



# YASKAWA AC Drive-V1000

## Compact Vector Control Drive

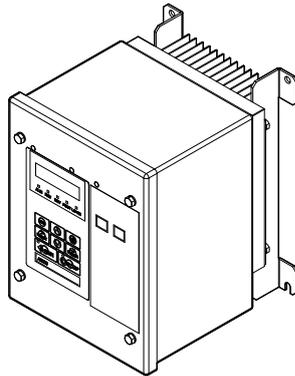
### NEMA Type 4X/IP66 Installation Manual

Type: CIMR-V□□□□□□□□□□

Models: 200 V Class, Three-Phase Input: 0.1 to 18.5 kW  
200 V Class, Single-Phase Input: 0.1 to 3.0 kW  
400 V Class, Three-Phase Input: 0.2 to 18.5 kW

To properly use the product, read this manual thoroughly and retain for easy reference, inspection, and maintenance. Ensure the end user receives this manual.

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MANUAL NO. TOBP C710606 35C



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# 1 Preface and Safety

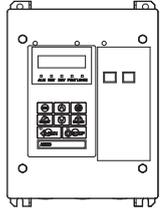
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# 1 Preface and Safety

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## ◆ Applicable Documentation

This manual provides instructions on installing the V1000 NEMA Type 4X/IP66 drive. For more specific information on the operation of this product, refer to the other manuals listed in the following table:

|  |   |
|--|---|
|    | <b>Yaskawa AC Drive - V1000 NEMA Type 4X/IP66 Installation Manual<br/>Manual No.: TOBPC71060635</b>   |
|  | This manual contains basic information required to install the V1000 NEMA Type 4X/IP66 drive. Carefully review this manual along with the Quick Start Guide accompanying the <b>NEMA Type 4X/IP66</b> . |
|  | <b>Yaskawa AC Drive - V1000 Technical Manual</b>  |
|  | This manual describes installation, wiring, operation procedures, functions, troubleshooting, maintenance, and inspections to perform before operation.   |
|  | <b>Yaskawa AC Drive - V1000 Quick Start Guide</b>   |
| This guide is packaged together with the product. It contains basic information required to install and wire the drive. This guide provides basic programming and simple setup and adjustment. |   |

## ◆ Terms

**Note:** Indicates a supplement or precaution that does not cause drive damage.

**Drive:** Yaskawa AC Drive-V1000 NEMA Type 4X/IP66

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## ◆ Registered Trademarks

Company names and product names listed in this manual are registered trademarks of those companies.

## ◆ Supplemental Safety Information

Read and understand this manual before installing, operating, or servicing the drive. The drive must be installed according to this manual and local codes.

The following conventions are used to indicate safety messages in this manual. Failure to heed these messages could result in serious or possibly even fatal injury or damage to the products or to related equipment and systems.

### **DANGER**

Indicates a hazardous situation, which, if not avoided, will result in death or serious injury.

### **WARNING**

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

### **CAUTION**

Indicates a hazardous situation, which, if not avoided, could result in minor or moderate injury.

### **NOTICE**

Indicates an equipment damage message.

# 1 Preface and Safety

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## ■ General Safety

### General Precautions

- The diagrams in this section may include drives without covers or safety shields to illustrate details. Be sure to reinstall covers or shields before operating any devices.
- Any illustrations, photographs, or examples used in this manual are provided as examples only and may not apply to all products to which this manual is applicable.
- The products and specifications described in this manual or the content and presentation of the manual may be changed without notice to improve the product and/or the manual.
- When ordering a new copy of the manual due to damage or loss, contact your Yaskawa representative or the nearest Yaskawa sales office and provide the manual number shown on the front cover.

### DANGER

#### Heed the safety messages in this manual.

Failure to comply will result in death or serious injury.

The operating company is responsible for any injuries or equipment damage resulting from failure to heed the warnings in this manual.

### WARNING

#### Fire Hazard

#### Select the correct main circuit fuse for use with the drive.

Failure to comply could result in death or serious injury due to fire. Refer to the Quick Start Guide packaged with the drive to select the correct main circuit fuse for UL/CE compliance.

### NOTICE

**Do not expose the drive to halogen group disinfectants.**

Failure to comply may cause damage to the electrical components in the drive.

Do not pack the drive in wooden materials that have been fumigated or sterilized.

Do not sterilize the entire package after the product is packed.

# 2 Product Overview

### ◆ About This Product

The V1000 NEMA Type 4X/IP66 drive is safe for indoor use and complies with the following standards:

- UL50E: Enclosures for Electrical Equipment, Environmental Considerations  
**NEMA Type 4X**
- International Standard IEC 60529 Degrees of protection provided by enclosures (IP Code)  
**IP66**

**NEMA Type 4X** – Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt, rain, sleet, snow, windblown dust, splashing water, hose-directed water, and corrosion; and that will be undamaged by the external formation of ice on the enclosure.

**IP66**-Dust-tight enclosures to do not allow any dust to penetrate. The enclosure guards the drive against powerful jetting water sprayed from any direction and is protected against access to hazardous parts with a wire.

The LED operator is located on the outside of the protective case for easy programming accessibility.

The drive is designed to be mounted as a stand alone unit and is not intended for mounting inside of another enclosure.

## 3 Receiving

### ◆ Model Number and Nameplate Check

Please perform the following tasks after receiving the drive:

- Inspect the drive for damage.  
If the drive appears damaged upon receipt, contact the shipper immediately.
- Verify receipt of the correct model by checking the information on the nameplate.  
*Figure 1* shows where the nameplate has been placed on the drive. Remove the front cover and check the information listed on the nameplate. *Refer to Removing the Front Cover on page 26.*
- If you have received the wrong model or the drive does not function properly, contact your supplier.

### ■ Nameplate

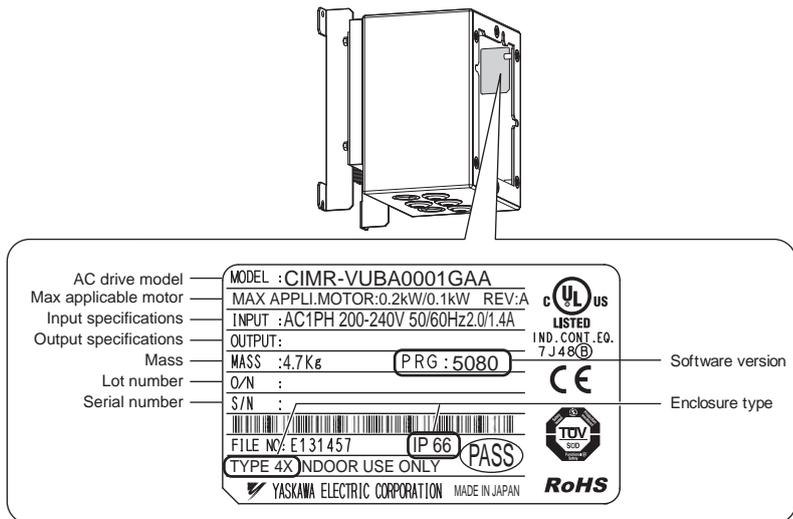
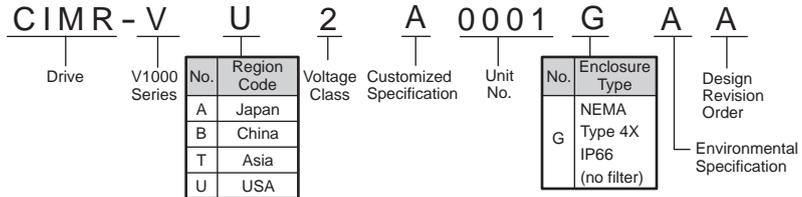


Figure 1 Nameplate Information

### 3 Receiving

#### ■ Drive Model Identification

The V1000 NEMA Type 4X, IP66 drive type is indicated by the letter “G” in the AC drive model designation code. Refer to the Quick Start Guide for complete model number information.



**Figure 2 Drive Model Number**

#### ◆ Contents and Packaging

**Table 1 Contents of Package**

| Description:     | V1000 NEMA Type 4X IP66 Drive   | Quick Start Guide   | Installation Manual   | CD  |
|------------------|---|---|---|---|
| -                |  |  |  |  |
| <b>Quantity:</b> | 1   | 1   | 1   | 1   |

## ◆ Required Additional Parts

*Table 2* lists additional parts for use with the drive.

**Table 2 Additional Parts**

| Parts Sold Separately | Description  |
|-----------------------|--|
| Cable glands          | Only use products recommended by Yaskawa. For details, refer to <a href="#">Cable Gland Selection on page 31</a> . |
| Fuse                  |  |

## ◆ Tool Requirements

**Socket Wrench:** An 8 mm or 10 mm socket wrench or nut driver. The tool requirement is based on drive model.

**Table 3 Tool Requirements by Drive Model CIMR-V□**

| Tool required       | Single-Phase<br>200 V Class                                    | Three-Phase<br>200 V Class  | Three-Phase<br>400 V Class  |
|---------------------|--|---|---|
| 8 mm socket wrench  | BA0001G<br>BA0002G<br>BA0003G<br>BA0006G<br>BA0010G<br>BA0012G | 2A0001G<br>2A0002G<br>2A0004G<br>2A0006G<br>2A0008G<br>2A0010G<br>2A0012G<br>2A0018G<br>2A0020G | 4A0001G<br>4A0002G<br>4A0004G<br>4A0005G<br>4A0007G<br>4A0009G<br>4A0011G |
| 10 mm socket wrench | —  | 2A0030G<br>2A0040G<br>2A0056G<br>2A0069G  | 4A0018G<br>4A0023G<br>4A0031G<br>4A0038G                                  |

# 4 Components

### ◆ Drive Components

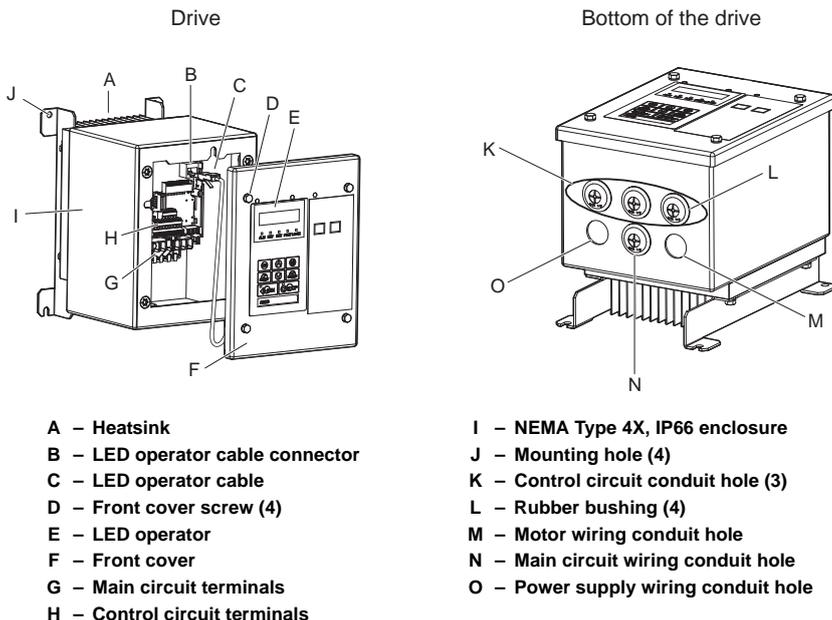


Figure 3 V1000 Drive Model CIMR-V□2□0001G

**NOTICE:** The rubber bushing used in the drive enclosure does not guarantee protection from water and dust. The rubber bushings can be removed without the use of a tool. For more permanent installations, replace rubber bushings with UL approved cable glands or gland cover plates with NEMA Type 4X, or IP66 integrity.

**Note:** Refer to [Drive Cooling Fans on page 37](#) for more information.

## ◆ LED Operator Display Overview

The LED operator located on the front of the protective enclosure is different than the LED operator on the standard V1000 drive. Differences include:

- The “ALM”, “REV”, “DRV”, and “FOUT” lights are below the data display area, not to the right of the data display area.
- The “LO/RE” light is below the data display area and to the right, not on the LO/RE key.
- A STOP light is on the upper left of the STOP key.

*LO/RE LED and RUN LED Indications on page 15* describes the unique characteristics of the V1000 NEMA Type 4X, IP66 LED operator compared to the standard V1000.

Refer to the drive Quick Start Guide for more details on the function of the LED Operator.

### ■ LED Operator

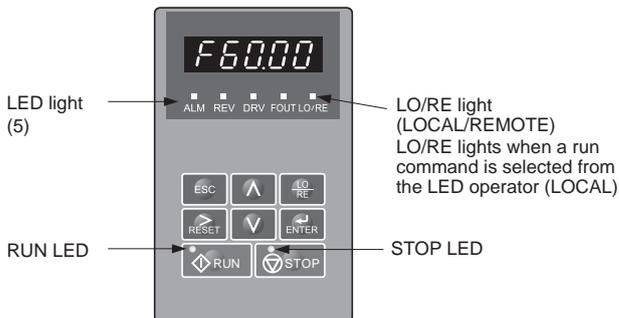


Figure 4 V1000 NEMA Type 4X, IP66 Drive LED Operator

## ◆ LO/RE LED and RUN LED Indications

Table 4 LED Display

| LED   | Lit  | Flashing  | Off  |
|---|--|---|--|
|  | When run command is selected from LED operator (LOCAL) | –   | Run command is selected from device other than LED operator (REMOTE) |
|  | During run   | <ul style="list-style-type: none"> <li>• During deceleration to stop</li> <li>• When a run command is input and frequency reference is 0</li> </ul> | During stop  |

## 4 Components

| LED   | Lit         | Flashing  | Off   |
|---|-------------|---|---|
|  | During stop | <ul style="list-style-type: none"> <li>• During deceleration at a fast-stop</li> <li>• During deceleration</li> <li>• During stop by interlock operation</li> </ul> | <ul style="list-style-type: none"> <li>• During run</li> <li>• During deceleration to stop</li> <li>• When a run command is input and frequency reference is 0</li> </ul> |

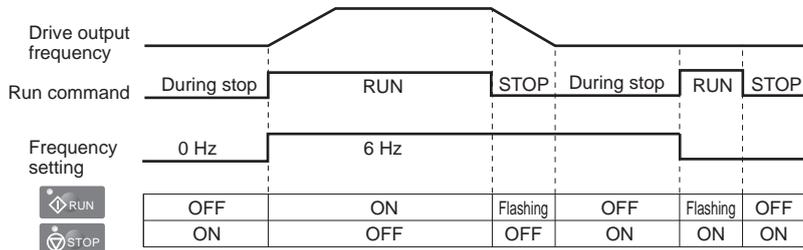


Figure 5 RUN LED and Drive Operation

## 5 Mechanical Installation

### ◆ Installation Environment

To help prolong the performance life of the drive, install the drive in an environment that is within the specifications listed in [Table 5](#).

**Table 5 Installation Environment**

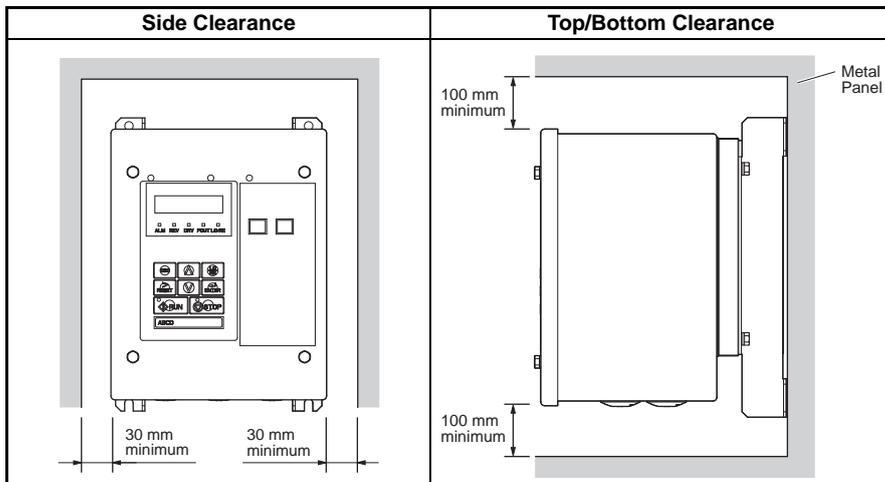
| Environment         | Conditions  |
|---------------------|---|
| Installation Area   | Indoors   |
| Ambient Temperature | -10 °C to +40 °C<br>Drive reliability improves in environments without wide temperature fluctuations.   |
| Storage Temperature | -20 °C to +60 °C  |
| Surrounding Area    | Install the drive in an environment suitable for NEMA Type 4X, IP66 enclosures:<br><br><b>NEMA Type 4X</b> – Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt, rain, sleet, snow, windblown dust, splashing water, hose-directed water, and corrosion; and that will be undamaged by the external formation of ice on the enclosure.<br><br><b>IP66</b> -Dust-tight enclosures to do not allow any dust to penetrate. The enclosure guards the drive against powerful jetting water sprayed from any direction and is protected against access to hazardous parts with a wire. |
| Altitude            | 1000 m or lower   |
| Vibration           | 10 to 20 Hz at 9.8 m/s <sup>2</sup><br>20 to 55 Hz at 5.9 m/s <sup>2</sup>  |
| Orientation         | Install the drive vertically to maintain maximum cooling effects.   |

## 5 Mechanical Installation

### ◆ Installation Spacing

**Table 6** explains the required installation spacing to maintain sufficient space for airflow and wiring. Install the heatsink against a closed surface to avoid diverting cooling air around the heatsink.

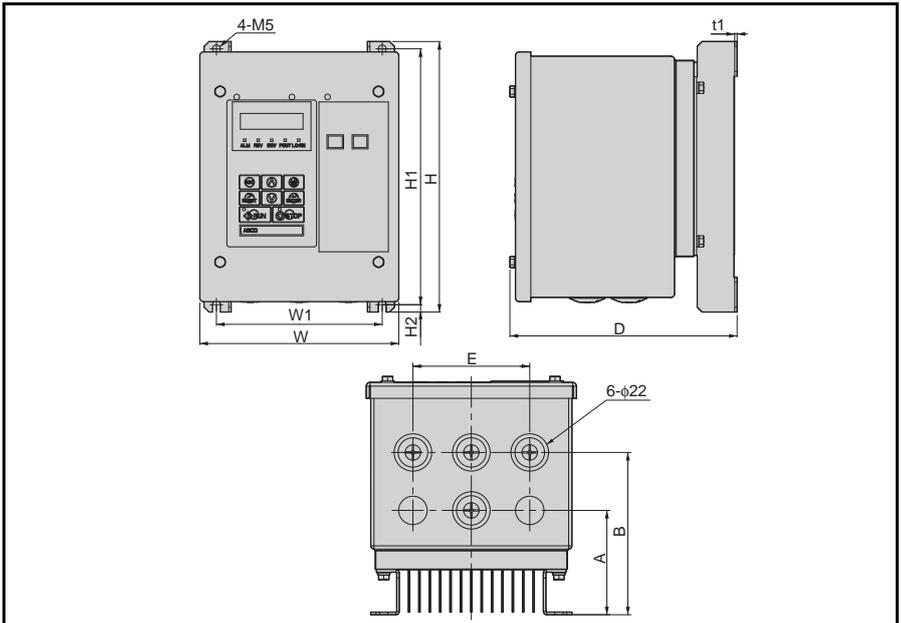
**Table 6 Correct Installation Spacing**



**NOTICE:** Do not install the drive using the Side-by-Side method available for standard V1000 drive models. Improper drive cooling may result in damage to the drive.

## ◆ Exterior and Mounting Dimensions

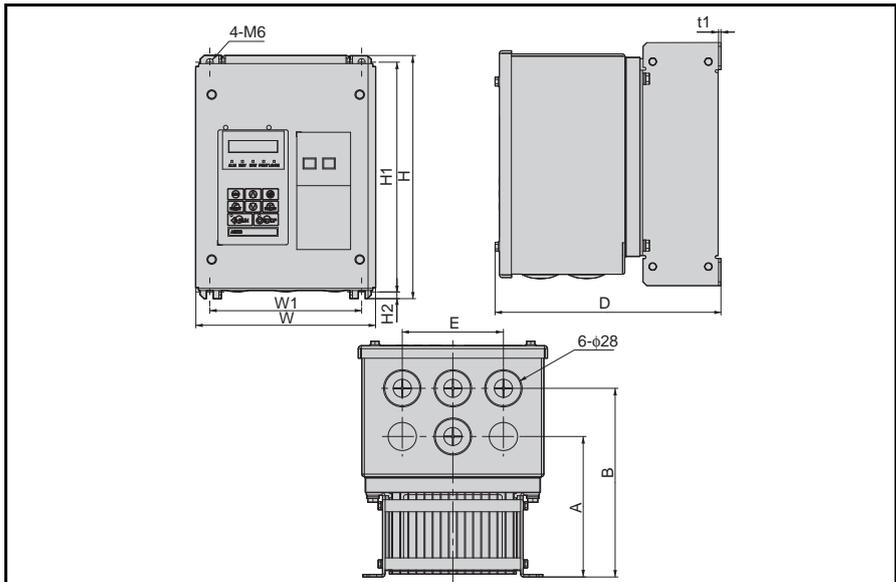
Table 7 V1000 Drive Dimensions for Models BA0001G~4A0004G



| Voltage Class               | Drive Model CIMR-V□ | Dimensions mm (in) |        |        |        |        |        |        |        |        |        | Weight kg (lbs) |
|-----------------------------|---------------------|--------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-----------------|
|                             |                     | W                  | H      | D      | W1     | H1     | H2     | t1     | A      | B      | E      |                 |
| Single-Phase<br>200 V Class | BA0001G             |                    |        |        |        |        |        |        |        |        |        | 4.7 (10.36)     |
|                             | BA0002G             |                    |        |        |        |        |        |        |        |        |        | 4.7 (10.36)     |
|                             | BA0003G             |                    |        |        |        |        |        |        |        |        |        | 4.9 (10.80)     |
| Three-Phase<br>200 V Class  | 2A0001G             |                    |        |        |        |        |        |        |        |        |        | 4.7 (10.36)     |
|                             | 2A0002G             | 162                | 222    | 185    | 135    | 210    | 6      | 2      | 81     | 126    | 90     | 4.7 (10.36)     |
|                             | 2A0004G             | (6.38)             | (8.74) | (7.28) | (5.32) | (8.27) | (0.24) | (0.08) | (3.19) | (4.96) | (3.54) | 4.8 (10.58)     |
| Three-Phase<br>400 V Class  | 2A0006G             |                    |        |        |        |        |        |        |        |        |        | 4.8 (10.58)     |
|                             | 4A0001G             |                    |        |        |        |        |        |        |        |        |        | 5.0 (11.02)     |
|                             | 4A0002G             |                    |        |        |        |        |        |        |        |        |        | 5.0 (11.02)     |
|                             | 4A0004G             |                    |        |        |        |        |        |        |        |        |        | 5.1 (11.24)     |

## 5 Mechanical Installation

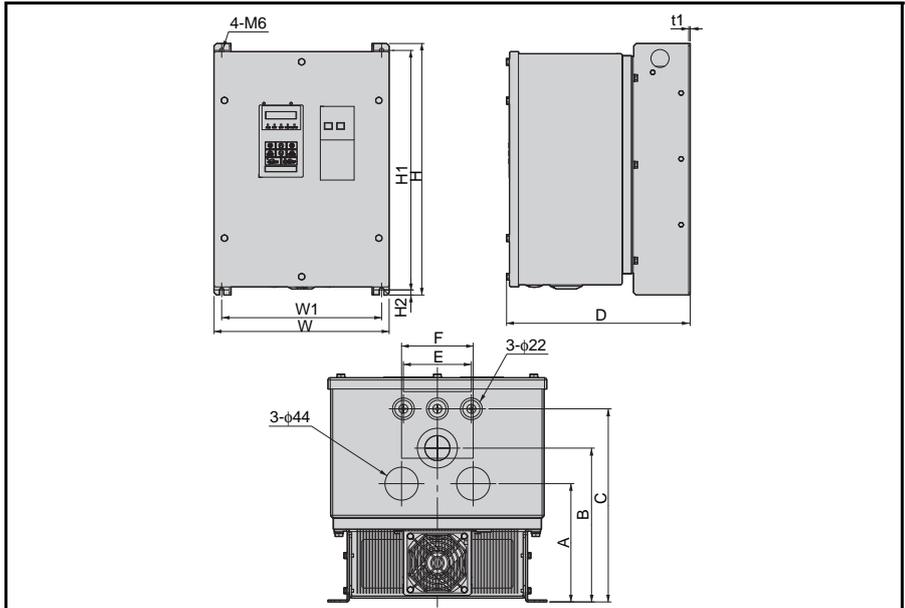
Table 8 V1000 Drive Dimensions for Models BA0006G~4A0011G



| Voltage Class               | Drive Model CIMR-V□ | Dimensions mm (in) |         |        |        |        |        |        |        |        |        | Weight kg (lbs) |             |
|-----------------------------|---------------------|--------------------|---------|--------|--------|--------|--------|--------|--------|--------|--------|-----------------|-------------|
|                             |                     | W                  | H       | D      | W1     | H1     | H2     | t1     | A      | B      | E      |                 |             |
| Single-Phase<br>200 V Class | BA0006G             |                    |         |        |        |        |        |        |        |        |        |                 | 7.8 (17.2)  |
|                             | BA0010G             |                    |         |        |        |        |        |        |        |        |        |                 | 7.8 (17.2)  |
|                             | BA0012G             |                    |         |        |        |        |        |        |        |        |        |                 | 8.2 (18.08) |
| Three-Phase<br>200 V Class  | 2A0008G <1>         |                    |         |        |        |        |        |        |        |        |        |                 | 7.7 (16.98) |
|                             | 2A0010G             |                    |         |        |        |        |        |        |        |        |        |                 | 7.7 (16.98) |
|                             | 2A0012G             | 187                | 255     | 235    | 158    | 241    | 7      | 2.5    | 140    | 188    | 100    | 7.7 (16.98)     |             |
|                             | 2A0018G <1>         | (7.36)             | (10.04) | (9.25) | (6.22) | (9.49) | (0.28) | (0.10) | (5.51) | (7.40) | (3.94) | 8.1 (17.86)     |             |
|                             | 2A0020G             |                    |         |        |        |        |        |        |        |        |        |                 | 8.1 (17.86) |
| Three-Phase<br>400 V Class  | 4A0005G             |                    |         |        |        |        |        |        |        |        |        |                 | 7.7 (16.98) |
|                             | 4A0007G             |                    |         |        |        |        |        |        |        |        |        |                 | 7.9 (17.42) |
|                             | 4A0009G             |                    |         |        |        |        |        |        |        |        |        |                 | 7.9 (17.42) |
|                             | 4A0011G             |                    |         |        |        |        |        |        |        |        |        |                 | 8.1 (17.86) |

<1> Only available in Asia

**Table 9 V1000 Drive Dimensions for Models 2A0030G~4A0038G**



| Voltage Class           | Drive Model CIMR-V□ | Dimensions mm (in) |             |             |             |             |            |            |            |              |             |           | Weight kg (lbs) |              |
|-------------------------|---------------------|--------------------|-------------|-------------|-------------|-------------|------------|------------|------------|--------------|-------------|-----------|-----------------|--------------|
|                         |                     | W                  | H           | D           | W1          | H1          | H2         | t1         | A          | B            | C           | E         |                 | F            |
| Three-Phase 200 V class | 2A0030G             |                    |             |             |             |             |            |            |            |              |             |           |                 | 21.8 (48.06) |
|                         | 2A0040G             |                    |             |             |             |             |            |            |            |              |             |           |                 | 21.8 (48.06) |
|                         | 2A0056G             |                    |             |             |             |             |            |            |            |              |             |           |                 | 23.2 (51.15) |
| Three-Phase 400 V class | 4A0018G             | 290 (11.42)        | 420 (16.54) | 305 (12.01) | 265 (10.43) | 400 (15.75) | 8.5 (0.33) | 2.5 (0.10) | 158 (6.22) | 205.5 (8.09) | 258 (10.16) | 90 (3.54) | 95 (3.74)       | 21.7 (47.84) |
|                         | 4A0023G             |                    |             |             |             |             |            |            |            |              |             |           |                 | 21.8 (48.06) |
|                         | 4A0031G             |                    |             |             |             |             |            |            |            |              |             |           |                 | 22.9 (50.49) |
|                         | 4A0038G             |                    |             |             |             |             |            |            |            |              |             |           |                 | 23.2 (51.15) |

## 5 Mechanical Installation

**Table 10 V1000 Drive Dimensions for Model 2A0069G**

| Voltage Class           | Drive Model CIMR-V□ | Dimensions mm (in) |                |                |                |                |               |               |               |               |               |               |               |                 |
|-------------------------|---------------------|--------------------|----------------|----------------|----------------|----------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|-----------------|
|                         |                     | W                  | H              | D              | W1             | H1             | H2            | t1            | A             | B             | C             | E             | F             | Weight kg (lbs) |
| Three-Phase 200 V class | 2A0069G             | 290<br>(11.42)     | 465<br>(18.31) | 305<br>(12.01) | 265<br>(10.43) | 445<br>(17.52) | 8.5<br>(0.33) | 2.5<br>(0.10) | 173<br>(6.81) | 188<br>(7.40) | 248<br>(9.76) | 130<br>(5.12) | 160<br>(6.30) | 27.7<br>(61.07) |

## 6 Electrical Installation

### ◆ Section Safety

#### DANGER

##### **Electrical Shock Hazard**

**Do not connect or disconnect wiring while the power is on.**

Failure to comply will result in death or serious injury.

Disconnect all power to the drive, wait at least five minutes after all indicators are off, measure the DC bus voltage to confirm safe level, and check for unsafe voltages before servicing to prevent electric shock. The internal capacitor remains charged even after the power supply is turned off. The charge indicator LED will extinguish when the DC bus voltage is below 50 Vdc.

#### WARNING

##### **Electrical Shock Hazard**

**Do not operate equipment with covers removed.**

Failure to comply could result in death or serious injury.

The diagrams in this section may show drives without covers or safety shields to show details. Reinstall covers or shields before operating the drive and run the drive according to the instructions described in this manual.

**Do not allow unqualified personnel to use equipment.**

Failure to comply could result in death or serious injury.

Maintenance, inspection, and replacement of parts must be performed only by authorized personnel familiar with installation, adjustment, and maintenance of this product.

### **WARNING**

**Do not use damaged wires, place excessive stress on wiring, or damage the wire insulation.**

Failure to comply could result in death or serious injury.

#### **Fire Hazard**

**Tighten all terminal screws to the specified tightening torque.**

Loose electrical connections could result in death or serious injury by fire due to overheating of electrical connections.

### **NOTICE**

#### **Damage to Equipment**

**Observe proper electrostatic discharge procedures (ESD) when handling the drive and circuit boards.**

Failure to comply may result in ESD damage to circuitry.

**Never shut the power off while the drive is outputting voltage.**

Failure to comply may cause the application to operate incorrectly or damage the drive.

**Do not operate damaged equipment.**

Failure to comply may cause further damage to the equipment.

Do not connect or operate any equipment with visible damage or missing parts.

**Do not use unshielded cable for control wiring.**

Failure to comply may cause electrical interference resulting in poor system performance.

Use shielded twisted-pair wires and ground the shield to the ground terminal of the drive.

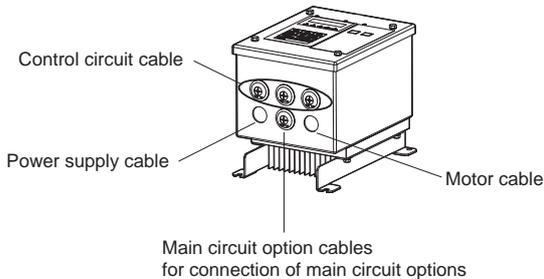
**Properly connect all pins and connectors.**

Failure to comply may prevent proper operation and possibly damage equipment.

### ◆ Wiring Preparation

1. Refer to [Cable Gland Selection on page 31](#) to select the proper cable glands for the drive.
2. Prepare all cables with terminal ends to ensure proper connections.
3. Remove the rubber bushing covering the conduit openings at the bottom of the drive. Review [Figure 6](#) to route the main circuit and control circuit cables through the proper conduit openings.

**Note:** The rubber bushing used in the drive enclosure does not guarantee protection from water and dust. The rubber bushings can be removed without the use of a tool. For more permanent installations, replace rubber bushings with UL approved cable glands or gland cover plates with NEMA Type 4X, or IP66 integrity.



**Figure 6 Conduit Openings**

### ◆ Wiring Instructions

Refer to the Standard and Main Circuit Connection Diagrams in the Quick Start Guide for detailed schematic wiring illustrations.

**NOTICE:** Do not attempt to disassemble the protective enclosure surrounding the drive. The protective enclosure is constructed as a single piece to include the heatsink. Attempting to disassemble the enclosure may void the enclosures protective integrity.

#### ■ Removing the Front Cover

Remove the front cover of the drive to access the main circuit and control circuit wiring.

1. Loosen the captive screws holding the front cover in place. Do not remove the screws from the cover. Remove the front cover.

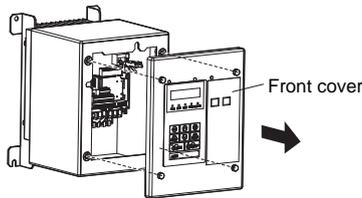


Figure 7 Removing the Front Cover

2. Press firmly on the tabs holding the LED operator cable in place to disconnect the cable.

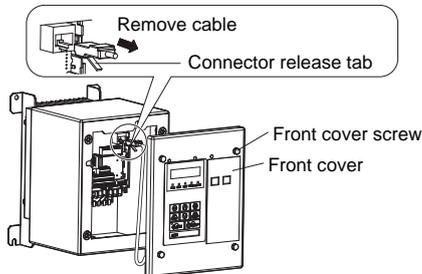


Figure 8 Removing the LED Operator Cable

### ■ Main Circuit and Control Circuit Wiring

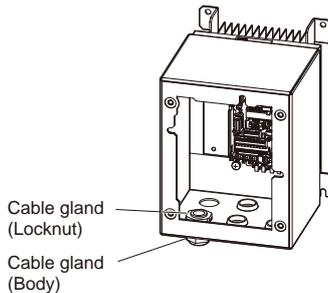
**NOTICE:** Use only the recommended multi conductor cable and use only one cable per cable gland. Attempting to pass more than one wire through a cable gland create a space between wires that reduces the waterproofing and dustproofing capabilities of the cable gland, and may damage the drive.

**NOTICE:** Properly seal the rubber gasket along the outside of the cable gland. Improper seals may allow water or oil into the drive and damage components.

Refer to the Electrical Installation section of the drive Quick Start Guide for proper main circuit and control circuit wiring type, gauge, tightening torque and procedures.

**Note:** Use 3-wire cable for single phase input, and 4-wire cable for 3-phase input.

1. After removing the rubber bushings, insert the cable glands into the holes and tighten them with the locknut.  
**Refer to Cable Gland Selection on page 31** for the maximum allowable tightening torque.



**Figure 9 Inserting the Cable Glands**

2. Route the cables through the cable glands, following the instructions in **Cable Gland Selection on page 31**.

**Note:** Use UL approved cable glands or gland cover plates with NEMA Type 4X, or IP66 integrity for all drive conduit holes.

## 6 Electrical Installation

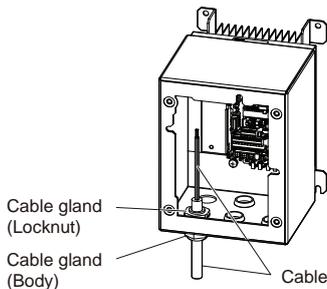


Figure 10 Cable Routing

3. Tighten the cable gland caps.
4. Connect the wires to the main and control circuit terminals.

### ■ Reattaching the Front Cover

1. Insert the LED operator cable into the correct port on the drive. Refer to the [Figure 8](#).
2. Replace the front cover on the drive and fasten the screws according to [Table 11](#).

**NOTICE:** Tighten all screws to the specified tightening torque. Loose screws may allow moisture or dust to enter the protective enclosure and damage drive components.

**NOTICE:** Do not pinch or damage the sealing gasket when attaching the front cover. Damage to the gasket may allow moisture or dust to enter the protective enclosure and damage drive components.

**NOTICE:** Do not use silicone sealant with cable glands or front cover to reinforce waterproofing. Corrosive vapors produced by the sealant can damage circuit boards and compromise the watertight integrity of the protective enclosure.

**NOTICE:** Do not pinch the LED operator cable between the waterproof/dustproof enclosure and the front cover when putting the front cover back on. This could damage the operator cable.

### ■ Front Cover Screws and Tightening Torque

Refer [Table 11](#) for tightening torque specifications.

Table 11 Front Cover Installation Screws and Tightening Torque

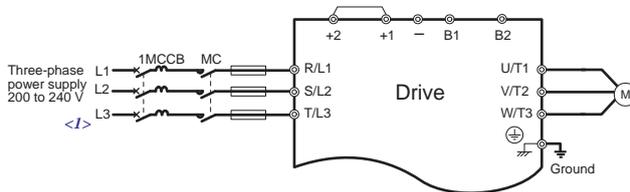
| Voltage Class            | Model No. CIMR-V□ | Installation Screw Size | Tightening Torque<br>N·m<br>(lb·in) |
|--------------------------|-------------------|-------------------------|-------------------------------------|
| Single Phase 200 V Class | BA0001 to BA0012  | M5                      | 2.0 to 2.5 (17.7 to 22.1)           |
| Three Phase 200 V Class  | 2A0001 to 2A0020  | M5                      | 2.0 to 2.5 (17.7 to 22.1)           |
|                          | 2A0030 to 2A0069  | M6                      | 5.4 to 6.0 (47.8 to 53)             |
| Three Phase 400 V Class  | 4A0001 to 4A0011  | M5                      | 2.0 to 2.5 (17.7 to 22.1)           |
|                          | 4A0018 to 4A0038  | M6                      | 5.4 to 6.0 (47.8 to 53)             |

### ◆ Fuse Installation

For details on selecting the proper fuse, refer to Quick Start Guide.

**WARNING! Electrical Shock Hazard.** Connect the recommended fuses between each input terminal and the main circuit power supply (3-phase: L1, L2, L3, single-phase: L1, L2). Failure to use fuses in the power supply could result in death or serious injury in the event of a short circuit inside the drive enclosure.

**WARNING! Fire Hazard.** Select the correct main circuit fuse for use with the drive. Failure to comply could result in death or serious injury due to fire. Refer to the Quick Start Guide packaged with the drive to select the correct main circuit fuse for UL/CE compliance.



**Figure 11 Fuse Installation**

<1> Single-phase drives do not have an L3 terminal.

# 7 Conditions of Acceptability

Adhere to the installation conditions specified in this manual to take full advantage of the NEMA Type 4X/IP66 design of this drive.

### ◆ Resistance Against Chemicals and Solvents

**Table 12** lists the information on chemical and solvent tolerability of the drive. The drive enclosure meets these requirements:

- UL50E: Enclosures for Electrical Equipment, Environmental Considerations  
**NEMA Type 4X**
- International Standard IEC 60529 Degrees of protection provided by enclosures (IP Code)  
**IP66**

Refer to the appropriate enclosure specification for more details on the enclosures resistance to chemicals and solvents.

**Table 12 Chemical and Solvent Tolerability**

| Reagent   | Solvent  |
|---|--|
| <ul style="list-style-type: none"><li>• Hydrochloric acid (10%)</li><li>• Sulfuric acid (10%)</li><li>• Nitric acid (10%)</li><li>• Ammonia water</li><li>• Sodium chloride</li></ul> | <ul style="list-style-type: none"><li>• Methanol</li><li>• Ethanol</li></ul> |

**NOTICE:** Do not allow a stream of chemicals or solvents to be sprayed directly onto the drive enclosure. Failure to do so can damage the drive.

**NOTICE:** Prevent moisture and other solvents from entering the drive enclosure when removing the front cover. Failing to do so can damage the drive or considerably shorten its expected performance life.

## 8 Cable Gland Selection

### ◆ Cable Glands for North America

Specific cable glands and gland plate covers are not listed for North America. [Table 13](#) lists the enclosure conduit hole dimensions by drive model. Use this table to select cable glands or gland plate covers from a local supplier. Use UL approved cable glands or gland cover plates with NEMA Type 4X, or IP66 integrity for all drive conduit holes. Cable glands or gland plate covers are customer supplied.

**Table 13 Conduit Hole Dimensions**

| Voltage Class               | Drive Model<br>CIMR-V□ | Main Circuit                     |                 |                 |                    | Control Circuit             |                |
|-----------------------------|------------------------|----------------------------------|-----------------|-----------------|--------------------|-----------------------------|----------------|
|                             |                        | Conduit Hole Diameter<br>mm (in) |                 |                 | Number<br>of Holes | Hole<br>Diameter<br>mm (in) | Total<br>Holes |
|                             |                        | Input<br>Holes                   | Output<br>Holes | Option<br>Holes |                    |                             |                |
| Single-Phase<br>200 V Class | BA0001G                | 22 (0.87)                        | 22 (0.87)       | 22 (0.87)       | 1                  | 22 (0.87)                   | 3              |
|                             | BA0002G                |                                  |                 |                 |                    |                             |                |
|                             | BA0003G                |                                  |                 |                 |                    |                             |                |
|                             | BA0006G                | 28 (1.10)                        | 28 (1.10)       | 28 (1.10)       | 1                  |                             |                |
|                             | BA0010G                |                                  |                 |                 |                    |                             |                |
|                             | BA0012G                |                                  |                 |                 |                    |                             |                |
| Three-Phase<br>200 V Class  | 2A0001G                | 22 (0.87)                        | 22 (0.87)       | 22 (0.87)       | 1                  | 22 (0.87)                   | 3              |
|                             | 2A0002G                |                                  |                 |                 |                    |                             |                |
|                             | 2A0004G                |                                  |                 |                 |                    |                             |                |
|                             | 2A0006G                | 28 (1.10)                        | 28 (1.10)       | 28 (1.10)       | 1                  |                             |                |
|                             | 2A0010G                |                                  |                 |                 |                    |                             |                |
|                             | 2A0012G                |                                  |                 |                 |                    |                             |                |
|                             | 2A0020G                |                                  |                 |                 |                    |                             |                |
|                             | 2A0030G                |                                  |                 |                 |                    |                             |                |
|                             | 2A0040G                |                                  |                 |                 |                    |                             |                |
|                             | 2A0056G                |                                  |                 |                 |                    |                             |                |
| 2A0069G                     |                        |                                  |                 |                 |                    |                             |                |

## 8 Cable Gland Selection

| Voltage Class              | Drive Model<br>CIMR-V□ | Main Circuit                     |                 |                 |                    | Control Circuit             |                |
|----------------------------|------------------------|----------------------------------|-----------------|-----------------|--------------------|-----------------------------|----------------|
|                            |                        | Conduit Hole Diameter<br>mm (in) |                 |                 | Number<br>of Holes | Hole<br>Diameter<br>mm (in) | Total<br>Holes |
|                            |                        | Input<br>Holes                   | Output<br>Holes | Option<br>Holes |                    |                             |                |
| Three-Phase<br>400 V Class | 4A0001G                | 22 (0.87)                        | 22 (0.87)       | 22 (0.87)       | 1                  | 22 (0.87)                   | 3              |
|                            | 4A0002G                |                                  |                 |                 |                    |                             |                |
|                            | 4A0004G                |                                  |                 |                 |                    |                             |                |
|                            | 4A0005G                | 28 (1.10)                        | 28 (1.10)       | 28 (1.10)       | 1                  |                             |                |
|                            | 4A0007G                |                                  |                 |                 |                    |                             |                |
|                            | 4A0009G                |                                  |                 |                 |                    |                             |                |
|                            | 4A0011G                |                                  |                 |                 |                    |                             |                |
|                            | 4A0018G                |                                  |                 |                 |                    |                             |                |
|                            | 4A0023G                |                                  |                 |                 |                    |                             |                |
|                            | 4A0031G                |                                  |                 |                 |                    |                             |                |
| 4A0038G                    |                        |                                  |                 |                 |                    |                             |                |

### ◆ Cable Glands for Asia

Yaskawa recommends the following SC cable glands but is not limited to SEIWA ELECTRIC MFG Co., Ltd. for the V1000 NEMA Type 4X/IP66 drive. The SEIWA cable gland is not readily available outside of Asia.

**Table 14 Cable Glands for Drive Main Circuit Wiring**

| Voltage Class            | Model No. CIMR-V□ | Conduit Hole Diameter mm |              |              | Cable Gland (Seiwa)            |                |                       |               |
|--------------------------|-------------------|--------------------------|--------------|--------------|--------------------------------|----------------|-----------------------|---------------|
|                          |                   | Input Holes              | Output Holes | Option Holes | Appropriate Wiring Diameter mm | Product Number | Tightening Torque N·m |               |
|                          |                   |                          |              |              |                                |                | Body, Cap             | Body, Locknut |
| Single-Phase 200 V Class | BA0001G           | 22                       | 22           | 22           | 10.5 to 12.5                   | SCL-14A        | 2.5 to 2.9            | 2.9 to 3.4    |
|                          | BA0002G           |                          |              |              |                                |                |                       |               |
|                          | BA0003G           |                          |              |              |                                |                |                       |               |
|                          | BA0006G           | 28                       | 28           | 28           | 10.6 to 12                     | SC-4A          | 2.0 to 2.5            | 2.9 to 3.4    |
|                          | BA0010G           |                          |              |              | 12.1 to 14                     | SC-4B          |                       |               |
|                          | BA0012G           |                          |              |              | 14.1 to 16                     | SC-4C          |                       |               |
| Three-Phase 200 V Class  | 2A0001G           | 22                       | 22           | 22           | 10.5 to 12.5                   | SCL-14A        | 2.5 to 2.9            | 2.9 to 3.4    |
|                          | 2A0002G           |                          |              |              |                                |                |                       |               |
|                          | 2A0004G           |                          |              |              |                                |                |                       |               |
|                          | 2A0006G           |                          |              |              |                                |                |                       |               |
|                          | 2A0008G           | 28                       | 28           | 28           | 10.6 to 12                     | SC-4A          | 2.0 to 2.5            | 2.9 to 3.4    |
|                          | 2A0010G           |                          |              |              | 10.6 to 12                     | SC-4A          |                       |               |
|                          | 2A0012G           |                          |              |              | 12.1 to 14                     | SC-4B          |                       |               |
|                          | 2A0018G           |                          |              |              | 14.1 to 16                     | SC-4C          |                       |               |
|                          | 2A0020G           | 44                       | 44           | 22           | 14.1 to 16                     | SC-4C          | 4.9 to 5.3            | 5.8 to 6.3    |
|                          | 2A0030G           |                          |              |              | 20.1 to 22                     | SC-6M          |                       |               |
|                          | 2A0040G           |                          |              |              | 22.1 to 24.5                   | SC-6A          |                       |               |
|                          | 2A0056G           |                          |              |              |                                |                |                       |               |
| 2A0069G                  | 50                | 50                       | 22           | 30 to 32     | SCL-38A                        | 3.4 to 3.9     | 4.9 to 5.3            |               |
| Three-Phase 400 V Class  | 4A0001G           | 22                       | 22           | 22           | 10.5 to 12.5                   | SCL-14A        | 2.5 to 2.9            | 2.9 to 3.4    |
|                          | 4A0002G           |                          |              |              |                                |                |                       |               |
|                          | 4A0004G           |                          |              |              |                                |                |                       |               |
|                          | 4A0005G           | 28                       | 28           | 28           | 10.6 to 12                     | SC-4A          | 2.0 to 2.5            | 2.9 to 3.4    |
|                          | 4A0007G           |                          |              |              |                                |                |                       |               |
|                          | 4A0009G           |                          |              |              |                                |                |                       |               |
|                          | 4A0011G           |                          |              |              |                                |                |                       |               |

## 8 Cable Gland Selection

| Voltage Class           | Model No. CIMR-V□ | Conduit Hole Diameter mm |              |              | Cable Gland (Seiwa)            |                |                       |               |
|-------------------------|-------------------|--------------------------|--------------|--------------|--------------------------------|----------------|-----------------------|---------------|
|                         |                   | Input Holes              | Output Holes | Option Holes | Appropriate Wiring Diameter mm | Product Number | Tightening Torque N·m |               |
|                         |                   |                          |              |              |                                |                | Body, Cap             | Body, Locknut |
| Three-Phase 400 V Class | 4A0018G           | 44                       | 44           | 22           | 20.1 to 22                     | SC-6M          | 4.9 to 5.3            | 5.8 to 6.3    |
|                         | 4A0023G           |                          |              |              |                                |                |                       |               |
|                         | 4A0031G           |                          |              |              |                                |                |                       |               |
|                         | 4A0038G           |                          |              |              |                                |                |                       |               |

**Note:** Use 3-wire cable for single phase input, and 4-wire cable for 3-phase input.

Refer to the Electrical Installation section of the drive Quick Start Guide for proper main circuit wiring type, gauge, tightening torque and procedures.

### ■ Cable Sleeve Selection (Asia)

The cable sleeves in [Table 15](#) can be used if wire gauges are smaller than the diameter of the cable glands. Cable sleeves are useful to prevent ingress of environmental contaminants through the interior of the cable gland.

**Table 15 Cable Sleeves**

| Compatible sleeve | Outer Wiring Diameter mm |
|-------------------|--------------------------|
| SC-6-1×16         | 16                       |
| SC-6-1×17         | 17                       |
| SC-6-1×18         | 18                       |
| SC-6-1×19         | 19                       |
| SCL-38-1×27-28.5  | 27 to 28.5               |

### ■ SC/SCL Cable Glands for Control Circuit Wiring (Asia)

**Table 16 Control Circuit Wiring Cable Glands**

| Drive-Side Conduit Openings |                 | Cable Gland (Seiwa)              |                |                       |               |
|-----------------------------|-----------------|----------------------------------|----------------|-----------------------|---------------|
| Hole Diameter (mm)          | Number of Holes | Appropriate Wiring Diameter (mm) | Product Number | Tightening Torque N·m |               |
|                             |                 |                                  |                | Body, Cap             | Body, Locknut |
| 22                          | 3               | 6.1 to 7.5                       | SC-3M          | 1 to 1.5              | 2 to 2.5      |
|                             |                 | 7.6 to 9.0                       | SC-3A          |                       |               |
|                             |                 | 9.1 to 10.5                      | SC-3B          |                       |               |
|                             |                 | 10.5 to 12.5                     | SCL-14A        | 2.5 to 2.9            | 2.9 to 3.4    |
|                             |                 | 12.5 to 14.5                     | SCL-14B        |                       |               |

Refer to the Electrical Installation section of the drive Quick Start Guide for proper control circuit wiring type, gauge, tightening torque and procedures

### ■ SC-□□ Series Cable Gland Dimensions (Asia)

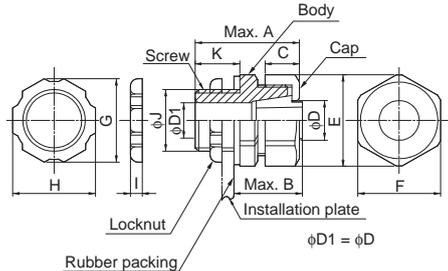


Figure 12 SC-□□ Series Cable Gland (SC-□□)

Table 17 SC Series Cable Gland Dimensions

| Model | Dimensions mm |                |         |           |    |      |          |      |      |         |    |   |                          |
|-------|---------------|----------------|---------|-----------|----|------|----------|------|------|---------|----|---|--------------------------|
|       | Screw         |                |         | Body, Cap |    |      |          |      |      | Locknut |    |   |                          |
|       | Name          | Diam. $\phi J$ | Lngh. K | A         | B  | C    | $\phi D$ | E    | F    | G       | H  | I | Rubber Packing Thickness |
| SC-3A | G 1/2         | 21.0           | 15      | 35        | 23 | 11.5 | 12       | 31.0 | 28.0 | 28.5    | 27 | 4 | 2.0                      |
| SC-3B |               |                |         |           |    |      |          |      |      |         |    |   |                          |
| SC-3M |               |                |         |           |    |      |          |      |      |         |    |   |                          |
| SC-4A | G 3/4         | 26.4           | 15      | 37        | 25 | 14.0 | 17       | 38.0 | 35.0 | 34.5    | 33 | 4 | 2.0                      |
| SC-4B |               |                |         |           |    |      |          |      |      |         |    |   |                          |
| SC-4C |               |                |         |           |    |      |          |      |      |         |    |   |                          |
| SC-6A | G1 1/4        | 41.9           | 20      | 54        | 37 | 20   | 34       | 59.5 | 53.5 | 52      | 49 | 5 | 2.0                      |
| SC-6M |               |                |         |           |    |      |          |      |      |         |    |   |                          |

## 8 Cable Gland Selection

### ■ SCL-□□□ Series Cable Gland Dimensions (Asia)

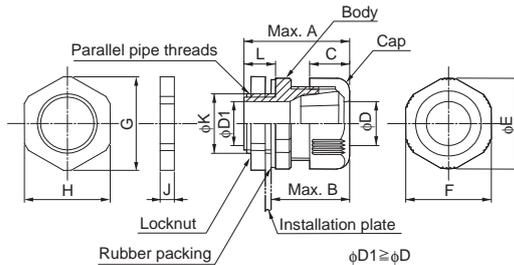


Figure 13 SCL-□□□ Series Cable Gland

Table 18 Cable Gland Dimensions (SCL-□□□)

| Model   | Dimensions mm |             |            |           |      |      |      |      |    |         |    |   |                                |
|---------|---------------|-------------|------------|-----------|------|------|------|------|----|---------|----|---|--------------------------------|
|         | Screw         |             |            | Body, Cap |      |      |      |      |    | Locknut |    |   |                                |
|         | Name          | Diam.<br>φK | Lngh.<br>L | A         | B    | C    | φD   | φE   | F  | G       | H  | J | Rubber<br>Packing<br>Thickness |
| SCL-14A | G 1/4         | 21.0        | 11.0       | 37.0      | 27.5 | 14.0 | 15.5 | 32.0 | 30 | 33.0    | 30 | 5 | 1.5                            |
| SCL-14B |               |             |            |           |      |      |      |      |    |         |    |   |                                |
| SCL-38A | G1 1/2        | 47.8        | 16         | 56.5      | 42.5 | 25   | 40   | 61   | 58 | 61      | 58 | 6 | 2.0                            |

## 9 Drive Cooling Fans

**NOTICE:** Follow cooling fan replacement instructions. If the cooling fan is not properly installed, damage to the drive may occur. For drives with multiple cooling fans, replace all cooling fans when performing maintenance to ensure maximum useful product life.

Contact your Yaskawa representative or the nearest Yaskawa sales office to order replacement cooling fans as required.

### ◆ Number of Cooling Fans and Types

Table 19 Number of Drive Cooling Fans by Model

| Single-Phase 200V Class |                |              | Three-Phase 200V Class |                |              | Three-Phase 400V Class |                |              |
|-------------------------|----------------|--------------|------------------------|----------------|--------------|------------------------|----------------|--------------|
| Drive Models            | Number of Fans |              | Drive Models           | Number of Fans |              | Drive Models           | Number of Fans |              |
| CIMR-V□                 | Internal Fan   | External Fan | CIMR-V□                | Internal Fan   | External Fan | CIMR-V□                | Internal Fan   | External Fan |
| BA0001G                 | –              | –            | 2A0001G                | –              | –            | 4A0001G                | –              | –            |
| BA0002G                 | –              | –            | 2A0002G                | –              | –            | 4A0002G                | –              | –            |
| BA0003G                 | –              | –            | 2A0004G                | –              | –            | 4A0004G                | –              | –            |
| BA0006G                 | –              | –            | 2A0006G                | –              | –            | 4A0005G                | –              | –            |
| BA0010G                 | –              | –            | 2A0008G                | –              | –            | 4A0007G                | 1              | –            |
| BA0012G                 | 1              | –            | 2A0010G                | –              | –            | 4A0009G                | 1              | –            |
| –                       | –              | –            | 2A0012G                | –              | –            | 4A0011G                | 1              | –            |
| –                       | –              | –            | 2A0018G                | 1              | –            | 4A0018G                | 1              | 1            |
| –                       | –              | –            | 2A0020G                | 1              | –            | 4A0023G                | 1              | 1            |
| –                       | –              | –            | 2A0030G                | 1              | 1            | 4A0031G                | 1              | 1            |
| –                       | –              | –            | 2A0040G                | 1              | 1            | 4A0038G                | 1              | 2            |
| –                       | –              | –            | 2A0056G                | 1              | 1            | –                      | –              | –            |
| –                       | –              | –            | 2A0069G                | 1              | 2            | –                      | –              | –            |

## 9 Drive Cooling Fans

### ◆ Cooling Fan Replacement

#### ■ Required Parts

**Table 2** lists parts required for cooling fan replacement.

**Table 20 Additional Parts**

| Parts Sold Separately | Description  |
|-----------------------|--|
| Cooling Fan           | Contact your Yaskawa representative or the nearest Yaskawa sales office to order replacement cooling fans as required.   |
| RTV Sealant           | <p><b>Manufacturer:</b> Shin-Etsu PN: KE3494<br/> <b>Description:</b> Non-Flow, Electronic Grade RTV</p> <p><b>North America:</b> Shin-Etsu Silicones of America, Inc.<br/>           1150 Damar Street, Akron, Ohio 44305-1201<br/>           Phone: 800-544-1745, Fax: 330-630-9855, <a href="http://www.shinetsua.com/">http://www.shinetsua.com/</a></p> <p><b>Asia:</b> Shin-Etsu Chemical Co., Ltd.<br/>           6-1, Ohtemachi 2-chome, Chiyoda-ku, Tokyo 100-0004, Japan<br/>           Phone: 03-3246-5121, <a href="http://www.shinetsu.co.jp">http://www.shinetsu.co.jp</a></p> |

#### ■ Tool Requirements

**Socket Wrench:** An 8 mm or 10 mm socket wrench or nut driver. The tool requirement is based on drive model. Refer to **Table 21**.

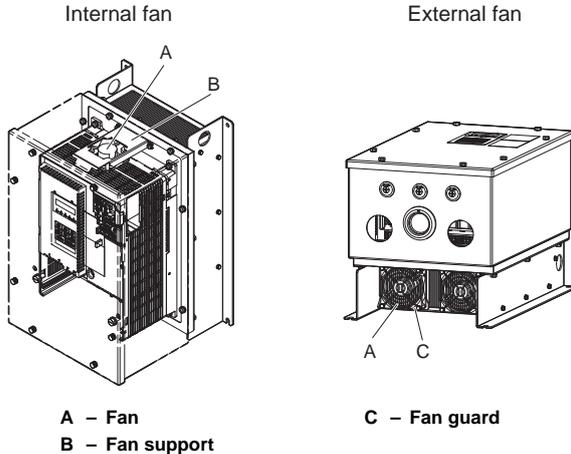
**Table 21 Tool Requirements by Drive Model CIMR-V□**

| Tool required                       | Single-Phase<br>200 V Class                                    | Three-Phase<br>200 V Class  | Three-Phase<br>400 V Class  |
|-------------------------------------|--|---|---|
| 8 mm socket wrench (cover removal)  | BA0001G<br>BA0002G<br>BA0003G<br>BA0006G<br>BA0010G<br>BA0012G | 2A0001G<br>2A0002G<br>2A0004G<br>2A0006G<br>2A0008G<br>2A0010G<br>2A0012G<br>2A0018G<br>2A0020G | 4A0001G<br>4A0002G<br>4A0004G<br>4A0005G<br>4A0007G<br>4A0009G<br>4A0011G |
| 10 mm socket wrench (cover removal) | —  | 2A0030G<br>2A0040G<br>2A0056G<br>2A0069G  | 4A0018G<br>4A0023G<br>4A0031G<br>4A0038G                                  |
| 7 mm socket wrench (fan removal)    | All models   |   |   |

Refer to **Figure 14** for the location of the internal fan and the external fan.

**WARNING! Electrical Shock Hazard.** Do not connect or disconnect wiring while the power is on. Failure to comply can result in serious personal injury. Before servicing the drive, disconnect all power to the equipment. The internal capacitor remains charged even after the power supply is turned off. After shutting off the power, wait for at least the amount of time specified on the drive before touching any components.

**CAUTION! Burn Hazard.** Do not touch a hot drive heatsink. Failure to comply could result in minor or moderate injury. Shut off the power to the drive when replacing the cooling fan. To prevent burns, wait at least 15 minutes and ensure the heatsink has cooled down.

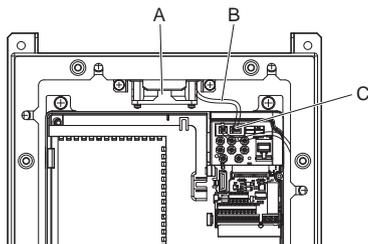


**Figure 14 Cooling Fan Location in 2A0069**

## 9 Drive Cooling Fans

### ■ Removing the Internal Fan

1. Remove the front cover.
2. Unplug the fan connector (CN7).



A – Internal fan

B – Fan relay cable

C – Fan connector (CN7)

Figure 15 Replacing the Internal Fan

3. Loosen the screws holding the fan unit in place, and remove the fan unit from the drive.

CIMR-V□BA0012  
CIMR-V□2A0018 to 0020  
CIMR-V□4A0007 to 0011

CIMR-V□2A0030 to 0069  
CIMR-V□4A0018 to 0038

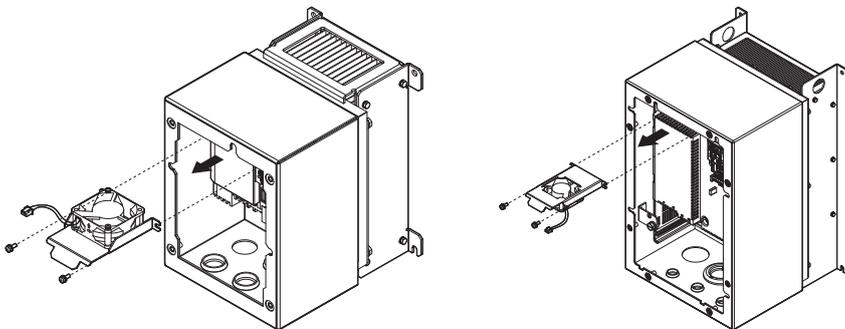


Figure 16 Replacing the Internal Fan

## ■ Installing the Internal Fan

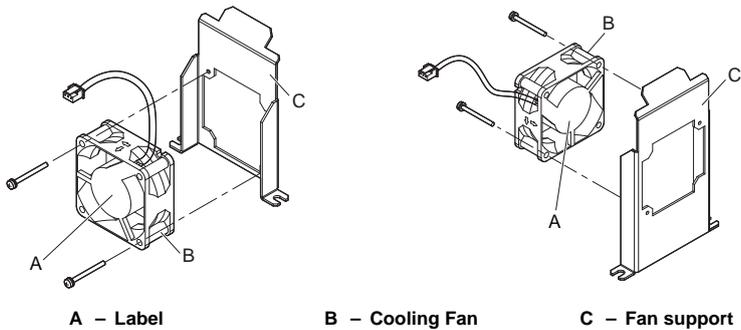
1. Refer to **Figure 17** to fasten the replacement fan into place.

**Note:** Refer to **Figure 18** to check the three points listed below when connecting the fan and the fan support in the drive. Improper installation can damage the fan.

- Direction of the fan label
- Routing of fan lead wire
- Direction of fan support bracket

CIMR-V□BA0012  
CIMR-V□2A0018 to 0020  
CIMR-V□4A0007 to 0011

CIMR-V□2A0030 to 0069  
CIMR-V□4A0018 to 0038



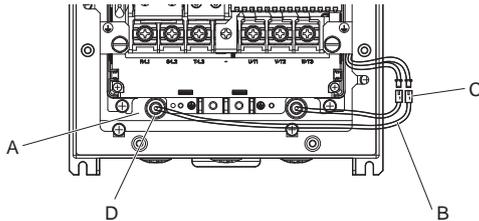
**Figure 17 Internal Fan Replacement: Installation**

2. Install the fan unit back into the drive enclosure in its original position.
3. Plug the fan connector (CN7) back in.

## 9 Drive Cooling Fans

### ■ Removing the External Fan

1. Remove the front cover.
2. Unplug the fan connector (CN7).



A – Fan <1>

B – Fan relay cable

C – Fan connector (CN7)

D – Rubber bushing

<1> The external fan is installed outside of the waterproof/dust-proof enclosure.

#### Figure 18 Replacing the External Fan (Removing the External Fan in 2A0069)

3. Remove the screws to take the fan guard out of the drive. Push the rubber bushing out of conduit hole and take the internal fan out of the drive.

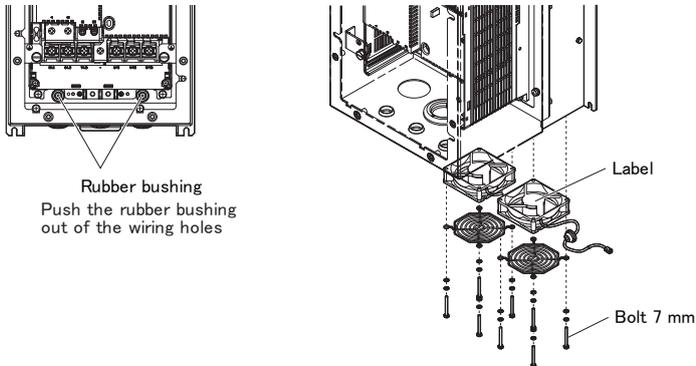
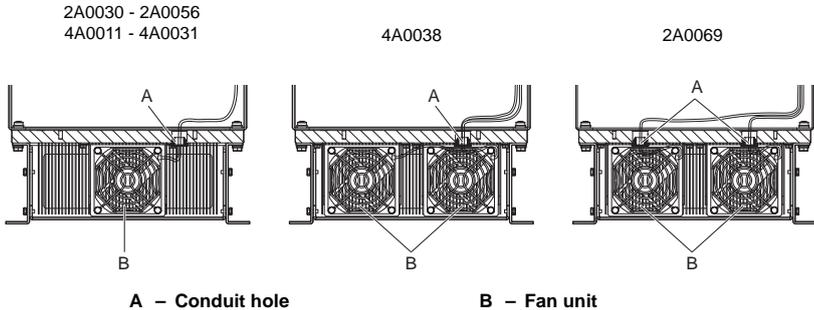


Figure 19 Replacing the External Fan

### ■ Installing the External Fan

The external fan installation procedure differs by drive model. Refer to [Figure 20](#) to install the external fan.

**NOTICE:** Install the fan so that the labeling faces inwards. The fan may be damaged if it is facing the wrong direction.

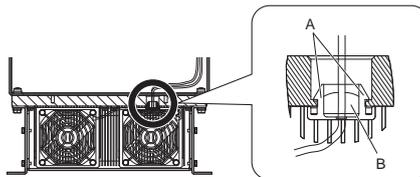


**Figure 20** Number of the External Fan and Conduit holes

1. Place the rubber bushing for the fan into the heatsink holes.

**NOTICE:** Make sure all bushings fit securely into place. If the rubber bushing left loose, water and dust can enter the drive.

2. Feed the fan wiring through the rubber bushing.
3. Plug the fan connector back in.
4. Fill up the wiring hole in the rubber grommet to a minimum depth of 9.7 mm with RTV sealant (KE-3494) specified in [Table 20](#).



**Figure 21** Fastening the Rubber bushing in 4A0038

5. Install the fan guard onto the fan.
6. Place the fan into its original position and fasten the fan into place.

# 10 Drive Replacement

### NOTICE

#### **Damage to Equipment**

**Replace the entire unit (drive enclosure, and heatsink) in the event that any single part becomes damaged.**

The drive, waterproof/dustproof enclosure, and heatsink are constructed as a single piece, and it is not possible to replace the drive separately from the protective enclosure.

# 11 Revision History

Document numbers and revision dates are provided on the bottom of the back cover of the manual.

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└─ Date of original publication

└─ Revision Number

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|                     |   | Chapter 9    | Deletion: Fuse Selection<br>Chapter numbers following chapter 9 change after this deletion.                            |
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