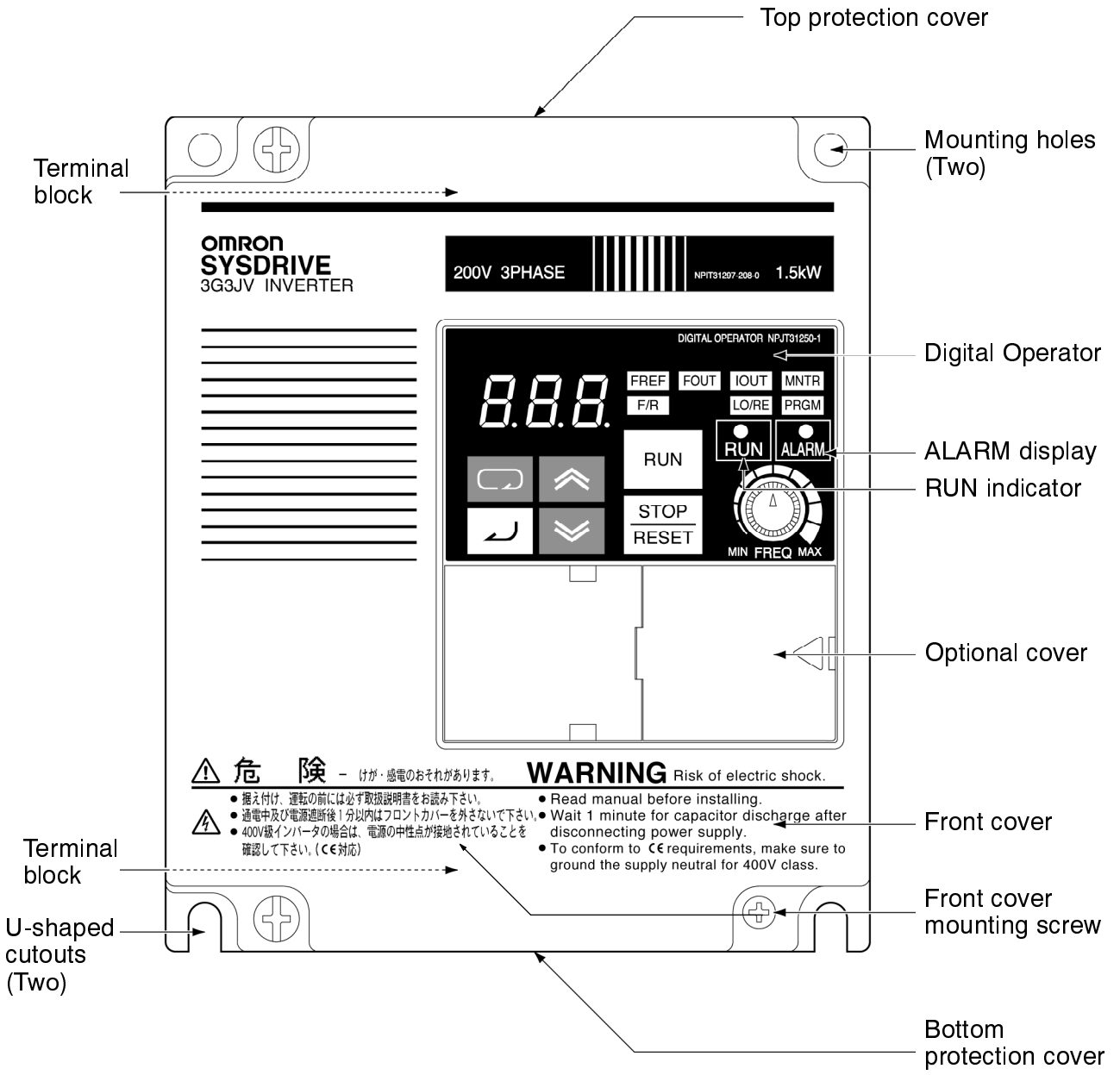
■ Suppression of Harmonics

Connects to DC reactors, thus suppressing harmonics more effectively than conventional AC reactors.

Further improvement in the suppression of harmonics is possible with the combined use of the DC and AC reactors.

1-2 Nomenclature

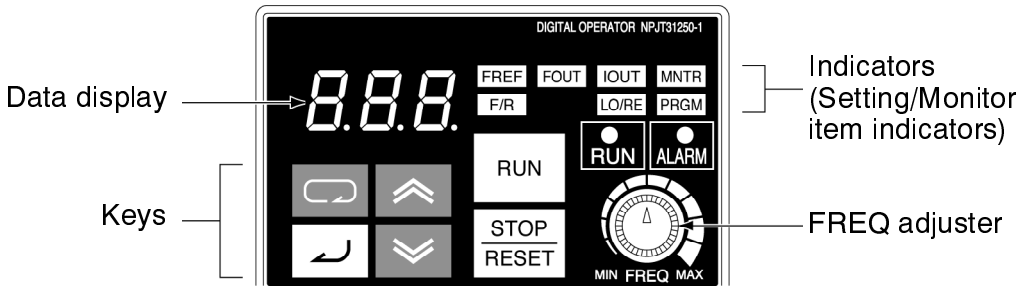
■ Panel



Note 1. The front cover functions as a terminal cover. The Digital Operator Unit cannot be removed.

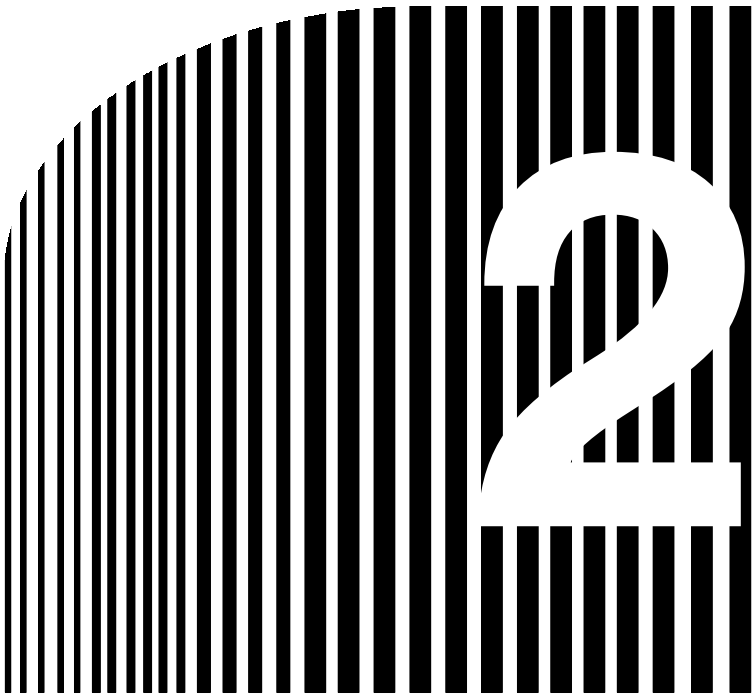
Note 2. Instead of mounting holes, each of the following models has two U-shaped cut-outs located diagonally.
3G3JV-A2001 (0.1 kW), 3G3JV-A2002 (0.25 kW), 3G3JV-A2004 (0.55 kW), and 3G3JV-A2007 (1.1 kW)
3G3JV-AB001 (0.1 kW), 3G3JV-AB002 (0.25 kW), and 3G3JV-AB004 (0.55 kW)

■ Digital Operator



Appearance	Name	Function
	Data display	Displays relevant data items, such as frequency reference, output frequency, and parameter set values.
MIN MAX FREQUENCY	FREQ adjuster	Sets the frequency reference within a range between 0 Hz and the maximum frequency.
FREF	FREF indicator	The frequency reference can be monitored or set while this indicator is lit.
FOUT	FOUT indicator	The output frequency of the Inverter can be monitored while this indicator is lit.
IOUT	IOUT indicator	The output current of the Inverter can be monitored while this indicator is lit.
MNTR	MNTR indicator	The values set in U01 through U10 are monitored while this indicator is lit.
F/R	F/R indicator	The direction of rotation can be selected while this indicator is lit when operating the Inverter with the RUN Key.
LO/RE	LO/RE indicator	The operation of the Inverter through the Digital Operator or according to the set parameters is selectable while this indicator is lit. **Note** This status of this indicator can be only monitored while the Inverter is in operation. Any RUN command input is ignored while this indicator is lit.
PRGM	PRGM indicator	The parameters in n01 through n79 can be set or monitored while this indicator is lit. **Note** While the Inverter is in operation, the parameters can be only monitored and only some parameters can be changed. Any RUN command input is ignored while this indicator is lit.

Appearance	Name	Function
	Mode Key	Switches the setting and monitor item indicators in sequence. Parameter being set will be canceled if this key is pressed before entering the setting.
	Increment Key	Increases multi-function monitor numbers, parameter numbers, and parameter set values.
	Decrement Key	Decreases multi-function monitor numbers, parameter numbers, and parameter set values.
	Enter Key	Enters multi-function monitor numbers, parameter numbers, and internal data values after they are set or changed.
RUN	RUN Key	Starts the Inverter running when the 3G3FV is in operation with the Digital Operator.
STOP RESET	STOP/RESET Key	Stops the Inverter unless parameter n06 is not set to disable the STOP Key.



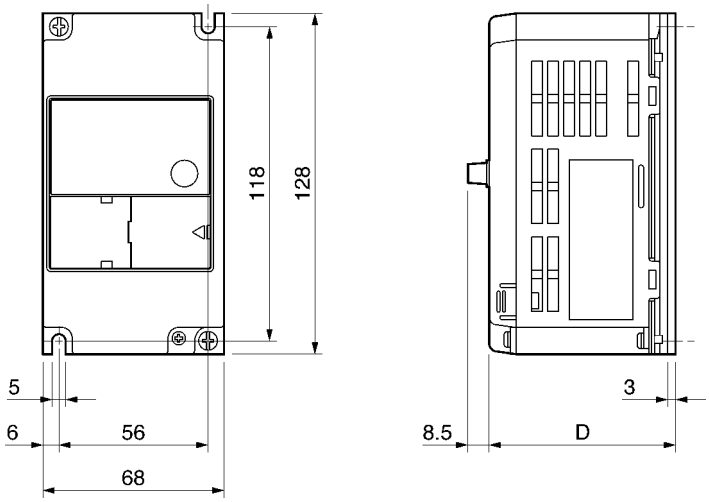
Chapter 2

· Design ·

2-1 Installation

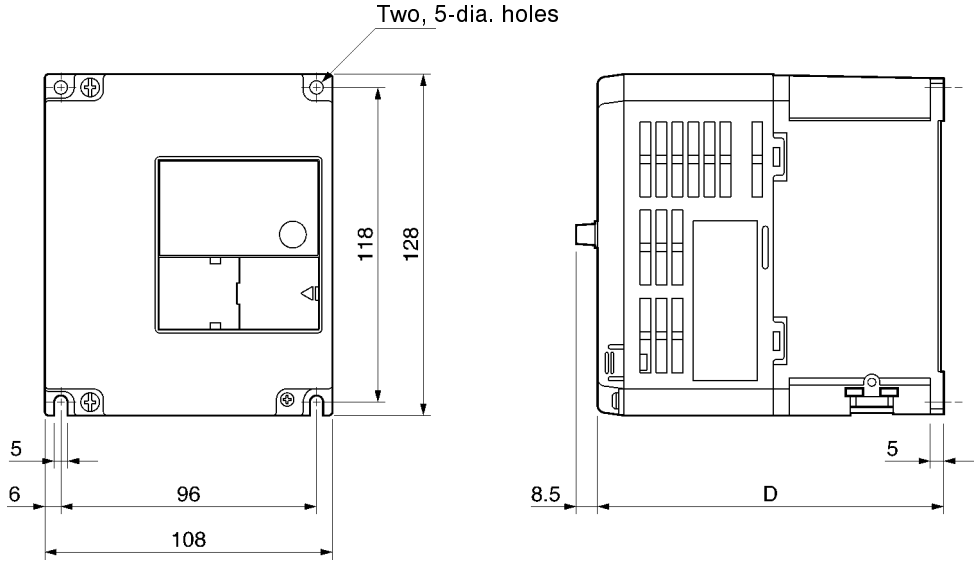
2-1-1 Dimensions

- **3G3JV-A2001 to 3G3JV-A2007 (0.1 to 0.75 kW) 3-phase 200-VAC Input 3G3JV-AB001 to 3G3JV-AB004 (0.1 to 0.4 kW) Single-phase 200-VAC Input**



Rated voltage	Model 3G3JV-	Dimensions (mm)	Weight (kg)
		D	
3-phase 200 VAC	A2001	70	Approx. 0.5
	A2002	70	Approx. 0.5
	A2004	102	Approx. 0.8
	A2007	122	Approx. 0.9
Single-phase 200 VAC	AB001	70	Approx. 0.5
	AB002	70	Approx. 0.5
	AB004	112	Approx. 0.9

● 3G3JV-A2015 to 3G3JV-A2022 (1.5 to 2.2 kW) 3-phase 200-VAC Input 3G3JV-AB007 to 3G3JV-AB015 (0.75 to 1.5 kW) Single-phase 200-VAC Input



Rated voltage	Model 3G3JV-	Dimensions (mm)	Weight (kg)
		D	
3-phase 200 VAC	A2015	129	Approx. 1.3
	A2022	154	Approx. 1.5
Single-phase 200 VAC	AB007	129	Approx. 1.5
	AB015	154	Approx. 1.5

2-1-2 Installation Conditions

⚠**Caution** Be sure to install the product in the correct direction and provide specified clearances between the Inverter and control panel or with other devices. Not doing so may result in fire or malfunction.

⚠**Caution** Do not allow foreign objects to enter inside the product. Doing so may result in fire or malfunction.

⚠**Caution** Do not apply any strong impact. Doing so may result in damage to the product or malfunction.

⚠**Caution** Provide an appropriate stopping device on the machine side to secure safety. (A holding brake is not a stopping device for securing safety.) Not doing so may result in injury.

⚠**Caution** Provide an external emergency stopping device that allows an instantaneous stop of operation and power interruption. Not doing so may result in injury.

■ Installation Direction and Dimensions

- Install the Inverter under the following conditions.

  Ambient temperature for operation (panel-mounting): –10°C to 50°C

  Humidity: 90% or less (no condensation)

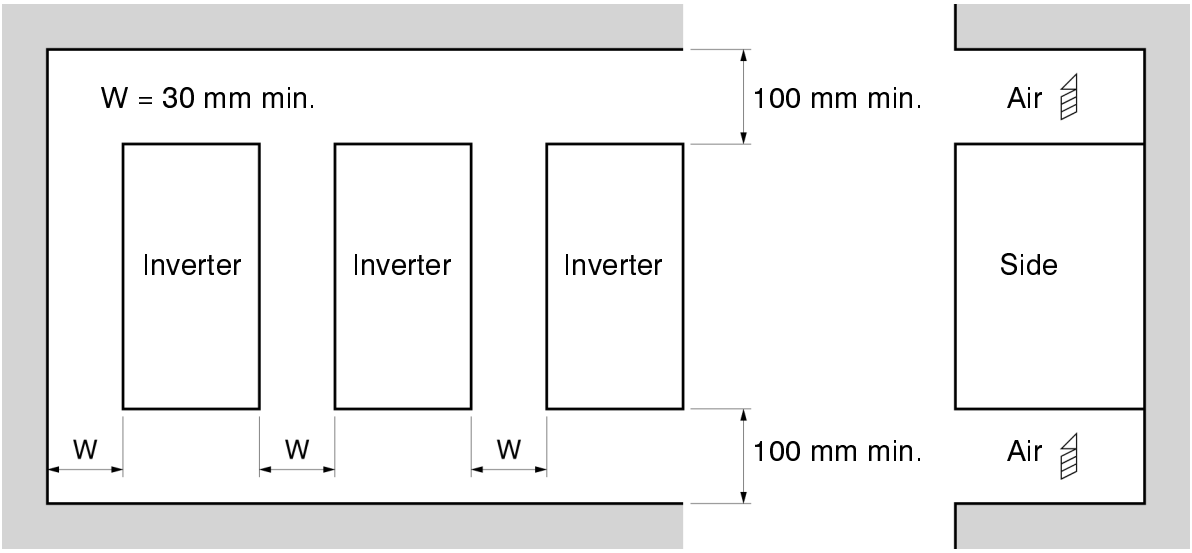
- Install the Inverter in a clean location free from oil mist and dust. Alternatively, install it in a totally enclosed panel that is completely protected from floating dust.
- When installing or operating the Inverter, always take special care so that metal powder, oil, water, or other foreign matter does not get into the Inverter.
- Do not install the Inverter on inflammable material such as wood.

■ Direction

- Install the Inverter on a vertical surface so that the characters on the nameplate are oriented upward.

■ Dimensions

- When installing the Inverter, always provide the following clearances to allow normal heat dissipation from the Inverter.



■ Ambient Temperature Control

- To enhance operation reliability, the Inverter should be installed in an environment free from extreme temperature changes.
- If the Inverter is installed in an enclosed environment such as a box, use a cooling fan or air conditioner to maintain the internal air temperature below 50°C.
  The life of the built-in electrolytic capacitors of the Inverter is prolonged by maintaining the internal air temperature as low as possible.
- The surface temperature of the Inverter may rise approximately 30°C higher than the ambient temperature. Be sure to keep away equipment and wires from the Inverter as far as possible if the equipment and wires are easily influenced by heat.

■ Protecting Inverter from Foreign Matter during Installation

- Place a cover over the Inverter during installation to shield it from metal power produced by drilling.
  Upon completion of installation, always remove the cover from the Inverter. Otherwise, ventilation will be affected, causing the Inverter to overheat.

2-2 Wiring

⚠WARNING Wiring must be performed only after confirming that the power supply has been turned OFF. Not doing so may result in electrical shock.

⚠WARNING Wiring must be performed by authorized personnel. Not doing so may result in electrical shock or fire.

⚠WARNING Be sure to confirm operation only after wiring the emergency stop circuit. Not doing so may result in injury.

⚠WARNING Always connect the ground terminals to a ground of 100 Ω or less for the 200-VAC class, or 10 Ω or less for the 400-VAC class. Not connecting to a proper ground may result in electrical shock.

⚠Caution Install external breakers and take other safety measures against short-circuiting in external wiring. Not doing so may result in fire.

⚠Caution Confirm that the rated input voltage of the Inverter is the same as the AC power supply voltage. An incorrect power supply may result in fire, injury, or malfunction.

⚠Caution Connect the Braking Resistor and Braking Resistor Unit as specified in the manual. Not doing so may result in fire.

⚠Caution Be sure to wire correctly and securely. Not doing so may result in injury or damage to the product.

⚠Caution Be sure to firmly tighten the screws on the terminal block. Not doing so may result in fire, injury, or damage to the product.

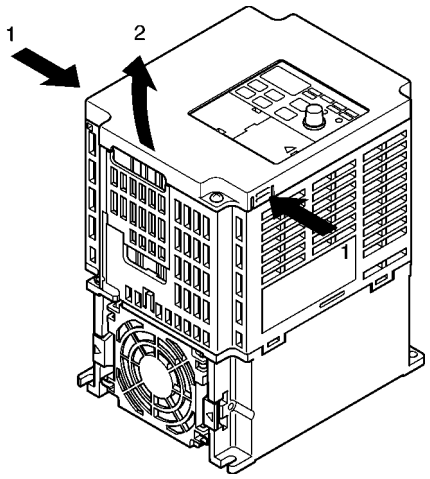
⚠Caution Do not connect an AC power to the U, V, or W output. Doing so may result in damage to the product or malfunction.

2-2-1 Removing and Mounting the Covers

It is necessary to remove the front cover, optional cover, top protection cover, and the bottom protection cover from the Inverter to wire the terminal block.
Follow the instructions below to remove the covers from the Inverter.
To mount the covers, take the opposite steps.

■ Removing the Front Cover

- Loosen the front cover mounting screws with a screwdriver.
- Press the left and right sides of the front cover in the arrow 1 directions and lift the bottom of the cover in the arrow 2 direction to remove the front cover as shown in the following illustration.



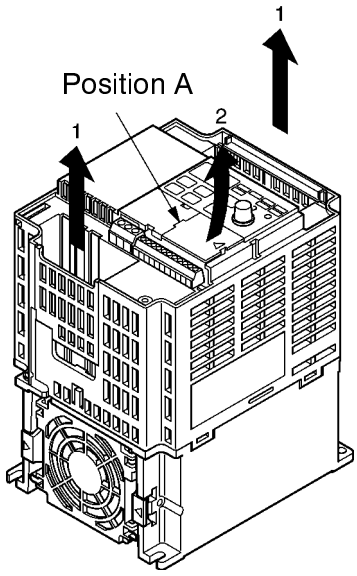
■ Removing the Top and Bottom Protection Covers and Optional Cover

● Removing the Top and Bottom Protection Covers

• After removing the front cover, pull the top and bottom protection covers in the arrow 1 directions.

● Removing the Optional Cover

• After removing the front cover, lift the optional cover in the arrow 2 direction based on position A as a fulcrum.

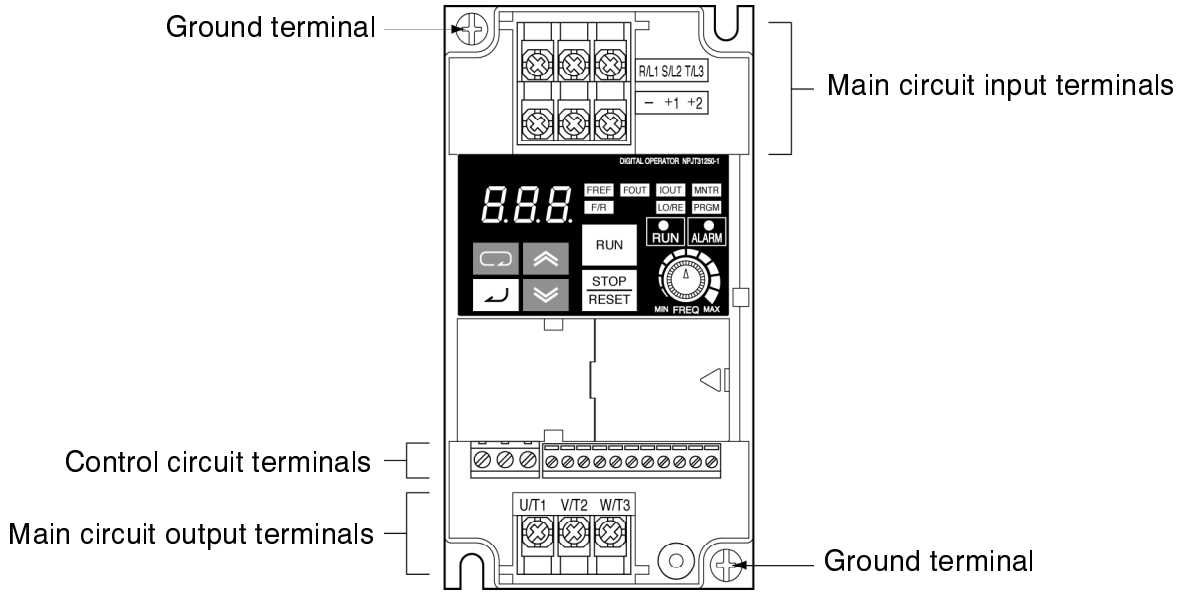


Note The front cover functions as a terminal cover. The Digital Operator cannot be removed.

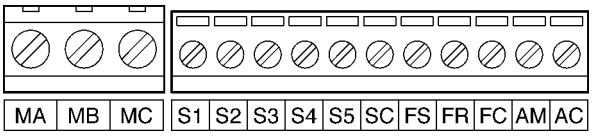
2-2-2 Terminal Block

Before wiring the terminal block, be sure to remove the front cover, top protection cover, and the bottom protection cover.

■ Position of Terminal Block



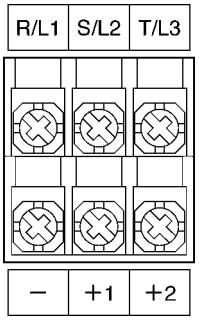
■ Arrangement of Control Circuit Terminals



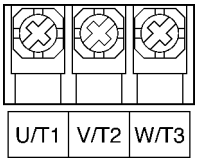
■ Arrangement of Main Circuit Terminals

● 3G3JV-A2001 to 3G3JV-A2007 3G3JV-AB001 to 3G3JV-AB004

Main Circuit Input Terminals (Upper Side)

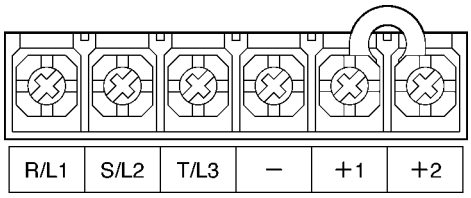


Main Circuit Output Terminals (Lower Side)

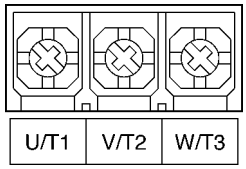


● 3G3JV-A2015 to 3G3JV-A2022 3G3JV-AB007 to 3G3JV-AB015

Main Circuit Input Terminals (Upper Side)



Main Circuit Output Terminals (Lower Side)



■ Main Circuit Terminals

Symbol	Name	Description
R/L1 S/L2 T/L3	Power supply input terminals	3G3JV-A2□: 3-phase 200 to 230 VAC 3G3JV-AB□: Single-phase 200 to 240 VAC **Note** Connect single-phase input to terminals R/L1 and S/L2.
U/T1 V/T2 W/T3	Motor output terminals	3-phase power supply output for driving motors. 3G3JV-A2□ and 3G3JV-AB□: 3-phase 200 to 230 VAC **Note** The maximum output voltage corresponds to the power supply input voltage of the Inverter.
+1 +2 –	Connection terminals +1 and +2: DC reactor connection terminals +1 and –: DC power supply input terminals	Connect the DC reactor for suppressing harmonics to terminals +1 and +2. When driving the Inverter with DC power, input the DC power to terminals +1 and –. (Terminal +1 is a positive terminal.)
⏚	Ground terminal	Be sure to ground the terminal under the following conditions. 3G3JV-A2□: Ground at a resistance of 100 Ω or less. 3G3JV-AB□: Ground at a resistance of 100 Ω or less. **Note** Be sure to connect the ground terminal directly to the motor frame ground.

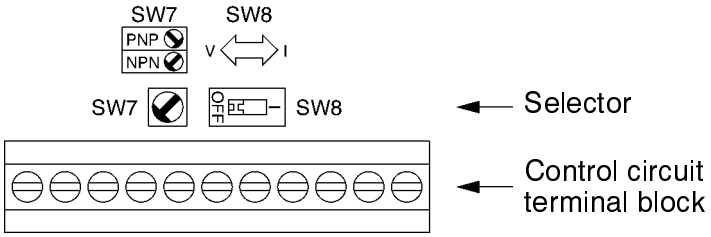
■ Control Circuit Terminals

Symbol		Name	Function	Signal level
Input	S1	Forward/Stop	Forward at ON. Stops at OFF.	Photocoupler 8 mA at 24 VDC
	S2	Multi-function input 1 (S2)	Set by parameter n36 (Reverse/Stop)	
	S3	Multi-function input 2 (S3)	Set by parameter n37 (External fault: Normally open)	
	S4	Multi-function input 3 (S4)	Set by parameter n38 (Fault reset)	
	S5	Multi-function input 4 (S5)	Set by parameter n39 (Multi-step reference 1)	
	SC	Sequence input common	Common for S1 through S5	
	FS	Frequency reference power supply	DC power supply for frequency reference use	20 mA at 12 VDC
	FR	Frequency reference input	Input terminal for frequency reference use	0 to 10 VDC (20 kΩ)
	FC	Frequency reference common	Common for frequency reference use	
Output	MA	Multi-function contact output (Normally open)	Set by parameter n40 (during running)	Relay output 1 A max. at 30 VDC 1 A max. at 250 VAC
	MB	Multi-function contact output (Normally closed)		
	MC	Multi-function contact output common	Common for MA and MB use	
	AM	Analog monitor output	Set by parameter n44 (Output frequency)	2 mA max. at 0 to 10 VDC
	AC	Analog monitor output common	Common for AM use	

Note Functions in parentheses are default settings.

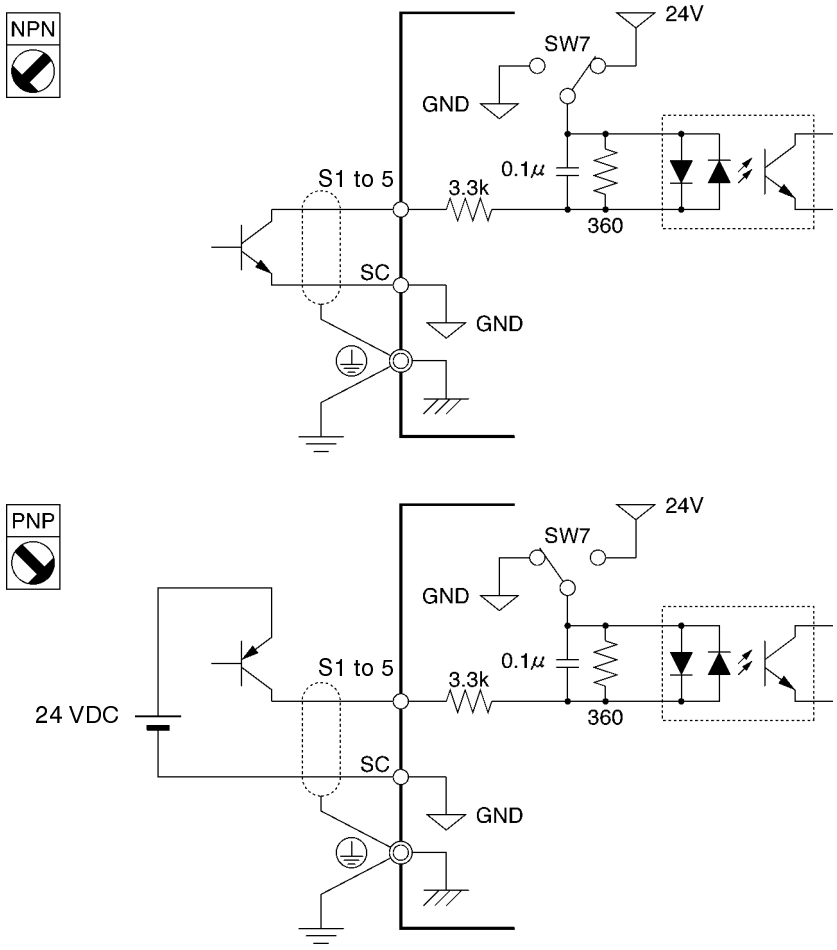
■ Selecting Input Method

• Switches SW7 and SW8, both of which are located above the control circuit terminals, are used for input method selection.
Remove the front cover and optional cover to use these switches.



● Selecting Sequence Input Method

• By using SW7, NPN or PNP input can be selected as shown below.

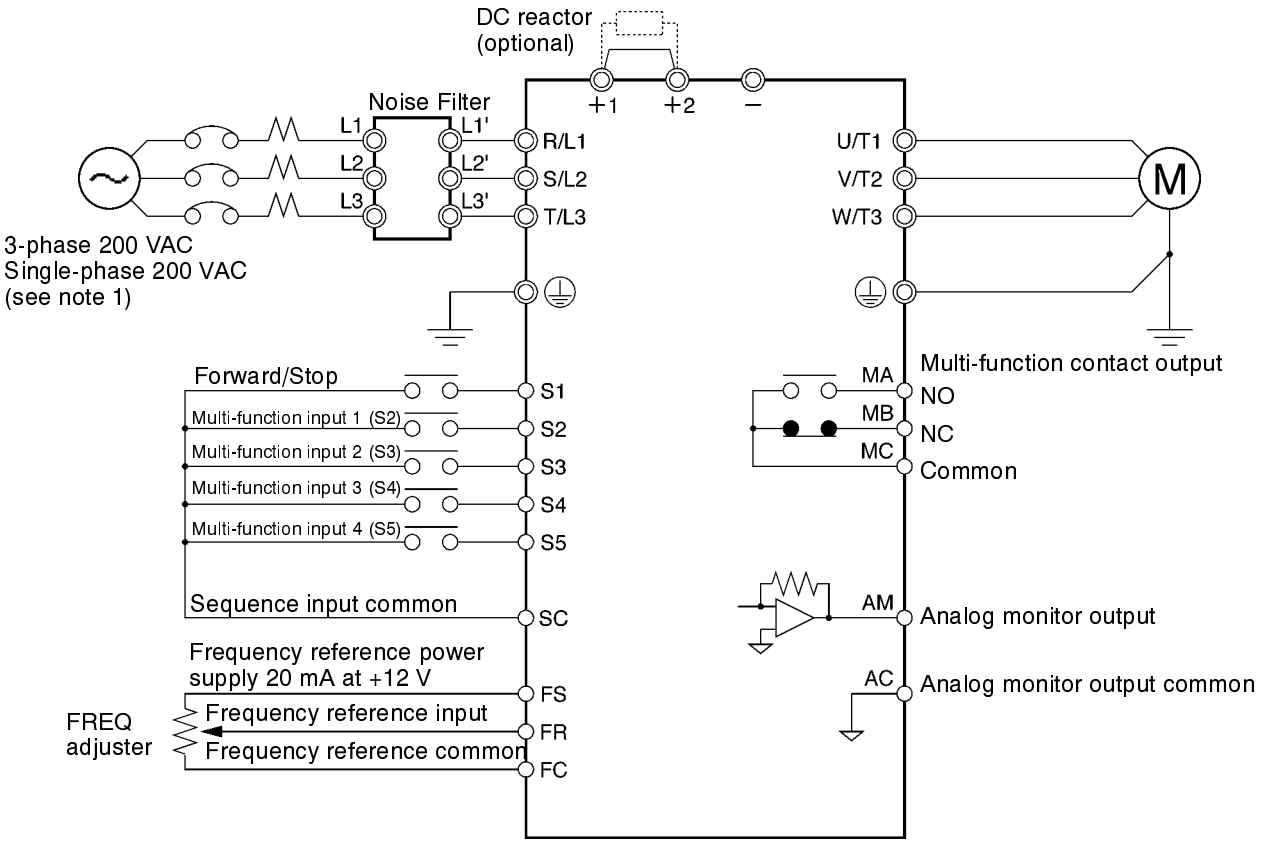


● Selecting Frequency Reference Input Method

• By using SW8, frequency reference voltage or current input can be selected. Parameter settings are required together with the selection of the frequency reference input method.

Frequency reference input method	SW8 setting	Frequency reference selection (parameter n03)
Voltage input	V (OFF)	Set value 2
Current input	I (ON)	Set value 3 or 4

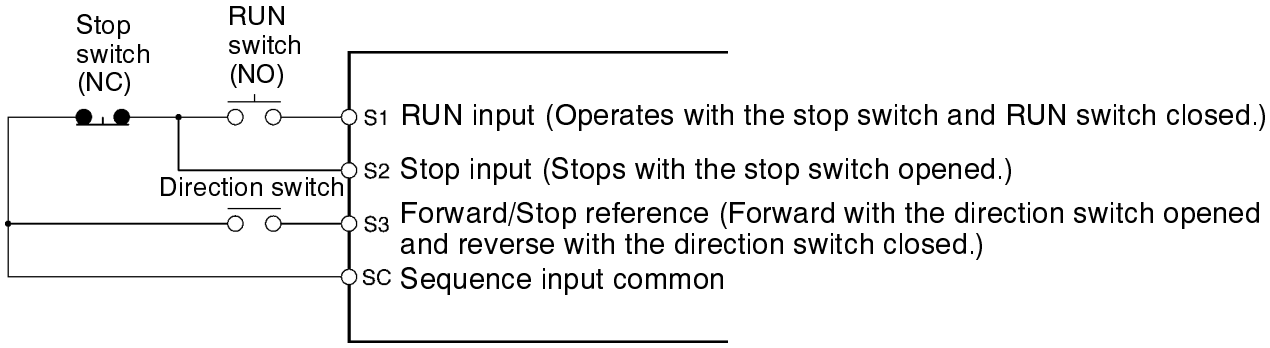
2-2-3 Standard Connections



Note 1. Connect single-phase 200 VAC to terminals R/L1 and S/L2 of the 3G3JV-AB□.

Note 2. The braking resistor cannot be connected because no braking transistor is incorporated.

● Example of 3-wire Sequence Connections



Note Set parameter n37 for 3-wire sequence input.

2-2-4 Wiring around the Main Circuit

■ Wire Size, Terminal Screw, Screw Tightening Torque, and Molded-case Circuit Breaker Capacities

- For the main circuit and ground, always use 600-V polyvinyl chloride (PVC) cables.
- If any cable is long and may cause voltage drops, increase the wire size according to the cable length.

● 3-phase 200-VAC Model

Model 3G3JV-	Terminal symbol	Terminal screw	Screw tightening torque (N•m)	Wire size (mm^2)	Recommended wire size (mm^2)	Molded-case circuit breaker capacity (A)
A2001	R/L1, S/L2, T/L3, –, +1, +2, U/T1, V/T2, W/T3	M3.5	0.8 to 1.0	0.75 to 2	2	5
	⏚					
A2002	R/L1, S/L2, T/L3, –, +1, +2, U/T1, V/T2, W/T3	M3.5	0.8 to 1.0	0.75 to 2	2	5
	⏚					
A2004	R/L1, S/L2, T/L3, –, +1, +2, U/T1, V/T2, W/T3	M3.5	0.8 to 1.0	0.75 to 2	2	5
	⏚					
A2007	R/L1, S/L2, T/L3, –, +1, +2, U/T1, V/T2, W/T3	M3.5	0.8 to 1.0	0.75 to 2	2	10
	⏚					
A2015	R/L1, S/L2, T/L3, –, +1, +2, U/T1, V/T2, W/T3	M3.5	0.8 to 1.0	2 to 5.5	2	20
	⏚					
A2022	R/L1, S/L2, T/L3, –, +1, +2, U/T1, V/T2, W/T3	M3.5	0.8 to 1.0	2 to 5.5	3.5	20
	⏚					

● Single-phase 200-VAC Model

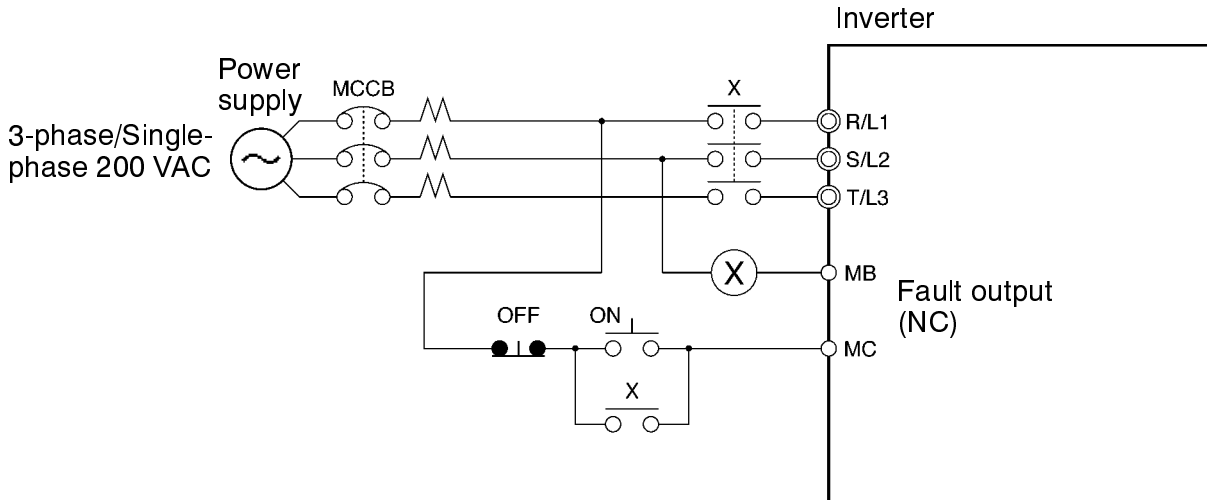
Model 3G3JV-	Terminal symbol	Terminal screw	Terminal torque (N•m)	Wire size (mm^2)	Recommended wire size (mm^2)	Circuit breaker capacity (A)
AB001	R/L1, S/L2, T/L3, –, +1, +2, U/T1, V/T2, W/T3	M3.5	0.8 to 1.0	0.75 to 2	2	5
	⏚					
AB002	R/L1, S/L2, T/L3, –, +1, +2, U/T1, V/T2, W/T3	M3.5	0.8 to 1.0	0.75 to 2	2	5
	⏚					
AB004	R/L1, S/L2, T/L3, –, +1, +2, U/T1, V/T2, W/T3	M3.5	0.8 to 1.0	0.75 to 2	2	10
	⏚					
AB007	R/L1, S/L2, T/L3, –, +1, +2, U/T1, V/T2, W/T3	M3.5	0.8 to 1.0	2 to 5.5	3.5	20
	⏚				2	
AB015	R/L1, S/L2, T/L3, –, +1, +2, U/T1, V/T2, W/T3	M3.5	0.8 to 1.0	2 to 5.5	5.5	20
	⏚				2	

■ Wiring on the Input Side of the Main Circuit

● Installing a Molded-case Circuit Breaker

Always connect the power input terminals (R/L1, S/L2, and T/L3) and power supply via a molded case circuit breaker (MCCB) suitable to the Inverter.

- Choose an MCCB with a capacity of 1.5 to 2 times the Inverter's rated current.
- For the MCCB's time characteristics, be sure to consider the Inverter's overload protection (one minute at 150% of the rated output current).
- If the MCCB is to be used in common among multiple Inverters, or other devices, set up a sequence such that the power supply will be turned off by a fault output, as shown in the following diagram.



● Installing a Ground Fault Interrupter

Inverter outputs use high-speed switching, so high-frequency leakage current is generated.

In general, a leakage current of approximately 100 mA will occur for each Inverter (when the power cable is 1 m) and approximately 5 mA for each additional meter of power cable.

Therefore, at the power supply input area, use a special-purpose breaker for Inverters, which detects only the leakage current in the frequency range that is hazardous to humans and excludes high-frequency leakage current.

- For the special-purpose breaker for Inverters, choose a ground fault interrupter with a sensitivity amperage of at least 10 mA per Inverter.
- When using a general leakage breaker, choose a ground fault interrupter with a sensitivity amperage of 200 mA or more per Inverter and with an operating time of 0.1 s or more.

● Installing a Magnetic Contactor

If the power supply of the main circuit is to be shut off because of the sequence, a magnetic contactor can be used instead of a molded-case circuit breaker.

When a magnetic contactor is installed on the primary side of the main circuit to stop a load forcibly, however, the regenerative braking does not work and the load coasts to a stop.

- A load can be started and stopped by opening and closing the magnetic contactor on the primary side. Frequently opening and closing the magnetic contactor, however, may cause the Inverter to break down.
- When the Inverter is operated with the Digital Operator, automatic operation cannot be performed after recovery from a power interruption.

● Connecting Input Power Supply to the Terminal Block

Input power supply can be connected to any terminal on the terminal block because the phase sequence of input power supply is irrelevant to the phase sequence (R/L1, S/L2, and R/L3).

● Installing an AC Reactor

If the Inverter is connected to a large-capacity power transformer (660 kW or more) or the phase advance capacitor is switched, an excessive peak current may flow through the input power circuit, causing the converter unit to break down.

To prevent this, install an optional AC reactor on the input side of the Inverter.

This also improves the power factor on the power supply side.

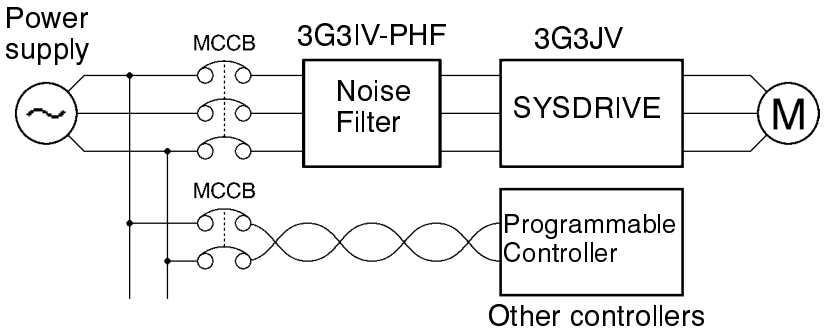
● Installing a Surge Absorber

Always use a surge absorber or diode for the inductive loads near the Inverter. These inductive loads include magnetic contactors, electromagnetic relays, solenoid valves, solenoid, and magnetic brakes.

● Installing a Noise Filter on the Power Supply Side

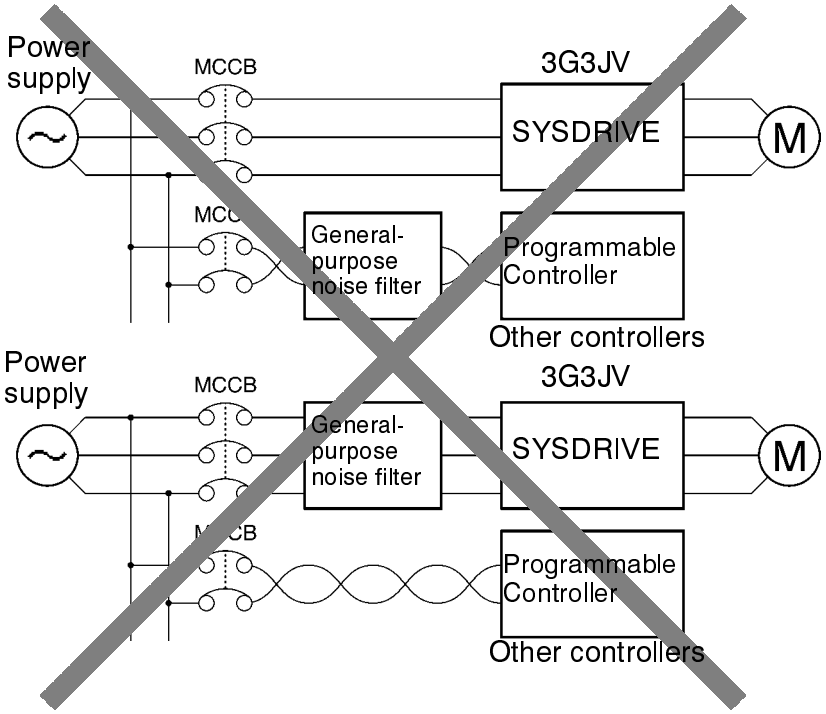
Install a Noise Filter to eliminate noise transmitted between the power line and the Inverter.

Wiring Example 1



Note Use a special-purpose Noise Filter for the SYSDRIVE 3G3JV.

Wiring Example 2



Note Do not use any general-purpose noise filter. No general-purpose noise filter can effectively suppress noise generated from the Inverter.

■ Wiring on the Output Side of the Main Circuit

● Connecting the Terminal Block to the Load

Connect output terminals U/T1, V/T2, and W/T3 to motor lead wires U, V, and W.

Check that the motor rotates forward with the forward command. Switch over any two of the output terminals to each other and reconnect if the motor rotates in reverse with the forward command.

● Never Connect a Power Supply to Output Terminals

Never connect a power supply to output terminals U/T1, V/T2, or W/T3.

If voltage is applied to the output terminals, the internal circuit of the Inverter will be damaged.

● Never Short or Ground Output Terminals

If the output terminals are touched with bare hands or the output wires come into contact with the Inverter casing, an electric shock or grounding will occur. This is extremely hazardous.

Also, be careful not to short the output wires.

● Do not Use a Phase Advancing Capacitor or Noise Filter

Never connect a phase advance capacitor or LC/RC Noise Filter to the output circuit.

Doing so will result in damage to the Inverter or cause other parts to burn.

● Do not Use an Electromagnetic Switch of Magnetic Contactor

Do not connect an electromagnetic switch of magnetic contactor to the output circuit.

If a load is connected to the Inverter during running, an inrush current will actuate the overcurrent protective circuit in the Inverter.

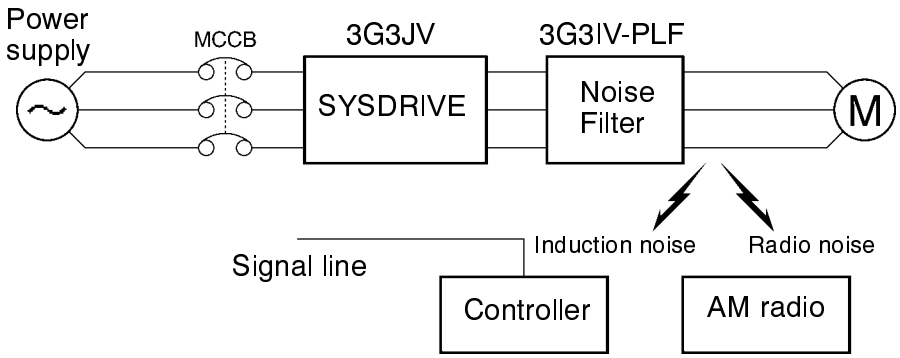
● Installing a Thermal Relay

The Inverter has an electronic thermal protection function to protect the motor from overheating. If, however, more than one motor is operated with one inverter or a multipolar motor is used, always install a thermal relay (THR) between the Inverter and the motor and set n33 to 2 (no thermal protection).

In this case, program the sequence so that the magnetic contactor on the input side of the main circuit is turned off by the contact of the thermal relay.

● Installing a Noise Filter on the Output Side

Connect a Noise Filter to the output side of the Inverter to reduce radio noise and induction noise.

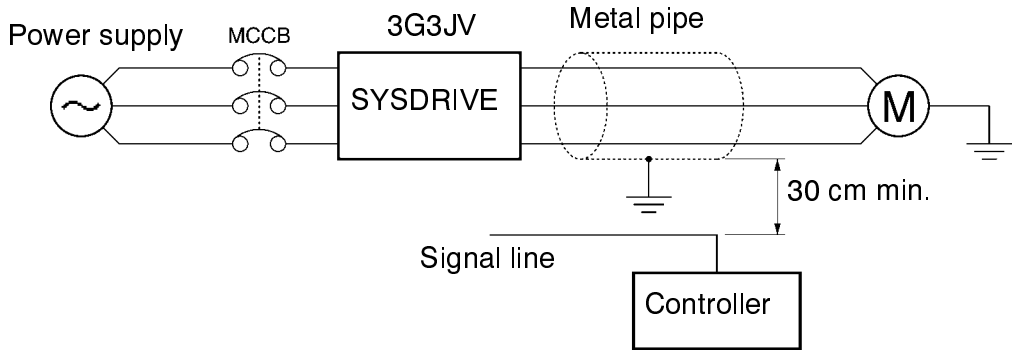


Induction Noise: Electromagnetic induction generates noise on the signal line, causing the controller to malfunction.

Radio Noise: Electromagnetic waves from the Inverter and cables cause the broadcasting radio receiver to make noise.

● Countermeasures against Induction Noise

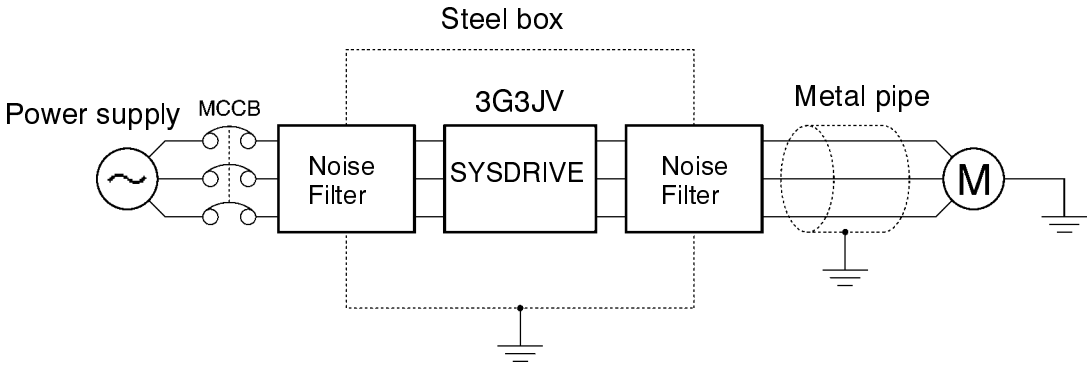
As described previously, a Noise Filter can be used to prevent induction noise from being generated on the output side. Alternatively, cables can be routed through a grounded metal pipe to prevent induction noise. Keeping the metal pipe at least 30 cm away from the signal line considerably reduces induction noise.



● Countermeasures against Radio Interference

Radio noise is generated from the Inverter as well as the input and output lines. To reduce radio noise, install Noise Filters on both input and output sides, and also install the Inverter in a totally enclosed steel box.

The cable between the Inverter and the motor should be as short as possible.



● Cable Length between Inverter and Motor

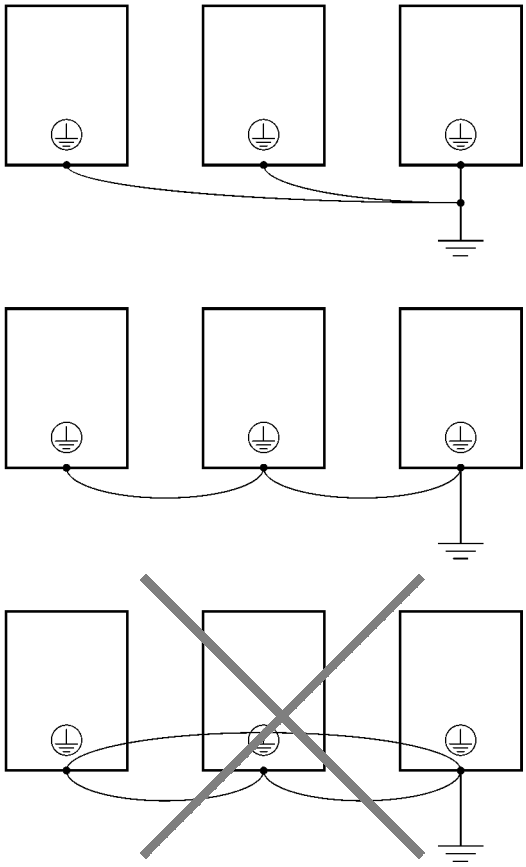
If the cable between the Inverter and the motor is long, the high-frequency leakage current will increase, causing the Inverter output current to increase as well. This may affect peripheral devices.

To prevent this, adjust the carrier frequency (set in n46) as shown in the table below. For details, refer to the parameter settings.

Cable length	50 m max.	100 m max.	More than 100 m
Carrier frequency	15 kHz max.	10 kHz max.	5 kHz max.

■ Ground Wiring

- Always use the ground terminal of the 200-V Inverter with a ground resistance of 100 Ω or less.
- Do not share the ground wire with other devices such as welding machines or power tools.
- Always use a ground wire that complies with technical standards on electrical equipment and minimize the length of the ground wire.
  Leakage current flows through the Inverter. Therefore, if the distance between the ground electrode and the ground terminal is too long, the potential on the ground terminal of the Inverter will become unstable.
- When using more than one Inverter, be careful not to loop the ground wire.



■ Countermeasures against Harmonics

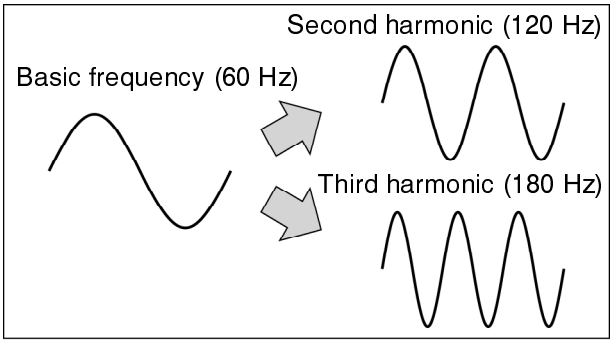
With the continuing development of electronics, the generation of harmonics from industrial machines has been causing problems recently.
The Ministry of International Trade and Industry provided some guidelines in September 1994 for the suppression of harmonics from electrical household appliances and electrical equipment in Japan. Since then, the problem has been drawing considerable attention.
Refer to the following information for the definition of harmonics (i.e., harmonic currents with voltages) and countermeasures against the generation of harmonics from the Inverter.

● Harmonics

Definition

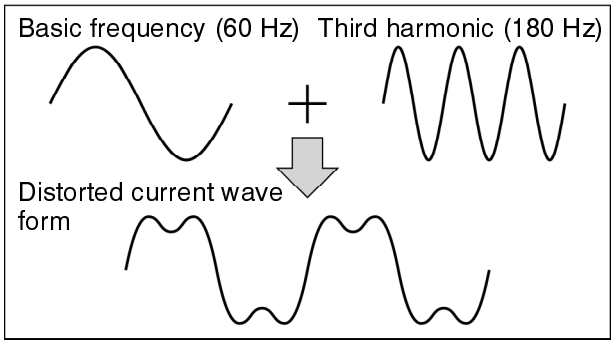
Harmonics consist of electric power produced from AC power and alternating at frequencies that are integral multiples of the frequency of the AC power.

The following frequencies are harmonics of a 60- or 50-Hz commercial power supply.
Second harmonic: 120 (100) Hz
Third harmonic: 180 (150) Hz



Problems Caused by Harmonics Generation

The waveform of the commercial power supply will be distorted if the commercial power supply contains excessive harmonics. Machines with such a commercial power supply will malfunction or generate excessive heat.



● Causes of Harmonics Generation

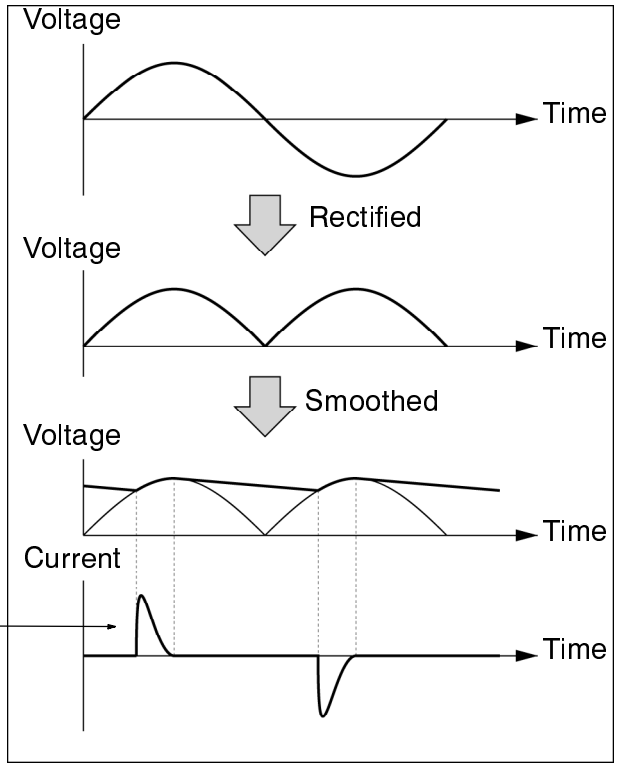
• Usually, electric machines have built-in circuitry that converts commercial AC power supply into DC power.
Such AC power, however, contains harmonics due to the difference in current flow between DC and AC.

Obtaining DC from AC Using Rectifiers and Capacitors

DC voltage is obtained by converting AC voltage into a pulsating one-side voltage with rectifiers and smoothing the pulsating one-side voltage with capacitors. Such AC current, however, contains harmonics.

Inverter

The Inverter as well as normal electric machines has an input current containing harmonics because the Inverter converts AC into DC. The output current of the Inverter is comparatively high. Therefore, the ratio of harmonics in the output current of the Inverter is higher than that of any other electric machine.



● Countermeasures with Reactors against Harmonics Generation

DC/AC Reactors

The DC reactor and AC reactor suppress harmonics and currents that change suddenly and greatly.

The DC reactor suppresses harmonics better than the AC reactor. The DC reactor used with the AC reactor suppresses harmonics more effectively.

The input power factor of the Inverter is improved by suppressing the harmonics of the input current of the Inverter.

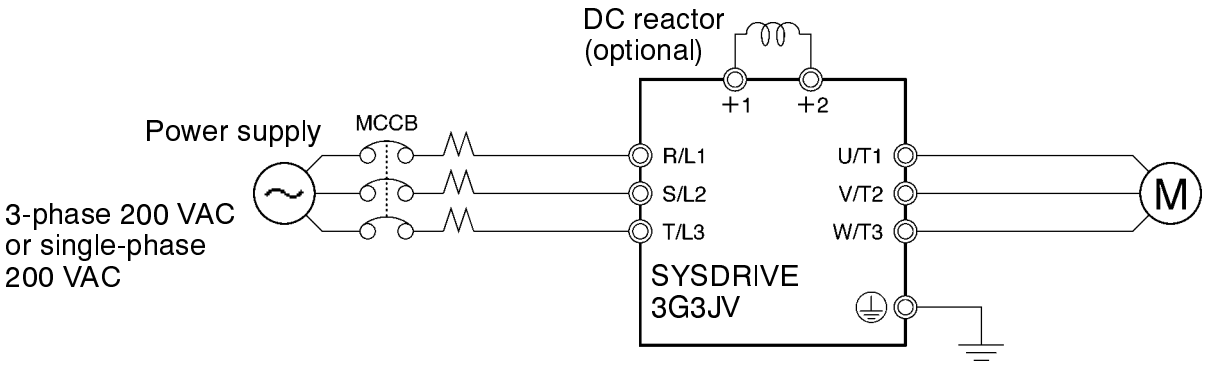
Connection

Connect the DC reactor to the internal DC power supply of the Inverter after shutting off the power supply to the Inverter and making sure that the charge indicator of the Inverter turns off.

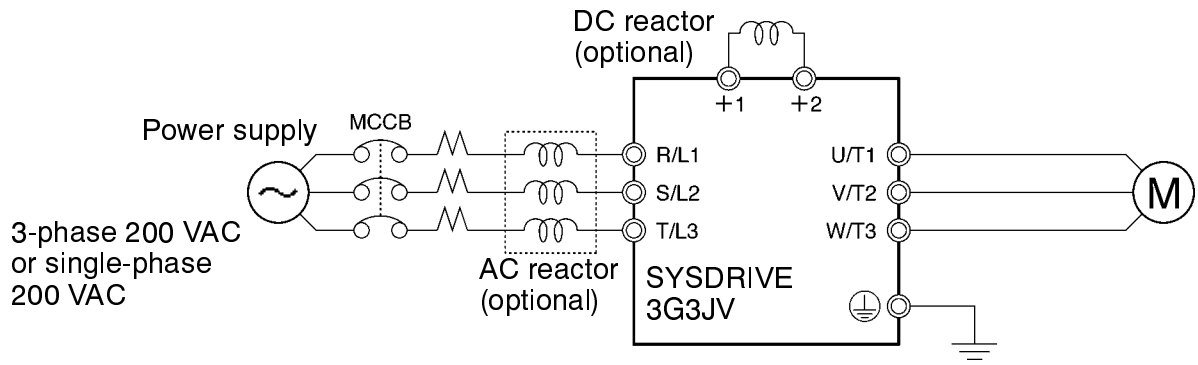
Do not touch the internal circuitry of the Inverter in operation, otherwise an electric shock or burn injury may occur.

Wiring Method

[With DC Reactor]



[With DC and AC Reactors]



Reactor Effects

Harmonics are effectively suppressed when the DC reactor is used with the AC reactor as shown in the following table.

Harmonics suppression method	Harmonic generation rate (%)							
	5th harmonic	7th harmonic	11th harmonic	13th harmonic	17th harmonic	19th harmonic	23rd harmonic	25th harmonic
No reactor	65	41	8.5	7.7	4.3	3.1	2.6	1.8
AC reactor	38	14.5	7.4	3.4	3.2	1.9	1.7	1.3
DC reactor	30	13	8.4	5	4.7	3.2	3.0	2.2
DC and AC reactors	28	9.1	7.2	4.1	3.2	2.4	1.6	1.4

2-2-5 Wiring Control Circuit Terminals

A control signal line must be 50 m maximum and separated from power lines.
The frequency reference must be input into the Inverter through shielded, twisted-pair wires.

■ Wiring Sequence I/O Terminals

Wire the sequence input terminals (S1 to S5 and SC) and multi-function contact output terminals (MA, MB, and MC) as described below.

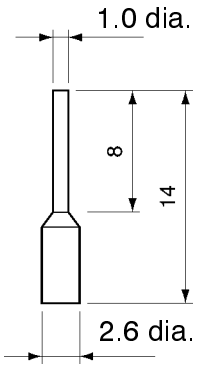
● Wires Used

Wire type	Wire size	Wire to be used
Single wire	0.5 to 1.25 mm^2	Polyethylene-shielded cable
Stranded wire	0.5 to 0.75 mm^2	

● Solderless Terminals for Control Circuit Terminals

The use of solderless terminals for the control circuit terminals is recommended because solderless terminals are easy to connect securely.

Note When using the following solderless terminal, make sure that the wire size is 0.5 mm^2.



Model: Phoenix Contact's A1 0.5-8 WH

(Size: mm)

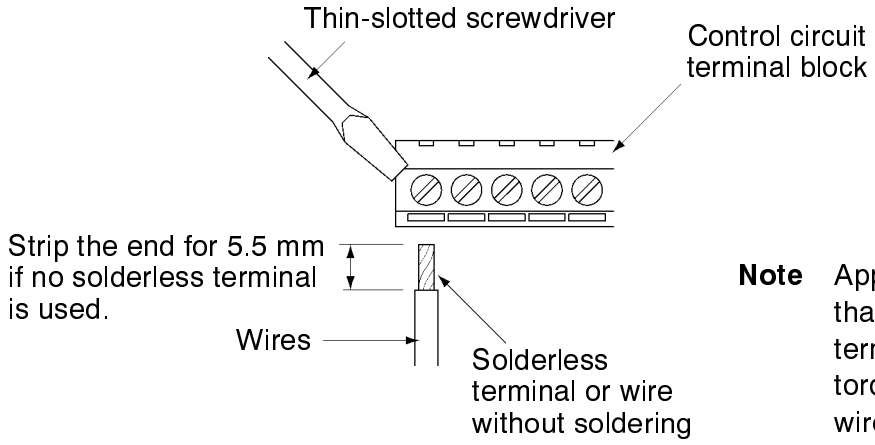
● Wiring Method

1. Loosen the terminal screws with a thin-slotted screwdriver.
2. Insert the wires from underneath the terminal block
3. Tighten the terminal screws firmly to a torque of 0.5 N•m.

Note 1. Always separate the control signal line from the main circuit cables and other power cables.

Note 2. Do not solder the wires to the control circuit terminals. The wires may not contact well with the control circuit terminals if the wires are soldered.

Note 3. The end of each wire connected to the control circuit terminals must be stripped for approximately 5.5 mm.



Note Applying a torque of greater than 0.5 N•m may damage the terminal block. If the tightening torque is insufficient, however, wires may be disconnected.

■ Wiring Frequency Reference Input Terminals

Wire the frequency reference input terminals FR and FC as described below for executing frequency references with the D/A Unit for digital-to-analog data conversion or external power supply.

● Wires Used

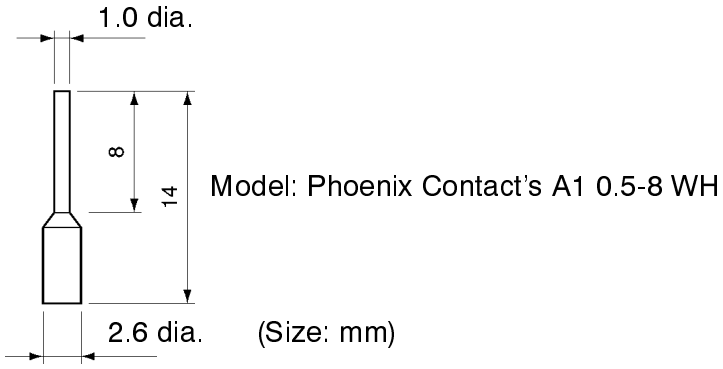
Use shielded, twisted-pair wires for wiring in order to prevent the Inverter from malfunctioning due to noise.

Wire type	Wire size	Wire to be used
Single wire	0.5 to 1.25 mm^2	Polyethylene-shielded cable for measurement use
Stranded wire	0.5 to 0.75 mm^2	

● Solderless Terminals for Frequency Reference Input Terminals

The use of solderless terminals for the frequency reference input terminals is recommended because solderless terminals are easy to connect securely.

Note Make sure that the wire size is 0.5 mm^2 when using the following solderless terminal.



● Wiring Method

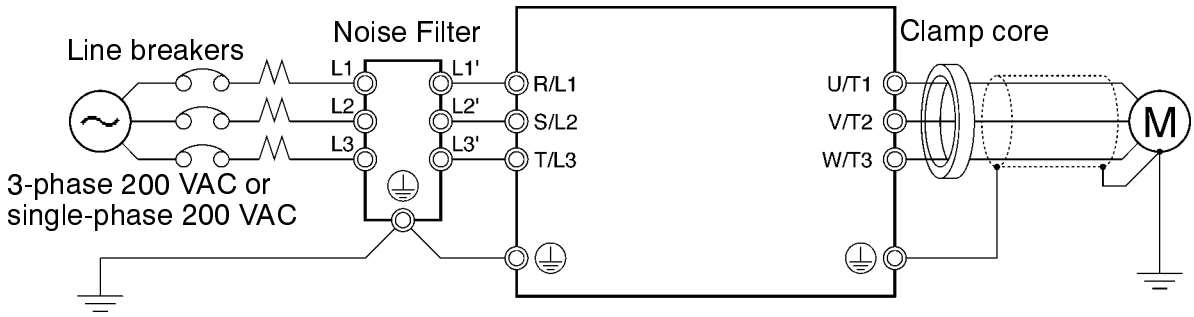
- The wiring method of the frequency reference input terminals is the same as that of the control circuit terminals.
- Always separate the control signal line from the main circuit cables and other power cables.
- Connect the shield to the ground terminal of the Inverter. Do not connect the shield to the load.
- Cover the shield with tape so that the shield will not come into contact with other signal wires or machines.

2-2-6 Conforming to EC Directive

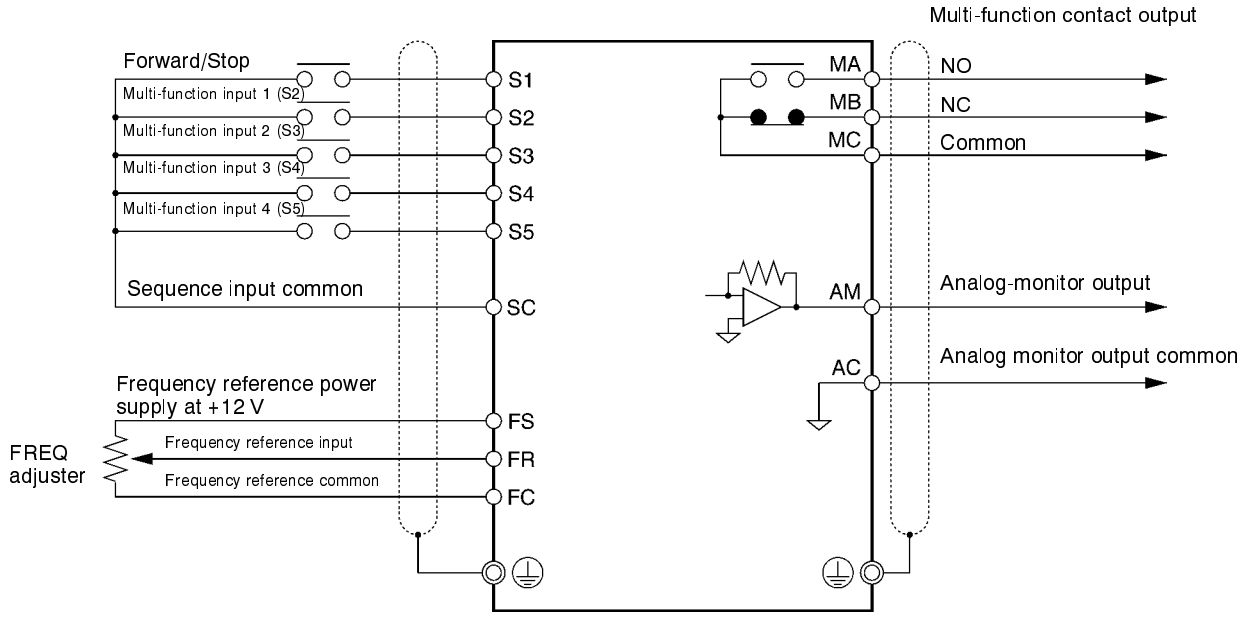
The following description provides the wiring method of the Inverter to meet DC Directive requirements. If the following requirements are not satisfied, the whole equipment incorporating the Inverter will need further confirmation.

■ Standard Connection

● Main Circuit Terminals



● Control Circuit Terminals



Note I/O signals can be connected to a single shielded cable.

• Wiring the Power Supply

Make sure that the Inverter and Noise Filter are grounded together.

- Always connect the power input terminals (R/L1, S/L2, and T/L3) and power supply via a dedicated Noise Filter.
- Reduce the length of the ground wire as much as possible.
- Locate the Noise Filter as close as possible to the Inverter. Make sure that the cable length between the Noise Filter and the Inverter does not exceed 40 cm.
- The following Noise Filters are available (all footprint type).

3-phase 200-VAC Noise Filter

Inverter	3-phase 200-VAC Noise Filter	
Model 3G3JV-	**Model 3G3JV-**	**Rated current (A)**
A2001/A2002/A2004/A2007	PFI2010-E	10
A2015/A2022	PFI2020-E	20

Single-phase 200-VAC Noise Filter

Inverter	Single-phase 200-V Noise Filter	
Model 3G3JV-	**Model 3G3JV-**	**Rated current (A)**
AB001/AB002/AB004	PFI1010-E	10
AB007/AB015	PFI1020-E	20

• Connecting a Motor to the Inverter

- When connecting a motor to the Inverter, be sure to use a cable with a braided shield.
- Reduce the length of the cable as short as possible and ground the shield on the Inverter side as well as the motor side. Make sure that the cable length between the Inverter and the motor does not exceed 20 cm. Furthermore, connect a clamp core (Clamp Filter) close to the output terminals of the Inverter.

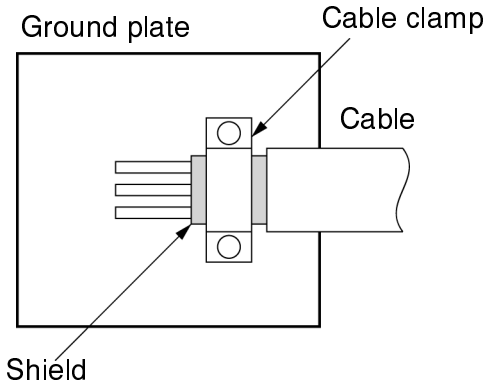
Product	Model	Manufacturer
Clamp Filter	2CAT3035-1330	TDK

• Wiring a Control Cable

- Be sure to connect a cable with a braided shield to the control circuit terminals.
- Ground the shield on the Inverter side only.

• Grounding the Shield

In order to ground the shield securely, it is recommended that a cable clamp be directly connected to the ground plate as shown below.



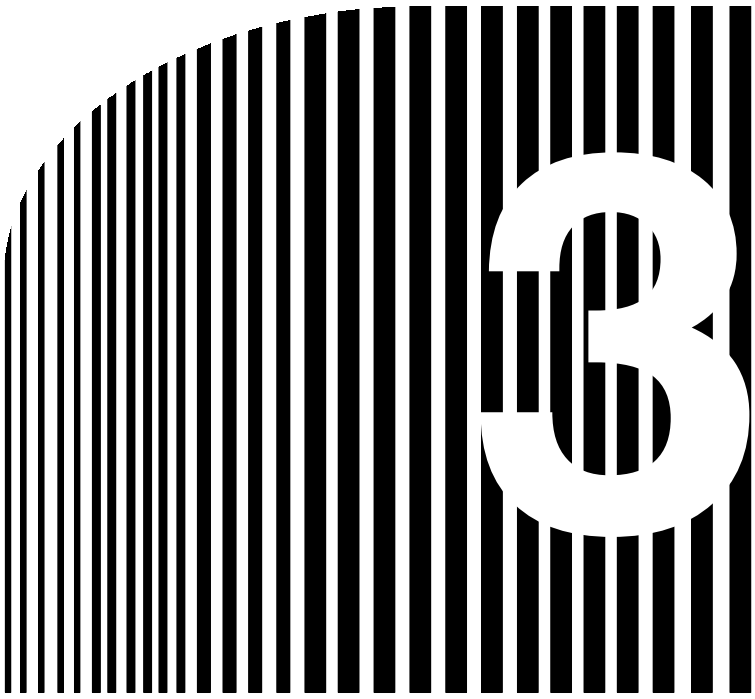
■ LVD Conformance

- Always connect the Inverter and power supply via a molded case circuit breaker (MCCB) suitable to the Inverter for protecting the Inverter from damage that may result from short-circuiting.
- Use one MCCB per Inverter.
- Select a suitable MCCB from the following table.

200-V Models

Inverter	MCCB (Mitsubishi Electric)	
Model 3G3JV-	Type	Rated current (A)
A2001	NF30	5
A2002		5
A2004		5
A2007		10
A2015		20
A2022		20
AB001	NF30	5
AB002		5
AB004		10
AB007		20
AB015		20

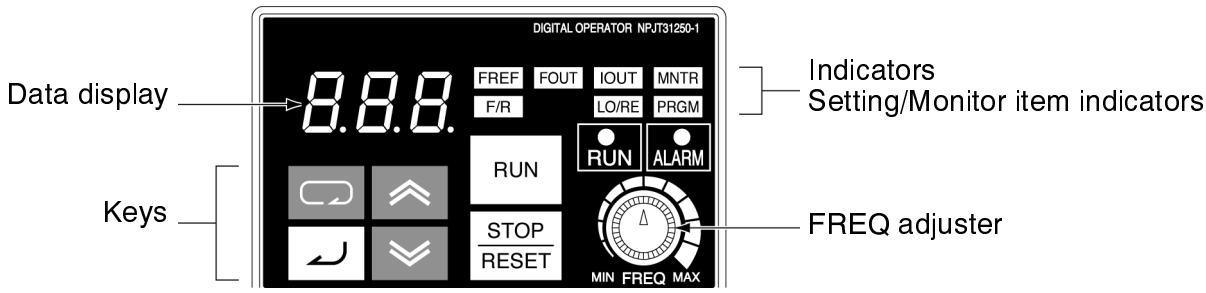
The frequency reference power supply (FS) of the Inverter is of basic insulation construction. When connecting the Inverter to peripheral devices, be sure to increase the degree of insulation.



Chapter 3

· Preparing for Operation and Monitoring ·

3-1 Nomenclature



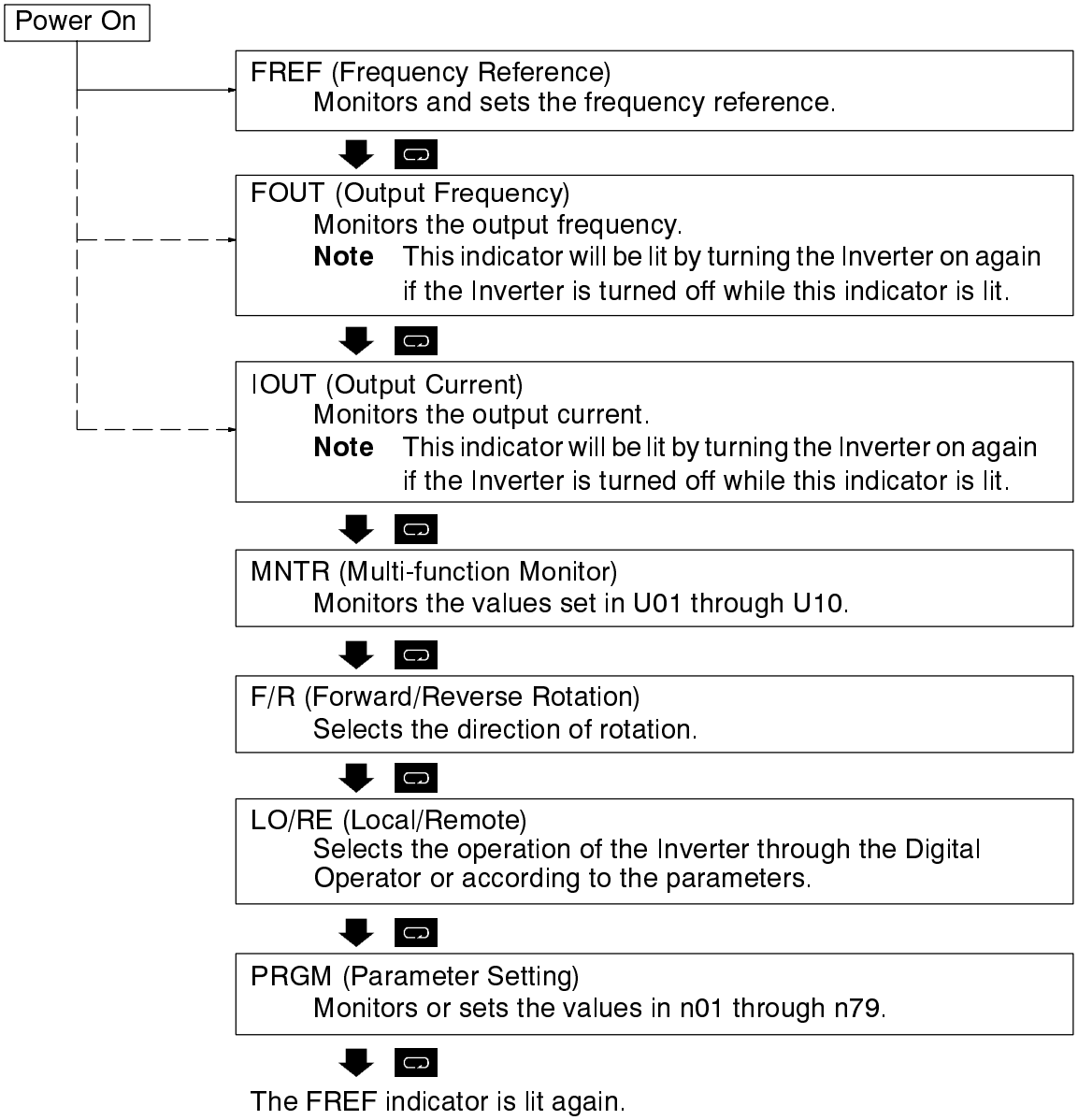
Appearance	Name	Function
	Data display	Displays relevant data items, such as frequency reference, output frequency, and parameter set values.
 MIN MAX FREQUENCY	FREQ adjuster	Sets the frequency reference within a range between 0 Hz and the maximum frequency.
FREF	FREF indicator	The frequency reference can be monitored or set while this indicator is lit.
FOUT	FOUT indicator	The output frequency of the Inverter can be monitored while this indicator is lit.
IOUT	IOUT indicator	The output current of the Inverter can be monitored while this indicator is lit.
MNTR	MNTR indicator	The values set in U01 through U10 are monitored while this indicator is lit.
F/R	F/R indicator	The direction of rotation can be selected while this indicator is lit, when operating the Inverter with the RUN Key.
LO/RE	LO/RE indicator	The operation of the Inverter through the Digital Operator or according to the parameters set is selectable while this indicator is lit. **Note** This status of this indicator can be only monitored while the Inverter is in operation. Any RUN command input is ignored while this indicator is lit.
PRGM	PRGM indicator	The parameters in n01 through n79 can be set or monitored while this indicator is lit. **Note** While the Inverter is in operation, the parameters can be only monitored and only some parameters can be changed. The RUN command input is ignored while this indicator is lit.

Appearance	Name	Function
	Mode Key	Switches the setting and monitor item indicators in sequence. Parameter setting being made is canceled if this key is pressed before entering the setting.
	Increment Key	Increases multi-function monitor numbers, parameter numbers, and parameter set values.
	Decrement Key	Decreases multi-function monitor numbers, parameter numbers, and parameter set values.
	Enter Key	Enters multi-function monitor numbers, parameter numbers, and internal data values after they are set or changed.
	RUN Key	Starts the Inverter running when the 3G3FV is in operation with the Digital Operator.
	STOP/RESET Key	Stops the Inverter unless n06 is not set to disable the STOP Key.

3-2 Outline of Operation

■ Selecting Indicators

Whenever the Mode Key is pressed, an indicator is lit in sequence beginning with the FREF indicator. The data display indicates the item corresponding to the indicator selected.
The FOUT or IOUT indicator will be lit by turning the Inverter on again if the Inverter is turned off while the FOUT or IOUT indicator is lit. The FREF indicator will be lit by turning the Inverter on again if the Inverter is turned off while an indicator other than the FOUR or IOUT indicator is lit.



■ Example of Frequency Reference Settings

Key sequence	Indicator	Display example	Explanation
	FREF	6.0	Power On **Note** If the FREF indicator has not been lit, press the Mode Key repeatedly until the FREF indicator is lit.
▲ ▼	FREF	600.	Use the Increment or Decrement Key to set the frequency reference. The data display will flash while the frequency reference is set. (see note 1)
↵	FREF	600.	Press the Enter Key so that the set value will be entered and the data display will be lit. (see note 1)

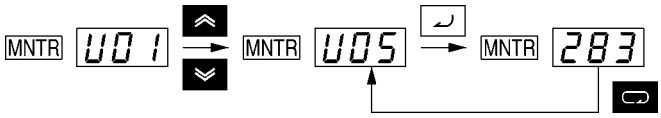
Note 1. The Enter Key need not be pressed when performing the setting for n08. The frequency reference will change when the set value is changed with the Increment or Decrement Key while the data display is continuously lit.

Note 2. The frequency reference can be set in either of the following cases.

- Parameter n03 for frequency reference selection is set to 1 (i.e., frequency reference 1 is enabled) and the Inverter is in remote mode.
- Parameter n07 for frequency selection in local mode is set to 1 (i.e., the Digital Operator is enabled) and the Inverter is in local mode.
- Frequency references 2 through 8 are input for multi-step speed operation.

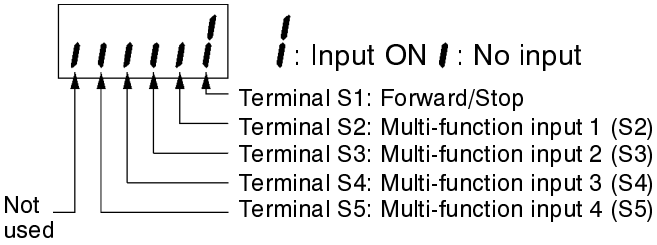
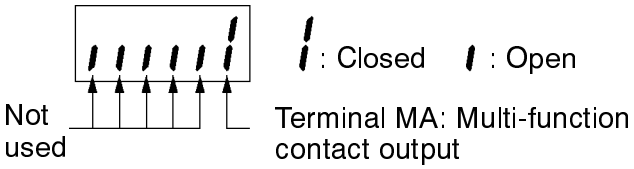
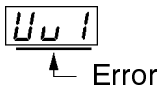
Note 3. The frequency reference can be changed, even during operation.

■ Example of Multi-function Display

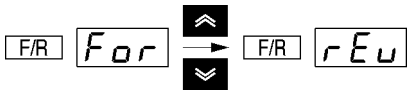


Key sequence	Indicator	Display	Explanation
	FREF	60	Power On
MODE	MNTR	U01	Press the Mode Key repeatedly until the MNTR indicator is lit. U01 will be displayed.
▲ ▼	MNTR	U05	Use the Increment or Decrement Key to select the monitor item to be displayed.
ENTER	MNTR	283	Press the Enter Key so that the data of the selected monitor item will be displayed.
MODE	MNTR	U05	The monitor number display will appear again by pressing the Mode Key.

● Status Monitor

Item	Display	Display unit	Function
U01	Frequency reference	Hz	Monitors the frequency reference. (Same as FREF)
U02	Output frequency	Hz	Monitors the output frequency. (Same as FOUT)
U03	Output current	A	Monitors the output current. (Same as IOUT)
U04	Output voltage	V	Monitors the internal output voltage reference value of the Inverter.
U05	DC bus voltage	V	Monitors the DC voltage of the internal main circuit of the Inverter.
U06	Input terminal status	---	Shows the ON/OFF status of inputs. 
U07	Output terminal status	---	Shows the ON/OFF status of outputs. 
U09	Error log (most recent one)	---	Displays the latest error. 
U10	Software No.	---	OMRON use only.

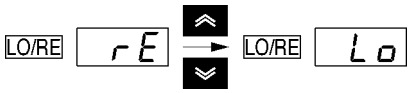
■ Example of Forward/Reverse Selection Settings



Key sequence	Indicator	Display example	Explanation
MODE	F/R	For	Press the Mode Key repeatedly until the F/R indicator is lit. The present setting will be displayed. For: Forward; rEv: Reverse
▲ ▼	F/R	rEu	Use the Increment or Decrement Key to change the direction of motor rotation. The direction of motor rotation selected will be enabled when the display changes after the key is pressed.

Note The direction of motor rotation can be changed, even during operation.

■ Example of Local/Remote Selection Settings



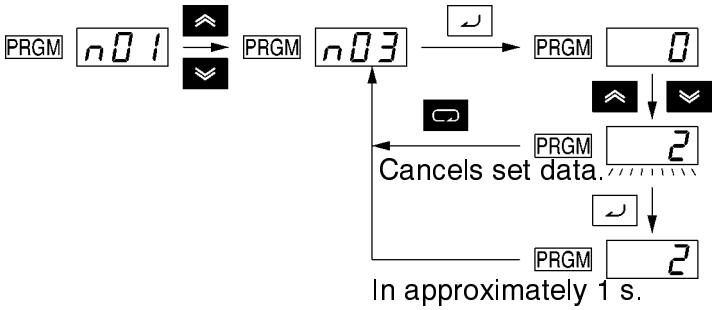
Key sequence	Indicator	Display example	Explanation
MODE	LO/RE	rE	Press the Mode Key repeatedly until the LO/RE indicator is lit. The present setting will be displayed. rE: Remote; Lo: Local
▲ ▼	LO/RE	Lo	Use the Increment or Decrement Key to set the Inverter to local or remote mode. The selection will be enabled when the display changes after the key is pressed.

Note 1. Local or remote selection is possible only when the Inverter is not in operation. The present setting can be monitored when the Inverter is in operation.

Note 2. Local or remote settings in multi-function input terminals can be changed through the multi-function input terminals only.

Note 3. Any RUN command input will be ignored while the LO/RE indicator is lit.

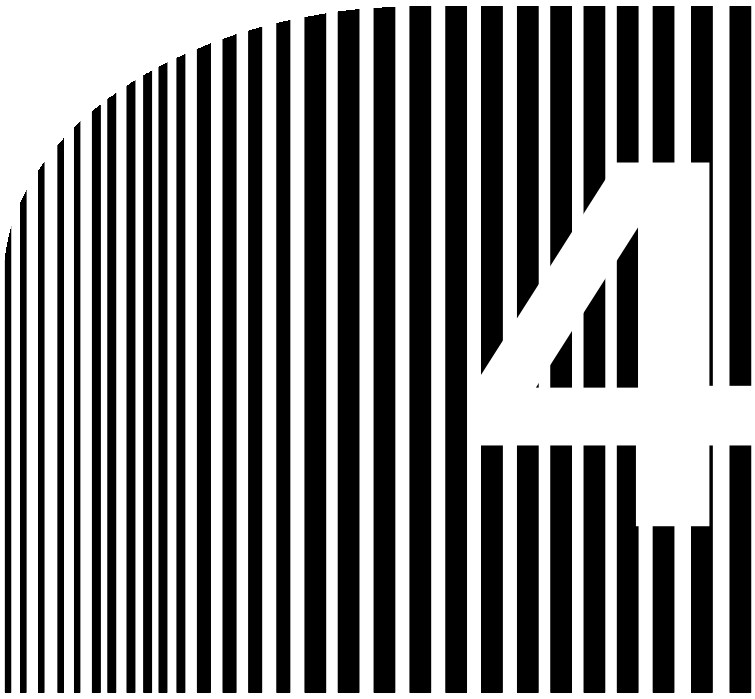
■ Example of Parameter Settings



Key sequence	Indicator	Display example	Explanation
	FREF	0.0	Power On
MODE	PRGM	n01	Press the Mode Key repeatedly until the PRGM indicator is lit.
▲ ▼	PRGM	n03	Use the Increment or Decrement Key to set the parameter number.
ENTER	PRGM	0	Press the Enter Key. The data of the selected parameter number will be displayed.
▲ ▼	PRGM	2	Use the Increment or Decrement Key to set the data. At that time the display will flash.
ENTER	PRGM	2	Press the Enter Key so that the set value will be entered and the data display will be lit. (see note 1)
In approximately 1 s.	PRGM	n03	The parameter number will be displayed.

Note 1. To cancel the set value, press the Mode Key instead. The parameter number will be displayed.

Note 2. There are parameters that cannot be changed while the Inverter is in operation. Refer to the list of parameters. When attempting to change such parameters, the data display will not change by pressing the Increment or Decrement Key.



Chapter 4

· Test Run ·

⚠**WARNING** Turn ON the input power supply only after mounting the front cover, terminal covers, bottom cover, Operator, and optional items. Not doing so may result in electrical shock.

⚠**WARNING** Do not remove the front cover, terminal covers, bottom cover, Operator, or optional items while the power is being supplied. Not doing so may result in electrical shock.

⚠**WARNING** Do not operate the Operator or switches with wet hands. Doing so may result in electrical shock.

⚠**WARNING** Do not touch the inside of the Inverter. Doing so may result in electrical shock.

⚠**WARNING** Do not come close to the machine when using the error retry function because the machine may abruptly start when stopped by an alarm. Doing so may result in injury.

⚠**WARNING** Do not come close to the machine immediately after resetting momentary power interruption to avoid an unexpected restart (if operation is set to be continued in the processing selection function after momentary power interruption is reset). Doing so may result in injury.

⚠**WARNING** Provide a separate emergency stop switch because the STOP Key on the Operator is valid only when function settings are performed. Not doing so may result in injury.

⚠**WARNING** Be sure confirm that the RUN signal is turned OFF before turning ON the power supply, resetting the alarm, or switching the LOCAL/REMOTE selector. Doing so while the RUN signal is turned ON may result in injury.

⚠**Caution** Be sure to confirm permissible ranges of motors and machines before operation because the Inverter speed can be easily changed from low to high. Not doing so may result in damage to the product.

⚠**Caution** Provide a separate holding brake when necessary. Not doing so may result in injury.

⚠**Caution** Do not perform a signal check during operation. Doing so may result in injury or damage to the product.

⚠**Caution** Do not carelessly change settings. Doing so may result in injury or damage to the product.

4-1 Procedure for Test Run

1. Installation and Mounting

Install the Inverter according to the installation conditions. Refer to page 2-2. Ensure that the installation conditions are met.

2. Wiring and Connection

Connect to the power supply and peripheral devices. Refer to page 2-7. Select peripheral devices which meet the specifications and wire correctly.

3. Power Connection

Carry out the following pre-connection checks before turning on the power supply.

- Always ensure that a power supply to the correct voltage is used and that the power input terminals (R/L1, S/L2, and T/L3) are wired correctly.

  3G3JV-A2□: 3-phase 200 to 230 VAC

  3G3JV-AB□: Single-phase 200 to 240 VAC (Wire R/L1 and S/L2)
- Make sure that the motor output terminals (U/T1, V/T2, and W/T3) are connected to the motor correctly.
- Ensure that the control circuit terminals and the control device are wired correctly. Make sure that all control terminals are turned off.
- Set the motor to no-load status (i.e., not connected to the mechanical system).
- Having conducted the above checks, connect the power supply.

4. Check the Display Status

Check to be sure that there are no faults in the Inverter.

- If the display at the time the power is connected is normal, it will read as follows:

  RUN indicator: Flashes

  ALARM indicator: Off

  Setting/Monitor indicators: FREF, FOUT, or IOUT is lit.

  Data display: Displays the corresponding data of the indicator that is lit.
- When a fault has occurred, the details of the fault will be displayed. In that case, refer to *Chapter 7 Maintenance Operations* and take necessary remedies.

5. Initializing Parameters

Initialize the parameters.

- Set n01 to 8 for initialization in 2-wire sequence.

6. Setting Parameters

Set the parameters required for a test run.

- Set the rated motor current in order to prevent the motor from burning due to overloading.

7. No-load Operation

Start the no-load motor using the Digital Operator.

- Set the frequency reference using the Digital Operator and start the motor using key sequences.

8. Actual Load Operation

Connect the mechanical system and operate using the Digital Operator.

- When there are no difficulties using the no-load operation, connect the mechanical system to the motor and operate using the Digital Operator.

9. Operation

Basic Operation:
Operation based on the basic settings required to start and stop the Inverter. Refer to page 5-1.

Advanced Operation:
Operation that uses PID control or other functions. Refer to page 6-1.

- For operation within standard parameters, refer to *Chapter 5 Basic Operation*.
- Refer to *Chapter 5 Basic Operation* and *Chapter 6 Advanced Operation* for the various advanced functions, such as stall prevention, carrier frequency setting, overtorque detection, torque compensation, and slip compensation.

4-2 Operation Example

1 Power Connection

■ Checkpoints before Connecting the Power Supply

- Check that the power supply is of the correct voltage and that the motor output terminals (R/L1, S/L2, and T/L3) are connected to the motor correctly.

  3G3JV-A2□: Three-phase 200 to 230 VAC

  3G3JV-AB□: Single-phase 200 to 240 VAC (Wire R/L1 and S/L2)

- Make sure that the motor output terminals (U/T1, V/T2, and W/T3) are connected to the motor correctly.
- Ensure that the control circuit terminals and the control device are wired correctly. Make sure that all control terminals are turned off.
- Set the motor to no-load status (i.e., not connected to the mechanical system).

■ Connecting the Power Supply

- After conducting the above checks, connect the power supply.

2 Check the Display Status

- If the display is normal when the power is connected, it will read as follows:

  Normal

  RUN indicator: Flashes

  ALARM indicator: Off

  Setting/Monitor indicators: FREF, FOUT, or IOUT is lit.

  Data display: Displays the corresponding data for the indicator that is lit.

- When a fault has occurred, the details of the fault will be displayed. In that case, refer to *Chapter 7 Maintenance Operations* and take necessary action.

  Fault

  RUN indicator: Flashes

  ALARM indicator: Lit (fault detection) or flashes (alarm detection)

  Setting/Monitor indicators: FREF, FOUT, or IOUT is lit.

  Data display: The fault code, such as UV1, is displayed. The display will differ depending on the type of fault.

3 Initializing Parameters

- Initialize the parameters using the following procedure.
- To initialize the parameters, set n01 to 8.

Key sequence	Indicator	Display example	Explanation
	FREF	0.0	Power On
	PRGM	n01	Press the Mode Key repeatedly until the PRGM indicator is lit.
	PRGM	1	Press the Enter Key. The data of n01 will be displayed.
	PRGM	8	Use the Increment or Decrement Key to set n01 to 8. The display will flash.
	PRGM	8	Press the Enter Key so that the set value will be entered and the data display will be lit.
In approximately 1 s.	PRGM	n01	The parameter number will be displayed.

4 Setting the Motor Current Parameter

- Set the motor current parameter in n32 in order to prevent the motor from burning due to overloading.

■ Setting the Rated Motor Current

- Check the rated current on the motor nameplate and set the motor current parameter.
- This parameter is used for the electronic thermal function for motor overload detection (OL1). By setting the correct parameter, the overloaded motor will be protected from burning.

n32	**Rated Motor Current**			**Changes during operation**	No
Setting range	0.0% to 120% (A) of rated output current of the Inverter	**Unit of setting**	0.1 A	**Default setting**	(see note 1)

Note 1. The standard rated current of the maximum applicable motor is the default rated motor current.

Note 2. Motor overload detection (OL1) is disabled by setting the parameter to 0.0.

Key sequence	Indicator	Display example	Explanation
	PRGM	n01	Displays the parameter number.
▲ ▼	PRGM	n32	Use the Increment or Decrement Key until n32 is displayed.
↵	PRGM	1.9	Press the Enter Key. The data of n32 will be displayed.
▲ ▼	PRGM	1.8	Use the Increment or Decrement Key to set the rated motor current. The display will flash.
↵	PRGM	1.8	Press the Enter Key so that the set value will be entered and the data display will be lit.
In approximately 1 s.	PRGM	n32	The parameter number will be displayed.

5 No-load Operation

• Start the no-load motor (i.e., not connected to the mechanical system) using the Digital Operator.

Note Before operating the Digital Operator, check that the FREQ adjuster is set to MIN.

■ Forward/Reverse Rotation with the Digital Operator

Key sequence	Indicator	Display example	Explanation
	FREF	0.0	Monitors the frequency reference.
RUN	FREF	0.0	Press the RUN Key. The RUN Indicator will be lit.
	FREF	10.0	Turn the FREQ adjuster clockwise slowly. The monitored frequency reference will be displayed. The motor will start rotating in the forward direction according to the frequency reference.
⊂⊃	F/R	For	Press the MODE Key to turn on the F/R indicator. “For” will be displayed.
▲ ▼	F/R	rEv	Use the Increment or Decrement Key to change the direction of motor rotation. The direction of motor rotation selected will be enabled when the display is changed after the Key is pressed.

- After changing the frequency reference or the rotation direction, check that there is no vibration or abnormal sound from the motor.
- Check that no faults have occurred in the Inverter during operation.

■ Stopping the Motor

- On completion of operating the motor in the no-load state in the forward or reverse direction, press the STOP/RESET Key. The motor will stop.

6 Actual Load Operation

- After checking the operation with the motor in no-load status, connect the mechanical system and operate with an actual load.

Note Before operating the Digital Operator, check that the FREQ adjuster is set to MIN.

■ Connecting the System

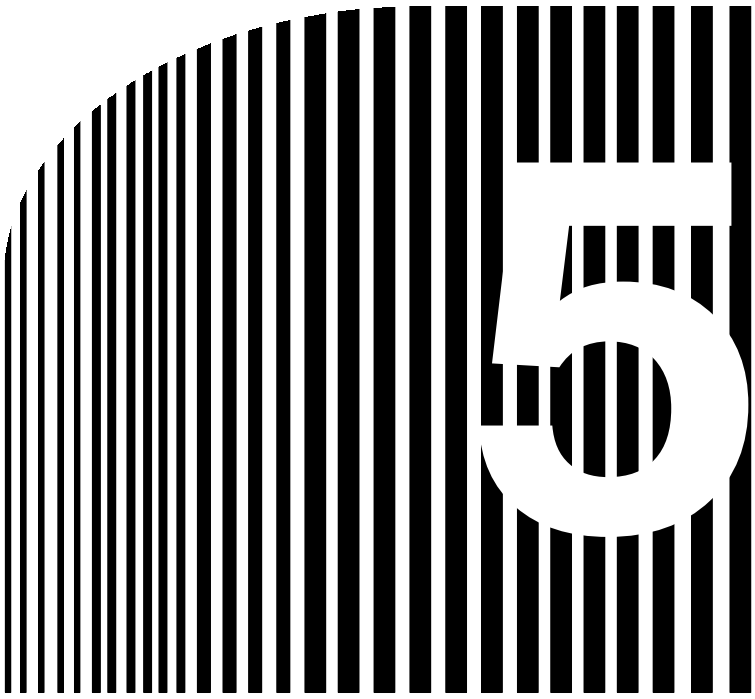
- After confirming that the motor has stopped completely, connect the mechanical system.
- Be sure to tighten all the screws when fixing the motor axis in the mechanical system.

■ Operation Using the Digital Operator

- In case a fault occurs during operation, make sure the Stop Key on the Digital Operator is easily accessible.
- Use the Digital Operator in the same way as no-load operation.
- First set the frequency reference to a low speed of one tenth the normal operating speed.

■ Checking the Operating Status

- Having checked that the operating direction is correct and that the machine is operating smoothly at slow speed, increase the frequency reference.
- After changing the frequency reference or the rotation direction, check that there is no vibration or abnormal sound from the motor. Check the monitor display (IOUT or multi-function monitor U03) to ensure that the output current is not becoming excessive.



Chapter 5

• Basic Operation •

This section explains the basic settings required to operate and stop the Inverter.
The settings of parameters described here will be sufficient for simple Inverter operations.
First, make these basic settings, then skip to the explanations of those special functions, even when your application requires special functions, such as stall prevention, carrier frequency setting, overtorque detection, torque compensation, slip compensation. Refer to *Chapter 6 Advanced Operation*.

5-1 Initial Settings

• The following initial settings are required.

Parameter Write-prohibit Selection/Parameter Initialization (n01): Set n01 to 1 so that n01 through n79 can be set or displayed.

Rated Motor Current (n32): Check the rated current on the motor nameplate and set the parameter.

■ Setting the Parameter Write-prohibit Selection/Parameter Initialization (n01)

• Set n01 to 1 so that n01 through n79 can be set or displayed.

n01	**Parameter Write-prohibit Selection/Parameter Initialization**			**Changes during operation**	No
Setting range	0, 1, 6, 8, 9	**Unit of setting**	1	**Default setting**	1

Note This parameter makes it possible to write-prohibit parameters, change the parameter set or displayed range, or initialize all parameters to default values.

Set Values

Value	Description
0	Only n01 can be displayed and set. The n02 through n79 parameters can be displayed only.
1	The n01 through n79 parameters can be displayed and set.
6	Only the error log memory is cleared.
8	Enables the initialization of all parameters in 2-wire sequence so that the parameters will return to default values.
9	Enables the initialization of all parameters in 3-wire sequence.

■ Setting the Rated Motor Current (n32)

Set the rated motor current (n32) in order to prevent the motor from burning due to overloading.

Check the rated current on the motor nameplate and set the parameter.

This parameter is used for the electronic thermal function for motor overload detection (OL1). By setting the correct parameter, the overloaded motor will be protected from burning.

n32	**Rated Motor Current**			**Changes during operation**	No
Setting range	0.0% to 120% (A) of rated output current of Inverter	**Unit of setting**	0.1 A	**Default setting**	(see note 1)

Note 1. The standard rated current of the maximum applicable motor is the default rated motor current.

Note 2. Motor overload detection (OL1) is disabled by setting the parameter to 0.0.

5-2 V/f Control

■ Setting the V/f Patterns (n09 to n15)

- Set the V/f pattern so that the motor output torque is adjusted to the required load torque.
- The 3G3JV incorporates an automatic torque boost function. Therefore, a maximum of 150% torque can be output at 3 Hz without changing the default settings. Check the system in trial operation and leave the default settings as they are if no torque characteristic changes are required.

n09	**Maximum Frequency (FMAX)**			**Changes during operation**	No
Setting range	50.0 to 400 (Hz)	**Unit of setting**	0.1 Hz (see note)	**Default setting**	60.0

n10	**Maximum Voltage (VMAX)**			**Changes during operation**	No
Setting range	1 to 255 (V)	**Unit of setting**	1 V	**Default settings**	200

n11	**Maximum Voltage Frequency (FA)**			**Changes during operation**	No
Setting range	0.2 to 400 (Hz)	**Unit of setting**	0.1 Hz (see note)	**Default setting**	60.0

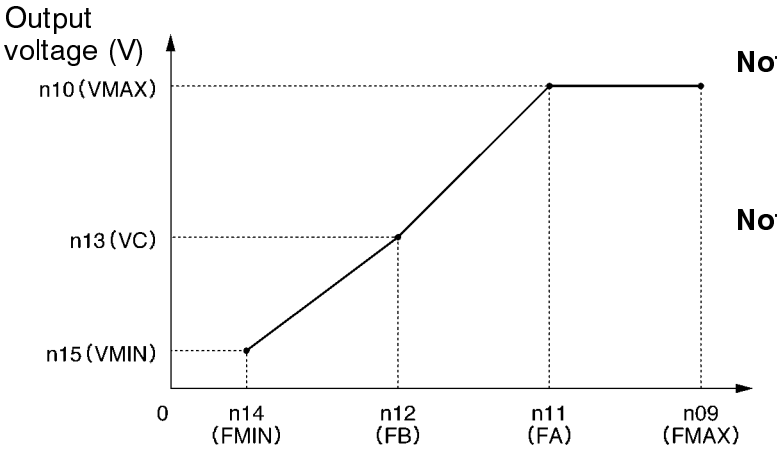
n12	**Middle Output Frequency (FB)**			**Changes during operation**	No
Setting range	0.1 to 399 (Hz)	**Unit of setting**	0.1 Hz (see note)	**Default setting**	1.5

n13	**Middle Output Frequency Voltage (VC)**			**Changes during operation**	No
Setting range	1 to 255 (V)	**Unit of setting**	1 V	**Default setting**	12

n14	**Minimum Output Frequency (FMIN)**			**Changes during operation**	No
Setting range	0.1 to 10.0 (Hz)	**Unit of setting**	0.1 Hz	**Default setting**	1.5

n15	**Minimum Output Frequency Voltage (VMIN)**			**Changes during operation**	No
Setting range	1 to 50 (V)	**Unit of setting**	1 V	**Default setting**	12

Note Values will be set in 0.1-Hz increments if the frequency is less than 100 Hz and 1-Hz increments if the frequency is 100 Hz or greater.



Note 1. Set the parameters so that the following condition will be satisfied.
$n14 \leqq n12 < n11 \leqq n09$

Note 2. The value set in n13 will be ignored if parameters n14 and n12 are the same in value.

- The vertical-axis load or the load with high viscous friction may require high torque at low speed. If the torque is insufficient at low speed, increase the voltage in the low-speed range by 1 V, provided that no overload (OL1 or OL2) is detected. If an overload is detected, decrease the set values or consider the use of an Inverter model with a higher capacity.
- The required torque of fan or pump control increases in proportion to the square of the speed. By setting a quadratic V/f pattern to increase the voltage in the low-speed range, the power consumption of the system will increase.

5-3 Setting the Local/Remote Mode

The 3G3JV operates in local or remote mode. The following description provides information on these modes and how to select them.

■ Basic Concept

Operation mode	Basic concept	Description
Local	The Inverter in a system operates independently in this mode so that the Inverter can be checked independently.	Operation Command Starts with the RUN Key of the Digital Operator and stops with the STOP/RESET Key. Frequency Reference Set with the Digital Operator or the FREQ adjuster. Set with frequency reference selection in local mode in n07.
Remote	The Inverter in a system operates according to the control signal of the host controller.	Operation Command Selectable from two types and set in n02. Frequency Reference Selectable from five types and set in n03.

■ Local/Remote Selection Methods

- The following two selection methods are available to set the Inverter to local or remote mode.
  - Select the mode with the LO/RE Key of the Digital Operator.
  - Set any one of multi-function inputs 1 through 4 (n36 through n39) to 17 to set the Inverter to local mode with control input turned ON.

Note If the above setting is made, mode selection with multi-function input will be possible, but not with the Digital Operator.

5-4 Selecting the Operation Command

The following description provides information on how to input operation commands to start or stop the Inverter or change the direction of rotation of the Inverter.
Two types of command input methods are available. Select either one of them according to the application.

■ Selecting the Operation Mode (n02)

- Select the method of operation mode input to start or stop the Inverter.
- The following method is enabled in remote mode only. The command can be input through key sequences on the Digital Operator.

n02	**Operation Command Selection**			**Changes during operation**	No
Setting range	0, 1	**Unit of setting**	1	**Default setting**	0

Set Values

Value	Description
0	The RUN and STOP/RESET Keys of the Digital Operator are enabled.
1	Multi-function input in 2- or 3-wire sequence through the control circuit terminals is enabled.

■ Selecting the STOP/RESET Key Function (n06)

- When parameter n02 is set to 1, set whether or not to use the STOP/RESET Key of the Digital Operator to stop the Inverter in remote mode. The STOP/RESET Key is always enabled in local mode regardless of the setting in n02.

n06	**STOP Key Function Selection**			**Changes during operation**	No
Setting range	0, 1	**Unit of setting**	1	**Default setting**	0

Set Values

Value	Description
0	The STOP/RESET Key of the Digital Operator is enabled.
1	The STOP/RESET Key of the Digital Operator is disabled. This setting is available only when the Digital Operator is selected for operation command input.

5-5 Setting the Frequency Reference

5-5-1 Selecting the Frequency Reference

The following description provides information on how to set the frequency reference in the Inverter. Select the method according to the operation mode.
Remote mode: Select and set one out of five frequency references in n03.
Local mode: Select and set one out of two frequency references in n07.

■ Selecting the Frequency Reference (n03) in Remote Mode

- Select the input method of frequency references in remote mode.
- Five frequency references are available in remote mode. Select one of them according to the application.

n03	**Frequency Reference Selection**			**Changes during operation**	No
Setting range	0 to 4	**Unit of setting**	1	**Default setting**	0

Set Values

Value	Description
0	The FREQ adjuster of the Digital Operator is enabled. (see note 1)
1	Frequency reference 1 (n21) is enabled.
2	The frequency reference control terminal (for 0- to 10-V input) is enabled. (see note 2)
3	The frequency reference control terminal (for 4- to 20-mA current input) is enabled. (see note 3)
4	The frequency reference control terminal (for 0- to 20-mA current input) is enabled. (see note 3)

Note 1. The maximum frequency (FMAX) is set when the FREQ adjuster is set to MAX.

Note 2. The maximum frequency (FMAX) is set with 10 V input.

Note 3. The maximum frequency (FMAX) is set with 20 mA input, provided that SW8 on the control PCB is switched from V to I.

- The frequency reference set in n03 works as frequency reference 1 when the Inverter is in multi-step speed operation. The set values in n22 through n28 for frequency references 2 through 8 are enabled.

■ Selecting the Frequency Reference (n07) in Local Mode

- Select the input method of frequency references in local mode.
- Two frequency references are available in local mode. Select one of them according to the application.

n07	**Frequency Reference Selection in Local Mode**			**Changes during operation**	No
Setting range	0, 1	**Unit of setting**	1	**Default setting**	0

Set Values

Value	Description
0	The FREQ adjuster of the Digital Operator is enabled. (see note 1)
1	Key sequences on the Digital Operator are enabled. (see note 2)

Note 1. The maximum frequency (FMAX) is set when the FREQ adjuster is set to MAX.

Note 2. The frequency reference can be set with key sequences while the FREF indicator is lit or with the set value in n21 for frequency reference 1. In either case, the value is set in n21.

5-5-2 Upper and Lower Frequency Reference Limits

Regardless of the methods of operation mode and frequency reference input, the upper and lower frequency reference limits can be set.

■ Setting the Upper and Lower Frequency Reference Limits (n30 and n31)

- Set the upper and lower frequency reference limits as percentage based on the maximum frequency as 100%.

n30	**Upper Frequency Reference Limit**			**Changes during operation**	No
Setting range	0% to 110% (Max. frequency = 100%)	**Unit of setting**	1%	**Default setting**	100

n31	**Lower Frequency Reference Limit**			**Changes during operation**	No
Setting range	0% to 110% (Max. frequency = 100%)	**Unit of setting**	1%	**Default setting**	0

Note If n31 is set to a value less than the minimum output frequency (FMIN), the Inverter will have no output when a frequency reference less than the minimum output frequency input is ON.

5-5-3 Adjusting the Analog Input

Input characteristic adjustments may be necessary for analog frequency references to be input. At that time, use the following parameters for gain, bias, and filter time parameter adjustments.

■ FR Terminal Adjustments for Frequency Reference Input

● Gain and Bias Settings (n41 and n42)

- Set the input characteristics of analog frequency references in n41 (for the frequency reference gain) and n42 (for the frequency reference bias).
- Set the frequency of maximum analog input (10 V or 20 mA) in n41 as percentage based on the maximum frequency as 100%.
- Set the frequency of minimum analog input (0 V, 0 mA, or 4 mA) in n42 as percentage based on the maximum frequency as 100%.

n41	**Frequency Reference Gain**			**Changes during operation**	Yes
Setting range	0% to 255% (Max. frequency = 100%)	**Unit of setting**	1%	**Default setting**	100

n42	**Frequency Reference Bias**			**Changes during operation**	Yes
Setting range	-99% to 99% (Max. frequency = 100%)	**Unit of setting**	1%	**Default setting**	0

● Filter Time Constant Settings (n43)

- The digital filter with a first-order lag can be set for analog frequency references to be input.
- This setting is ideal if the analog input signal changes rapidly or the signal is subject to noise interference.
- The larger the set value is, the slower the response speed will be.

n43	**Analog Frequency Reference Filter Time**			**Changes during operation**	No
Setting range	0.00 to 2.00 (s)	**Unit of setting**	0.01 s	**Default setting**	0.10

5-5-4 Setting Frequency References through Key Sequences

The following description provides information on parameters related to frequency reference settings through key sequences on the Digital Operator

■ Setting Frequency References 1 through 8 and the Inching Frequency Command (n21 through n28 and n29)

A total of nine frequency references (frequency references 1 through 8) and an inching frequency command can be set together in the Inverter.

● Setting Frequency References 1 through 8 (n21 through n28)

n21	**Frequency Reference 1**			**Changes during operation**	Yes
Setting range	0.0 to max. frequency	**Unit of setting**	0.01 Hz (see note 1)	**Default setting**	6.0

n22	**Frequency Reference 2**			**Changes during operation**	Yes
Setting range	0.0 to max. frequency	**Unit of setting**	0.01 Hz (see note 1)	**Default setting**	0.0

n23	**Frequency Reference 3**			**Changes during operation**	Yes
Setting range	0.0 to max. frequency	**Unit of setting**	0.01 Hz (see note 1)	**Default setting**	0.0

n24	**Frequency Reference 4**			**Changes during operation**	Yes
Setting range	0.0 to max. frequency	**Unit of setting**	0.01 Hz (see note 1)	**Default setting**	0.0

n25	**Frequency Reference 5**			**Changes during operation**	Yes
Setting range	0.0 to max. frequency	**Unit of setting**	0.01 Hz (see note 1)	**Default setting**	0.0

n26	**Frequency Reference 6**			**Changes during operation**	Yes
Setting range	0.0 to max. frequency	**Unit of setting**	0.01 Hz (see note 1)	**Default setting**	0.0

n27	**Frequency Reference 7**			**Changes during operation**	Yes
Setting range	0.0 to max. frequency	**Unit of setting**	0.01 Hz (see note 1)	**Default setting**	0.0

n28	**Frequency Reference 8**			**Changes during operation**	Yes
Setting range	0.0 to max. frequency	**Unit of setting**	0.01 Hz (see note 1)	**Default setting**	0.0

Note 1. Values will be set in 0.1-Hz increments if the frequency is less than 100 Hz and 1-Hz increments if the frequency is 100 Hz or over.

Note 2. Frequency reference 1 is enabled with n03 for frequency reference selection set to 1.

Note 3. Frequency references 2 through 8 are enabled by setting multi-step speed references 1, 2, and 3 in n36 through n39 for multi-function input. Refer to the following table for the relationship between multi-step speed references 1 through 3 and frequency references 1 through 8.

Frequency reference	Multi-step speed reference 1 (Set value: 6)	Multi-step speed reference 2 (Set value: 7)	Multi-step speed reference 3 (Set value: 8)
Frequency reference 1	OFF	OFF	OFF
Frequency reference 2	ON	OFF	OFF
Frequency reference 3	OFF	ON	OFF
Frequency reference 4	ON	ON	OFF
Frequency reference 5	OFF	OFF	ON
Frequency reference 6	ON	OFF	ON
Frequency reference 7	OFF	ON	ON
Frequency reference 8	ON	ON	ON

No multi-step speed reference 3 settings will be required if only frequency references 1 through 4 are used, for example. Any multi-step speed reference not set is regarded as turned-OFF input.

• Setting the Inching Frequency Command (n29)

- The inching frequency command must be set as multi-function input in order to use the inching frequency command.

n29	**Inching Frequency Command**			**Changes during operation**	Yes
Setting range	0.0 to max. frequency	**Unit of setting**	0.01 Hz (see note 1)	**Default setting**	6.0

Note 1. The value will be set in 0.1-Hz increments if the frequency is less than 100 Hz and 1-Hz increments if the frequency is 100 Hz or over.

Note 2. In order to use the inching frequency command, one of the n36 through n39 parameters for multi-function input must be set to 10 as an inching frequency command. Parameter n29 is selectable by turning on the multi-function input set with the inching frequency command. The inching frequency command takes precedence over the multi-step speed reference (i.e., when the inching frequency command is ON, all multi-step speed reference input will be ignored).

■ Setting the Frequency Reference with the FREF Indicator Lit

- The frequency reference can be set while the FREF indicator of the Digital Operator is lit in the following cases.
  - Parameter n03 for frequency reference selection is set to 1, which enables frequency reference 1, and the Inverter is in remote mode.
  - Parameter n07 for frequency selection in local mode is set to 1, which enables key sequences on the Digital Operator, and the Inverter is in local mode.
  - Frequency references 2 through 8 are set with multi-step speed reference input.
- The frequency reference can be changed, even during operation.
- When the frequency reference is changed while the FREF indicator is lit, the corresponding parameter is changed simultaneously. For example, if frequency reference 2 has been selected with multi-function input (a multi-step speed reference), the set value in n22 (for frequency reference 2) will be changed simultaneously when the frequency reference is changed while the FREF indicator is lit.
- Take the following default steps, for example, to change the frequency reference with the FREF indicator lit.

Key sequence	Indicator	Display example	Explanation
	FREF	6.0	Power On **Note** If the FREF indicator has not been lit, press the Mode Key repeatedly until the FREF indicator is lit.
▲ ▼	FREF	60.0	Use the Increment or Decrement Key to set the frequency reference. The data display will flash while the frequency reference is set.
↵	FREF	60.0	Press the Enter Key so that the set value will be entered and the data display will be lit.

● Setting the Key Sequential Frequency (n08)

• The Enter Key need not be pressed when changing the setting in n08. In that case, the frequency reference will change when the set value is changed with the Increment or Decrement Key while the data display is continuously lit.

n08	**Key Sequential Frequency Setting**			**Changes during operation**	No
Setting range	0, 1	**Unit of setting**	1	**Default setting**	0

Set Values

Value	Description
0	Enter Key enabled (The set value is entered with the Enter Key pressed.)
1	Enter Key disabled (The set value set is entered immediately.)

5-6 Setting the Acceleration/Deceleration Time

The following description provides information on parameters related to acceleration and deceleration time settings.
Trapezoidal and S-shape acceleration and deceleration are available. Using the S-shape characteristic function for acceleration and deceleration can reduce shock to the machinery when stopping or starting.

■ Setting the Acceleration/Deceleration Time (n16 through n19)

- Two acceleration times and two deceleration times can be set.
- The acceleration time is the time required to go from 0% to 100% of the maximum frequency and the deceleration time is the time required to go from 100% to 0% of the maximum frequency. The actual acceleration or deceleration time is obtained from the following formula.

Acceleration/Deceleration time = (Acceleration/Deceleration time set value) × (Frequency reference value) ÷ (Max. frequency)

Acceleration time 2 and deceleration time 2 are enabled by setting 11 for acceleration/deceleration time selection in any of the n36 through n39 parameters for multi-function input.

Deceleration time 2 is also enabled by emergency-stop settings 19, 20, 21, and 22 in any of the n36, n37, n38, and n39 parameters for multi-function input with n04 for interruption mode selection set to 0 (i.e., deceleration stop).

n16	**Acceleration time 1**			**Changes during operation**	Yes
Setting range	0.0 to 999 (s)	**Unit of setting**	0.1 s (see note)	**Default setting**	10.0

n17	**Deceleration Time 1**			**Changes during operation**	Yes
Setting range	0.0 to 999 (s)	**Unit of setting**	0.1 s (see note)	**Default setting**	10.0

n18	**Acceleration Time 2**			**Changes during operation**	Yes
Setting range	0.0 to 999 (s)	**Unit of setting**	0.1 s (see note)	**Default setting**	10.0

n19	**Deceleration Time 2**			**Changes during operation**	Yes
Unit of setting	0.0 to 999 (s)	**Unit of setting**	0.1 s (see note)	**Default setting**	10.0

Note Values will be set in 0.1-Hz increments if the frequency is less than 100 Hz and 1-Hz increments if the frequency is 100 Hz or over.

■ S-shape Acceleration/Deceleration Characteristic (n20)

- Trapezoidal and S-shape acceleration and deceleration are available. Using the S-shape characteristic function for acceleration and deceleration can reduce shock to the machinery when stopping or starting.
- Any one of three S-shape acceleration/deceleration times (0.2, 0.5, and 1.0 s) is selectable.

n20	**S-shape Acceleration/Deceleration Characteristic**			**Changes during operation**	No
Setting range	0 to 3	**Unit of setting**	1	**Default setting**	0

Set Values

Value	Description
0	No S-shape acceleration/deceleration characteristic (Trapezoidal acceleration/deceleration)
1	S-shape acceleration/deceleration characteristic time is 0.2 s
2	S-shape acceleration/deceleration characteristic time is 0.5 s
3	S-shape acceleration/deceleration characteristic time is 1.0 s

Note When the S-shape acceleration/deceleration characteristic time is set, the acceleration and deceleration times will be lengthened according to the S-shape at the beginning and end of acceleration/deceleration.

5-7 Selecting the Reverse Rotation-prohibit

This parameter is used to specify whether to enable or disable the reverse rotation command sent to the Inverter from the control circuit terminals or Digital Operator.
The parameter should be set to “not accept” when the Inverter is applied to systems that prohibit the reverse rotation of the Inverter.

■ Selecting the Reverse Rotation-prohibit (n05)

n05	**Reverse Rotation-prohibit Selection**			**Changes during operation**	No
Setting range	0, 1	**Unit of setting**	1	**Default setting**	0

Set Values

Value	Description
0	Accept
1	Not accept

5-8 Selecting the Interruption Mode

This parameter is used to specify the interruption mode when the STOP command is input.
The Inverter either decelerates or coasts to a stop according to the interruption mode selection.

■ Selecting the Interruption Mode (n04)

n04	**Interruption Mode Selection**			**Changes during operation**	No
Setting range	0, 1	**Unit of setting**	1	**Default setting**	0

Set Values

Value	Description
0	Frequency deceleration stop (see note)
1	Free running

Note The Inverter will decelerate to stop according to the setting in n17 for deceleration time 1 if any of the n36 through n39 parameters for multi-function input is not set to 11 for acceleration/deceleration time selection. If any one of the n36 through n39 multi-function input parameters is set to acceleration/deceleration time selection, the Inverter will decelerate to stop according to the selected setting of deceleration time when the STOP command is input.

5-9 Multi-function I/O

5-9-1 Multi-function Input

The 3G3JV incorporates four multi-function input terminals (S2 through S5). Inputs into these terminals have a variety of functions according to the application.

■ Multi-function Input (n36 through n39)

n36	**Multi-function Input 1 (S2)**			**Changes during operation**	No
Setting range	2 to 8, 10 to 22 (see note)	**Unit of setting**	1	**Default setting**	2

n37	**Multi-function Input 2 (S3)**			**Changes during operation**	No
Setting range	0, 2 to 8, 10 to 22 (see note)	**Unit of setting**	1	**Default setting**	5

n38	**Multi-function Input 3 (S4)**			**Changes during operation**	No
Setting range	2 to 8, 10 to 22 (see note)	**Unit of setting**	1	**Default setting**	3

n39	**Multi-function Input 4 (S5)**			**Changes during operation**	No
Setting range	2 to 8, 10 to 22, 34 (see note)	**Unit of setting**	1	**Default setting**	6

Note Do not set values outside the above setting ranges.

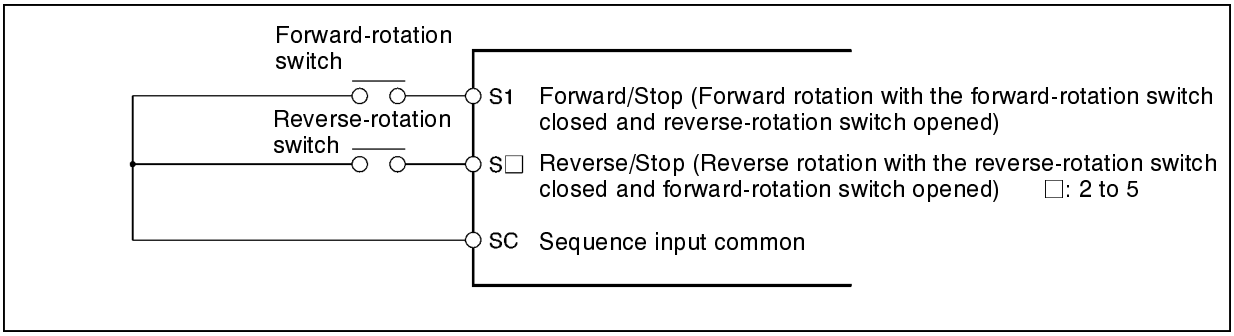
Set Values

Value	Function	Description
0	Forward/Reverse rotation command	3-wire sequence (to be set in n37 only) By setting n37 to 0, the set value in n36 is ignored and the following setting are forcibly made. S1: RUN input (RUN when ON) S2: STOP input (STOP when OFF) S3: Forward/Reverse rotation command (OFF: Forward; ON: Reverse)
2	Reverse/Stop	Reverse rotation command (2-wire sequence)
3	External fault (NO)	ON: External fault (FP□ detection: □ is a terminal number)
4	External fault (NC)	OFF: External fault (EF□ detection: □ is a terminal number)
5	Fault reset	ON: Fault reset (disabled while RUN command is input)
6	Multi-step speed reference 1	Signals to select frequency references 2 through 8. **Note** Refer to *5-5-4 Setting the Frequency References through Key Sequences* for the relationship between multi-step speed references and frequency references. **Note** Any multi-step speed reference not set is regarded as turned-OFF input.
7	Multi-step speed reference 2	
8	Multi-step speed reference 3	
10	Inching frequency command	ON: Inching frequency command (taking precedence over the multi-step speed reference)
11	Acceleration/Deceleration time selection	ON: Acceleration time 2 and deceleration time 2 are selected.
12	External base block command (NO)	ON: Output shut off (while motor coasting to a stop and “bb” flashing)
13	External base block command (NC)	OFF: Output shut off (with motor free running and “bb” flashing)
14	Search command (Searching starts from maximum frequency)	ON: Speed search (Searching starts from n09)
15	Search command (Searching starts from preset frequency)	ON: Speed search
16	Acceleration/Deceleration-prohibit command	ON: Acceleration/Deceleration is on hold (running at parameter frequency)

Value	Function	Description
17	Local or remote selection	ON: Local mode (operated with the Digital Operator) **Note** After this setting is made, mode selection with the Digital Operator is not possible.
19	Emergency stop fault (NO)	The Inverter stops according to the setting in n04 for interruption mode selection with the emergency stop input turned ON. n04 set to 0: Decelerates to stop at deceleration time 2 set in n19. n04 set to 1: Coasts to a stop. **Note** NO: Emergency stop with the contact closed. NC: Emergency stop with the contact opened. **Note** Fault: Fault output is ON and reset with RESET input. Alarm output is ON (no reset required). **Note** "STP" is displayed (lit with fault input ON and flashes with alarm input ON)
20	Emergency stop alarm (NO)	
21	Emergency stop fault (NC)	
22	Emergency stop alarm (NC)	
34	Up or down command	Up or down command (set in n39 only) By setting n39 to 34, the set value in n38 is ignored and the following settings are forcibly made. S4: Up command S5: Down command **Note** It is impossible to set the up or down command and multi-step speed references 1 through 3 together. **Note** For up and down command functions in detail, refer to *6-7-7 UP/DOWN Command Frequency Memory (n62)*.

■ Operation in 2-wire Sequence (Set Value: 2)

- The Inverter operates in 2-wire sequence by setting a multi-function input parameter to 2 (reverse/stop).
- The following diagram shows a wiring example of the terminals in 2-wire sequence.



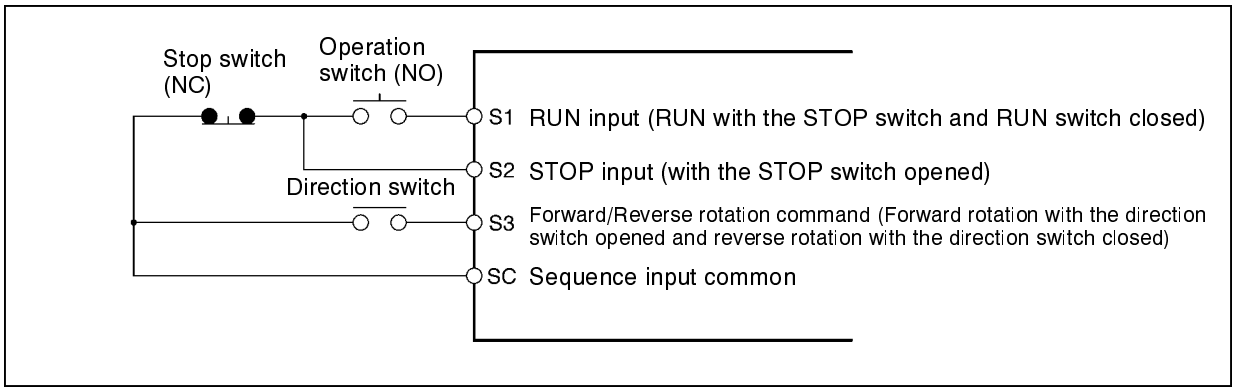
■ Operation in 3-wire Sequence (n37 = 0)

- The Inverter operates in 3-wire sequence by setting n37 for multi-function input 2 to 0.
- Only n37 can be set to 0 (3-wire sequence). By making this setting, the set value in n36 is ignored and the following settings are forcibly made.

  S1: RUN input (RUN when ON)

  S2: STOP input (STOP when OFF)

  S3: Forward/Reverse rotation command (OFF: Forward; ON: Reverse)
- The following diagram shows a wiring example of the terminals in 3-wire sequence.



5-9-2 Multi-function Output

The 3G3JV incorporates two multi-function output terminals (MA and MB). Output from these terminals has a variety of functions according to the application.

■ Selecting the Multi-function Output (n40)

n40	**Multi-function Output (MA/MB and MC)**			**Changes during operation**	No
Setting range	0 to 7, 10 to 17 (see note)	**Unit of setting**	1	**Default setting**	1

Note Do not set values outside the above setting ranges.

Set Values

Value	Function	Description
0	Fault output	ON: Fault output (with protective function working)
1	Operation in progress	ON: Operation in progress (with RUN command input or inverter output)
2	Frequency detection	ON: Frequency detection (with frequency reference coinciding with output frequency)
3	Idling	ON: Idling (at less than min. output frequency)
4	Frequency detection 1	ON: Output frequency ≧ frequency detection level (n58)
5	Frequency detection 2	ON: Output frequency ≦ frequency detection level (n58)
6	Overtorque being monitored (NO-contact output)	Output if any of the following parameter conditions is satisfied. • Overtorque detection function selection (n59) • Overtorque detection level (n60) • Overtorque detection time (n61) **Note** NO contact: ON with overtorque being detected; NC contact: OFF with overtorque being detected
7	Overtorque being monitored (NC-contact output)	
10	Alarm output	ON: Alarm being detected (Nonfatal error being detected)
11	Base block in progress	ON: Base block in progress (in operation with output shutoff)
12	RUN mode	ON: Local mode (with the Digital Operator)
13	Inverter ready	ON: Inverter ready to operate (with no fault detected)
14	Fault retry	ON: Fault retry (Inverter resetting with fault retry (n48) not set to 0)
15	UV in progress	ON: Undervoltage being monitored (main circuit undervoltage UV1 detected)
16	Rotating in reverse direction	ON: Rotating in reverse direction
17	Speed search in progress	ON: Speed search in progress

5-10 Analog Monitor Output

The 3G3JV incorporates analog monitor output terminals AM and AC. These terminals have analog monitor values of output frequency or current.

■ Setting the Analog Monitor Output (n44 and n45)

- The output frequency or current as a monitored item is set in n44.
- The analog output characteristics are set as an analog monitor output gain in n45.

n44	**Analog Monitor Output**			**Changes during operation**	No
Setting range	0, 1	**Unit of setting**	1	**Default setting**	0

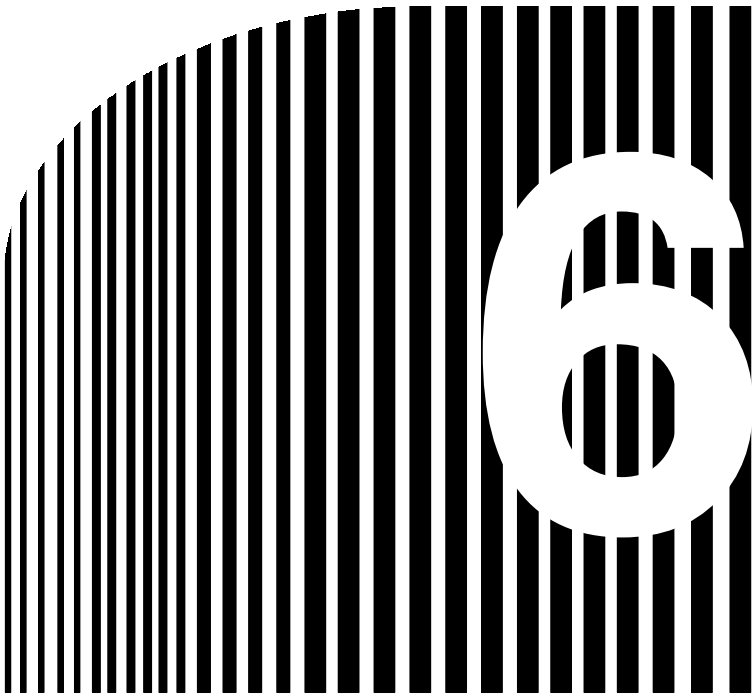
Set Values

Value	Description
0	Output frequency (Reference: 10 V at max. frequency)
1	Output current (Reference: 10 V with rated output current)

n45	**Analog Monitor Output Gain**			**Changes during operation**	Yes
Set range	0.00 to 2.00	**Unit of setting**	0.01	**Default setting**	1.00

Note 1. Set the multiplication ratio based on the set value in n44.
For example, if an output of 5 V is desired at maximum frequency (with n44 set to 0), set n45 to 0.50.

Note 2. The maximum output voltage of the analog monitor output terminals are 10 V.



Chapter 6

· Advanced Operation ·

This chapter provides information on the use of advanced functions of the Inverter for operation.
Refer to this chapter to use the various advanced functions, such as stall prevention, carrier frequency setting, overtorque detection, torque compensation, and slip compensation.

6-1 Setting the Carrier Frequency

The carrier frequency of the 3G3JV can be fixed or varied in proportion to the output frequency.

n46	**Carrier Frequency Selection**			**Changes during operation**	No
Setting range	1 to 4, 7 to 9	**Unit of setting**	1	**Default setting**	(see note)

Note The default setting varies with the capacity of the Inverter model.

Set Values

Value	Description
1	2.5 kHz
2	5.0 kHz
3	7.5 kHz
4	10.0 kHz
7	2.5 kHz (12×): 12 times as high as output frequency (between 1.0 and 2.5 kHz)
8	2.5 kHz (24×): 24 times as high as output frequency (between 1.0 and 2.5 kHz)
9	2.5 kHz (36×): 36 times as high as output frequency (between 1.0 and 2.5 kHz)

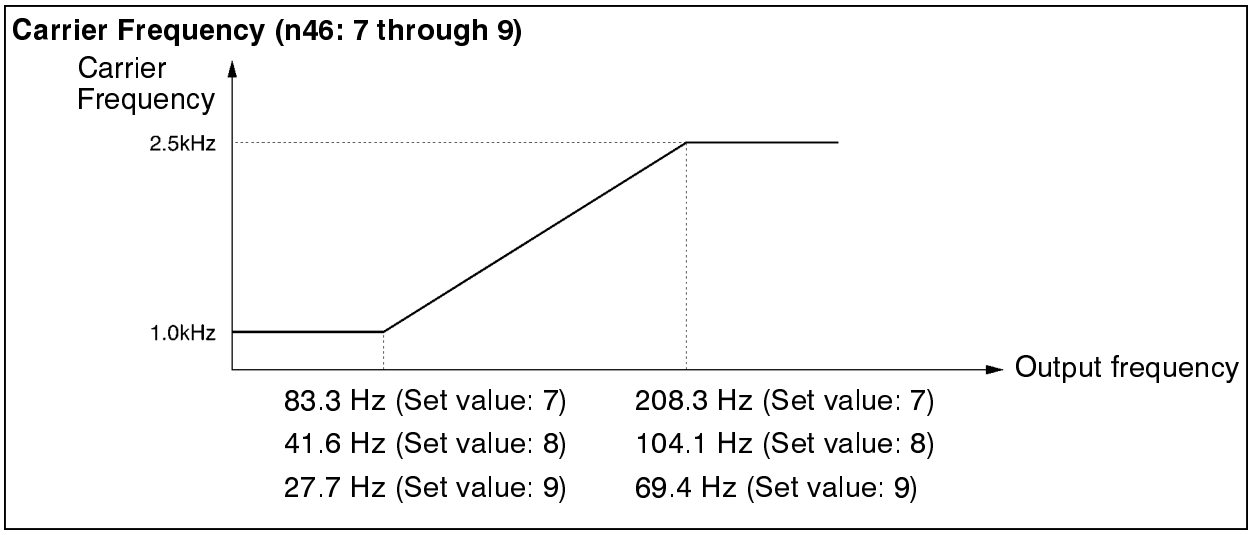
- The default setting does not need any changes in normal operation.
- Change the default setting in the following cases.

The wiring distance between the Inverter and motor is long:
Set the Inverter to a lower carrier frequency.

Reference carrier frequency: 10 kHz at a maximum wiring distance of 100 m and 5 kHz at a wiring distance exceeding 100 m.

Excessive speed or torque dispersion at low speed:
Set the carrier frequency to a lower value.

Note The carrier frequency changes as shown in the following graph with 7 through 9 set in n46.



- The Inverter cannot maintain rated output current with the carrier frequency set to a value higher than the default one.
  The following table shows the default value and a decrease in the output current of each Inverter model.
  Be sure to use the Inverter so that there will be no decrease in rated output current.

Voltage	Model 3G3JV-	Default setting	Rated output current (A)	Set to 3 Reduced rated output current (A)	Set to 4 Reduced rated output current (A)
3-phase 200 V	A2001	4 (10 kHz)	0.8	←	←
	A2002	4 (10 kHz)	1.6	←	←
	A2004	4 (10 kHz)	3.0	←	←
	A2007	4 (10 kHz)	5.0	←	←
	A2015	3 (7.5 kHz)	8.0	←	7.0
	A2022	3 (7.5 kHz)	11.0	←	10.0
Single-phase 200 V	AB001	4 (10 kHz)	0.8	←	←
	AB002	4 (10 kHz)	1.6	←	←
	AB004	4 (10 kHz)	3.0	←	←
	AB007	4 (10 kHz)	5.0	←	←
	AB015	3 (7.5 kHz)	8.0	←	7.0

n75	**Low Carrier Frequency at Low Speed**			**Changes during operation**	No
Setting range	0, 1	**Unit of setting**	1	**Default setting**	0

Set Values

Value	Description
0	Low carrier frequency at low speed disabled.
1	Low carrier frequency at low speed enabled.

- Normally set n75 to 0.
- When the output frequency is 5 Hz or higher and the output current rate is 110% or less, the carrier frequency will be automatically reduced to 2.5 kHz with n75 set to 1. If the load is heavy at low speed, the Inverter will withstand higher overcurrent by suppressing the heat radiation of the Inverter caused by the carrier frequency.
- This function is enabled with 2, 3, or 4 set in n46 for carrier frequency.

6-2 DC Injection Braking Function

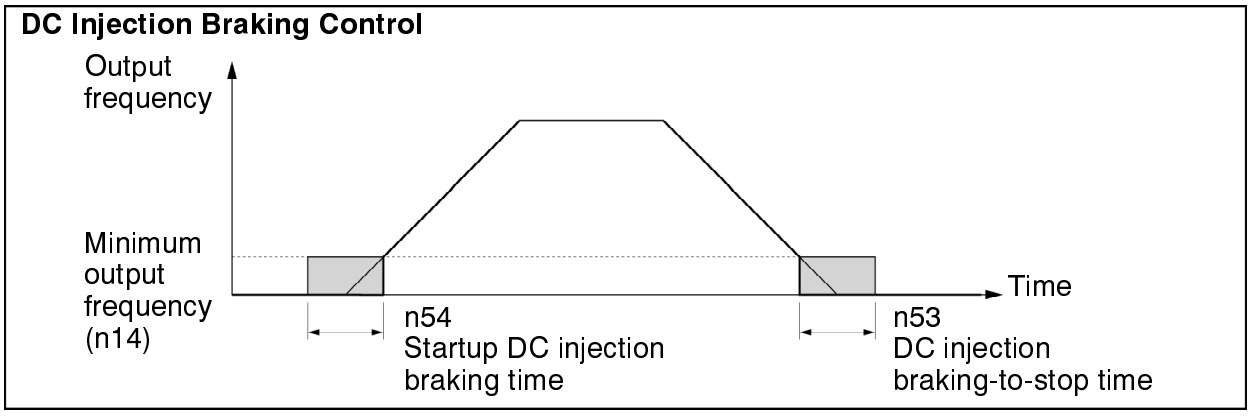
The DC injection braking function applies DC on the induction motor for braking control.
Startup DC Injection Braking:
This braking is used for stopping and starting the motor rotating by inertia with no regenerative processing.
DC Injection Braking to Stop:
Adjust the stop DC injection braking time if the motor rotating does not decelerate to a stop in normal operation due to inertia from a heavy load. By increasing the DC injection braking time or DC injection braking current, the time required for stopping the motor is reduced.

n52	**DC Injection Braking Current**			**Changes during operation**	No
Setting range	0 to 100 (%)	**Unit of setting**	1%	**Default setting**	50

n53	**DC Injection Braking-to-stop Time**			**Changes during operation**	No
Setting range	0.0 to 25.5 (s)	**Unit of setting**	0.1 s	**Default setting**	0.5

n54	**Startup DC Injection Braking Time**			**Changes during operation**	No
Setting range	0.0 to 25.5 (s)	**Unit of setting**	0.1 s	**Default setting**	0.0

- Set the DC injection braking current as percentage based on the rated current of the Inverter as 100%.
- After the startup DC injection braking time is set, the Inverter starts up at minimum frequency on completion of the startup DC injection braking control of the Inverter.
- After the speed is reduced, the Inverter is switched to DC injection braking at minimum output frequency.



6-3 Stall Prevention Function

A stall will occur if the motor cannot keep up with the rotating magnetic field on the motor stator side when a large load is applied to the motor or a sudden acceleration/deceleration is performed.
In the 3G3JV, stall prevention functions can be set independently for accelerating, running, and decelerating conditions.

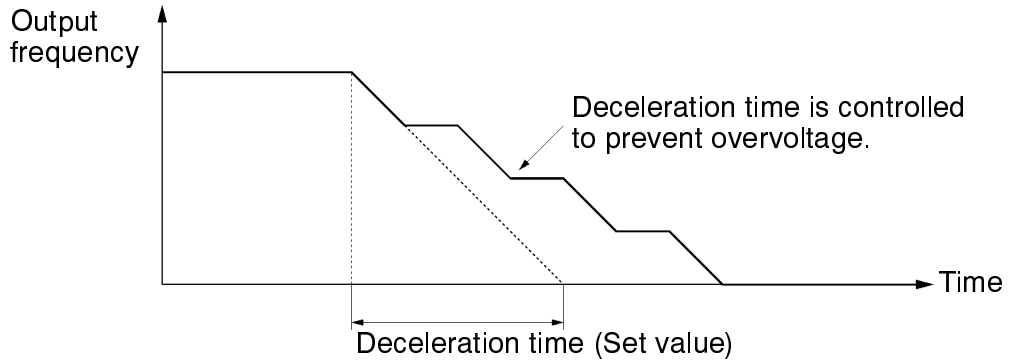
n55	**Stall Prevention Level during Deceleration**			**Changes during operation**	No
Setting range	0, 1	**Unit of setting**	1	**Default setting**	0

Set Values

Value	Description
0	Stall prevention during deceleration
1	No stall prevention during deceleration

- If 1 is set, the motor will be decelerated according to the set deceleration time. If the deceleration time is too short, the main circuit may result in overvoltage.
- If 0 is set, the deceleration time will be automatically lengthened to prevent overvoltage.

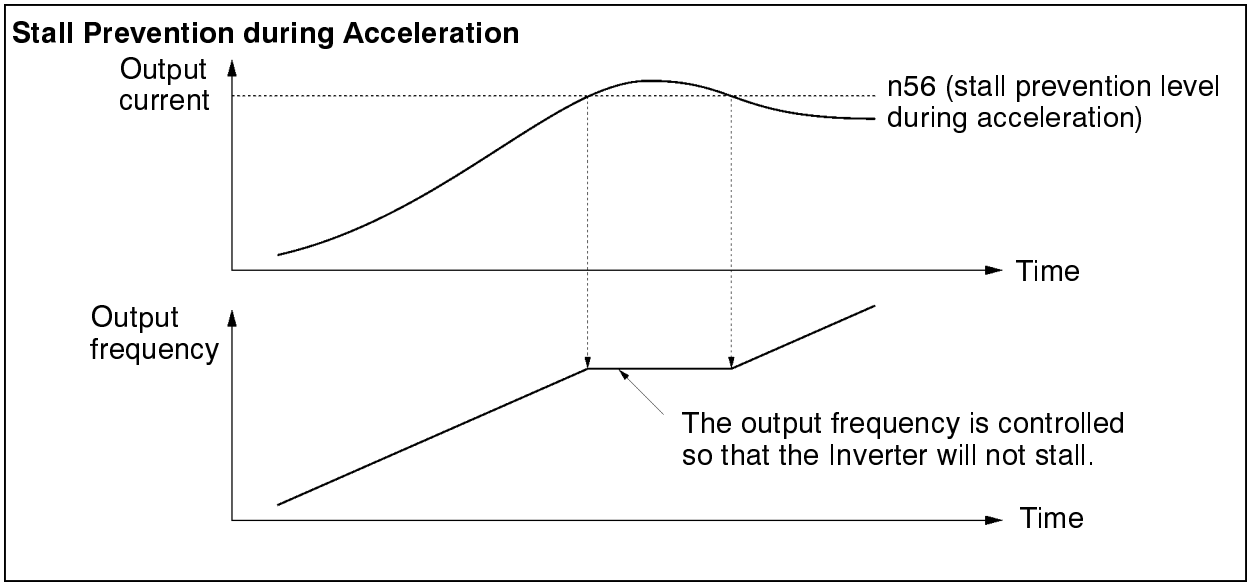
Stall Prevention during Deceleration with n55 Set to 0



n56	**Stall Prevention Level during Acceleration**			**Changes during operation**	No
Setting range	30 to 200 (%)	**Unit of setting**	1%	**Set Values**	170

Set Values

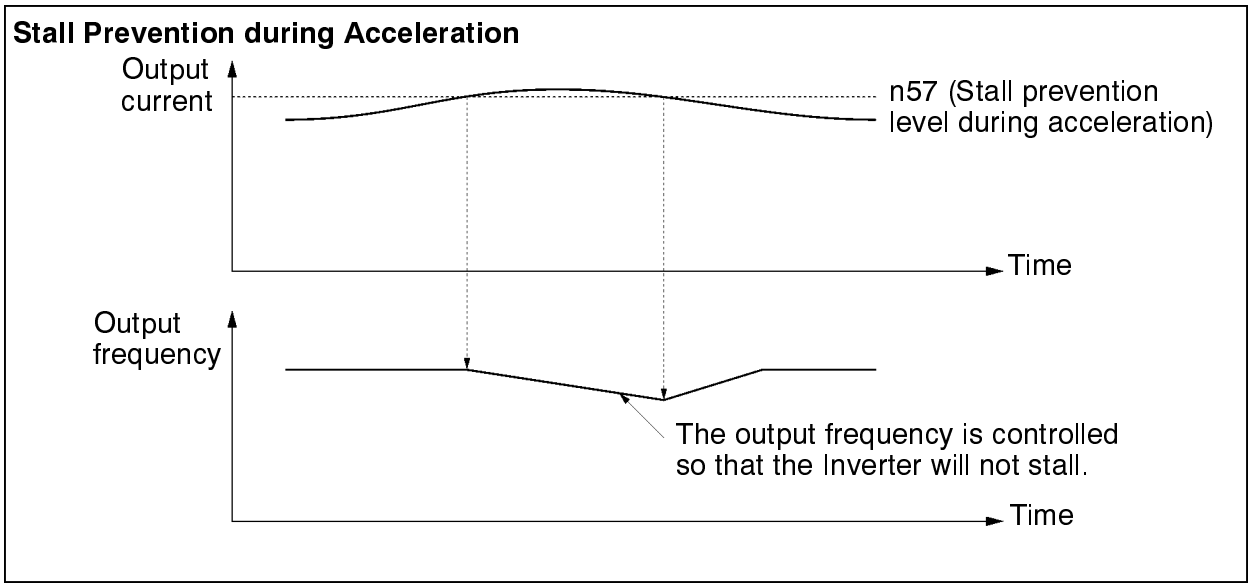
- This function is used to stop accelerating the load if the output current exceeds the set current value so that the Inverter will continue operating without stalling. The Inverter accelerates the load while the output current is the same as or less than the set value.
- Set the parameter as percentage based on the rated Inverter current as 100%.
- The default setting does not need any changes in normal operation.
- Decrease the set value if the capacity of the motor is smaller than that of the Inverter or the motor stalls with the default value.
  The set value is normally 2 or 3 times higher than the rated current of the motor. Set this current as percentage based on the rated inverter current as 100%.



n57	**Stall Prevention during Operation**			**Changes during operation**	No
Setting range	30 to 200 (%)	**Unit of setting**	1%	**Default setting**	160

Set Values

- This function will decrease the output frequency if the output current exceeds the set current value by a minimum of approximately 100 ms so that the Inverter will continue operating without stalling. The Inverter will increase the output frequency to return to the set frequency reference level when the output current is less than the set value.
- The Inverter accelerates or decelerates the output frequency according to the preset acceleration or deceleration time. (Acceleration time 1: n16, n17 or acceleration time 2: n18, n19)
- Set the parameter as percentage based on the rated Inverter current as 100%.
- The default setting does not need any changes in normal operation.
- Decrease the set value if the capacity of the motor is smaller than that of the Inverter or the motor stalls with the default value.
  The set value is normally 2 or 3 times higher than the rated current of the motor. Set this current in percentage based on the rated Inverter current as 100%.



6-4 Overtorque Detection Function

When an excessive load is applied to the equipment, the Inverter detects the overtorque condition through an increase in the output current.

n59	**Overtorque Detection Function Selection**			**Changes during operation**	No
Setting range	0 to 4	**Unit of setting**	1	**Default setting**	0

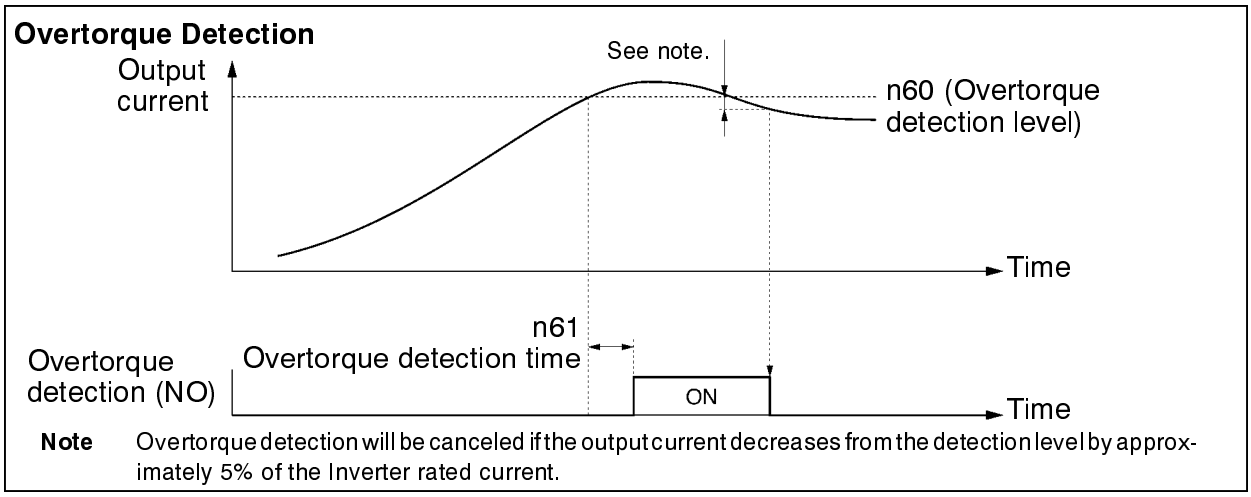
Set Values

Value	Description
0	Inverter does not monitor overtorque.
1	Inverter monitors overtorque only when speed is matched. It continues operation (issues warning) even after overtorque is detected.
2	Inverter monitors overtorque only when speed is matched. It discontinues operation (through protective function) when overtorque is detected.
3	Inverter always monitors overtorque during operation. It continues operation (issues warning) even after overtorque is detected.
4	Inverter always monitors overtorque during operation. It discontinues operation (through protective function) when overtorque is detected.

- Set n60 for overtorque detection level and n61 for overtorque detection time to enable the overtorque detection function. The Inverter will detect overtorque when the current the same as or higher than the detection level is output for the preset detection time.
- Set n40 for multi-function output to either of the following so that external overtorque detection output will be ON.

  Set Value: 6 for overtorque detection (NO)

  Set Value: 7 for overtorque detection (NC)



Note Overtorque detection will be canceled if the output current decreases from the detection level by approximately 5% of the Inverter rated current.

n60	**Overtorque Detection Level**			**Changes during operation**	No
Setting range	30 to 200 (%)	**Unit of setting**	1%	**Default setting**	160

Set Values

- Set the parameter as percentage based on the rated Inverter current as 100%.

n61	**Overtorque Detection Time**			**Changes during operation**	No
Setting range	0.1 to 10.0 (s)	**Unit of setting**	0.1 s	**Default setting**	0.1

Set Values

- Set the overtorque detection time.
- The Inverter will detect overtorque when the current the same as or higher than the detection level is output for the preset detection time.

6-5 Torque Compensation Function

This function increases the output torque of the Inverter by detecting an increase in the motor load.

n63	**Torque Compensation Gain**			**Changes during operation**	Yes
Setting range	0.0 to 2.5	**Unit of setting**	0.1	**Default setting**	1.0

Set Values

- The default setting does not need any changes in normal operation.
- Change the default setting in the following cases.

  The wiring distance between the Inverter and motor is long:
  Set the gain to a larger value.

  The capacity of the motor is lower than the maximum applicable motor capacity of the Inverter:
  Set the gain to a larger value.

  The motor vibrates:
  Set the gain to a smaller value.

- The torque compensation gain must be adjusted so that the output current at low speed will not exceed 50% of the rated output current of the Inverter, otherwise the Inverter may be damaged.

6-6 Slip Compensation Function

The slip compensation function calculates the motor torque according to the output current, and sets gain to compensate for output frequency. This function is used to improve speed accuracy when operating with a load.

n64	**Rated Motor Slip**			**Changes during operation**	Yes
Setting range	0.0 to 20.0 (Hz)	**Unit of setting**	0.1 Hz	**Default setting**	(see note)

Note The default setting varies with the capacity of the Inverter model.

Set Values

- Set the rated slip value of the motor in use.
- This parameter is used as a slip compensation constant.
- Calculate the rated motor slip value from the rated frequency (Hz) and rpm on the motor nameplate by using the following formula.

$$\text{Rated slit value (Hz)} = \text{Rated frequency (Hz)} - \frac{\text{Rated rpm} \times \text{Number of poles}}{120}$$

n65	**Motor Current with No Load**			**Changes during operation**	No
Setting range	0 to 99 (%)	**Unit of setting**	1%	**Default setting**	(see note)

Note The default setting varies with the capacity of the Inverter model.

Set Values

- Set the motor current with no load in percentage based on the rated motor current as 100%.
- Contact the motor manufacturer for the motor current with no load.
- This parameter is used as a slip compensation constant.

n66	**Slip Compensation Gain**			**Changes during operation**	Yes
Setting range	0.0 to 2.5	**Unit of setting**	0.1	**Default setting**	0.0 (see note)

Note This parameter is disabled with the value set to 0.0.

Set Values

- Set the parameter to 1.0 first and check the operation of the Inverter. Then fine-tune the gain with 0.1-gain increments or decrements.

  If the speed is lower than the target value, increase the set value.

  If the speed is higher than the target value, decrease the set value.

n67	**Slip Compensation Parameter**			**Changes during operation**	No
Setting range	0.0 to 25.5 (s)	**Unit of setting**	0.1 s	**Default setting**	2.0

Set Values

- This parameter is used for the response adjustment of the slip compensation function.
- The default setting does not need any changes in normal operation.
- Change the default setting in the following cases.

  The motor vibrates: Set the value to a larger value.

  The motor response is low: Set the value to a smaller value.

6-7 Other Functions

The following description provides information on the other functions and parameter settings of the Inverter.

6-7-1 Motor Protection Characteristics (n33 and n34)

• This parameter setting is for motor overload detection (OL1).

n33	**Motor Protection Characteristic Selection**			**Changes during operation**	No
Setting range	0 to 2	**Unit of setting**	1	**Default setting**	0

Set Values

Value	Description
0	Protection characteristics for general-purpose induction motors
1	Protection characteristics for Inverter-dedicated motors
2	No protection

• This parameter is used to set the electric thermal characteristics of the motor to be connected.

• Set the parameter according to the motor.

• If a single Inverter is connected to more than one motor, set the parameter to 2 for no protection. The parameter is also disabled by setting n32 for rated motor current to 0.0.

n34	**Motor Protection Time**			**Changes during operation**	No
Setting range	1 to 60 (min)	**Unit of setting**	1 min	**Default setting**	8

Set Values

- This parameter is used to set the electronic thermal protection constant of motor overload detection OL1.
- The default setting does not need any changes in normal operation.
- To set the parameter according to the characteristics of the motor, confirm the thermal time constant with the motor manufacturer and set the parameter with some margin. In other words, set the value a little shorter than the thermal time constant.
- To detect motor overloading more quickly, reduce the set value, provided that it does not cause any application problems.

6-7-2 Cooling Fan Operation Function (n35)

- This parameter is used to operate the cooling fan of the Inverter while the Inverter is turned on or only while the Inverter is in operation.

n35	**Cooling Fan Operation Selection**			**Changes during operation**	No
Setting range	0, 1	**Unit of setting**	1	**Default setting**	0

Set Values

Value	Description
0	The fan rotates only while the RUN command is input and for 1 minute after the Inverter stops operating.
1	The fan rotates while the Inverter is turned on.

- This parameter is available only if the Inverter incorporates a cooling fan.
- If the operation frequency of the Inverter is low, the life of the fan can be prolonged by setting the parameter to 0.

6-7-3 Momentary Power Interruption Compensation (n47)

- The parameter specifies the processing that will be performed when a momentary power interruption occurs.

n47	**Momentary Power Interruption Compensation**			**Changes during operation**	No
Setting range	0 to 2	**Unit of setting**	1	**Default setting**	0

Set Values

Value	Description
0	Disabled. (An undervoltage fault will be detected when there is momentary power interruption for 15 ms or more.)
1	The Inverter will continue operating if power is restored within 0.5 s. (see note 1)
2	The Inverter will restart when power is restored. (see note 2)

Note 1. An undervoltage warning is detected with the parameter set to 1. The Inverter will restart after speed searching if power is restored within 0.5 s. If power failure continues for more than 0.5 s, undervoltage fault 1 will be detected.

Note 2. No undervoltage warning is detected with the parameter set to 2. The Inverter will restart after speed searching when power is restored.

6-7-4 Fault Retry (n48)

⚠ **Caution** The Inverter may be break if the fault retry function is used.

If the Inverter breaks, take the following measures:
Be sure to install a no-fuse breaker (NFB).
Provide the Inverter and peripheral machines with a sequence so that the machines will stop operating when the Inverter has an operational fault.

- The fault retry function automatically resets and restarts the Inverter in the case the Inverter has an overvoltage fault, overcurrent fault, or ground fault.
- In the case of any other fault, the protective function operates instantly and the fault retry function does not operate.
- This function is to be used only if the user does not want to interrupt the mechanical system, even if this function may damage the Inverter.
- Set n40 for multi-function output to the following value so that external overtorque detection output will be turned on.

  Set value: 14 for fault retries

n48	**Number of Fault Retries**			**Changes during operation**	No
Setting range	0 to 10	**Unit of setting**	1	**Default setting**	0

Set Values

- Set the number of fault retries required.
- The count of fault retries will be cleared in any of the following cases.

  The Inverter is normal for 10 minutes continuously after the latest fault retry was made.

  Power supply to the Inverter is interrupted.

  A fault reset is input.

6-7-5 Frequency Jump Function (n49 to n51)

- The frequency jump function prevents the Inverter from generating frequencies that make the mechanical system resonate.
- The frequency jump function can be used effectively to set two dead bands of a frequency reference.

n49	**Jump Frequency 1**			**Changes during operation**	No
Setting range	0.0 to 400 (Hz)	**Unit of setting**	0.1 Hz (see note)	**Default setting**	0.0

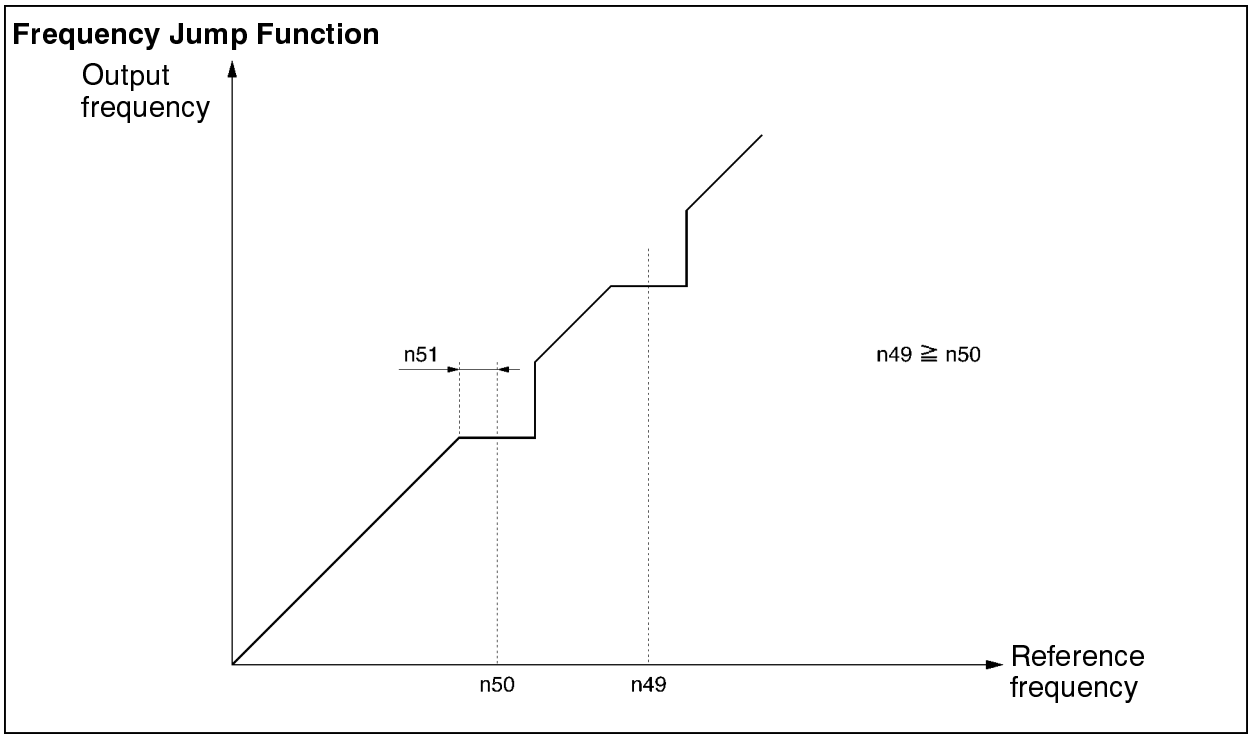
n50	**Jump Frequency 2**			**Changes during operation**	No
Setting range	0.0 to 400 (Hz)	**Setting range**	0.1 Hz (see note)	**Unit of setting**	0.0

n51	**Default Setting**			**Changes during operation**	No
Setting range	0.0 to 25.5 (Hz)	**Unit of setting**	0.1 Hz	**Default setting**	0.0

Note Values will be set in 0.1-Hz increments if the frequency is less than 100 Hz and 1-Hz increments if the frequency is 100 Hz or greater.

Set Values

- Set n49 and n50 for jump frequencies 1 and 2 to the central values of jumping frequencies.
- These values must satisfy the following condition.
  n49 ≧ n50
- The value in n51 must be set for the jump width.
- This function is disabled with n51 set to 0.0.
- The operation of the Inverter within the dead bands is prohibited. While the Inverter is in acceleration or deceleration control, however, the Inverter does not jump the bands but changes the frequency smoothly.



6-7-6 Frequency Detection Function

- The 3G3JV has the following frequency detection functions.

  Frequency Detection:
  Detects that the frequency reference coincides with the output frequency.

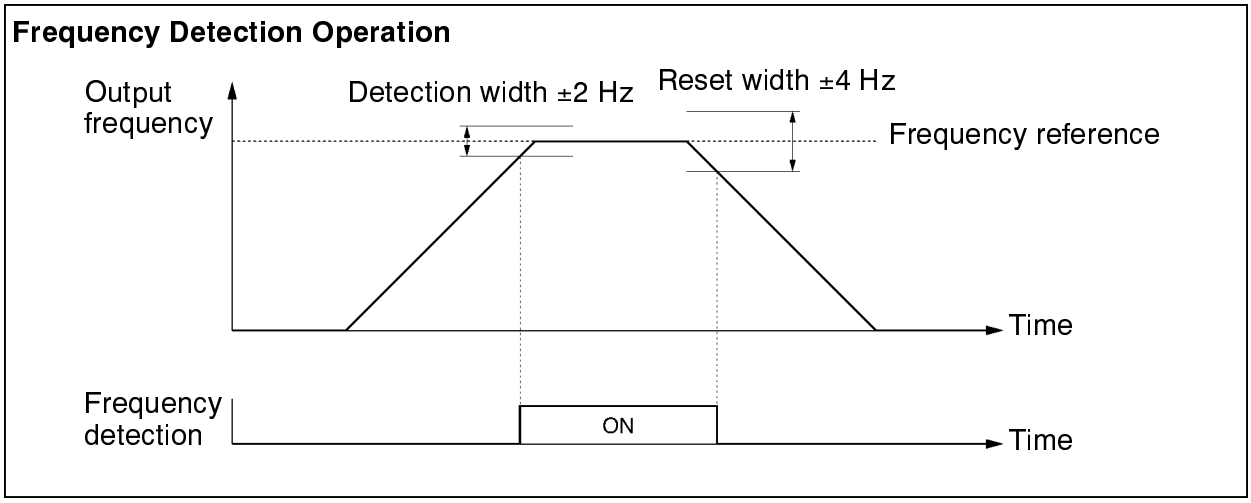
  Frequency Detection Levels 1 and 2:
  Detects that the output frequency is the same as or higher or lower than the set value (frequency detection level) in n58.

- The parameter n40 for multi-function output must be set for the frequency detection function.

■ Frequency Detection

- The parameter n40 for multi-function output must be set for frequency detection output.

  Set value: 2 for frequency detection



■ Frequency Detection Levels 1 and 2

- The parameter n40 for multi-function output must be set for frequency detection output.

  Set value: 4 for frequency detection level 1 (Output frequency ≧ n58)

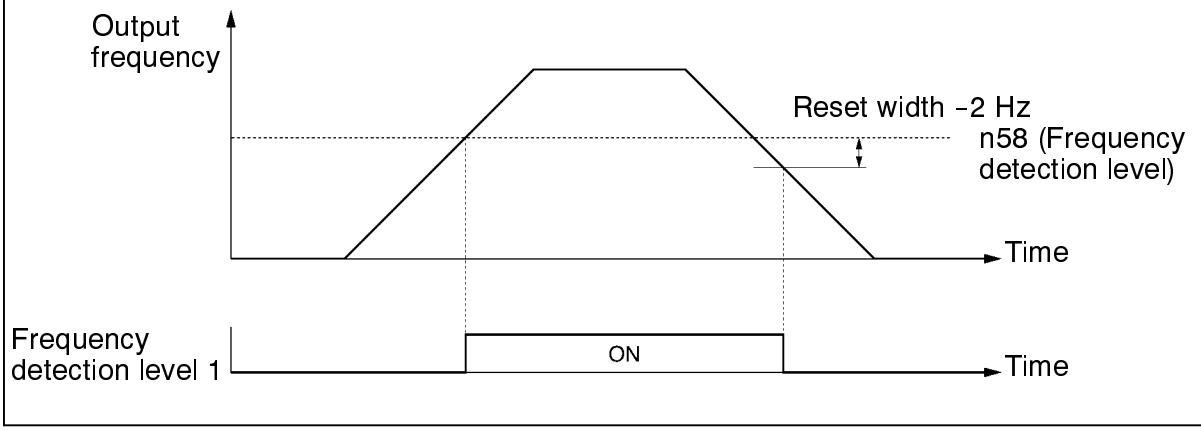
  Set value: 5 for frequency detection level 2 (Output frequency ≦ n58)

• Set the frequency detection level in n58.

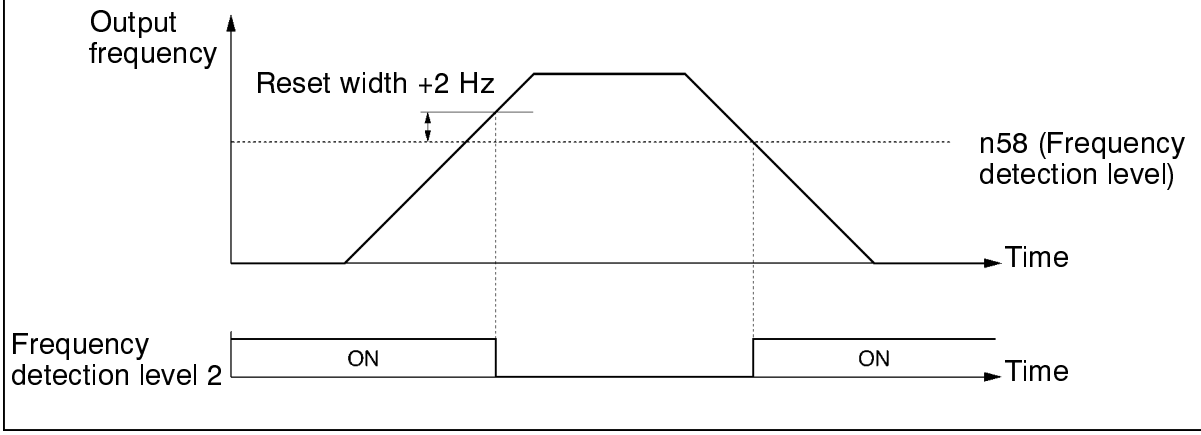
n58	**Frequency Detection Level**			**Changes during operation**	No
Setting range	0.0 to 400 (Hz)	**Unit of setting**	0.1 Hz (see note)	**Default setting**	0.0

Note The value will be set in 0.1-Hz increments if the frequency is less than 100 Hz and 1-Hz increments if the frequency is 100 Hz or over.

Frequency Detection Level 1



Frequency Detection Level 2



6-7-7 UP/DOWN Command Frequency Memory (n62)

- This function changes the reference frequency by turning the UP and DOWN commands on and off.
- In order to use this function, set n39 for multi-function inputs 4 to 34. Then the multi-function input 3 (S4) and multi-function input 4 (S5) terminals are set as described below.

  Multi-function input 3 (S4): UP command (The value in n38 for multi-function input 3 is ignored.)

  Multi-function input 4 (S5): DOWN command
- The output frequency held by the UP/DOWN function will be stored in the memory if n62 for frequency hold function selector is set to 1.
- By setting n62 to 1, the frequency reference kept on hold for 5 s or more will be retained even after a power interruption, and operation will be restarted at this frequency the next time the RUN command is input.
- The stored output frequency will be cleared from the memory if n62 is set to 0. The retained frequency is initialized with n01 for parameter initialization set to 8 or 9.

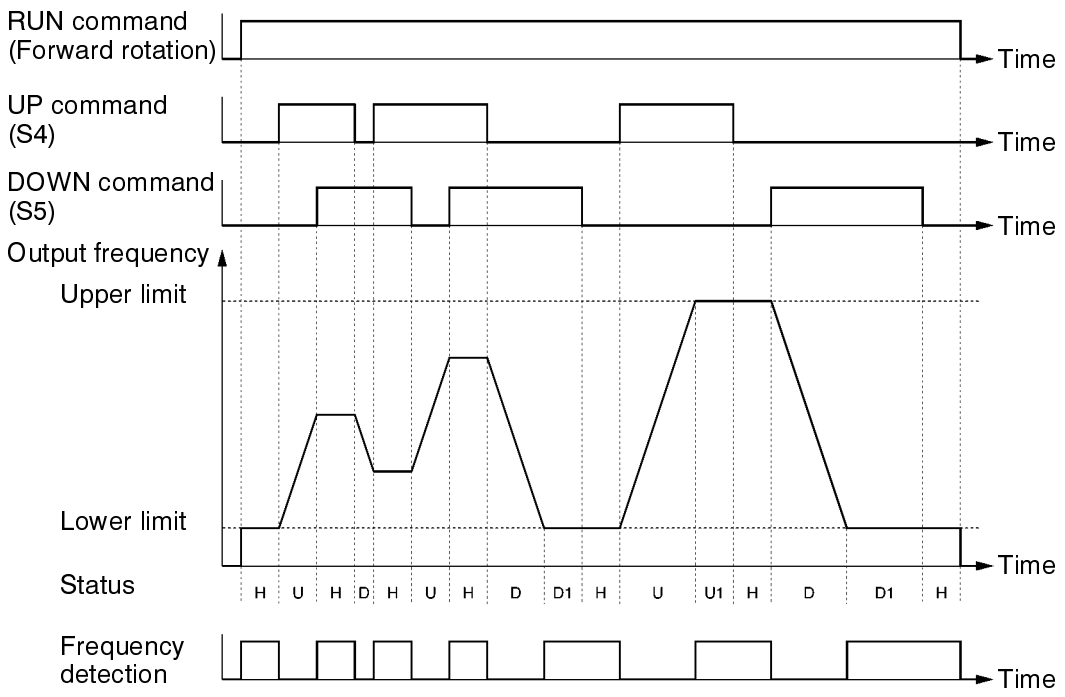
Note While this function is used, frequency references can be used with the UP/DOWN command or inching frequency command. All multi-step speed references are disabled.

n62	**Frequency Hold Function Selector**			**Changes during operation**	No
Setting range	0, 1	**Unit of setting**	1	**Default setting**	0

Set Values

Value	Description
0	The frequency on hold is not retained.
1	The frequency on hold for 5 s or more is retailed.

Operation of UP/DOWN Function



Note Status U: UP (acceleration)
D: DOWN (deceleration)
H: Hold
U1: Frequency acceleration restricted by upper limit.
D1: Frequency deceleration restricted by lower limit.

- The following ON/OFF combinations of UP and DOWN commands are possible.

Command	Acceleration	Deceleration	Hold	Hold
S4 (UP command)	ON	OFF	OFF	ON
S5 (DOWN command)	OFF	ON	OFF	ON

- With the UP/DOWN function used, the output frequency has the following restrictions for upper and lower limits.

  Upper limit: The maximum frequency in n09 or the frequency reference upper limit in n30, whichever is smaller.

  Lower limit: The minimum output frequency in n14 or frequency reference lower limit in n31, whichever is smaller.

- When the RUN command for forward or reverse rotation is input, the Inverter will start operating at the lower limit regardless of whether the UP/DOWN command is input or not.
- When the UP/DOWN function and inching frequency command are both assigned to multi-function inputs, an inching frequency command input will have the highest priority.
- If n62 for frequency hold function selection is set to 1, the output frequency held by the UP/DOWN function for 5 s or more will be stored in the memory. The output frequency will be held by the UP/DOWN function when both UP and DOWN commands are ON or OFF together.

6-7-8 Error History (n78)

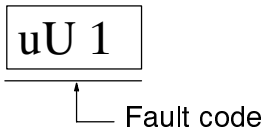
- The 3G3JV stores information on the latest error.
- The information on the latest error recorded is displayed by pressing the Enter Key after n78 for error history is displayed.
- The details of the information are the same as that obtained from the multi-function monitor U09.

n78	**Error History**			**Changes during operation**	---
Setting range	---	**Unit of setting**	---	**Default setting**	---

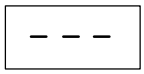
Note The information is read only.

Display Example

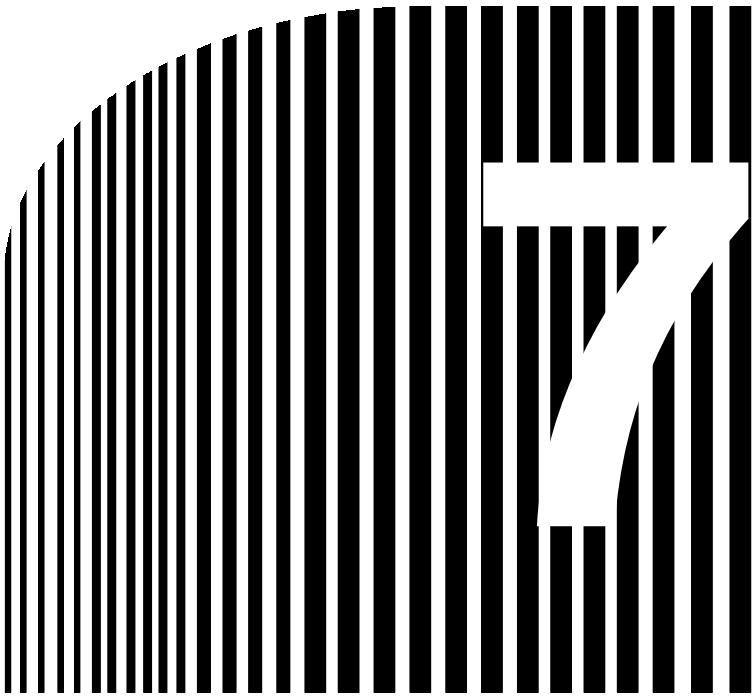
- Fault display



- No error stored



- To clear the error history, set n01 for parameter write-prohibit selection/parameter initialization to 6.



Chapter 7

· Maintenance Operations ·

7-1 Protective and Diagnostic Functions

7-1-1 Fault Detection (Fatal Error)

The Inverter will detect the following faults if the Inverter or motor burns or the internal circuitry of the Inverter malfunctions. When the Inverter detects a fault, the fault code will be displayed on the Digital Operator, the fault contact output will operate, and the Inverter output will be shut off causing the motor to coast to a stop. The stopping method can be selected for some faults, and the selected stopping method will be used with these faults. If a fault has occurred, refer to the following table to identify and correct the cause of the fault. Use one of the following methods to reset the fault after restarting the Inverter.

- Turn on the fault reset signal. A multi-function input (n36 to n39) must be set to 5 (Fault Reset).
- Press the STOP/RESET Key on the Digital Operator.
- Turn the main circuit power supply off and then on again.

■ Fault Displays and Processing

Fault display	Fault name and meaning	Probable cause and remedy
%c	**Overcurrent (OC)** The Inverter output current is as high as or higher than 200% of the rated output current.	• A short-circuit or ground fault has occurred and at the Inverter output. → Check and correct the motor power cable. • The V/f setting is incorrect. → Reduce the V/f set voltage. • The motor capacity is too large for the Inverter. → Reduce the motor capacity to the maximum permissible motor capacity. • The magnetic contactor on the output side of the Inverter has been opened and closed. → Rearrange the sequence so that the magnetic contactor will not open or close while the Inverter has current output. • The output circuit of the Inverter is damaged. → Replace the Inverter.

Fault display	Fault name and meaning	Probable cause and remedy
%U	**Overvoltage (OV)** The main circuit DC voltage has reached the overvoltage detection level (410 VDC).	• The deceleration time is too short. → Increase the deceleration time. • The power supply voltage is too high. → Decrease the voltage so it will be within specifications. • There is excessive regenerative energy due to overshooting at the time of acceleration. → Suppress the overshooting as much as possible.
uU1	**Main circuit undervoltage (UV1)** The main circuit DC voltage has reached the undervoltage detection level (200 VDC for the 3G3JV-A2□ and 160 VDC for the 3G3JV-AB□).	• Power supply to the Inverter has phase loss, power input terminal screws are loose, or the power cable is disconnected. → Check the above and take necessary countermeasures. • Incorrect power supply voltage → Make sure that the power supply voltage is within specifications. • Momentary power interruption has occurred. → Use the momentary power interruption compensation (Set n47 so that the Inverter restarts after power is restored) → Improve the power supply. • The internal circuitry of the Inverter is damaged. → Change the Inverter.
%h	**Radiation fin overheated (OH)** The temperature of the radiation fins of the Inverter has reached 110°C ± 10°C.	• The ambient temperature is too high. → Ventilate the Inverter or install a cooling unit. • The load is excessive. → Reduce the load. → Decrease the Inverter capacity. • The V/f setting is incorrect. → Reduce the V/f set voltage. • The acceleration/deceleration time is too short. → Increase the acceleration/deceleration time. • The ventilation is obstructed. → Change the location of the Inverter to meet the installation conditions. • The cooling fan of the Inverter does not work. → Replace the cooling fan.

Fault display	Fault name and meaning	Probable cause and remedy
%l1	**Motor overload (OL1)** The electric thermal relay actuated the motor overload protective function.	• The load is excessive. → Reduce the load. → Decrease the Inverter capacity. • The V/f setting is incorrect. → Reduce the V/f set voltage. • The value in n11 for maximum voltage frequency is low. → Check the motor nameplate and set n11 to the rated frequency. • The acceleration/deceleration time is too short. → Increase the acceleration/deceleration time. • The value in n32 for rated motor current is incorrect. → Check the motor nameplate and set n32 to the rated current. • The Inverter is driving more than one motor. → Disable the motor overload detection function and install an electronic thermal relay for each of the motors. The motor overload detection function is disabled by setting n32 to 0.0 or n33 to 2. • The motor protective time setting in n34 is short. → Set n34 to 8 (the default value).
%l2	**Inverter overload (OL2)** The electronic thermal relay has actuated the Inverter overload protective function.	• The load is excessive. → Reduce the load. • The V/f setting is incorrect. → Reduce the V/f set voltage. • The acceleration/deceleration time is too short. → Increase the acceleration/deceleration time. • The Inverter capacity is insufficient. → Use an Inverter model with a higher capacity.

Fault display	Fault name and meaning	Probable cause and remedy
%l3	**Overtorque detection (OL3)** There has been a current or torque the same as or greater than the setting in n60 for overtorque detection level and that in n61 for overtorque detection time. A fault has been detected with n59 for overtorque detection function selection set to 2 or 4.	• The mechanical system is locked or has a failure. → Check the mechanical system and correct the cause of overtorque. • The parameter settings were incorrect. → Adjust the n60 and n61 parameters according to the mechanical system. Increase the set values in n60 and n61.
gf	**Ground fault (GF)** The ground fault current at the output of the Inverter has exceeded the rated output current of the Inverter.	• A ground fault has occurred at the Inverter output. → Check the connections between the Inverter and motor and reset the fault after correcting its cause.
ef□	**External fault □ (EF□)** An external fault has been input from a multi-function input. A multi-function input 1, 2, 3, or 4 set to 3 or 4 has operated. The EF number indicates the number of the corresponding input (S2 to S5).	• An external fault was input from a multi-function input. → Remove the cause of the external fault. • The sequence is incorrect. → Check and change the external fault input sequence including the input timing and NO or NC contact.
f00	**Digital Operator transmission fault 1 (F00)** An initial memory fault has been detected	• The internal circuitry of the Inverter has a fault. → Turn the Inverter off and on. → Replace the Inverter if the same fault occurs again.
f01	**Digital Operator transmission fault 2 (F01)** A ROM fault has been detected.	• The internal circuitry of the Inverter has a fault. → Turn the Inverter off and on. → Replace the Inverter if the same fault occurs again.

Fault display	Fault name and meaning	Probable cause and remedy
f04	**Initial memory fault (F04)** An error in the built-in EEPROM of the Inverter has been detected.	• The internal circuitry of the Inverter has a fault. → Initialize the Inverter with n01 set to 8 or 9 and turn the Inverter off and on. → Replace the Inverter if the same fault occurs again.
f05	**Analog-to-digital converter fault (F05)** An analog-to-digital converter fault has been detected.	• The internal circuitry of the Inverter has a fault. → Turn the Inverter off and on. → Replace the Inverter if the same fault occurs again.
f07	**Digital Operator fault (F07)** An error in the built-in control circuit of the Digital Operator has been detected.	• The internal circuitry of the Digital Operator has a fault. → Turn the Digital Operator off and on. → Replace the Digital Operator if the same fault occurs again.
STP	**Emergency stop (STP)** An emergency stop alarm is input to a multi-function input. (A multi-function input 1, 2, 3, or 4 set to 19 or 21 has operated.)	• An emergency stop alarm is input to a multi-function input. → Remove the cause of the fault. • The sequence is incorrect. → Check and change the external fault input sequence including the input timing and NO or NC contact.
OFF	**Power supply error** • Insufficient power supply voltage • Control power supply fault • Hardware fault	• No power supply is provided. → Check and correct the power supply wire and voltage. • Terminal screws are loosened. → Check and tighten the terminal screws. • The Inverter is damaged. → Replace the Inverter.

7-1-2 Warning Detection (Nonfatal Error)

The warning detection is a type of Inverter protective function that does not operate the fault contact output and returns the Inverter to its original status once the cause of the error has been removed. The Digital Operator flashes and display the detail of the error. If a warning occurs, take appropriate countermeasures according to the table below.

Note Some warnings or some cases stop the operation of the Inverter as described in the table.

■ Warning Displays and Processing

Fault display	Fault name and Meaning	Probable cause and remedy
uU (flashing)	**Main Circuit Undervoltage (UV)** The main circuit DC voltage has reached the undervoltage detection level (200 VDC for the 3G3JV-A2□ and 160 VDC for the 3G3JV-AB□).	• Power supply to the Inverter has phase loss, power input terminal screws are loose, or the power line is disconnected. → Check the above and take necessary countermeasures. • Incorrect power supply voltage → Make sure that the power supply voltage is within specifications.
%U (flashing)	**Main Circuit Overvoltage** The main circuit DC voltage has reached the overvoltage detection level (410 VDC).	• The power supply voltage is too high. → Decrease the voltage so it will be within specifications.
%h (flashing)	**Radiation fin overheated (OH)** The temperature of the radiation fins of the Inverter has reached 110°C ± 10°C.	• The ambient temperature is too high. → Ventilate the Inverter or install a cooling unit.
%l3 (flashing)	**Overtorque detection (OL3)** There has been a current or torque the same as or greater than the setting in n60 for overtorque detection level and that in n61 for overtorque detection time. A fault has been detected with n59 for overtorque detection function selection set to 1 or 3.	• The mechanical system is locked or has a failure. → Check the mechanical system and correct the cause of overtorque. • The parameter settings were incorrect. → Adjust the n60 and n61 parameters according to the mechanical system. Increase the set values in n60 and n61.

Fault display	Fault name and Meaning	Probable cause and remedy
ser (flashing)	**Sequence error (SER)** A sequence change has been input while the Inverter is in operation. Local or remote selection is input while the Inverter is in operation. **Note** The Inverter coasts to a stop.	• A sequence error has occurred. → Check and adjust the local or remote selection sequence as multi-function input.
bb (flashing)	**External base block (bb)** The external base block command has been input. **Note** The Inverter coasts to a stop.	• The external base block command has been input as multi-function input. → Remove the cause of external base block input. • The sequence is incorrect. → Check and change the external fault input sequence including the input timing and NO or NC contact.
ef (flashing)	**Forward- and reverse-rotation input (EF)** The forward and reverse commands are input to the control circuit terminals simultaneously for 0.5 s or more. **Note** The Inverter stops according to the method set in n04.	• A sequence error has occurred. → Check and adjust the local or remote selection sequence.

Fault display	Fault name and Meaning	Probable cause and remedy
STP (flashing)	**Emergency stop (STP)** The Digital Operator stops operating. The STOP/RESET Key on the Digital Operator is pressed while the Inverter is operating according to the forward or reverse command through the control circuit terminals. **Note** The Inverter stops according to the method set in n04.	• The parameter setting was incorrect. → Turn off the forward or reverse command once, check that the n06 parameter setting for STOP/RESET Key function selection, and restart the Inverter.
	The emergency stop alarm signal is input as multi-function input. A multi-function input 1, 2, 3, or 4 set to 20 or 22 has been used. **Note** The Inverter stops according to the method set in n04.	• An emergency stop alarm is input to a multi-function input. → Remove the cause of the fault. • The sequence is incorrect. → Check and change the external fault input sequence including the input timing and NO or NC contact.
fRn (flashing)	**Cooling fan fault (FAN)** The cooling fan has been locked.	• The cooling fan wiring has a fault. → Turn off the Inverter, dismount the fan, and check and repair the wiring. • The cooling fan in not in good condition. → Check and remove the foreign material or dust on the fan. • The cooling fan is beyond repair. → Replace the fan.

7-2 Troubleshooting

Due to parameter setting errors, faulty wiring, and so on, the Inverter and motor may not operate as expected when the system is started up. If that should occur, use this section as a reference and apply the appropriate measures.
Refer to *7-1 Protective and Diagnostic Functions*, if the contents of the fault are displayed,

7-2-1 Parameters Fail Set

■ The display does not change when the Increment or Decrement Key is pressed.

- Parameter write-prohibit is input.

  This occurs when n01 for parameter write-prohibit selection/parameter initialization is set to 0. Set n01 to an appropriate value according to the parameter to be set.

- The Inverter is operating.

  There are some parameters that cannot be set during operation. Refer to the list of parameters. Turn the Inverter off and then make the settings.

■ The Digital Operator does not display anything.

Turn the Inverter off and on. If the Digital Operator still does not display anything, the internal circuitry of the Inverter must have failed. Replace the Inverter.

7-2-2 Motor Fails to Operate

■ The motor does not operate with input through the control circuit terminals even though the frequency reference is correct.

- The operation method setting is incorrect.

  If parameter n02 for operation mode selection is not set to 1 to enable the control circuit terminals, the RUN command cannot be executed through the control circuit terminals.

  Check and correct the setting in n02.

- Input in 2-wire sequence while 3-wire sequence is in effect and vice-versa.

  The Inverter will operate in 3-wire sequence according to the RUN, stop, and forward/stop commands if n37 for multi-function input 2 is set to 0. At that time, the Inverter will not operate if input in 2-wire sequence is ON. On the other hand, the Inverter in 2-wire sequence will only rotate in the reverse direction if input in 3-wire sequence is ON.

  Check and correct the setting in n37 or change the input method of the RUN command.

- The Inverter is not in RUN mode.

  When the PRGM or LO/RE indicator (red indicator) of the Digital Operator is lit, the Inverter does not start.

  Cancel the RUN command, press the Mode Key to change the mode of the Inverter, and restart the Inverter with the green indicator lit.

- The frequency reference is too low.

  If the frequency reference is set below the minimum output frequency set in n14, the Inverter will not operate.

  Raise the frequency reference to at least the minimum output frequency.

- The Inverter is in local mode.

  The Inverter in local mode starts with the RUN command given with the RUN Key pressed.

  Check the LO/RE indicator. If the display is “Lo,” the Inverter is in local mode. Press the Increment Key and set the Inverter to remote mode with “rE” displayed.

  If the above operation is not possible, a multi-function input is set to local/remote selection. In that case, the mode can be changed with the multi-function input only. Turn the corresponding input terminal OFF so that the Inverter will be set to remote mode.

- The wiring on the Inverter control circuit terminals is incorrect.

  The Inverter cannot check input signals if the input wiring on the control circuit terminals is incorrect.

  Operate the Digital Operator and check the input terminal status of multi-function monitor U06.

  The NPN or PNP input sequence is selectable. The NPN input sequence is the default setting.

  Refer to *2-2-2 Terminal Block* and check that the setting of switch SW7 and wiring are correct.

■ The motor does not operate with input through the control circuit terminals. (The frequency reference is zero or different from the set value.)

• The frequency reference setting is incorrect.

The analog input of frequency references is ignored with the Digital Operator selected. The digital input of frequency references is ignored unless the Digital Operator is selected.

Check that the setting in n03 for frequency reference selection coincides with the actual method of giving frequency instructions.

Before using analog input, refer to *2-2-2 Terminal Block* and check that the setting of SW8 and the actual method (with voltage and current) of providing frequency references are correct.

• The Inverter is in local mode.

Frequency references can be provided only through key sequences on the Digital Operator or with the FREQ adjuster to the Inverter in local mode.

Check the LO/RE indicator. If the display is “Lo,” the Inverter is in local mode. Press the Increment Key and set the Inverter to remote mode with “rE” displayed.

If the above operation is not possible, the multi-function input will be set to local/remote selection. In that case, the mode can be changed with the multi-function input only. Turn the corresponding input terminal OFF so that the Inverter will be set to remote mode.

• The analog input gain or bias setting is incorrect.

Check that the frequency reference gain in n41 and frequency reference bias in n42 are set according to the actual analog input characteristics.

■ The motor stops during acceleration or when a load is connected.

• The load may be too big.

The 3G3JV has a stall prevention function and automatic torque boost function, but the motor responsiveness limit may be exceeded if acceleration is too rapid or if the load is too big.

Lengthen the acceleration time or reduce the load. Also consider increasing the motor capacity.

■ The motor only rotates in one direction.

• Reverse rotation-prohibit is selected.

If n05 for reverse rotation-prohibit selection is set to 1 (reverse run prohibited), the Inverter will not accept reverse-rotation commands.

To use both forward and reverse rotation, set n05 to 0.

7-2-3 Motor Rotates in the Wrong Direction

- The output wiring of the motor is faulty.

  When the U/T1, V/T2, and W/T3 terminals of the Inverter are properly connected to the T1(U), T2(V), and T3(W) terminals of the motor, the motor operates in a forward direction when a forward rotation command is executed. The forward direction depends on the maker and the motor type. Therefore, be sure to check the specifications.

  Switching two wires among the U/T1, V/T2, and W/T3 will reverse the direction of rotation.

7-2-4 Motor Outputs No Torque or Acceleration is Slow

- The stall prevention level during running is too low.

  If the value in n57 for stall prevention level during operation is too low, the speed will drop before torque output is turned ON.

  Check to be sure that the set value is suitable.

- The stall prevention level during acceleration is too low.

  If the value in n56 for stall prevention level during acceleration is too slow, the acceleration time will be too long.

  Check to be sure that the set value is suitable.

7-2-5 Motor Deceleration is Slow

- The deceleration time setting is too long.

  Check the deceleration time settings in n17 and n19.

- Motor torque is insufficient.

  If the parameter constants are correct and there is no overvoltage fault, the power the motor will be limited.

  Consider increasing the motor capacity.

7-2-6 Vertical-axis Load Drops when Brakes are Applied

- The sequence is incorrect.

  The Inverter goes into DC braking status for 0.5 s after deceleration is completed. This is the default setting.

  Check the sequence to make sure that the brake is applied with DC braking status or adjust the value n53 for DC injection control time.

- The DC injection braking is insufficient.

  If the DC braking power is insufficient, adjust the value in n52 for DC injection control current.

- An inappropriate brake is being used.

  Use a brake intended for braking rather than holding.

7-2-7 Motor Burns

- The load is too big.

  If the load of the motor is too big and the motor is used with the effective torque exceeding the rated torque of the motor, the motor will burn out. For example, the rated torque of the motor and capacity may be limited to eight hours of use if the inscription on the motor states that the motor is rated for eight hours. If the 8-hour rated torque is used for normal operation, it may cause the motor to bun out.

  Reduce the load amount by either reducing the load or lengthening the acceleration/deceleration time. Also consider increasing the motor capacity.

- The ambient temperature is too high.

  The rating of the motor is determined within a particular ambient operating temperature range. The motor will burn out if it runs continuously at the rated torque in an environment in which the maximum ambient operating temperature is exceeded.

  Lower the ambient temperature of the motor to within the acceptable ambient operating temperature range.

- The withstand voltage between the phases of the motor is insufficient.

  When the motor is connected to the output of the Inverter, a surge will be generated between the switching of the Inverter and the coil of the motor.

  Normally, the maximum surge voltage is approximately three times the input power supply voltage of the Inverter (i.e., approximately 600 V).

  Therefore, the dielectric strength of the motor to be used must be higher than the maximum surge voltage.

7-2-8 Controller or AM Radio Receives Noise when Inverter is Started

- Noise derives from Inverter switching.

  Take the following actions to prevent noise.

  - Lower the carrier frequency of the Inverter in n46.

    The number of internal switching times is reduced, so noise can be reduced to some extent.

  - Install an Input Noise Filter.

    Install an Input Noise Filter on the power input area of the Inverter.

  - Install an Output Noise Filter.

    Install an Output Noise Filter on the output area of the Inverter.

  - Use metal tubing.

    Electric waves can be shielded by metal. Therefore, enclose the Inverter with a metal tube.

7-2-9 Ground Fault Interrupter is Actuated when Inverter is Started

- Leakage current flows through the Inverter.

  The Inverter performs internal switching. Therefore, a leakage current flows through the Inverter. This leakage current may actuate the ground fault interrupter, shutting the power off.

  Use a ground fault interrupter with a high leakage-current detection value (sensitivity amperage of 200 mA or more, operating time of 0.1 s or more) or one with high-frequency countermeasures for Inverter use.

  Reducing the carrier frequency value in n46 is also effective.
  In addition, remember that a leakage current increases in proportion to the cable length. Normally, approximately 5 mA of leakage current is generated for each meter of cable.

7-2-10 Mechanical Vibration

■ Mechanical system makes unusual noise.

- Resonance between the characteristic frequency of the mechanical system and the carrier frequency.

  There may be resonance between the characteristic frequency of the mechanical system and the carrier frequency. If the motor is running with no problems and the machinery system is vibrating with a high-pitched whine, it may indicate that this is occurring. To prevent this type of resonance, adjust the carrier frequency value in n46.

- Resonance between the characteristic frequency of a machine and the output frequency of the Inverter.

  There may be resonance between the characteristic frequency of a machine and the output frequency of the Inverter. To prevent this from occurring, use the frequency jump function with the constants set in n49 through n51 to change the output frequency or install vibration-proof rubber on the motor base to prevent the resonance of the mechanical system.

■ Vibration and hunting are occurring.

- Influence by the slip compensation function.

  The slip compensation function of the Inverter may influence the characteristic frequency of the mechanical system to cause vibration or hunting. In that case, increase the time constant in n67 for slip compensation. The larger this time constant is, however, the slower the response speed of the slip compensation function will be.

7-2-11 Motor Rotates after Output of Inverter is Turned Off

• Insufficient DC Control

If the motor continues operating at low speed, without completely stopping, and after a deceleration stop has been executed, it means that the DC braking is not decelerating enough.

In such cases, adjust the DC control as described below.

• Increase the parameter in n52 for DC injection control current.

• Increase the parameter in n53 for DC injection control time.

7-2-12 Detects 0 V when Motor Starts and Motor Stalls

• Insufficient DC control at startup

Generation of 0 V and stalling can occur if the motor is turning when it is started.

This can be prevented by slowing the rotation of the motor by DC braking before starting the motor.

Increase the parameter in n54 for startup DC injection control time.

7-2-13 Output Frequency Does Not Reach Frequency Reference

• The frequency reference is within the jump frequency range.

If the jump function is used, the output frequency stays within the jump frequency range.

Make sure that the jump width settings in n49 through n50 for jump frequencies 1 and 2 and jump width in n51 are appropriate.

• The preset output frequency exceeds the upper-limit frequency.

The upper-limit frequency can be obtained from the following formula.
Maximum frequency in n09 × frequency reference upper limit in n30/100

Make sure that the parameters in n09 and n30 are correct.

7-3 Maintenance and Inspection

⚠**WARNING** Do not touch the Inverter terminals while the power is being supplied.

⚠**WARNING** Maintenance or inspection must be performed only after turning OFF the power supply, confirming that the CHARGE indicator (or status indicators) is turned OFF, and after waiting for the time specified on the front cover. Not doing so may result in electrical shock.

⚠**WARNING** Maintenance, inspection, or parts replacement must be performed by authorized personnel. Not doing so may result in electrical shock or injury.

⚠**WARNING** Do not attempt to take the Unit apart or repair. Doing either of these may result in electrical shock or injury.

⚠**Caution** Carefully handle the Inverter because it uses semiconductor elements. Careless handling may result in malfunction.

⚠**Caution** Do not change wiring, disconnect connectors or Operator, or replace fans while power is being supplied. Doing so may result in injury or malfunction.

■ Daily Inspection

Check the following items with the system in operation.

- The motor should not be vibrating or making unusual noises.
- There should be no abnormal heat generation.
- The output current value shown on the monitor display should not be higher than normal.
- The cooling fan on the bottom of the Inverter should be operating normally, if the Inverter model has the cooling fan.

■ Periodic Inspection

Check the following items during periodic maintenance.

Before beginning inspection, be sure to turn off the power supply. Confirm that all the indicators on the front panel have turned off, and then wait until at least 1 minute has elapsed before beginning the inspection.

Be sure not to touch the terminals right after the power has been turned off. Otherwise, an electric shock may occur.

- The terminal screws of the Inverter should not loose.
- There should be no conductive dust or oil mist on the terminal block or inside the Inverter.
- The mounting screws of the Inverter should not be loose.
- No dirt or dust should be accumulating on the radiation fin.
- No dust should be accumulating on the vents of the Inverter.
- There should be no abnormalities in the outward appearance of the Inverter.
- There should be no unusual noises or vibration and the accumulated operating time should not exceeded the specifications.

■ Periodic Maintenance Parts

Periodic inspection standards vary with the installation environment and usage conditions of the Inverter.

The maintenance periods of the Inverter are described below. Keep them as reference.

Maintenance Periods (Reference)

- Cooling fan: 2 to 3 years
- Electrolytic capacitor: 5 years
- Fuse: 10 years

The usage conditions are as follows:

- Ambient temperature: 40°C
- Load factor: 80%
- Operation: 8 hours per day
- Installation: According to instructions in manual

It is recommended that the ambient temperature and power-on time be reduced as much as possible to extend of the life of the Inverter.

Note For details regarding maintenance, consult your OMRON representative.

■ Replacement of Cooling Fan

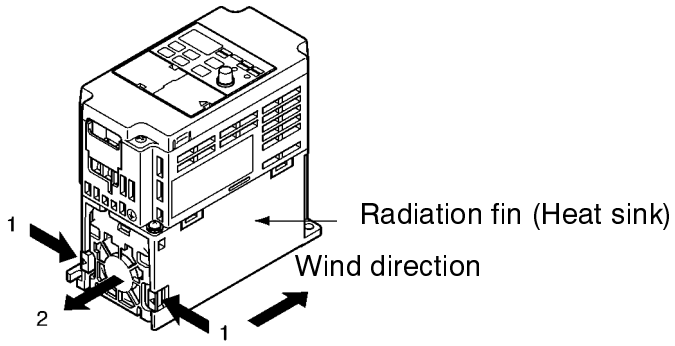
If the FAN fault is displayed or the cooling fan needs replacement, take the following steps to replace it.

● Cooling Fan Models

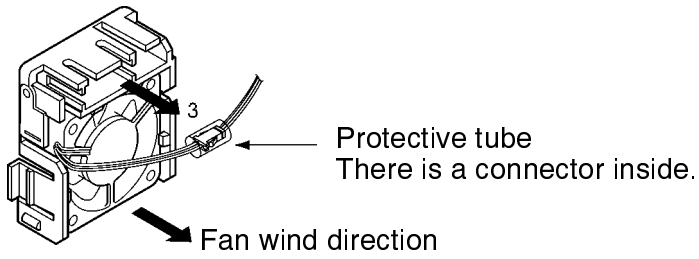
Inverter		Cooling Fan
3-phase 200-VAC	3G3JV-A2007	3G3IV-PFAN2007
	3G3JV-A2015 or 3G3JV-A2022	3G3IV-PFAN2015J
Single-phase 200-VAC	3G3JV-AB015	3G3IV-PFAN2015J

● Replacing Cooling Fan of 68-mm-wide Inverter Model

1. Press the left and right sides of the fan cover located on the lower part of the radiation fin in the arrow 1 directions. Then lift the bottom of the Fan in the arrow 2 direction to remove the Fan as shown in the following illustration.



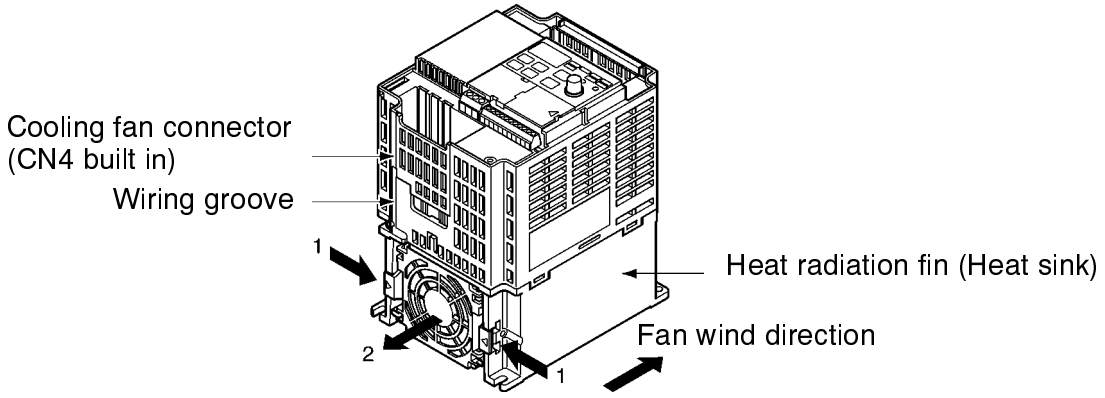
2. Hold the fan wire and pull the protective tube of the cover in the arrow 3 direction.



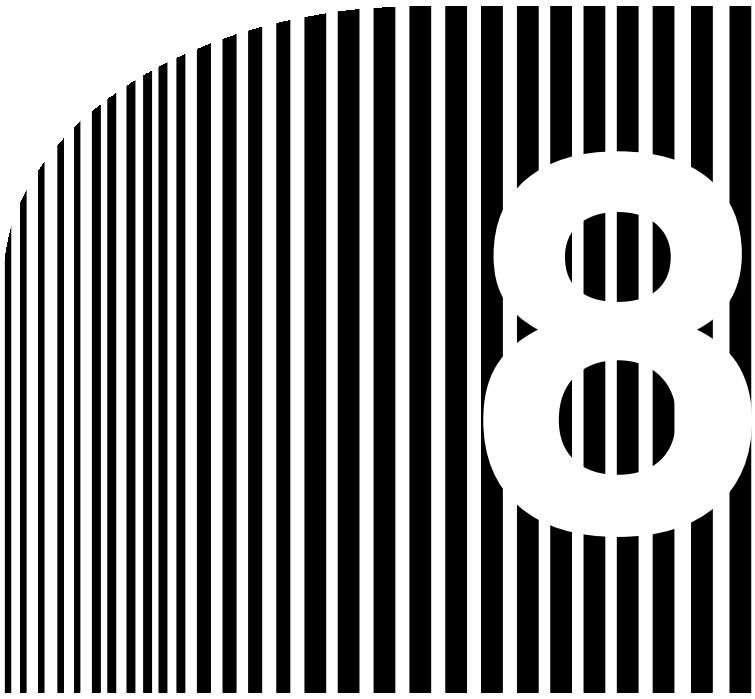
3. Slide the protective tube and remove the internal connector.
4. Remove the Fan from the fan cover.
5. Mount the new Fan on the fan cover. At this time, make sure that the wind direction of the Fan will be in the direction of the heat radiation fin.
6. Attach the connector, cover the connector with the protective tube, and insert the connector into the cover.
7. Mount the fan cover with the new Fan to the lower part of the heat radiation fin. Make sure that the fan cover snaps on securely with the heat radiation fin.

● Replacing Cooling Fan of 108-mm-wide Inverter Model

1. Dismount the front cover, bottom cover, and fan connector CN4.



2. Press the left and right sides of the fan cover located on the lower part of the radiation fin in the arrow 1 directions. Then lift the bottom of the Fan in the arrow 2 direction to remove the fan as shown in the following illustration.
   Disconnect the wire from the electrical inlet on the bottom of the plastic casing.
3. Remove the Fan from the fan cover.
4. Mount the new Fan on the fan cover. At this time, make sure that the wind direction of the fan will be in the direction of the heat radiation fin.
5. Mount the fan cover with the new Fan to the lower part of the heat radiation fin. Make sure that the fan cover snaps on securely with the heat radiation fin.
6. Wire the power line through the electrical inlet on the bottom of the plastic casing and the wiring groove into the internal circuitry of the Inverter.
7. Attach the wire to connector CN4 and attach the bottom cover and front cover.



Chapter 8

· Specifications ·

8-1 Inverter Specifications

3-phase 200-VAC models	**Model 3G3JV-**		**A2001**	**A2002**	**A2004**	**A2007**	**A2015**	**A2022**
	Power supply	**Rated voltage and frequency**	3-phase 200 to 230 VAC at 50/60 Hz					
		Allowable voltage fluctuation	−15% to 10%					
		Allowable frequency fluctuation	±5%					
	Heat radiation (W)		13.0	18.0	28.1	45.1	72.8	86.5
	Weight (kg)		0.5	0.5	0.8	0.9	1.3	1.5
	Cooling method		Natural cooling			Cooling fan		

Single-phase 200-VAC models	**Model 3G3JV-**		**AB001**	**AB002**	**AB004**	**AB007**	**AB015**	**---**
	Power supply	**Rated voltage and frequency**	Single-phase 200 to 240 VAC at 50/60 Hz					
		Allowable voltage fluctuation	−15% to 10%					
		Allowable frequency fluctuation	±5%					
	Heat radiation (W)		13.0	18.0	28.1	45.1	72.8	---
	Weight (kg)		0.5	0.5	0.9	1.5	1.5	---
	Cooling method		Natural cooling				Cooling fan	

Max. applicable motor capacity (kW)		0.1	0.2	0.4	0.75	1.5	2.2
Output specifications	**Rated output capacity (kVA)**	0.3	0.6	1.1	1.9	3.0	4.2
	Rated output current (A)	0.8	1.6	3.0	5.0	8.0	11.0
	Rated output voltage (V)	3-phase 200 to 240 VAC (according to the input voltage)					
	Max. output frequency	400 Hz parameter setting					
Control characteristics	**Harmonic-current countermeasures**	DC reactor (option) connection possible					
	Control method	Sine wave PWM (V/f control)					
	Carrier frequency	2.5 to 10.0 kHz (in vector control)					
	Frequency control range	0.1 to 400 Hz					
	Frequency precision (temperature characteristics)	Digital commands: ±0.01% (−10°C to 50°C) Analog commands: ±0.5% (25°C ± 10°C)					
	Frequency setting resolution	Digital commands: 0.1 Hz (less than 100 Hz) and 1 Hz (100 Hz or over) Analog commands: 0.06 Hz/60 Hz (equivalent to 1/1000)					
	Output frequency resolution	0.01 Hz					

Control characteristics	**Overload capacity**	150% of rated output current for 1 min
	External frequency set signal	Selectable with FREQ adjuster: 0 to 10 VDC (20 kΩ), 4 to 20 mA (250 Ω), and 0 to 20 mA (250 Ω)
	Acceleration/deceleration time	0.0 to 999 s (Independent acceleration and deceleration time settings: 2 types)
	Braking torque	Approx. 20%
	Voltage/frequency characteristics	Set a user V/f pattern
Protective functions	**Motor protection**	Protection by electronic thermal
	Instantaneous overcurrent protection	Stops at approx. 250% of rated output current
	Overload protection	Stops in 1 min at approximately 150% of rated output current
	Overvoltage protection	Stops when main-circuit DC voltage is approximately 410 V
	Undervoltage protection	Stops when main-circuit DC voltage is approximately 200 V (160 V for single-phase 200-VAC model)
	Momentary power interruption compensation (selection)	Stops for 15 ms or more. By setting the Inverter to momentary power interruption mode, operation can be continued if power is restored within approximately 0.5 s.
	Cooling fin overheating	Detects at 110°C ± 10°C
	Grounding protection	Protection at rated output current level
	Charge indicator (RUN indicator)	Lit when the main circuit DC voltage is approximately 50 V or less.
Environment	**Location**	Indoors (with no corrosive gas, oil spray, or metallic dust)
	Ambient temperature	Operating: -10°C to 50°C
	Ambient humidity	Operating: 90% max. (with no condensation)
	Ambient temperature	-20°C to 60°C
	Altitude	1,000 m max.
	Insulation resistance	5 MΩ min. (Do not carry out any insulation resistance or withstand voltage tests)
	Vibration resistance	9.8 m/s^2 {1G} max. between 10 to 20 Hz 2.0 m/s^2 {0.2G} max. between 20 and 50 Hz
Degree of protection		Panel-mounting models: Conforms to IP20

8-2 Option Specifications

8-2-1 EMC-compatible Noise Filter

- Be sure to select an optimum Noise Filter from the following so that the Inverter will satisfy EMC directive requirements of the EC Directives.
- Connect the Noise Filter between the power supply and the input terminals (R/L1, S/L2, and T/L3) of the Inverter.
- The Inverter can be mounted to the upper side of the Noise Filter because the upper side of the Noise Filter incorporates mounting holes for the Inverter.

■ Standard Specifications

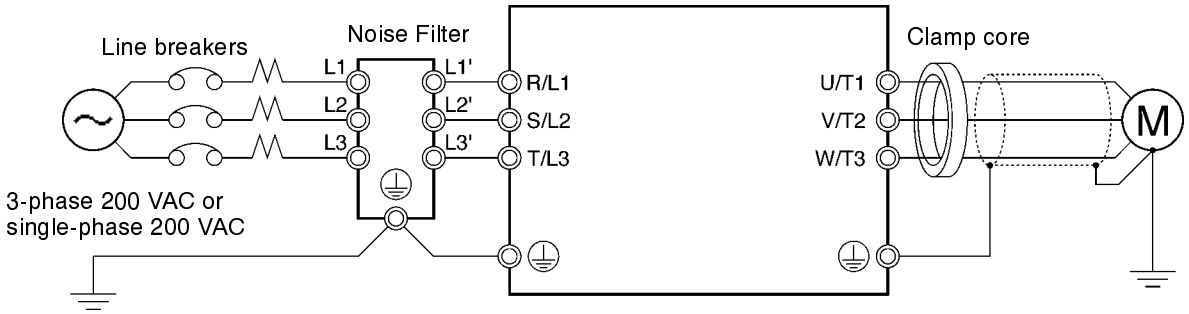
Noise Filters for 3-phase 200-VAC Inverter Models

Inverter	Noise Filter for 3-phase 200-VAC Inverter models		
Model 3G3JV-	Model 3G3JV-	Rated current (A)	Weight (kg)
A2001/A2002/A2004/A2007	PFI2010-E	10	1.1
A2015/A2022	PFI2020-E	20	1.1

Noise Filters for Single-phase 200-VAC Inverter Models

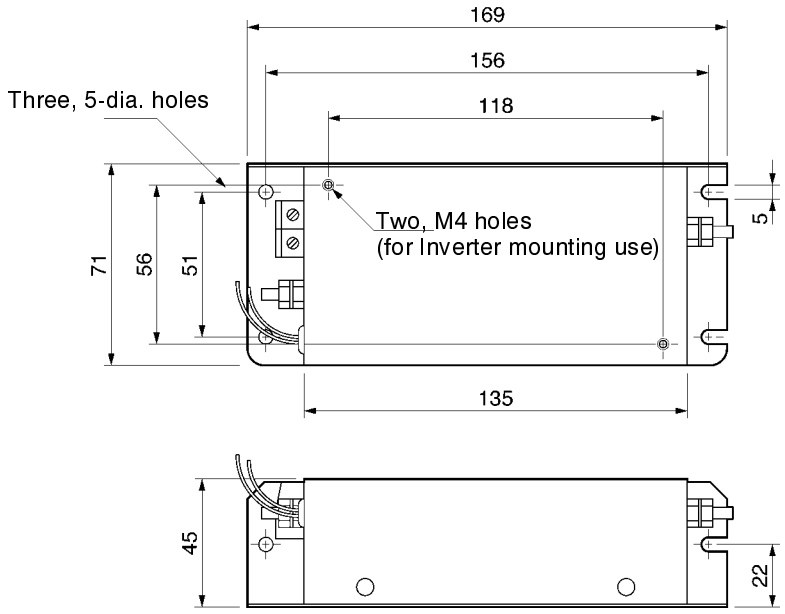
Inverter	Noise Filter for single-phase 200-VAC Inverter models		
Model 3G3JV-	Model 3G3JV-	Rated current (A)	Weight (kg)
AB001/AB002/AB004	PFI1010-E	10	1.1
AB007/AB015	PFI1020-E	20	1.1

■ Connection Example

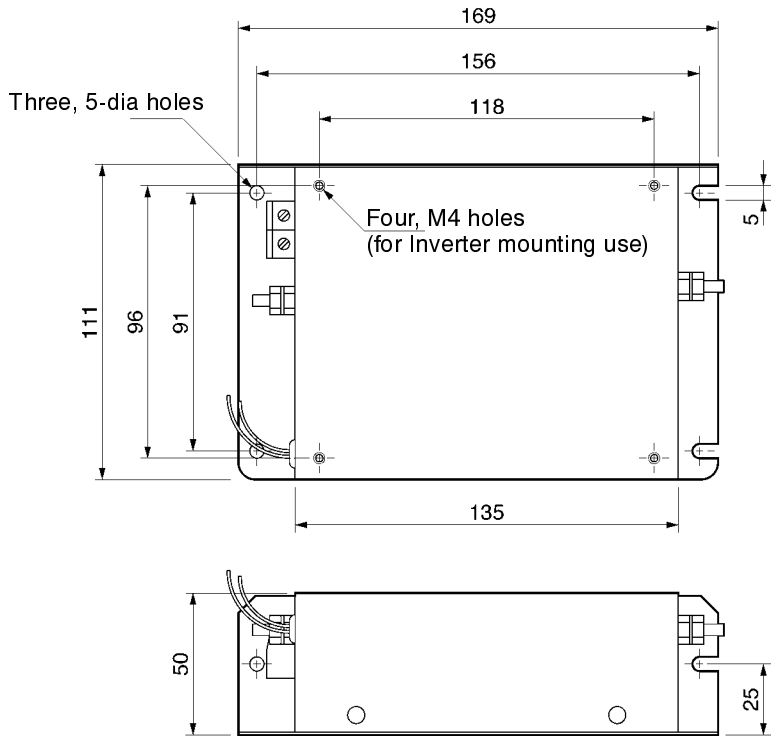


Noise Filters for Single-phase 200-VAC Models

● 3G3JV-PFI1010-E



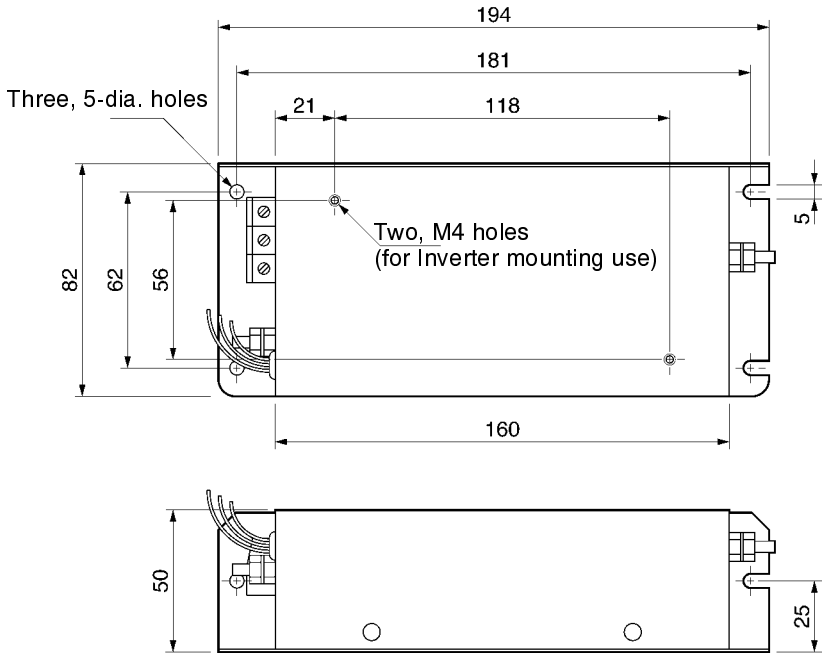
● 3G3JV-PFI1020-E



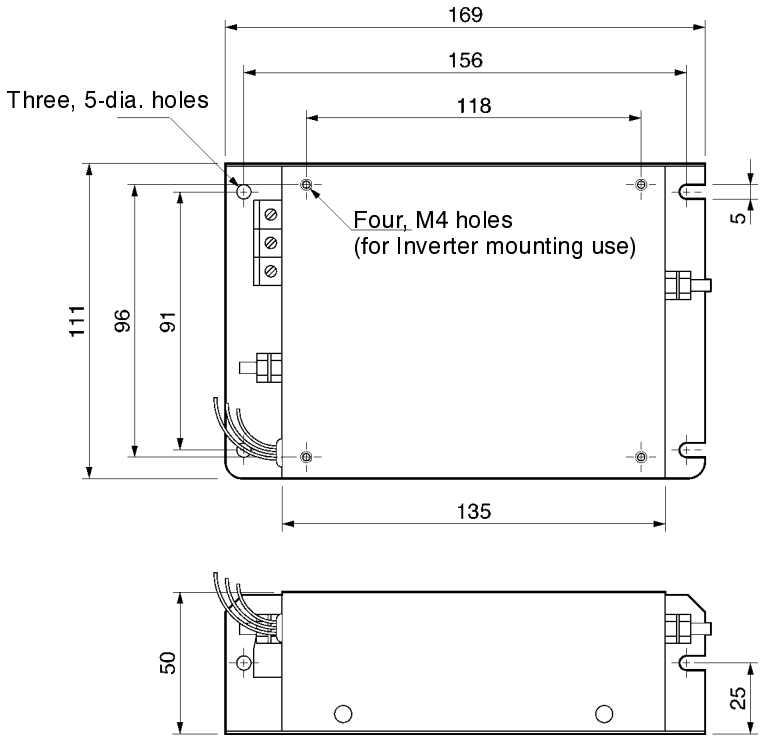
■ External Dimensions

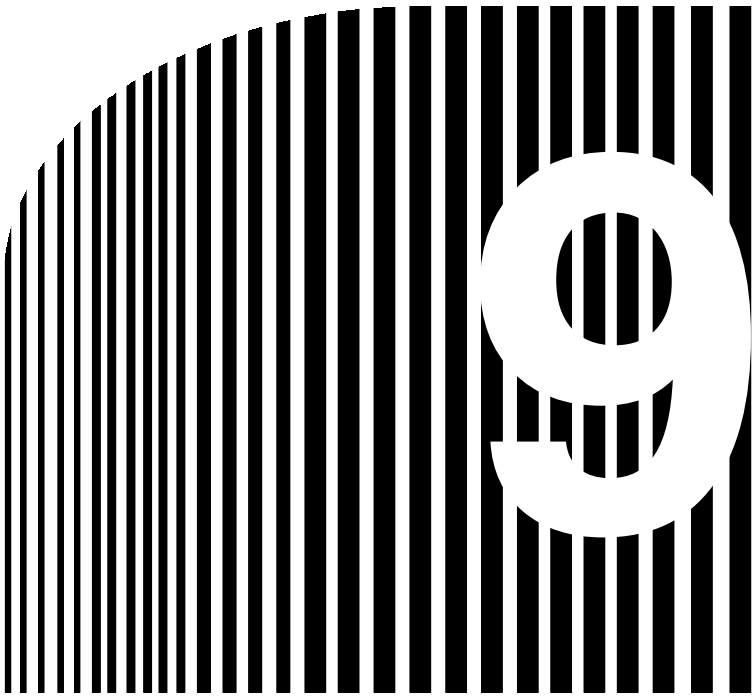
Noise Filters for 3-phase 200-VAC Inverter Models

● 3G3JV-PFI2010-E



● 3G3JV-PFI2020-E

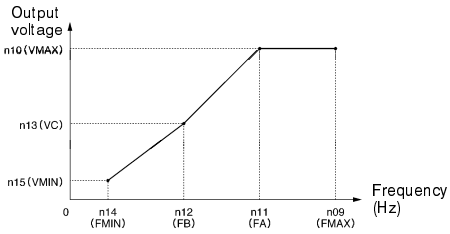




Chapter 9

・List of Parameters・

Parameter No.	Name	Description	Setting range	Unit of setting	Default setting	Changes during operation	Reference page
n01	Parameter write-prohibit selection/parameter initialization	Used to prohibit parameters to be written, sets parameters, or change the monitor range of parameters. Used to initialize parameters to default values. 0: Sets or monitors parameter n01. Parameters n02 through n79 can be monitored only. 1: Sets or monitors parameters n01 through n79. 6: Clears the error log. 8: Initializes parameters to default values in 2-wire sequence. 9: Initializes parameters to default values in 3-wire sequence.	0, 1, 6, 8, 9	1	1	No	5-2
n02	Operation mode selection	Used to select the input method for the RUN and STOP commands in remote mode. 0: The STOP/RESET Key on the digital Operator is enabled. 1: Multi-function inputs through the control circuit terminals in 2- or 3-wire sequence. **Note** The RUN command only through key sequences on the Digital Operator is acceptable in local mode.	0, 1	1	0	No	5-7
n03	Frequency reference selection	Used to set the input method for the frequency reference in remote mode. 0: Digital Operator 1: Frequency reference 1 (n21) 2: Frequency reference control circuit terminal (0 to 10 V) 3: Frequency reference control circuit terminal (4 to 20 mA) 4: Frequency reference control circuit terminal (0 to 20 mA)	0 to 4	1	0	No	5-8
n04	Interruption mode selection	Used to set the stopping method for use when the STOP command is input. 0: Decelerates to stop in preset time. 1: Coasts to stop (with output shut off by the STOP command)	0, 1	1	0	No	5-18
n05	Reverse rotation-prohibit selection	Used to select the operation with the reverse command input. 0: Reverse enabled. 1: Reverse disabled.	0, 1	1	0	No	5-17

Parameter No.	Name	Description	Setting range	Unit of setting	Default setting	Changes during operation	Reference page
n06	STOP/RESET Key function selection	Used to select the stop method in remote mode with n02 for operation mode selection set to 1. 0: STOP/RESET Key of the Digital Operator enabled. 1: STOP/RESET Key of the Digital Operator disabled.	0, 1	1	0	No	5-7
n07	Frequency selection in local mode	Used to set the input method for the frequency reference in local mode. 0: The FREQ adjuster of the Digital Operator enabled. 1: Key sequences on the Digital Operator enabled.	0, 1	1	0	No	5-9
n08	Key sequential frequency setting	Used to enable the Enter Key for setting the frequency reference with the Increment and Decrement Keys. 0: The value is entered with the Enter Key pressed. 1: The value is enabled when the value is input.	0, 1	1	0	No	5-14
n09	Maximum frequency (FMAX)	Used to set the V/f pattern as the basic characteristic of the Inverter with output voltage per frequency set.	50.0 to 400	0.1 Hz (see note)	60.0	No	5-4
n10	Maximum voltage (VMAX)		1 to 255	1 V	200	No	5-4
n11	Maximum voltage frequency (FA)		0.2 to 400	0.1 Hz (see note)	60.0	No	5-4
n12	Middle output frequency (FB)		0.1 to 399	0.1 Hz (see note)	1.5	No	5-4
n13	Middle output frequency voltage (VC)	**Note** Set the parameters so that the following condition will be satisfied. n14 ≦ n12 < n11 ≦ n09	1 to 255	1 V	12	No	5-4
n14	Minimum output frequency (FMIN)	**Note** The value set in n15 will be ignored if parameters n14 and n12 are the same in value.	0.1 to 10.0	0.1 Hz	1.5	No	5-4
n15	Minimum output frequency voltage (VMIN)		1 to 50	1 V	12.0	No	5-4
n16	Acceleration time 1	Acceleration time: The time required to go from 0% to 100% of the maximum frequency.	0.0 to 999	0.1 s	10.0	Yes	5-15
n17	Deceleration time 1	Deceleration time: The time required to go from 100% to 0% of the maximum frequency.			10.0	Yes	5-15
n18	Acceleration time 2	**Note** The actual acceleration or deceleration time is obtained from the following formula. Acceleration/Deceleration time = (Acceleration/Deceleration time set value) × (Frequency reference value) ÷ (Max. frequency)			10.0	Yes	5-15
n19	Deceleration time 2				10.0	Yes	5-15

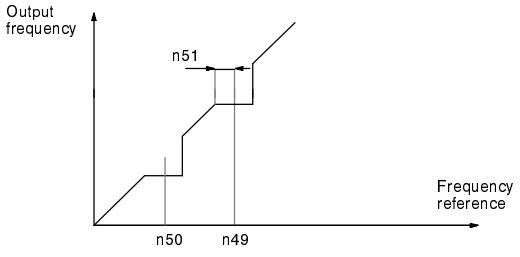
Parameter No.	Name	Description	Setting range	Unit of setting	Default setting	Changes during operation	Reference page
n20	S-shape acceleration/deceleration characteristic	Used to set S-shape acceleration/deceleration characteristics. 0: No S-shape acceleration/deceleration (trapezoidal acceleration/deceleration) 1: S-shape acceleration/deceleration characteristic time 0.2 s 2: S-shape acceleration/deceleration characteristic time 0.5 s 3: S-shape acceleration/deceleration characteristic time 1.0 s **Note** When the S-shape acceleration/deceleration characteristic time is set, the acceleration and deceleration times will be lengthened according to the S-shape at the beginning and end of acceleration/deceleration.	0 to 3	1	0	No	5-16
n21	Frequency reference 1	Used to set internal frequency references. **Note** Frequency reference 1 is enabled in remote mode with n03 for frequency reference selection set to 1. **Note** These frequency references are selected with multi-step speed references (multi-function input). See the reference pages for the relationship between multi-step speed references and frequency references.	0.0 to max. frequency	0.1 Hz (see note)	6.0	Yes	5-11
n22	Frequency reference 2				0.0	Yes	5-11
n23	Frequency reference 3				0.0	Yes	5-11
n24	Frequency reference 4				0.0	Yes	5-11
n25	Frequency reference 5				0.0	Yes	5-11
n26	Frequency reference 6				0.0	Yes	5-11
n27	Frequency reference 7				0.0	Yes	5-11
n28	Frequency reference 8				0.0	Yes	5-11
n29	Inching frequency command	Used to set the inching frequency command. **Note** The inching frequency command is selected with the inching command (multi-function input). The inching frequency command takes precedence over the multi-step speed reference.			6.0	Yes	5-12
n30	Frequency reference upper limit	Used to set the upper and lower frequency reference limits in percentage based on the maximum frequency as 100%. **Note** If n31 is set to a value less than the minimum output frequency (n14), the Inverter will have no output when a frequency reference less than the minimum output frequency input is input.	0 to 110	1%	100	No	5-9
n31	Frequency reference lower limit		0 to 110	1%	0	No	5-9

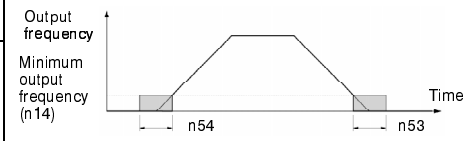
Parameter No.	Name	Description	Setting range	Unit of setting	Default setting	Changes during operation	Reference page
n32	Rated motor current	Used to set the rated motor current for motor overload detection (OL1) based on the rated motor current. **Note** Motor overload detection (OL1) is disabled by setting the parameter to 0.0. **Note** The rated motor current is default to the standard rated current of the maximum applicable motor.	0.0 to 120% of rated output current of the Inverter.	0.1 A	Varies with the capacity.	No	5-3
n33	Motor protection characteristics	Used to set the motor overload detection (OL1) for the electronic thermal characteristics of the motor. 0: Protection characteristics for general-purpose induction motors 1: Protection characteristics for inverter-dedicated motors 2: No protection **Note** If a single Inverter is connected to more than one motor, set the parameter to 2 for no protection. The parameter is also disabled by setting n32 for rated motor to 0.0.	0 to 2	1	0	No	6-15
n34	Motor protective time setting	Used to set the electric thermal characteristics of the motor to be connected in 1-minute increments. **Note** The default setting does not require any changes in normal operation. **Note** To set the parameter according to the characteristics of the motor, check with the motor manufacturer the thermal time constant and set the parameter with some margin. In other words, set the value slightly shorter than the thermal time constant. **Note** To detect motor overloading quicker, reduce the set value, provided that it does not cause any application problems.	1 to 60	1 min	8	No	6-15
n35	Cooling fan operation function	Used to operate the Cooling Fan of the Inverter while the Inverter is turned on or only while the Inverter is in operation. 0: Rotates only while RUN command is input and for 1 minute after Inverter stops operating 1: Rotates while Inverter is turned on **Note** This parameter is available only if the Inverter incorporates a Cooling Fan. **Note** If the operation frequency of the Inverter is low, the life of the fan can be prolonged by setting the parameter to 0.	0, 1	1	0	No	6-16

Parameter No.	Name	Description			Setting range	Unit of setting	Default setting	Changes during operation	Reference page
n36	Multi-function input 1 (Input terminal S2)	Used to select the functions of multi-function input terminals S2 through S5.			2 to 8, 10 to 22	1	2	No	5-19
		Set value	**Function**	**Description**					
n37	Multi-function input 2 (Input terminal S3)	0	Forward/Reverse rotation command	3-wire sequence (to be set in n37 only) By setting n37 to 0, the set value in n36 is ignored and the following setting are forcibly made. S1: RUN input (RUN when ON) S2: STOP input (STOP when OFF) S3: Forward/Reverse rotation command (OFF: Forward; ON: Reverse)	0, 2 to 8, 10 to 22	1	5	No	5-19
n38	Multi-function input 3 (Input terminal S4)				2 to 8, 10 to 22	1	3	No	5-19
n39	Multi-function input 4 (Input terminal S5)				2 to 8, 10 to 22, 34	1	6	No	5-19
		2	Reverse/Stop	Reverse rotation command in 2-wire sequence (Reversed with the terminal turned ON)					
		3	External fault (NO)	ON: External fault (FP□ detection: □ is a terminal number)					
		4	External fault (NC)	OFF: External fault (EF□ detection: □ is a terminal number)					
		5	Fault reset	ON: Fault reset (disabled while RUN command is input)					
		6	Multi-step speed reference 1	Signals to select frequency references 1 through 8. Refer to *5-5-4 Setting Frequency References through Key Sequences* for the relationship between multi-step speed references and frequency references.					
		7	Multi-step speed reference 2						
		8	Multi-step speed reference 3						
		10	Inching frequency command	ON: Inching frequency command (taking precedence over the multi-step speed reference)					
		11	Acceleration/Deceleration time changeover	ON: Acceleration time 2 and deceleration time 2 are selected.					

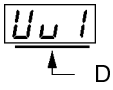
Parameter No.	Name	Description			Setting range	Unit of setting	Default setting	Changes during operation	Reference page
n39	Multi-function input 4 (Input terminal S5)	12	External base block command (NO)	ON: Output shut off (while motor coasting to a stop and “bb” flashing)	2 to 8, 10 to 22, 34	1	6	No	5-19
		13	External base block command (NC)	OFF: Output shut off (with motor free running and “bb” flashing)					
		14	Search command (Searching starts from maximum frequency)	ON: Speed search (Searching starts from n09)					
		15	Search command (Searching starts from preset frequency)	ON: Speed search					
		16	Acceleration/ Deceleration-prohibit command	ON: Acceleration/Deceleration is on hold (running at parameter frequency)					
		17	Local or remote selection	ON: Local mode (operated with the Digital Operator)					
		19	Emergency stop fault (NO)	The Inverter stops according to the setting in n04 for interruption mode selection with the emergency stop input turned ON. NO: Emergency stop with the contact closed. NC: Emergency stop with the contact opened. Fault: Fault output is ON and reset with RESET input. Alarm output is ON (no reset required). “STP” is displayed (lit with fault input ON and flashes with alarm input ON)				
		20	Emergency stop alarm (NO)						
		21	Emergency stop fault (NC)						
		22	Emergency stop alarm (NC)						
		34	Up or down command	Up or down command (set in n39 only) By setting n39 to 34, the set value in n38 is ignored and the following setting are forcibly made. S4: Up command S5: Down command					

<table>
<tr><th>Parameter No.</th><th>Name</th><th colspan="3">Description</th><th>Setting range</th><th>Unit of setting</th><th>Default setting</th><th>Changes during operation</th><th>Reference page</th></tr>
<tr><td rowspan="19">n40</td><td rowspan="19">Multi-function output (MA/MB and MC output terminals)</td><td colspan="3">Used to select the functions of multi-function output terminals.</td><td rowspan="19">0 to 7, 10 to 17</td><td rowspan="19">1</td><td rowspan="19">1</td><td rowspan="19">No</td><td rowspan="19">5-22</td></tr>
<tr><td>Set value</td><td>Function</td><td>Description</td></tr>
<tr><td>0</td><td>Fault output</td><td>ON: Fault output (with protective function working)</td></tr>
<tr><td>1</td><td>Operation in progress</td><td>ON: Operation in progress</td></tr>
<tr><td>2</td><td>Frequency detection</td><td>ON: Frequency detection (with frequency reference coinciding with output frequency)</td></tr>
<tr><td>3</td><td>Idling</td><td>ON: Idling (at less than min. output frequency)</td></tr>
<tr><td>4</td><td>Frequency detection 1</td><td>ON: Output frequency ≧ frequency detection level (n58)</td></tr>
<tr><td>5</td><td>Frequency detection 2</td><td>ON: Output frequency ≦ frequency detection level (n58)</td></tr>
<tr><td>6</td><td>Overtorque being monitored (NO-contact output)</td><td rowspan="2">Output if any of the following parameter conditions is satisfied.
n59: Overtorque detection function selection
n60: Overtorque detection level
n61: Overtorque detection time
NO contact: ON with overtorque being detected
NC contact: OFF with overtorque being detected</td></tr>
<tr><td>7</td><td>Overture being monitored (NC-contact output)</td></tr>
<tr><td>8</td><td rowspan="2">Not used</td><td rowspan="2">---</td></tr>
<tr><td>9</td></tr>
<tr><td>10</td><td>Alarm output</td><td>ON: Alarm being detected (Nonfatal error being detected)</td></tr>
<tr><td>11</td><td>Base block in progress</td><td>Base block in progress (in operation with output shut-off)</td></tr>
<tr><td>12</td><td>RUN mode</td><td>ON: Local mode (with the Digital Operator)</td></tr>
<tr><td>13</td><td>Inverter ready</td><td>ON: Inverter ready to operate (with no fault detected)</td></tr>
<tr><td>14</td><td>Fault retry</td><td>ON: Fault retry</td></tr>
<tr><td>15</td><td>UV in progress</td><td>ON: Undervoltage being monitored</td></tr>
<tr><td>16</td><td>Rotating in reverse direction</td><td>ON: Rotating in reverse direction</td></tr>
<tr><td>17</td><td>Speed search in progress</td><td>ON: Speed search in progress</td></tr>
</table>

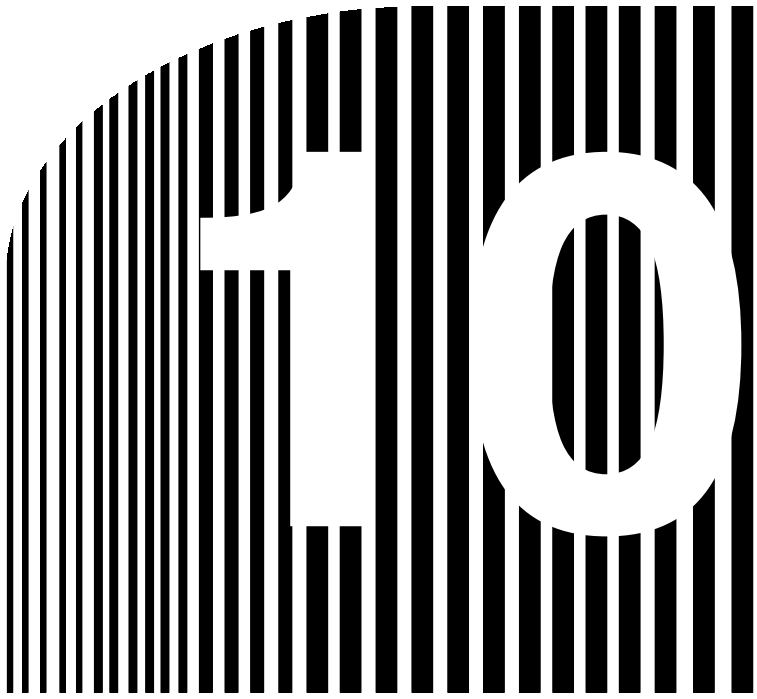
Parameter No.	Name	Description	Setting range	Unit of setting	Default setting	Changes during operation	Reference page
n41	Frequency reference gain	Used to the input characteristics of analog frequency references. Gain: The frequency of maximum analog input (10 V or 20 mA) in percentage based on the maximum frequency as 100%. Bias: The frequency of minimum analog input (0 V or 0 or 4 mA) in percentage based on the maximum frequency as 100%.	0 to 255	1%	100	Yes	5-10
n42	Frequency reference bias		−99 to 99	1%	0	Yes	5-10
n43	Filter time constant settings	Used to set the digital filter with a first-order lag for analog frequency references to be input.	0.00 to 2.00	0.01 s	0.10	No	5-10
n44	Analog motor output	Used to set the output frequency or current as a monitored item. 0: Output frequency (10-V output at max. frequency with n45 set to 1.00). 1: Output current (10-V output with Inverter rated output current with n45 set to 1.00)	0, 1	1	0	No	5-24
n45	Analog monitor output gain	Used to set the output characteristics of analog monitor output.	0.00 to 2.00	0.01	1.00	Yes	5-24
n46	Carrier frequency selection	Used to set the carrier frequency. **Note** The default setting does not need any changes in normal operation. **Note** Refer to *6-1 Setting the Carrier Frequency* for details.	1 to 4, 7 to 9	1	Varies with the capacity.	No	6-2
n47	Momentary power interruption compensation	Used to specify the processing that is performed when a momentary power interruption occurs. 0: Inverter stops operating 1: Inverter continues operating if power interruption is 0.5 s or less. 2: Inverter restarts when power is restored.	0 to 2	1	0	No	6-17
n48	Fault retry	Used to reset and restart the Inverter automatically in the case the Inverter has an overvoltage fault, overcurrent fault, or ground fault.	0 to 10	1	0	No	6-17
n49	Jump frequency 1	Used to set the frequency jump function.  **Note** These values must satisfy the following condition: n49 ≧ n50	0.0 to 400	0.1 Hz (see note)	0.0	No	6-18
n50	Jump frequency 2		0.0 to 400	0.1 Hz (see note)	0.0	No	6-18
n51	Jump width		0.0 to 25.5	0.1 Hz	0.0	No	6-18

Parameter No.	Name	Description	Setting range	Unit of setting	Default setting	Changes during operation	Reference page
n52	DC control current	Used to impose DC on the induction motor for braking control. Set the DC braking current in percentage based on the rated current of the Inverter as 100%. 	0 to 100	1%	50	No	6-5
n53	Interruption DC control time		0.0 to 25.5	0.1 s	0.5	No	6-5
n54	Startup DC control time		0.0 to 25.5	0.1 s	0.0	No	6-5
n55	Stall prevention during deceleration	Used to select a function to change the deceleration time of the motor automatically so that there will be no overvoltage imposed on the motor during deceleration. 0: Stall prevention during deceleration enabled 1: Stall prevention during deceleration disabled	0, 1	1	0	No	6-7
n56	Stall prevention level during acceleration	Used to select a function to stop the acceleration of the motor automatically for stall prevention during acceleration. Set the level in percentage based on the rated current of the Inverter as 100%.	30 to 200	1%	170	No	6-8
n57	Stall prevention level during operation	Used to select a function to reduce the output frequency of the Inverter automatically for stall prevention during operation. Set the level in percentage based on the rated current of the Inverter as 100%.	30 to 200	1%	160	No	6-9
n58	Frequency detection level	Used to set the frequency to be detected. **Note** The parameter n40 for multi-function output must be set for the output of frequency detection levels 1 and 2.	0.0 to 400	0.1 Hz	0.0	No	6-21
n59	Overtorque detection function selection	Used to enable or disable overtorque detection and select the processing method after overtorque detection. 0: Overtorque detection disabled 1: Overtorque detection only when speed coincides and operation continues (issues alarm) 2: Overtorque detection only when speed coincides and output shut off (for protection) 3: Overtorque always detected and operation continues (issues alarm) 4: Overtorque always detected and output shut off (for protection)	0 to 4	1	0	No	6-10
n60	Overtorque detection level	Used to set overtorque detection level. Set the level in percentage based on the rated current of the Inverter as 100%.	30 to 200	1%	160	No	6-11
n61	Overtorque detection time	Used to set the detection time of overtorque.	0.1 to 10.0	0.1 s	0.1	No	6-11

Parameter No.	Name	Description	Setting range	Unit of setting	Default setting	Changes during operation	Reference page
n62	UP/DOWN command frequency memory	Used to store the adjusted frequency reference with the UP/DOWN function. 0: Frequency not stored 1: Frequency stored The frequency must be on hold for 5 s or more.	0, 1	1	0	No	6-22
n63	Torque compensation gain	Used to set the gain of the torque compensation function. The default setting does not need any changes in normal operation.	0.0 to 2.5	0.1	1.0	Yes	6-12
n64	Motor rated slip	Used to set the rated slip value of the motor in use. **Note** Used as the constant of the slip compensation function.	0.0 to 20.0	0.1 Hz	Varies with the capacity.	Yes	6-13
n65	Motor no-load current	Used to set the no-load current of the motor in use based on the rated motor current as 100%. **Note** Used as the constant of the slip compensation function.	0 to 99	1%	Varies with the capacity.	No	6-13
n66	Slip compensation gain	Used to set the gain of the slip compensation function. **Note** The slip compensation function is disabled with n66 set to 0.0.	0.0 to 2.5	0.1	0.0	Yes	6-14
n67	Slip compensation time constant	Used for the response speed of the slip compensation function. **Note** The default setting does not need any changes in normal operation.	0.0 to 25.5	0.1 s	2.0	No	6-14
n68	OMRON's control reference use	Do not change the set value.	---	---	0	---	---
n69	OMRON's control reference use	Do not change the set value.	---	---	0	---	---
n70	OMRON's control reference use	Do not change the set value.	---	---	0	---	---
n71	OMRON's control reference use	Do not change the set value.	---	---	2	---	---
n72	OMRON's control reference use	Do not change the set value.	---	---	0	---	---
n73	OMRON's control reference use	Do not change the set value.	---	---	10	---	---
n74	OMRON's control reference use	Do not change the set value.	---	---	0	---	---
n75	Low-speed carrier frequency reduction selection	Used to select a function to reduce the carrier frequency when Inverter is at low speed. 0: Function disabled 1: Function enabled **Note** Normally set n75 to 0.	0.1	1	0	No	6-4
n76	OMRON's control reference use	Do not change the set value	---	---	rdy	---	---
n77	OMRON's control reference use	Do not change the set value	---	---	0	---	---

Parameter No.	Name	Description	Setting range	Unit of setting	Default setting	Changes during operation	Reference page
n78	Error log	Used to display the latest error recorded.  **Note** "– – –" will be displayed if no error has been recorded. **Note** This parameter is monitored only.	---	---	---	---	6-24
n79	Software number	Used to display the software number of the Inverter for OMRON's control reference use. **Note** This parameter is monitored only.	---	---	---	---	---

Note Values will be set in 0.1-Hz increments if the frequency is less than 100 Hz and 1-Hz increments if the frequency is 100 Hz or over.



Chapter 10

· Using the Inverter for a Motor ·

■ Using Inverter for Existing Standard Motor

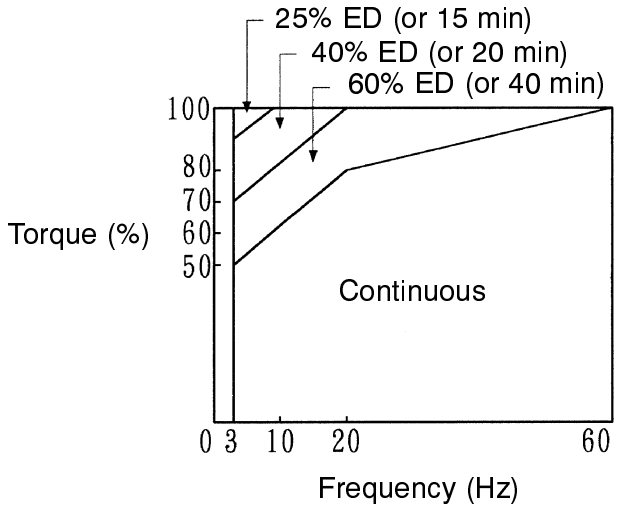
When a standard motor is operated with the Inverter, a power loss is lightly higher than when operated with a commercial power supply.

In addition, cooling effects also decline the low-speed range, resulting in an increase in the motor temperature. Therefore, motor torque should be reduced in the low speed range.

The following figure shows allowable load characteristics of a standard motor.

If 100% torque is continuously required in the low-speed range, use a special motor for use with Inverters.

Allowable Load Characteristics of Standard Motor



● High-speed Operation

When using the motor at high-speed (60 Hz or more), problems may arise in dynamic balance and bearing durability.

● Torque Characteristics

The motor may require more acceleration torque when the motor is operated with the Inverter than when operated with a commercial power supply. Check the load torque characteristics of the machine to be used with the motor to set a proper V/f pattern.

● Vibration

The 3G3JV Series employs high carrier PWM control to reduce motor vibration. When the motor is operated with the Inverter, motor vibration is almost the same as when operated with a commercial power supply.

Motor vibration may, however, become greater in the following cases.

- Resonance with the natural frequency of the mechanical system

  Take special care when a machine that has been operated at a constant speed is to be operated in variable speed mode.

  If resonance occurs, install vibration-proof rubber on the motor base.

- Imbalance rotor

  Take special care when the motor is operated at a high speed (60 Hz or more).

● Noise

Noise is almost the same as when the motor is operated with a commercial power supply. Motor noise, however, becomes louder when the motor is operated at a speed higher than the rated speed (60 Hz).

■ Using Inverter for Special Motors

● Pole-changing Motor

The rated input current of pole-changing motors differs from that of standard motors. Select, therefore, an appropriate Inverter according to the maximum input current of the motor to be used.

Before changing the number of poles, always make sure that the motor has stopped.

Otherwise, the overvoltage protective or overcurrent protective mechanism will be actuated, resulting in an error.

● Submersible Motor

The rated input current of submersible motors is higher than that of standard motors. Therefore, always select an Inverter by checking its rated output current.

When the distance between the motor and Inverter is long, use a cable thick enough to connect the motor and Inverter to prevent motor torque reduction.

● Explosion-proof Motor

When an explosion-proof motor or increased safety-type motor is to be used, it must be subject to an explosion-proof test in conjunction with the Inverter. This is also applicable when an existing explosion-proof motor is to be operated with the Inverter.

● Gearmotor

The speed range for continuous operation differs according to the lubrication method and motor manufacturer. In particular, the continuous operation of an oil-lubricated motor in the low speed range may result in burning. If the motor is to be operated at a speed higher than 60 Hz, consult with the manufacturer.

● Synchronous Motor

A synchronous motor is not suitable for Inverter control.

If a group of synchronous motors is individually turned on and off, synchronism may be lost.

● Single-phase Motor

Do not use the Inverter for a single-phase motor.

The motor should be replaced with a 3-phase motor.

■ Power Transmission Mechanism (Speed Reducers, Belts, and Chains)

If an oil-lubricated gear box or speed reducer is used in the power transmission mechanism, oil lubrication will be affected when the motor operates only in the low speed range. The power transmission mechanism will make noise and experience problems with service life and durability if the motor is operated at a speed higher than 60 Hz.

■ Motor Burnout Caused by Insufficient Dielectric Strength of Each Phase of Motor

Surge occurs among the phases of the motor when the output voltage is switched.

If the dielectric strength of each phase of the motor is insufficient, the motor may burn out.

The dielectric strength of each phase of the motor must be higher than the maximum surge voltage. Normally, the maximum surge voltage is approximately three times the power voltage imposed on the Inverter.

Revision History

A manual revision code appears as a suffix to the catalog number on the front cover of the manual.

The following table outlines the changes made to the manual during each revision. Page numbers refer to the previous version.

Revision code	Date	Revised content
1	May 1999	Original production