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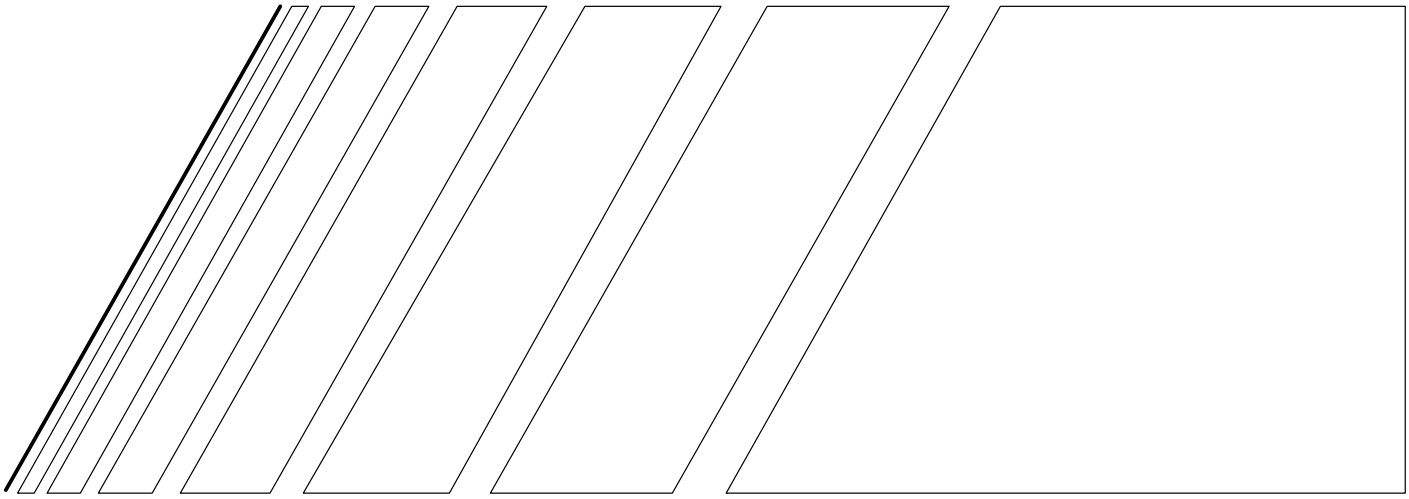

# USER'S MANUAL

# SYSDRIVE 3G3EV SERIES

(Standard Models)

## Compact Low-noise Inverter

Thank you for choosing this SYSDRIVE 3G3EV-series product. Proper use and handling of the product will ensure proper product performance, will length product life, and may prevent possible accidents.
Please read this manual thoroughly and handle and operate the product with care.

## NOTICE

1. This manual describes the functions of the product and relations with other products. You should assume that anything not described in this manual is not possible.
2. Although care has been given in documenting the product, please contact your OMRON representative if you have any suggestions on improving this manual.
3. The product contains potentially dangerous parts under the cover. Do not attempt to open the cover under any circumstances. Doing so may result in injury or death and may damage the product. Never attempt to repair or disassemble the product.
4. We recommend that you add the following precautions to any instruction manuals you prepare for the system into which the product is being installed.
   - Precautions on the dangers of high-voltage equipment.
   - Precautions on touching the terminals of the product even after power has been turned off. (These terminals are live even with the power turned off.)
5. Specifications and functions may be changed without notice in order to improve product performance.

## Items to Check Before Unpacking

Check the following items before removing the product from the package:

- Has the correct product been delivered (i.e., the correct model number and specifications)?
- Has the product been damaged in shipping?
- Are any screws or bolts loose?

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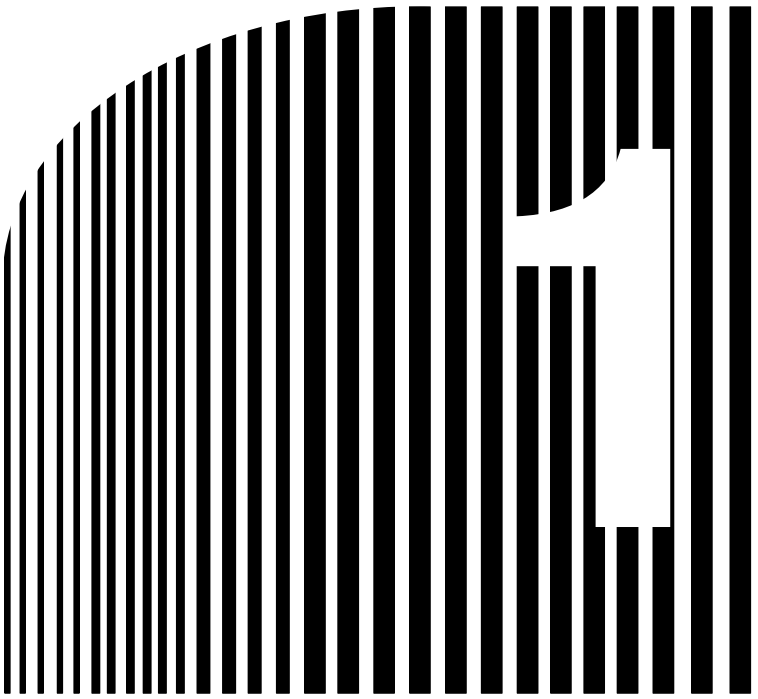


# Chapter 1

## · Getting Started ·

1-1 Items to be Checked when Unpacking
1-2 Precautions

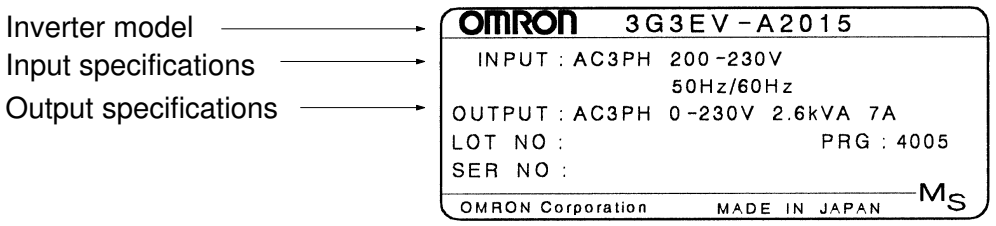
# 1-1 Items to be Checked when Unpacking

## ■ Checking the Product

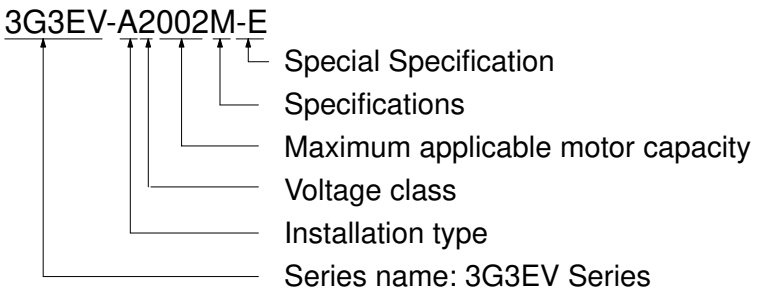
On delivery, always check that the delivered product is the SYSDRIVE 3G3EV Inverter that you ordered.

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

### ● Checking the Nameplate




### ● Checking the Model




### Specifications

| | |
|---|---|
| Blank | Standard model |
| M | Multi-function model |
| R | SYSMAC BUS model |

### Maximum Applicable Motor Capacity

| | |
|---|---|
| 001 | 0.1 kW |
| 002 | 0.2 (0.37) kW |
| 004 | 0.4 (0.55) kW |
| 007 | 0.75 (1.1) kW |
| 015 | 1.5 kW |

**Note** The figures in parentheses indicate capacities for 400-VAC class models.

**Voltage Class**

| | |
|---|---|
| 2 | Three-phase 200-VAC input |
| B | Single/Three-phase 200-VAC input |

**Installation Type/Option**

| | |
|---|---|
| A | Panel mounting |
| P | Option |

**Special Specification**

| | |
|---|---|
| -E | English Models |
| -CUE | UL/CUL and EC Directives Models |
| Blank | Japanese Models |

### ● Checking for Damage

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

### ■ Checking Accessories

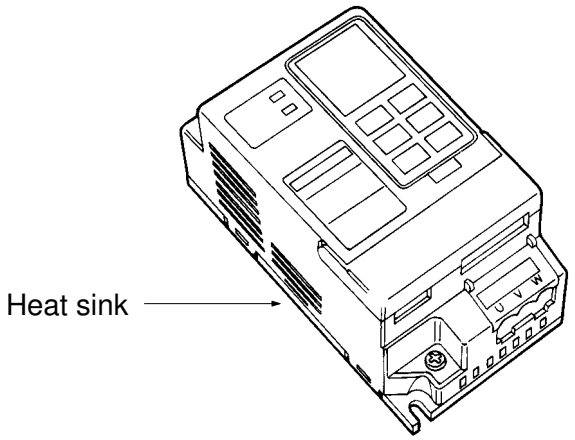
Note that this manual is the only accessory provided with the 3G3EV (Standard Model). Set screws and other necessary parts must be prepared by customers.

## 1-2 Precautions

To ensure safe operation of the 3G3EV, note the following items:

### ■ Always Hold the Heat Sink During Removal.

When moving the 3G3EV, always hold the heat sink (aluminum portion on the rear of the Unit).




### ■ Watch Out for Residual Voltage On Charged Portions

After the power is turned off, residual voltage remains in the capacitor inside the Inverter. Therefore, touching terminals immediately after turning the power off may cause an electrical shock.

If an inspection or some other task is to be performed, always wait at least one minute from the time all indicators on the front panel go off.

(Note that this warning is applicable whenever you perform any task after turning the main circuit off.)

## ■ Do Not Remove the Digital Operator When the Main Circuit is Still On.

Always turn the main circuit off before removing the digital operator.

Removing the digital operator with the main circuit ON may cause an electrical shock and damage the equipment.

## ■ Do Not Modify Wiring or Check Signals When the Main Circuit is On.

Always turn the main circuit off before modifying wiring or checking signals.

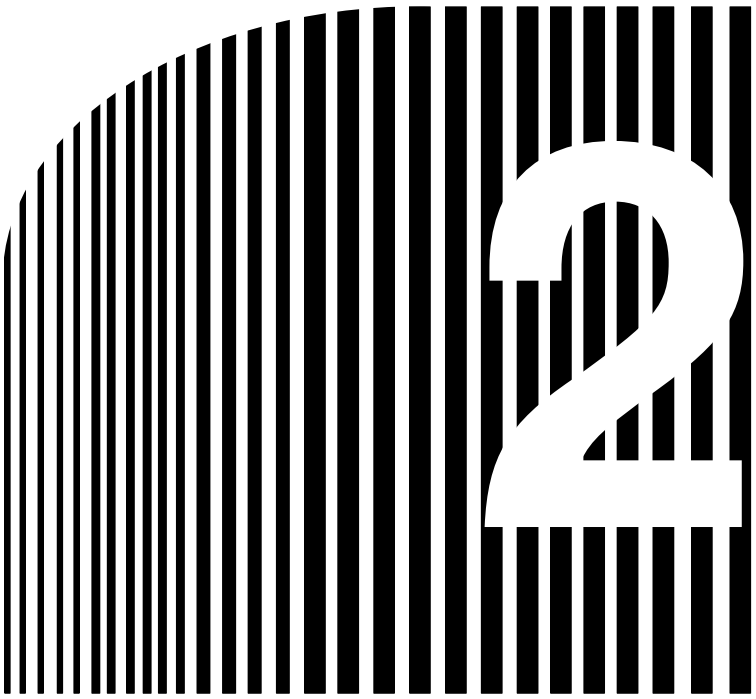
Touching terminals while the main circuit is on may cause an electrical shock and damage the equipment.

## ■ Do Not Conduct a Dielectric Strength Test.

Because the 3G3EV Inverter is an electronic control unit using semiconductor, never conduct a dielectric strength test or an insulation resistance test for the control circuit.

## ■ Modify Constant Settings Correctly.

Always modify the constant settings according to the procedures described in this manual.

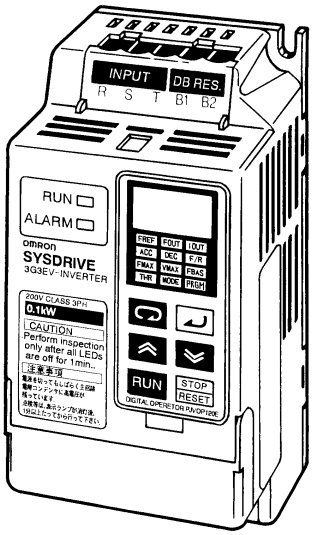


# Chapter 2

## · Overview ·

2-1 Features
2-2 Component Names

# 2-1 Features




## ■ Easy to Use

### ● Basic Constants Displayed On Indicators

Constants for basic operations such as frequency setting and acceleration/deceleration time setting are displayed on dedicated indicators. Therefore, constant numbers can be confirmed easily.

### ● Minimum Constant Setting Items

Constant setting items have been minimized to enable even first-time users to set constants easily.

## ■ Easy to Install

### ● Very Small and Lightweight

The 3G3EV Inverter is approximately half the size of our Low-noise General-purpose Inverters in terms of volume and weight percentage. This improves space efficiency and operating efficiency (including easier removal).

### ● Optional DIN Track

An optional DIN track is available. This DIN track enables the user to mount the 3G3EV Inverter on the DIN track with a one-touch operation.

## ■ Easy to Wire

### ● Easy Wiring without Having to Open the Front Cover

This Inverter can be wired just by opening the terminal block cover.

### ● Separate Input and Output Terminal Blocks

Power input terminals are located in the upper section, while motor output terminals are in the lower section. In this way, the input and output terminal blocks are separated according to the contactors, so incorrect wiring can be prevented.

### ● Soldering No Longer Necessary

No connector means no soldering.

## ■ Easy to Operate

### ● Switching the Operation Mode with a One-touch Operation

For example, after a test run is performed using the Digital Operator, it can be easily switched to a production run using control terminals with a one-touch operation.

### ● Checking a Test Run with Various Monitors

Output frequency, output current, and the direction of motor rotation appear in the display section of the Digital Operator, so the mechanical system can be easily monitored during a test run.

## ■ Low Noise

An insulated gate bipolar transistor (IGBT) power element has been adopted to eliminate metallic noise.

## ■ High-torque Operation Even in Low Speed Range

A torque rate of 150% can be achieved even in a low speed range where output frequency is only 3 Hz. Thus, acceleration time can be reduced.

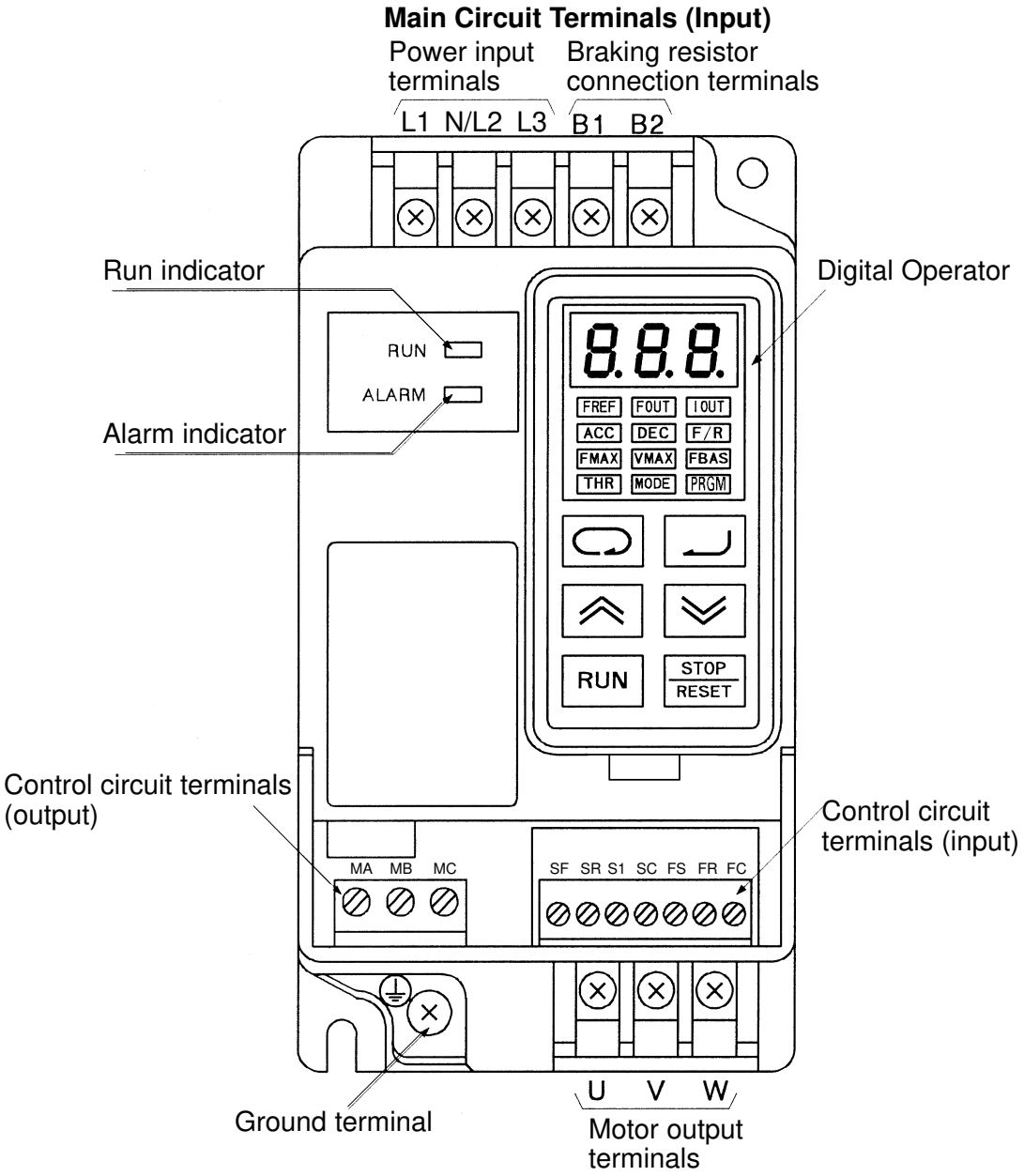
## ■ Various Input Power Supplies

A 400-VAC-class Inverter has been newly added to the 3G3EV Series to cope with various power supplies.

- Three-phase 200-VAC input: 0.1 to 1.5 kW
- Single/Three-phase 200-VAC input: 0.1 to 1.5 kW
- Three-phase 400-VAC input: 0.2 to 1.5 kW

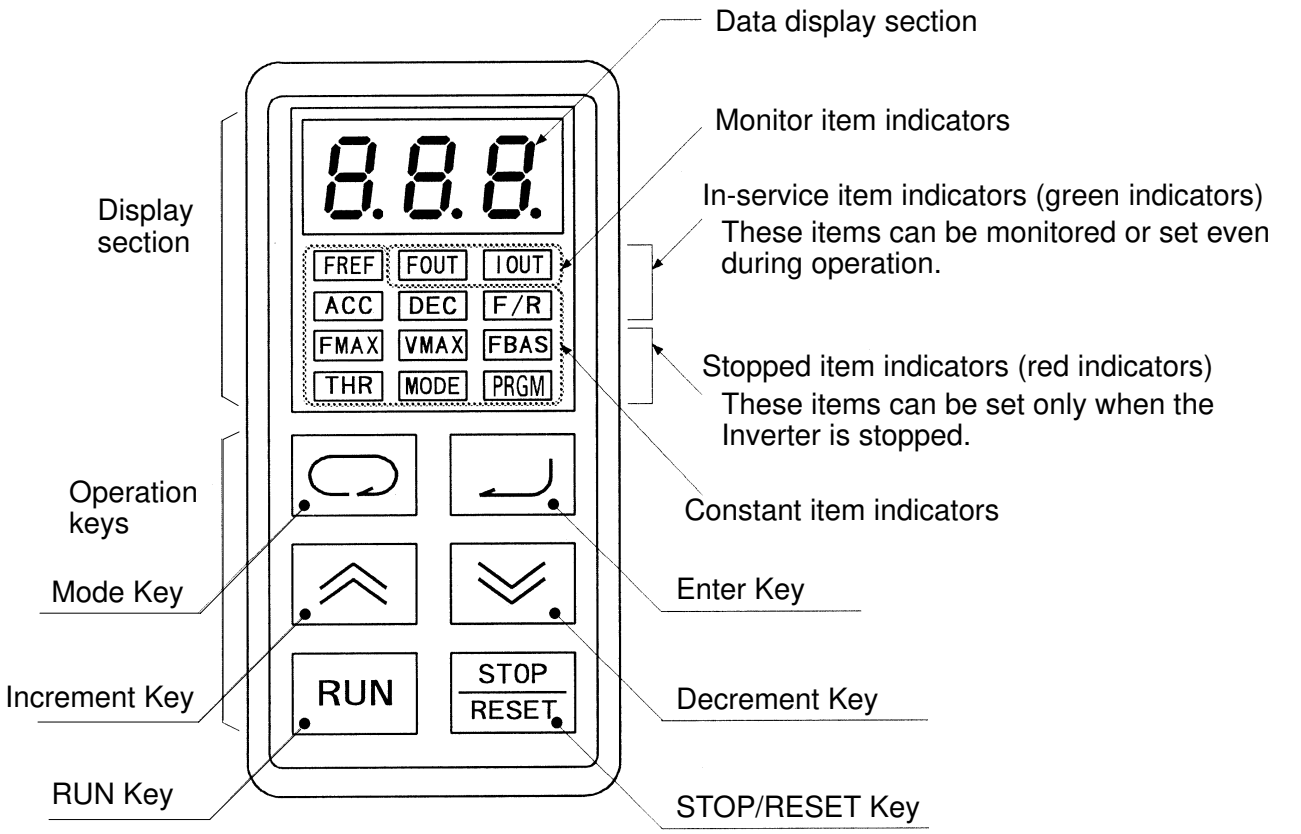
# 2-2 Component Names

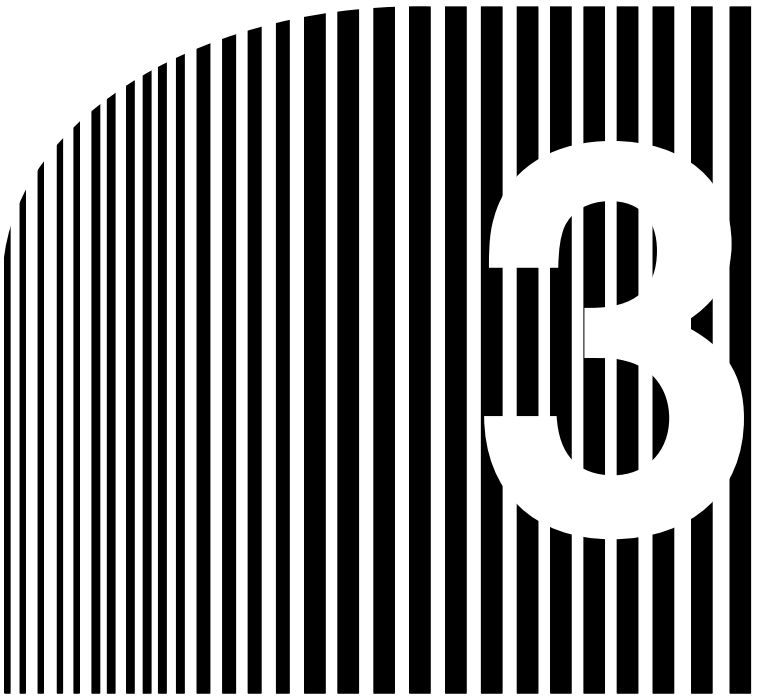
## ■ Main Unit




**Note** This diagram shows the Inverter with all terminal block covers removed.

## ■ Digital Operator





# Chapter 3

## · Design ·

3-1 Installation
3-2 Wiring

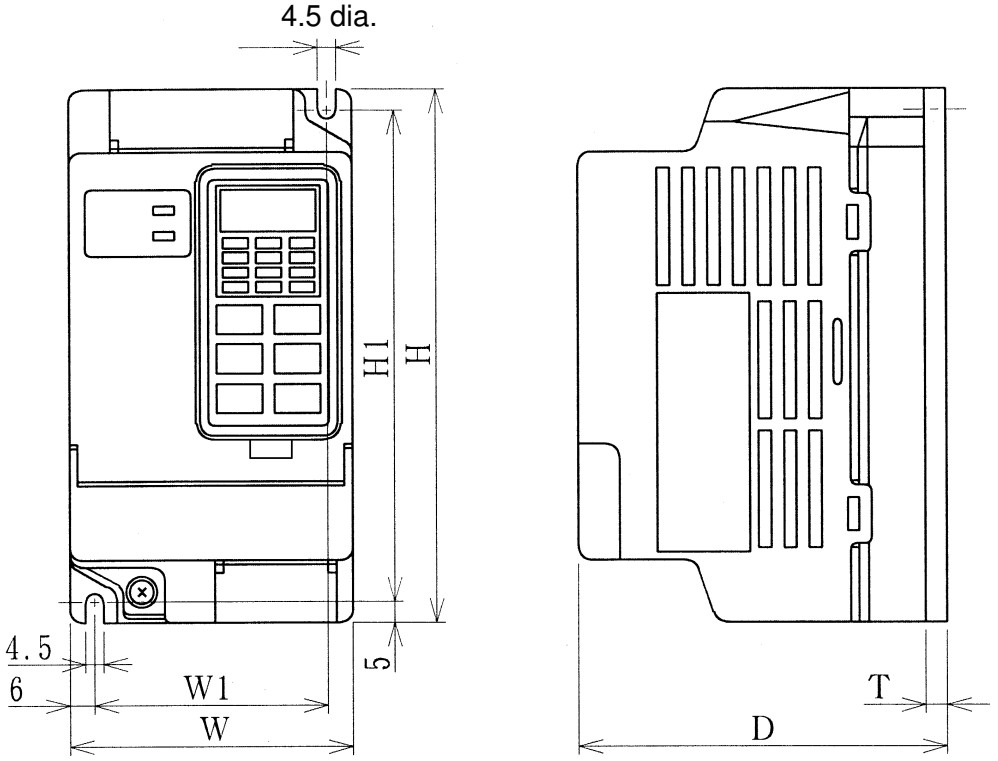
# 3-1 Installation

## 3-1-1 Outside/Mounting Dimensions

**Note** All dimensions are in millimeters.

### ■ 3G3EV-A2001(-□) to 3G3EV-A2004(-□) (0.1 to 0.4 kW): Three-phase 200-VAC Input

### ■ 3G3EV-AB001(-□) to 3G3EV-AB002(-□) (0.1 to 0.2 kW): Single/Three-phase 200-VAC Input




**Note 1.** For the 3G3EV-A2001(-□), 3G3EV-A2002(-□), and 3G3EV-AB001(-□), a U-shaped notch (4.5 mm wide) is provided instead of the upper mounting hole (4.5 mm in diameter).

**Note 2.** Install the Inverter with two M4 bolts.

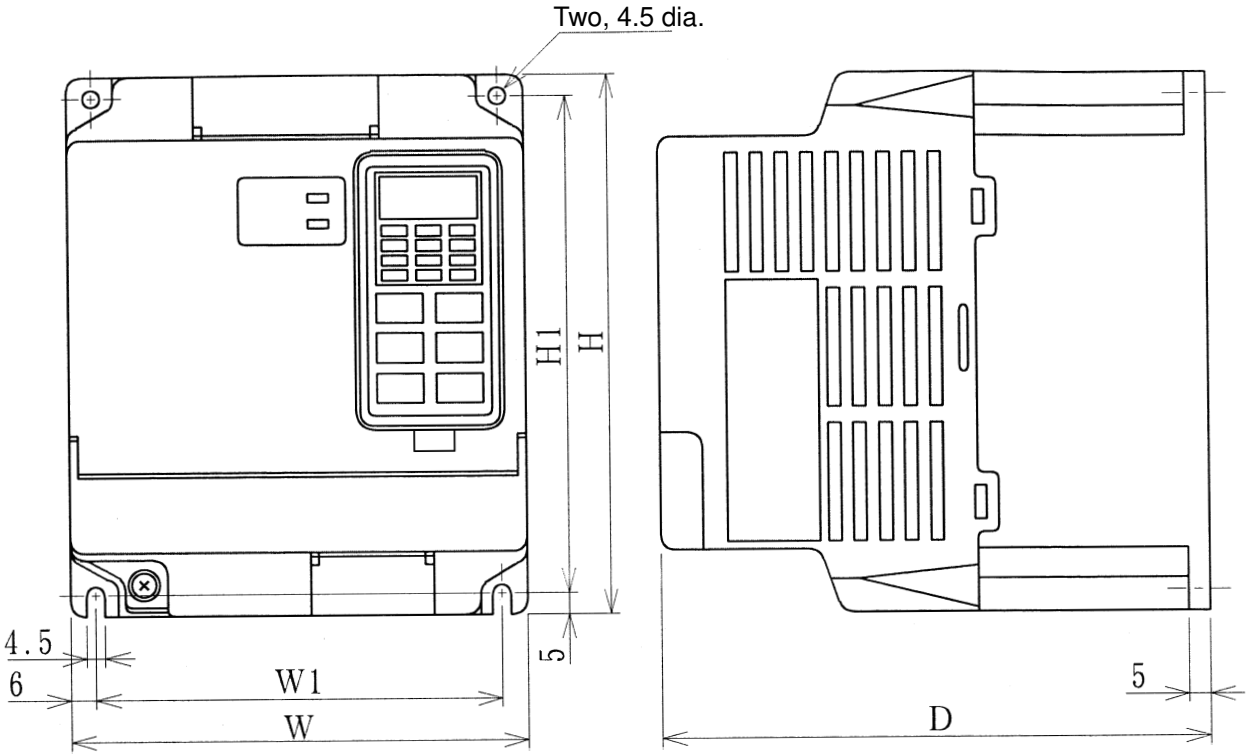
## ● Three-phase 200-VAC Input Model

| 3G3EV model | Output | W | H | D | W1 | H1 | T | Weight (kg) |
|---|---|---|---|---|---|---|---|---|
| A2001(-□) | 0.1 kW | 68 | 128 | 75 | 56 | 118 | 3 | Approx. 0.5 |
| A2002(-□) | 0.2 kW | | | 88 | | | 3 | Approx. 0.6 |
| A2004(-□) | 0.4 kW | | | 110 | | | 5 | Approx. 0.9 |

## ● Single/Three-phase 200-VAC Input Model

| 3G3EV model | Output | W | H | D | W1 | H1 | T | Weight (kg) |
|---|---|---|---|---|---|---|---|---|
| AB001(-□) | 0.1 kW | 68 | 128 | 75 | 56 | 118 | 3 | Approx. 0.5 |
| AB002(-□) | 0.2 kW | | | 108 | | | 3 | Approx. 0.6 |

## ■ 3G3EV-A2007(-□) to 3G3EV-A2015(-□) (0.75 to 1.5 kW): Three-phase 200-VAC Input
## 3G3EV-AB004(-□) to 3G3EV-AB015(-□) (0.4 to 1.5 kW): Single/Three-phase 200-VAC Input
## 3G3EV-A4002(-□) to 3G3EV-A4015(-□) (0.2 to 1.5 kW): Three-phase 400-VAC Input




**Note** Install the Inverter with four M4 bolts.

### ● Three-phase 200-VAC Input Model

| 3G3EV model | Output | W | H | D | W1 | H1 | Weight (kg) |
|---|---|---|---|---|---|---|---|
| A2007(-□) | 0.75 kW | 108 | 128 | 130 | 96 | 118 | Approx. 1.3 |
| A2015(-□) | 1.5 kW | | | 155 | | | Approx. 1.5 |

### ● Single/Three-phase 200-VAC Input Model

| 3G3EV model | Output | W | H | D | W1 | H1 | Weight (kg) |
|---|---|---|---|---|---|---|---|
| AB004(-□) | 0.4 kW | 108 | 128 | 130 | 96 | 118 | Approx. 1.3 |
| AB007(-□) | 0.75 kW | | | | | | Approx. 1.3 |
| AB015(-□) | 1.5 kW | 130 | | 170 | 118 | | Approx. 2.0 |

**• Three-phase 400-VAC Input Model**

| 3G3EV model | Output | W | H | D | W1 | H1 | Weight (kg) |
|---|---|---|---|---|---|---|---|
| A4002(-□) | 0.2 kW | 108 | 128 | 92 | 96 | 118 | Approx. 1.0 |
| A4004(-□) | 0.4 kW | | | 110 | | | Approx. 1.0 |
| A4007(-□) | 0.75 kW | | | 140 | | | Approx. 1.5 |
| A4015(-□) | 1.5 kW | 130 | | 170 | 118 | | Approx. 2.0 |

## 3-1-2 Installation Conditions

### ■ Installation Site

- Install the Inverter under the following conditions:

  Ambient temperature for operation: –10°C to 50°C
  Humidity: 90% RH or less (non-condensing)

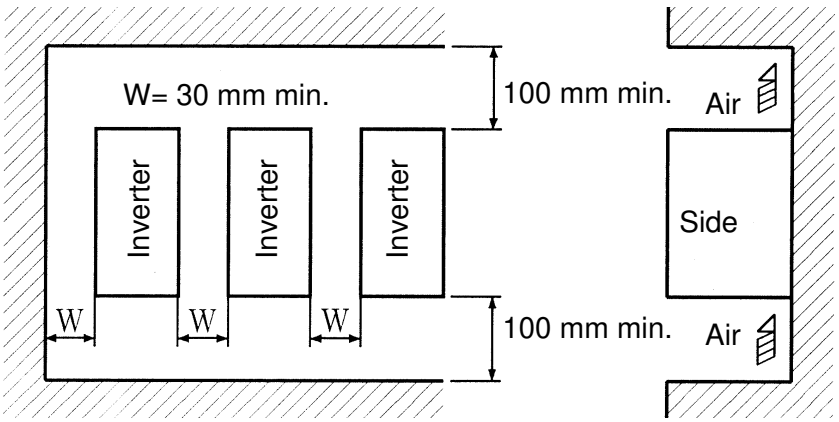
- Install the Inverter in a clean location free from oil mist and dust. Alternatively, install it in a totally enclosed panel that is completely shielded from suspended dust.
- When installing or operating the Inverter, always take special care so that metal powder, oil, water, or other foreign matter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

### ■ Direction of Installation

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

### ■ Installation Space

- When installing the Inverter, always provide the following installation space 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 rises.
- 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 surface temperature of the Inverter may reach 30°C higher than the ambient temperature. Therefore, keep all thermally susceptible devices and wires away from the Inverter.

## ■ Protecting the Inverter from Foreign Matter during Installation

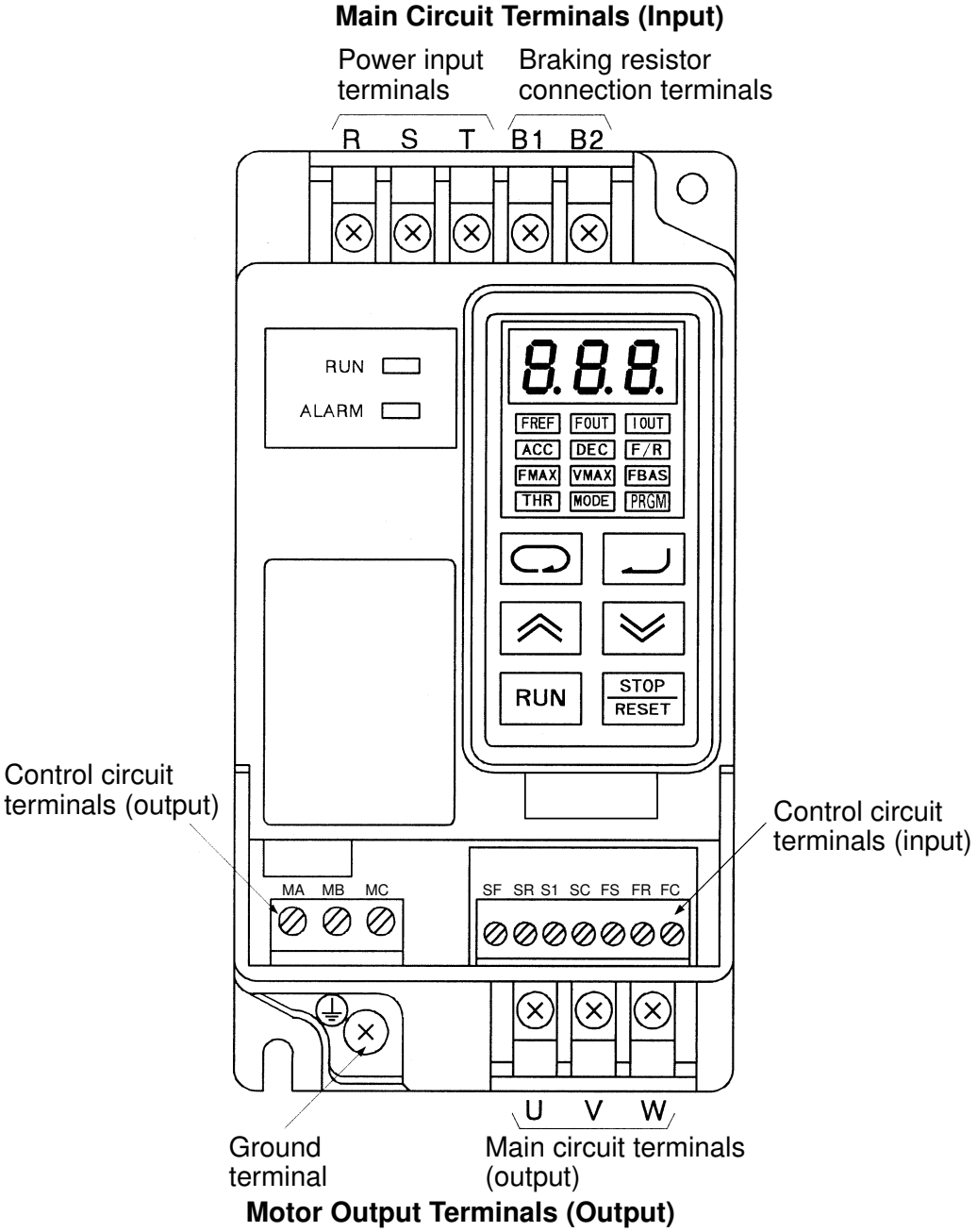
- Place a cover over the Inverter to shield it from metal powder produced by drilling during installation.

  (Upon completion of installation, always remove the cover from the Inverter. Otherwise, ventilation will be affected, causing the invert to overheat.)

# 3-2 Wiring

## 3-2-1 Terminal Blocks

### ■ Name of Each Terminal Block




**Note** This diagram shows an Inverter with all terminal block covers removed.

## ■ Main Circuit Terminals

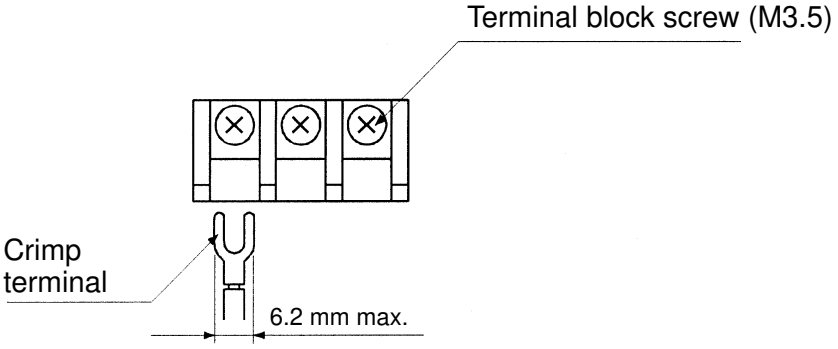
### ● Input Terminals (Top Section)

| Terminal symbol | Name and description |
|---|---|
| R (L1)<br>S (L2/N)<br>T (L3) | **Power input terminals**<br>A2□: Three-phase 200 to 230 VAC, 50/60 Hz<br>AB□: Single-phase 200 to 240 VAC, 50/60 Hz<br>Three-phase 200 to 230 VAC, 50/60 Hz<br>A4□: Three-phase 380 to 460 VAC, 50/60 Hz<br>**Note:** Single-phase power must be input between terminals R to S. |
| B1<br>B2 | **Braking resistor connection terminals (see note)**<br>Terminals for connecting an optional braking resistor |

**Note** Before shipping, a resin plate is attached to each braking resistor connection terminal to prevent incorrect wiring.
When connecting a braking resistor, always remove the resin plates with a pair of long-nose pliers.

### ● Output Terminals (Bottom Section)

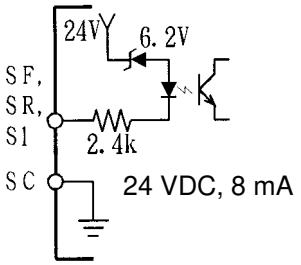
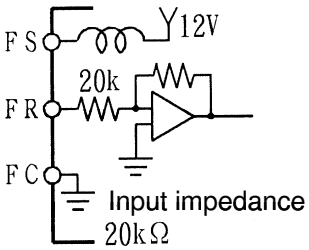
| Terminal symbol | Name and description |
|---|---|
| U<br>V<br>W | **Motor output terminals**<br>Three-phase power output terminals for operating the motor. (Never connect an AC power supply to these terminals.)<br>A2□, AB□: Three-phase 200 to 230 VAC<br>A4□: Three-phase 380 to 460 VAC<br>**Note:** Depending on input voltage |
| ⏚ | **Ground terminal**<br>Always use a ground terminal with one of the following ground resistances:<br>100 Ω or less for 200-VAC class<br>10 Ω or less for 400-VAC class.<br>(Connect also to the power supply neutral to conform to the EC Directives.)<br>Be sure to connect a grounding line to the FG terminal and also connect directly to the FG terminal of the motor. |



## ■ Control Circuit Terminals

### ● Input Terminals (On Right-hand Side)

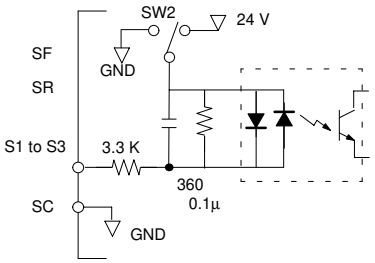
No external power supply is required because a built-in power supply is provided.

| Terminal symbol | Name and description | Interface |
|---|---|---|
| SF | **Forward/Stop**<br>When the terminal is ON, the motor rotates in the forward direction. When the terminal is OFF, the motor stops. |  <br>(See note 3) |
| SR | **Reverse/Stop**<br>When the terminal is ON, the motor reverses. When the terminal is OFF, the motor stops. | |
| S1 | **Multi-function input (see note 1)** | |
| SC | **Sequence input common**<br>Input terminal common to SF, SR, and S1 | |
| FS | **Frequency reference power supply**<br>Output voltage: 12 VDC<br>Permissible amperage: 20 mA |  |
| FR | **Frequency reference input (see note 2)**<br>0 to 10 VDC is input. | |
| FC | **Frequency reference common** | |

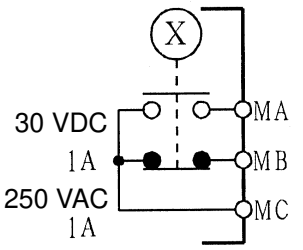
**Note 1.** Constant No. 06 (n06) is used to set this function. This constant is factory-set to "fault reset."

**Note 2.** FR can be switched to an amperage input terminal (4 to 20 mA) by setting the internal DIP switch and constant No. 02 (operation mode selection). For details, refer to *7-2 Frequency Reference by Amperage Input*.

**Note 3.** The circuit for a 400-VAC-class Inverter is as shown below.



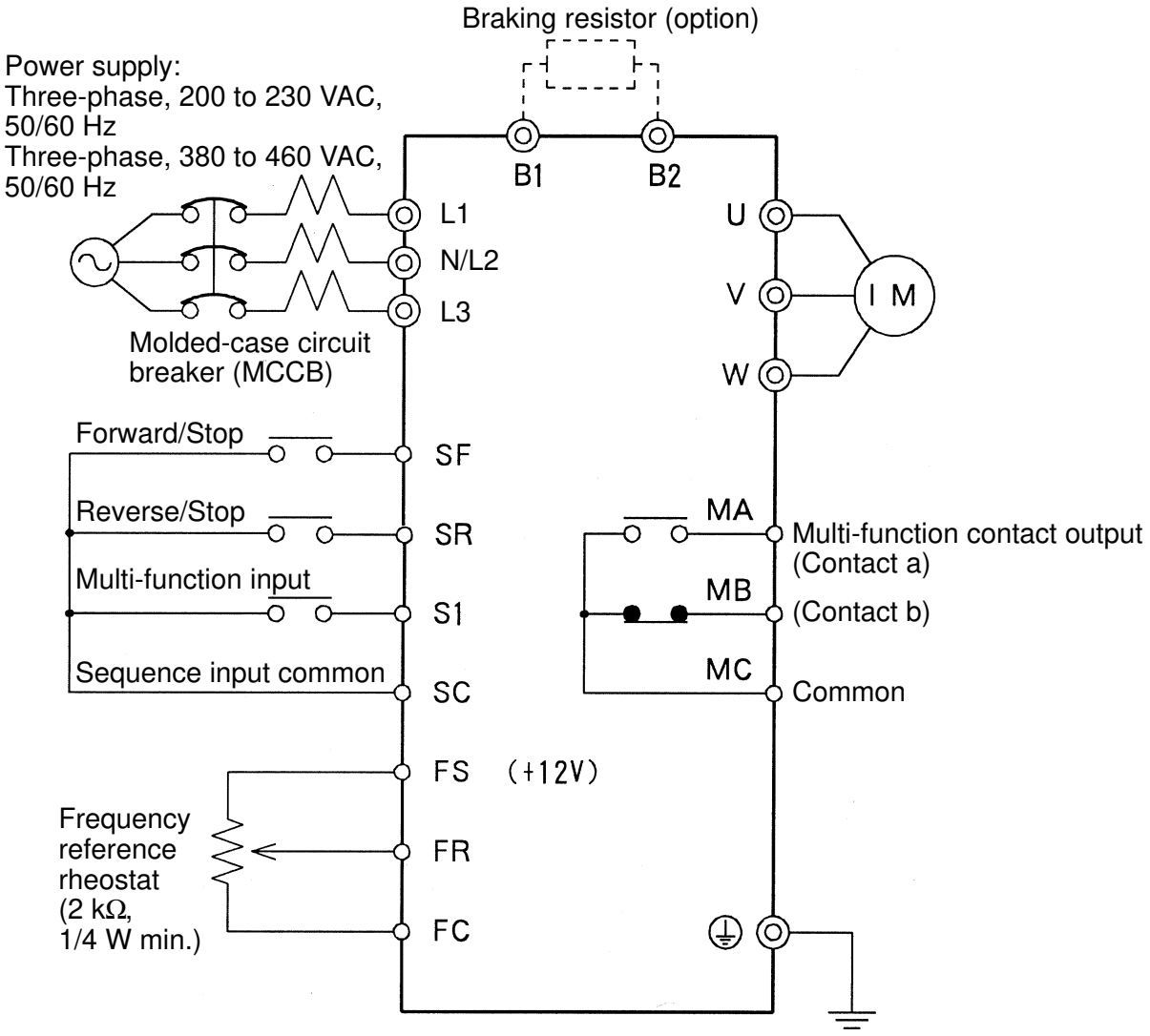
### ● Output Terminals (On Left-hand Side)

| Terminal symbol | Name and description | Interface |
|---|---|---|
| MA | **Multi-function contact output (contact a) (see note)** |  |
| MB | **Multi-function contact output (contact b) (see note)** | |
| MC | **Multi-function contact output (common)** | |



**Note** Constant No. 09 (n09) is used to set the function. This constant is factory set to "operation in progress."

## ■ Standard Connection Diagram



**Note 1.** If a 3G3EV-AB□□□ is used in single-phase input mode, single-phase 200 to 240 VAC power with a frequency of 50/60 Hz must be input between terminals R and S.

**Note 2.** For the 3-wire sequence, refer to the wiring on page 4-12.

**Note 3.** The input sequence power is built in.

## 3-2-2 Wiring Around the Main Circuit

System reliability and noise resistance are affected by the wiring method used. Therefore, always follow the instructions given below when connecting the Inverter to peripheral devices and other parts.

### ■ Wire Size and Molded-Case Circuit Breaker to be Used

For the main circuit and ground, always use 600-V polyvinyl chloride (PVC) cables.

If the cable is long and may cause voltage drops, increase the wire size according to the cable length.

| Model | Terminal symbol | Terminal screw | Wire size ($mm^2$) | Molded-case circuit breaker capacity (A) |
|---|---|---|---|---|
| 3G3EV-A2001(-□) | R S T B1 B2 | M3.5 | 0.75 to 2 | 10 |
| 3G3EV-AB001(-□) | U V W ⏚ | | | 5 |
| 3G3EV-A2002(-□) | R S T B1 B2 | M3.5 | 0.75 to 2 | 5 |
| 3G3EV-AB002(-□) | U V W ⏚ | | | |
| 3G3EV-A4002(-□) | | | | |
| 3G3EV-A2004(-□) | R S T B1 B2 | M3.5 | 0.75 to 2 | 5 |
| 3G3EV-AB004(-□) | U V W ⏚ | | | |
| 3G3EV-A4004(-□) | | | | |
| 3G3EV-A2007(-□) | R S T B1 B2 | M3.5 | 0.75 to 2 | 10 |
| 3G3EV-AB007(-□) | U V W ⏚ | | | 20 |
| 3G3EV-A4007(-□) | | | | 5 |
| 3G3EV-A2015(-□) | R S T B1 B2 | M3.5 | 0.75 to 2 | 10 |
| 3G3EV-AB015(-□) | U V W ⏚ | | 1.25 to 2 | 20 |
| 3G3EV-A4015(-□) | | | 0.75 to 2 | 10 |

**Note** Tighten the M3.5 terminal screw to the torque of 0.8 N • m.

### Determining the Wire Size

Determine the wire size for the main circuit so that line voltage drop is within 2% of the rated voltage.

Line voltage drop $V_D$ is calculated as follows:

$V_D$ (V) = $\sqrt{3}$ x wire resistance (Ω/km) x wire length (m) x amperage (A) x $10^{-3}$

## ■ Wiring on the Input Side of Main Circuit

### ● Installing a Molded-case Circuit Breaker

Always connect the power input terminals (R, S, and T) and power supply via a molded-case circuit breaker. Power must be supplied instantaneously. Unstable power startup will not start the Inverter.

### ● Installing a Ground Fault Interrupter

If a ground fault interrupter is to be connected to the wire on the primary side (R, S, and T) of the main circuit, use either of the following interrupters to prevent malfunctions:

- Ground fault interrupter with a sensitivity amperage of 200 mA or more and with an operating time of 0.1 second or more
- Ground fault interrupter with high-frequency countermeasures (for Inverter)

### ● Installing a Magnetic Contactor

This Inverter can be used without a magnetic contactor (MC) on the power supply side.

If the power supply for 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.

However, when a magnetic contactor is installed on the primary side of the main circuit to forcibly stop a load, note that 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. Note, however, that frequently opening and closing the magnetic contactor may cause the Inverter to break down.
- When the Inverter is operated with a Digital Operator, automatic operation cannot be performed after recovery from a power interruption.

### ● Connecting Input Power Supply to the Terminal Block

Because the phase sequence of input power supply is irrelevant to the phase sequence (R, S, T) of the terminal block, input power supply can be connected to any terminal on the terminal block.