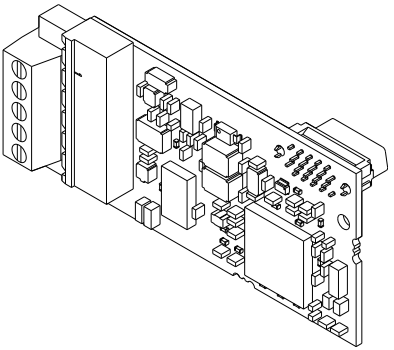
YASKAWA

YASKAWA AC Drive Option

DeviceNet
Installation Manual

Model SI-N3

To correctly use the product, read this manual thoroughly and keep it for easy reference, inspection, and maintenance. Make sure that the end user receives this manual.



MANUAL NO. TOEP C730600 84B

This Page Intentionally Blank

Table of Contents

1 Preface and Safety

YASKAWA Electric supplies component parts for use in a wide variety of industrial applications. The selection and application of YASKAWA products remain the responsibility of the equipment designer or end user.

YASKAWA accepts no responsibility for the way its products are incorporated into the final system design. Under no circumstances should any YASKAWA product be incorporated into any product or design as the exclusive or sole safety control. Without exception, all controls should be designed to detect faults dynamically and fail safely under all circumstances. All products designed to incorporate a component part manufactured by YASKAWA must be supplied to the end user with appropriate warnings and instructions as to the safe use and operation of that part. Any warnings provided by YASKAWA must be promptly provided to the end user. YASKAWA offers an express warranty only as to the quality of its products in conforming to standards and specifications published in the manual. NO OTHER WARRANTY, EXPRESS OR IMPLIED, IS OFFERED. YASKAWA assumes no liability for any personal injury, property damage, losses, or claims arising from misapplication of its products.

◆ Applicable Documentation

Document	Description
YASKAWA AC Drive Option DeviceNet Installation Manual (This book)	Read this manual first. The manual provides information about wiring, settings, functions, and troubleshooting. The manual is packaged together with the product.
YASKAWA AC Drive Option DeviceNet Technical Manual Manual No.: SIEP C730600 84	The technical manual contains detailed information about the option. Access the following sites to obtain the technical manual: U.S.: http://www.yaskawa.com Europe: http://www.yaskawa.eu.com Japan: http://www.e-mechatronics.com Other areas: Check the back cover of these manuals. For questions, contact Yaskawa or a Yaskawa representative.
YASKAWA AC Drive Manuals	Refer to the drive manual to connect with the option. Drive manuals contain basic installation and wiring information in addition to detailed parameter setting, fault diagnostic, and maintenance information. The manuals also include important information about parameter settings and tuning the drive. The Quick Start Guides are packaged with the drive. The most recent versions of these manuals are available for download on our documentation websites: U.S.: http://www.yaskawa.com Europe: http://www.yaskawa.eu.com Japan: http://www.e-mechatronics.com Other areas: Check the back cover of these manuals. For questions, contact Yaskawa or a Yaskawa representative.

◆ Glossary

Terms	Definition
Option	YASKAWA AC Drive Option SI-N3 DeviceNet
Keypad	• HOA Operator • LCD Operator • LED Operator • HOA Keypad • LCD Keypad • LED Keypad
Hex. (Example: 900 (Hex.))	Identifies a unit for hexadecimal number format.

◆ Registered Trademarks

- DeviceNet is a registered trademark of Open DeviceNet Vendor Association, Inc. (ODVA).
- Trademarks are the property of their respective owners.

◆ Supplemental Safety Information

Read and understand this manual before installing, operating, or servicing this option. The option 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 *This signal word identifies a hazard that will cause serious injury or death if you do not prevent it.*

⚠ WARNING *This signal word identifies a hazard that can cause death or serious injuries if you do not prevent it.*

⚠ CAUTION *This signal word identifies a hazardous situation, which, if not avoided, can cause minor or moderate injury.*

NOTICE *This signal word identifies a property damage message that is not related to personal injury.*

■ Section Safety

General Precautions
• The diagrams in this section may include options and drives without covers or safety shields to illustrate details. Be sure to reinstall covers or shields before operating any devices. The option should be used according to the instructions described in this manual. • The diagrams in this manual are provided as examples only and may not pertain to all products covered by this manual. • 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. • Contact Yaskawa or a Yaskawa representative and provide the manual number shown on the front cover to order new copies of the manual.

⚠ DANGER *Do not ignore the safety messages in this manual. If you ignore the safety messages in this manual, it will cause serious injury or death. The manufacturer is not responsible for injuries or damage to equipment.*

⚠ WARNING *Electrical Shock Hazard. Do not modify the drive or option circuitry. Failure to obey can cause serious injury or death, or cause damage to the drive or option and will void warranty. Yaskawa is not responsible for modifications of the product made by the user.*

NOTICE *Damage to Equipment. Do not use steam or other disinfectants to fumigate wood for packaging the drive. Use alternative methods, for example heat treatment, before you package the components. Gas from wood packaging fumigated with halogen disinfectants, for example fluorine, chlorine, bromine, iodine or DOP gas (phthalic acid ester), can cause damage to the drive.*

2 Overview

This option provides a communications connection between the drive and an ODVA DeviceNet network. The option connects the drive to a DeviceNet network and facilitates the exchange of data.

DeviceNet is a communications link to connect industrial devices (for example limit switches, photoelectric switches, motor starters, smart motor controllers, operator interfaces, and variable frequency drives) and control devices (for example, programmable controllers and computers) to a network. DeviceNet is a simple networking solution. DeviceNet decreases the cost and time to wire and install factory automation devices, and it gives the option to interchange like components from other vendors.

DeviceNet is an open network standard.

Install the option/DeviceNet option on a drive to do these functions from a DeviceNet communication master device:

- Operate the drive
- Monitor the drive operation status
- Change drive parameter settings

Figure 2.1 DeviceNet Approved

◆ Compatible Products

You can use the option with these products:

Table 2.1 Compatible Products

Drive	Model
A1000	All
E1000	All
H1000	All
L1000A *1	All
U1000 *1	All
Z1000U *1	All
GA500	All
GA700 *2	All

Drive	Model
GA800 *2	All
FP605 *2	All

*1 Before you install the option on an L1000A, U1000 or Z1000U drive, make sure that the option software version is PRG: 1112 or later.

*2 Before you install the option on a GA500, GA700, GA800, or FP605 drive, make sure that the option software version is PRG: 1115 or later.

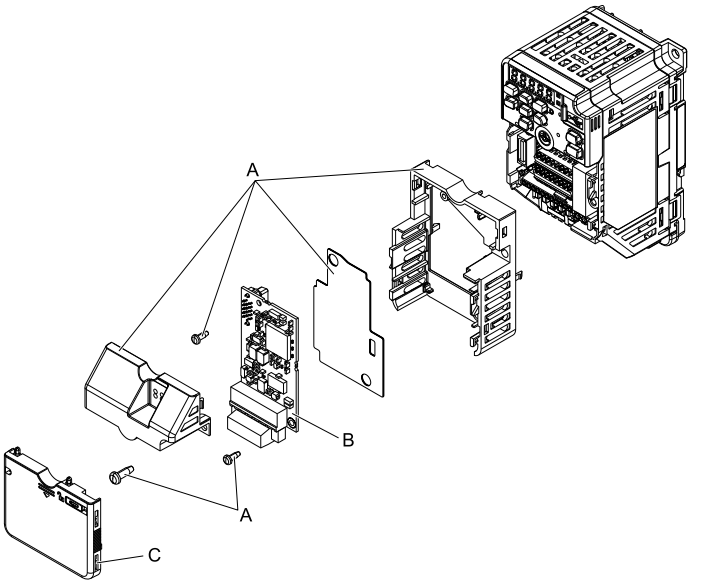
Note:

- Refer to the option package labeling in the field designated "PRG (four digit number)" or the option labeling in the field to identify the option software version.
- For Yaskawa customers in the North or South America region:
  If your product is not listed in Table 2.1, refer to the web page below to confirm this manual is correct for your product. The web page provides a list of option manuals by product, and a direct link to download a PDF of the manual.
  Scan QR code Or refer to:
  http://www.yaskawa.com/optionlookup

◆ Install the Option on a GA500 Drive

An option card mounting kit is necessary to install the option on a GA500 drive. The option card mounting kit model is: JOHB-GA50. This kit is sold separately.

Refer to the option card mounting kit manual for more information about installation.



A - Option card mounting kit components (sold separately)
B - Option
C - Drive front cover

Figure 2.2 Option Card Mounting Kit (JOHB-GA50)

3 Receiving

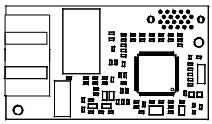
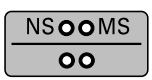
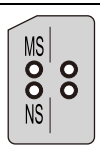
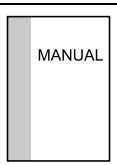
After you receive the option package:

- Make sure that there is no damage to the option and no parts are missing.
  The Yaskawa warranty does not include damage from shipping. If there is damage to the option or other parts, contact the shipping company immediately.

  NOTICE *Damage to Equipment. Do not use damaged parts to connect the drive and the option. Failure to comply could damage the drive and option.*
- Make sure that the model number on the option nameplate and the model number on the purchase order are the same. Refer to Figure 4.1 for more information.
- Contact the distributor where you purchased the option or contact Yaskawa or a Yaskawa representative about any problems with the option.

◆ Option Package Contents

Table 3.1 Contents of Package

Option Contents			Quantity
Option			1
Ground wire *1			1
Screws (M3)			3 *2
LED label	1000-Series, Z1000U		1
	GA500, GA700, and GA800		1
Manuals			1

*1 GA700 and GA800 drives do not use the ground wire.
*2 Only two screws are necessary to install the option on GA700 and GA800 drives.

Note:

The LED label for FP605 drives is packaged with the FP605 drive.

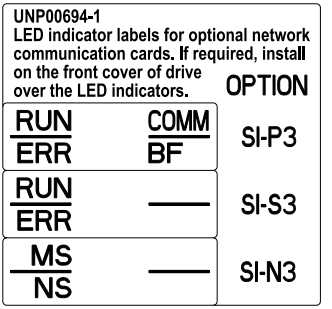


Figure 3.1 LED Label for FP605

◆ Installation Tools

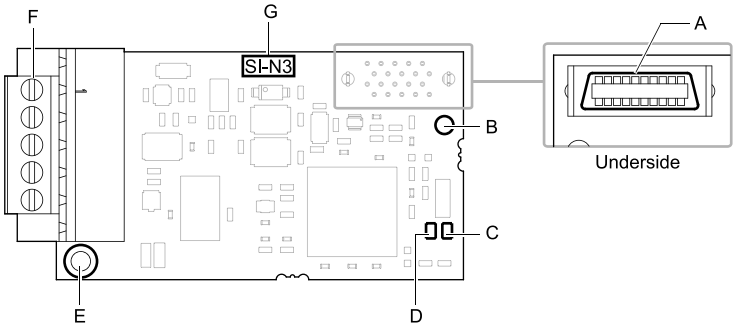
You can use these tools to install the option to the drive:

- A Phillips screwdriver or slotted screwdriver (M3 *1)
- A flat-blade screwdriver (blade depth: 0.4 mm (0.02 in.), width: 2.5 mm (0.1 in.)).
- A pair of diagonal cutting pliers.
- A small file or medium-grit sandpaper.

*1 Phillips screw sizes are different for different drive capacities. Prepare different screwdrivers for different screw sizes.

4 Option Components

◆ Option



A - Connector (CN5)
B - Installation hole
C - LED (MS) *1*
D - LED (NS) *1*
E - Ground terminal (FE) and installation hole *2*
F - Terminal block CN1
G - Option model number

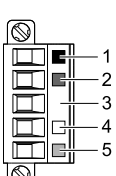
Figure 4.1 Option

*1 Refer to *Option LED States on page 14* for more information about the LEDs.
*2 Connect the included ground wire during installation. The ground wire is not necessary for installation on GA700 and GA800 drives.

◆ Terminal block CN1

The communication terminal is a pluggable terminal block that serves as the connection point of the DeviceNet network communication cable to the option.

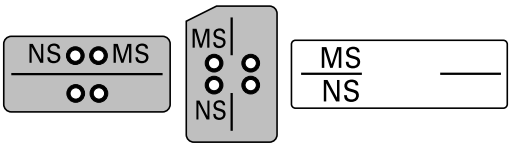
Table 4.1 Terminal Descriptions

Terminal	Pin	Color	Signal	Description
	1	Black	V-	Network common
	2	Blue	CAN_L	CAN data Low
	3	-	Shield	Cable shield
	4	White	CAN_H	CAN data High
	5	Red	V+	Communications network power DC +24V

◆ Option LED States

The option has two bicolor LEDs:

- Module status (MS)
- Network status (NS)



A - 1000-Series, Z1000U
B - GA500, GA700, and GA800
C - FP605 *1*

Figure 4.2 Option LED Labels

*1 LED label has transparent background and white letters. Please make sure that you use the correct label for FP605. The LED label for FP605 drives is packaged with the FP605 drive.

Wait 2 seconds minimum for the power-up diagnostic process to complete before you verify the LED states.

The Table 4.2 shows the operating status of the option LEDs after the power-up diagnostic LED sequence is complete.

Refer to Table 4.3 for more information about the LEDs.

Table 4.2 Option LED States

LED Name	Indication		Operating State	Description
	Color	Display		
MS	OFF		Power supply off	There is no power to the drive.
	Green	ON	Option operating	The option is operating normally.
	Green	Flashing	Option initializing	There are defects or errors in the settings. • There is an incorrect baud rate setting. • MAC ID duplication
	Red	ON	Fatal error occurred	The option detected a fatal (unrecoverable) error. If the unit does not recover after you cycle power, you may need to replace the option.
	Red	Flashing	Non-fatal error occurred	The option detected a non-fatal (recoverable) error.
	Red/ Green	Flashing	Option self-test	The option is in self-test mode.

LED Name	Indication		Operating State	Description
	Color	Display		
NS	OFF		Power supply OFF or Offline	The drive is not on-line. • Duplicate MAC ID test has not been passed. • There is no power to the drive.
	Green	ON	Online communications established	The option is online and has established connections. • The option has established connections to other nodes.
	Green	Flashing	Online communications not established	The option is online without an established connection. • Duplicate MAC ID test was passed and is online but has no open connections to other nodes.
	Red	ON	Ring fault	The option detected a communications device error. • An error occurred disabling DeviceNet communications. (MAC ID duplication or Bus off detected)
	Red	Flashing	Communications time-out (non-fatal)	A communications time-out occurred.
	Red/ Green	Flashing	Comm error	Specific communication faulted device. • The device detected a network access error and is in the communications faulted state. • The device then received and accepted an Identify communication fault request-long protocol message.

■ Power-Up Diagnostics

An LED test is performed each time the drive is powered up. The initial boot sequence can take several seconds. After the LEDs complete the diagnostic LED sequence, the option is successfully initialized. The LEDs then assume operational conditions as shown in Table 4.2.

Table 4.3 Power-Up Diagnostic LED Sequence

Sequence	Module Status (MS)	Network Status (NS)	Time (ms)
1	Green	OFF	250
2	Red	OFF	250
3	Green	Green	250

Sequence	Module Status (MS)	Network Status (NS)	Time (ms)
4	Green	Red	250
5	Green	OFF	-

5 Installation Procedure

◆ Section Safety

⚠ DANGER *Electrical Shock Hazard. Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, measure for dangerous voltages to make sure that the drive is safe. If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.*

⚠ WARNING *Electrical Shock Hazard. Do not operate the drive when covers are missing. Replace covers and shields before you operate the drive. Use the drive only as specified by the instructions. Some figures in this section include drives without covers or safety shields to more clearly show the inside of the drive. If covers or safety shields are missing from the drive, it can cause serious injury or death.*

⚠ WARNING *Electrical Shock Hazard. Only let approved personnel install, wire, maintain, examine, replace parts, and repair the drive. If personnel are not approved, it can cause serious injury or death.*

⚠ WARNING *Electrical Shock Hazard. Do not remove covers or touch circuit boards while the drive is energized. If you touch the internal components of an energized drive, it can cause serious injury or death.*

⚠ WARNING *Electrical Shock Hazard. Do not use damaged wires, put too much force on the wiring, or cause damage to the wire insulation. Damaged wires can cause serious injury or death.*

⚠ WARNING *Fire Hazard. Tighten all terminal screws to the correct tightening torque. Connections that are too loose or too tight can cause incorrect operation and damage to the drive. Incorrect connections can also cause death or serious injury from fire.*

NOTICE *Damage to Equipment. When you touch the option, make sure that you observe correct electrostatic discharge (ESD) procedures. If you do not follow procedures, it can cause ESD damage to the drive circuitry.*

NOTICE *Damage to Equipment. Do not de-energize the drive while the drive is outputting voltage. Incorrect equipment sequencing can cause damage to the drive.*

NOTICE *Do not operate a drive or connected equipment that has damaged or missing parts. You can cause damage to the drive and connected equipment.*

NOTICE *Use Yaskawa connection cables or recommended cables only. Incorrect cables can cause the drive or option to function incorrectly.*

NOTICE *Damage to Equipment. Correctly connect the connectors. Incorrect connections can cause malfunction or damage to the equipment.*

NOTICE *Damage to Equipment. Make sure that all connections are correct after you install the drive and connecting peripheral devices. Incorrect connections can cause damage to the option.*

◆ Procedures to Install and Wire Options on a Drive

Procedures to install and wire the option are different for different drive models.

Refer to the following table to check the procedures to install and wire the option on a drive.

Table 5.1 Procedures to Install and Wire Options on a Drive

Drive	Procedures to Install and Wire Options on a Drive	Reference Page
A1000	Procedure A	17
E1000	Procedure A	17
H1000	Procedure A	17
L1000A	Procedure A	17
U1000	Procedure A	17
Z1000U	Procedure A	17
GA500	**1 *2*	-
GA700	Procedure B	22
GA800	Procedure B	22
FP605	Procedure C	27

*1 To install the option on GA500 drives, use the option mounting kit (JOHB-GA50) and manual.
*2 Before you install the option on a GA500 drive, make sure that the option software version is PRG: 1115 or later.

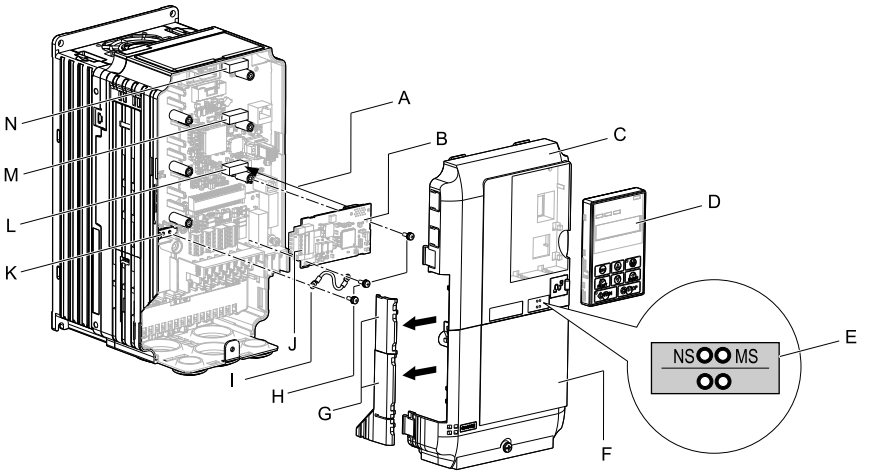
■ Procedure A

This section shows the procedure to install and wire the option on a 1000-series drive.

Prepare the Drive for the Option

Before you install the option on a YASKAWA AC Drive L1000A, U1000 or Z1000U, make sure that the option software version is PRG: 1112 or later.

Correctly wire the drive as specified by the manual packaged with the drive. Make sure that the drive functions correctly. Refer to the drive manuals for more information.



A - Insertion point for CN5 connector
B - Option
C - Drive front cover
D - Keypad
E - LED label
F - Drive terminal cover
G - Removable tabs for wire routing
H - Included screws
I - Ground wire
J - Terminal block (CN1)
K - Drive grounding terminal (FE)
L - Connector CN5-A
M - Connector CN5-B (Not available for communication option installation.)
N - Connector CN5-C (Not available for communication option installation.)

Figure 5.1 Drive Components with Option

Install the Option

Use this procedure to install the option.

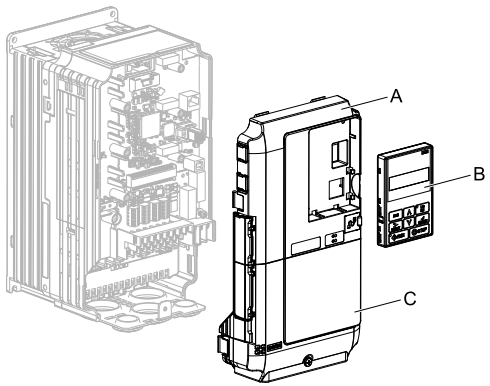
⚠ DANGER *Electrical Shock Hazard. Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, measure for dangerous voltages to make sure that the drive is safe. If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.*

1. Remove the keypad (B), front cover (A), and terminal cover (C).

   Shut off power to the drive and wait for the time specified on the drive warning label at a minimum. Make sure that the charge indicator LED is unlit, then remove the keypad and front cover. Refer to the drive manuals for more information.

You can only install this option into the CN5-A connector on the drive control board.

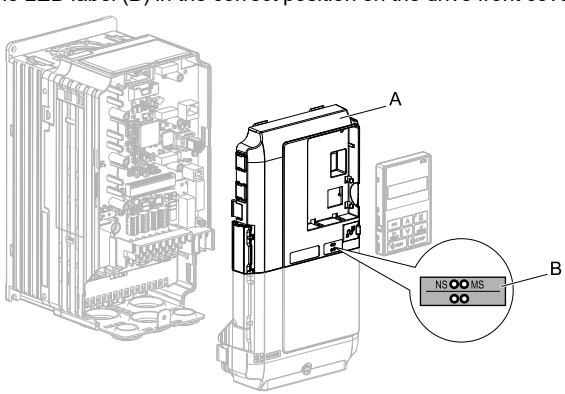
NOTICE *Damage to Equipment. When you touch the option, make sure that you observe correct electrostatic discharge (ESD) procedures. If you do not follow procedures, it can cause ESD damage to the drive circuitry.*



A - Drive front cover **C - Drive terminal cover**
B - Keypad

Figure 5.2 Remove the Keypad, Front Cover, and Terminal Cover

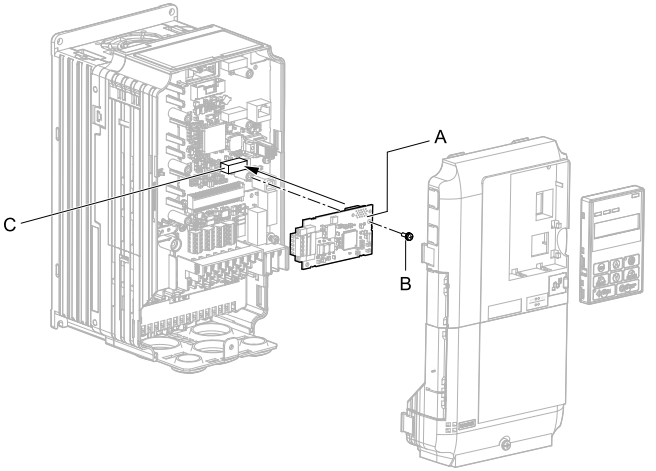
2. Put the LED label (B) in the correct position on the drive front cover (A).



A - Drive front cover **B - LED label**

Figure 5.3 Put the LED Label on the Drive Front Cover

3. Install the option (A) into the CN5-A connector (C) on the drive and use the included screws (B) to put it in place.



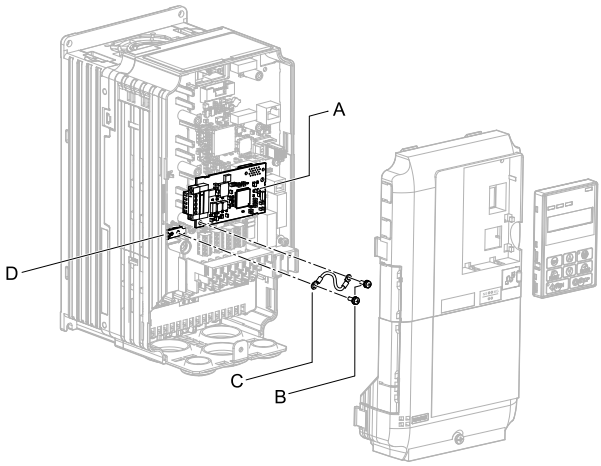
A - Option
B - Included screw
C - Connector CN5-A

Figure 5.4 Install the Option

4. Use one of the remaining included screws (B) to connect one end of the ground wire (C) to the ground terminal (D). Use the last remaining included screw (B) to connect the other end of the ground wire (C) to the remaining ground terminal and installation hole on the option (A).

   Tighten the screws to a correct tightening torque:

   • 0.5 N·m to 0.6 N·m (4.4 in·lb to 5.3 in·lb)



A - Option
B - Included screws
C - Ground wire
D - Drive grounding terminal (FE)

Figure 5.5 Connect the Ground Wire

Note:
The drive has only two ground terminal screw holes. When you connect three options, two options will share one ground terminal.

5. Route the option wiring.

   Procedures to wire the option are different for different drive models.

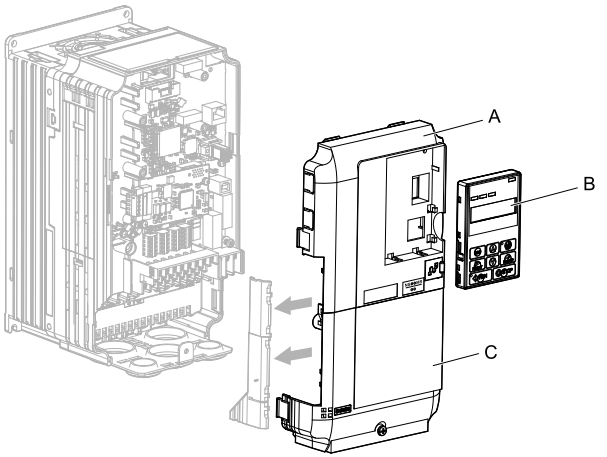
   Firmly connect the DeviceNet communication cable to option terminal block (CN1). Isolate communication cables from main circuit wiring and other electrical and power lines. Refer to *Communication Cable Wiring on page 36* for more information.

   NOTICE *Damage to Equipment. When you touch the option, make sure that you observe correct electrostatic discharge (ESD) procedures. If you do not follow procedures, it can cause ESD damage to the drive circuitry.*

6. Reattach the front cover (A), terminal cover (C), and keypad (B).

   Refer to the drive manuals for more information.

   NOTICE *Do not pinch cables between the front covers and the drive. Failure to comply could cause erroneous operation.*



A - Drive front cover
B - Keypad
C - Drive terminal cover

Figure 5.6 Replace the Front Cover, Terminal Cover, and Keypad

7. Set drive parameters in *Related Drive Parameters on page 39* for correct option performance.

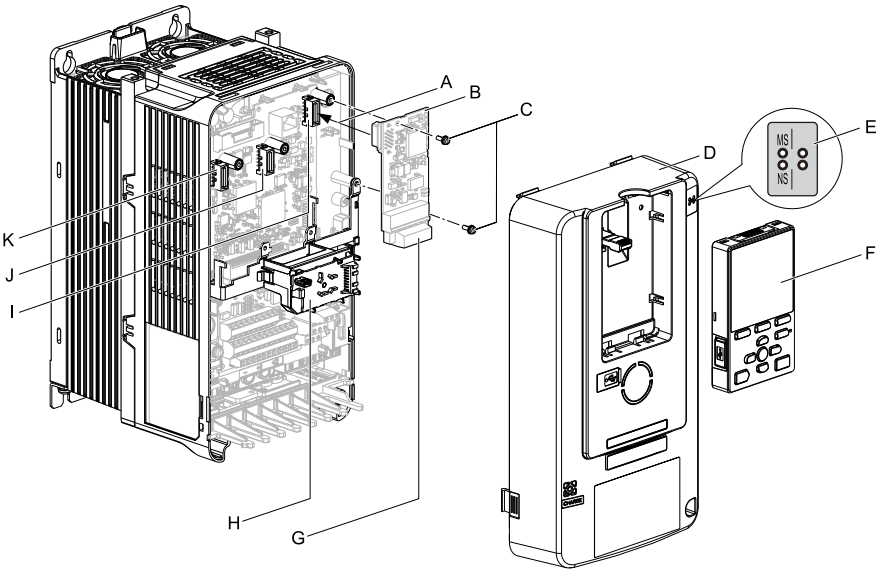
■ Procedure B

This section shows the procedure to install and wire the option on a GA700 or GA800 drive.

Prepare the Drive for the Option

Before you install the option on a YASKAWA AC Drive GA700 or GA800, make sure that the option software version is PRG: 1115 or later.

Correctly wire the drive as specified by the manual packaged with the drive. Make sure that the drive functions correctly. For information about drive connection and wiring, refer to the manuals for the drive on which you will use this option.



A - Insertion point for CN5 connector
B - Option
C - Included screws
D - Drive front cover
E - LED label
F - Keypad
G - Terminal block (CN1)
H - LED status ring board
I - Connector CN5-A
J - Connector CN5-B (Not available for communication option installation.)
K - Connector CN5-C (Not available for communication option installation.)

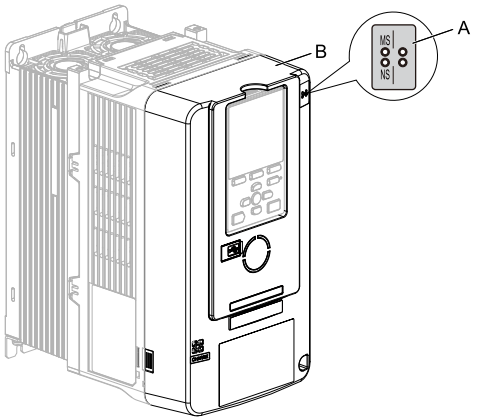
Figure 5.7 Drive Components with Option

Install the Option

Use this procedure to install the option.

⚠ DANGER *Electrical Shock Hazard. Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, measure for dangerous voltages to make sure that the drive is safe. If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.*

1. Put the LED label (A) in the correct position on the drive front cover (B).



A - LED label **B - Drive front cover**

Figure 5.8 Put the LED Label on the Drive Front Cover

2. Remove the keypad (E) and front cover (D).

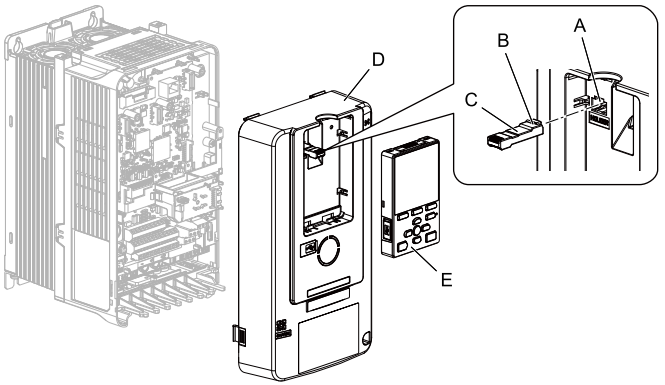
   Shut off power to the drive and wait for the time specified on the drive warning label at a minimum. Make sure that the charge indicator LED is unlit, then remove the keypad and front cover. Refer to the drive manuals for more information.

   You can only install this option into the CN5-A connector on the drive control board.

   NOTICE *Damage to Equipment. When you touch the option, make sure that you observe correct electrostatic discharge (ESD) procedures. If you do not follow procedures, it can cause ESD damage to the drive circuitry.*

Note:

Remove the keypad, then move the keypad connector to the holder on the drive, then remove the front cover.



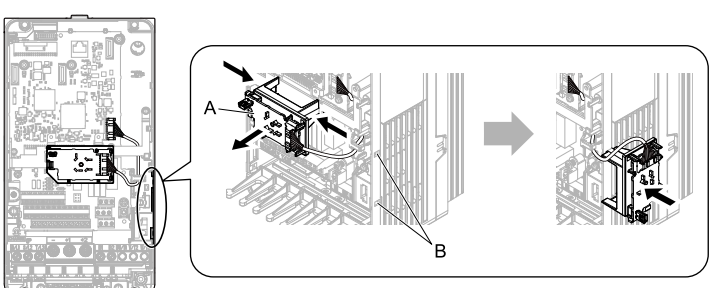
A - Holder
B - Keypad connector tab
C - Keypad connector
D - Drive front cover
E - Keypad

Figure 5.9 Remove the Front Cover and Keypad

3. Carefully remove the LED Status Ring board (A) and put it in the temporary placement holes (B) on the right side of the drive.

   Refer to the drive manuals for more information.

   NOTICE *Do not remove the LED Status Ring board cable connector. If you disconnect the LED Status Ring board, it can cause incorrect operation and damage to the drive.*



Drive front view

A - LED Status Ring board
B - Temporary placement holes

Figure 5.10 Remove the LED Status Ring Board

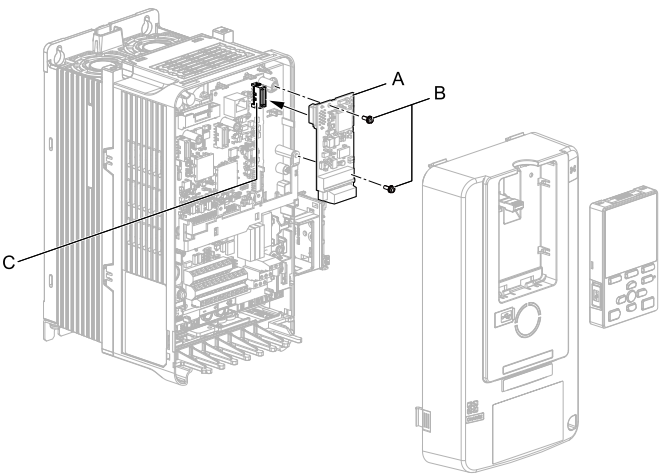
4. Install the option (A) into the CN5-A connector (C) on the drive and use the included screws (B) to put it in place.

   Tighten the screw to a correct tightening torque:

   - 0.5 N·m to 0.6 N·m (4.4 in·lb to 5.3 in·lb)

Note:

1. A ground wire is not necessary. Do not use the ground wire.
2. Only two screws are necessary to install the option on GA700 and GA800 drives.
3. The option package contains three screws and one ground wire.



A - Option
B - Included screws
C - Connector CN5-A

Figure 5.11 Install the Option

5. Firmly connect the DeviceNet communication cable to option terminal block (CN1).

   Isolate communication cables from main circuit wiring and other electrical and power lines. Refer to *Communication Cable Wiring on page 36* for more information.

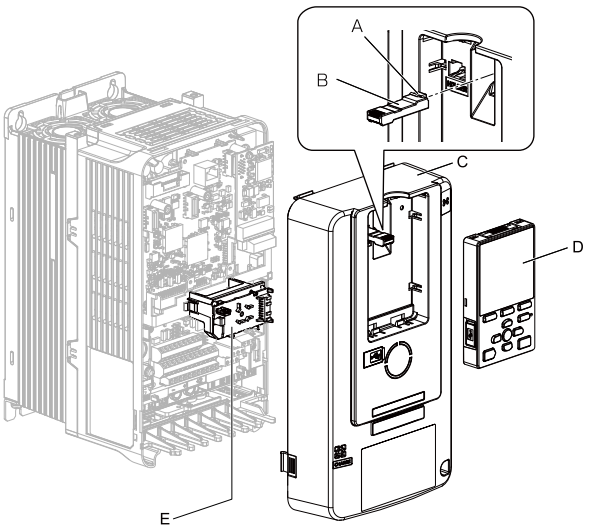
   NOTICE *Damage to Equipment. When you touch the option, make sure that you observe correct electrostatic discharge (ESD) procedures. If you do not follow procedures, it can cause ESD damage to the drive circuitry.*

6. Reattach the LED Status Ring board (E), front cover (C), and keypad (D).

   Refer to the drive manuals for more information.

NOTICE *Do not pinch cables between the front cover or the LED Status Ring board and the drive. Failure to comply could cause erroneous operation.*

Note:
• Replace the keypad connector, then install the keypad.
• Put the keypad connector tab into the holder when you install the keypad connector to the holder.



A - Keypad connector tab
B - Keypad connector
C - Drive front cover
D - Keypad
E - LED Status Ring board

Figure 5.12 Install the LED Status Ring board, Front Cover, and Keypad

7. Set drive parameters in *Related Drive Parameters on page 39* for correct option performance.

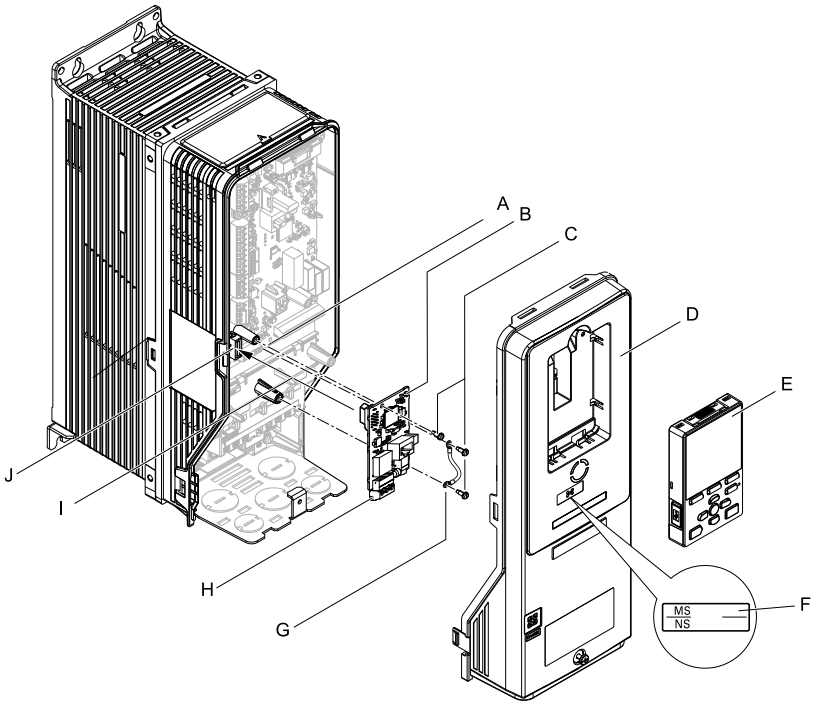
■ Procedure C

This section shows the procedure to install and wire the option on an FP605 drive.

Prepare the Drive for the Option

Before you install the option on an FP605 drive, make sure that the option software version is PRG: 1115 or later.

Correctly wire the drive as specified by the manual packaged with the drive. Make sure that the drive functions correctly. Refer to the drive manuals for more information.



A - Drive grounding terminal (FE)
B - Option
C - Included screws
D - Drive front cover
E - Keypad
F - LED label
G - Ground wire
H - Option terminal block CN1
I - Insertion point for connector CN5-A
J - Connector CN5-A

Figure 5.13 Drive Components with Option

Install the Option

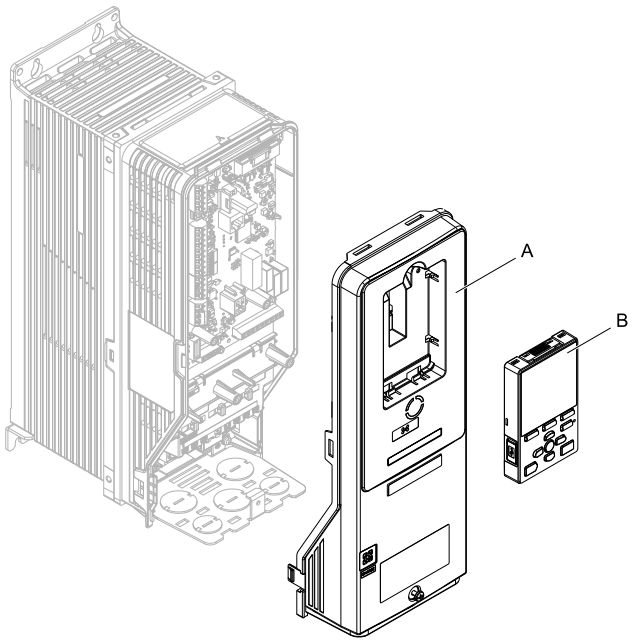
Use this procedure to install the option.

⚠ DANGER *Electrical Shock Hazard. Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, measure for dangerous voltages to make sure that the drive is safe. If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.*

1. Remove the keypad (B) and front cover (A).

   Shut off power to the drive and wait for the time specified on the drive warning label at a minimum. Make sure that the charge indicator LED is unlit, then remove the keypad and front cover. Refer to the drive manuals for more information.

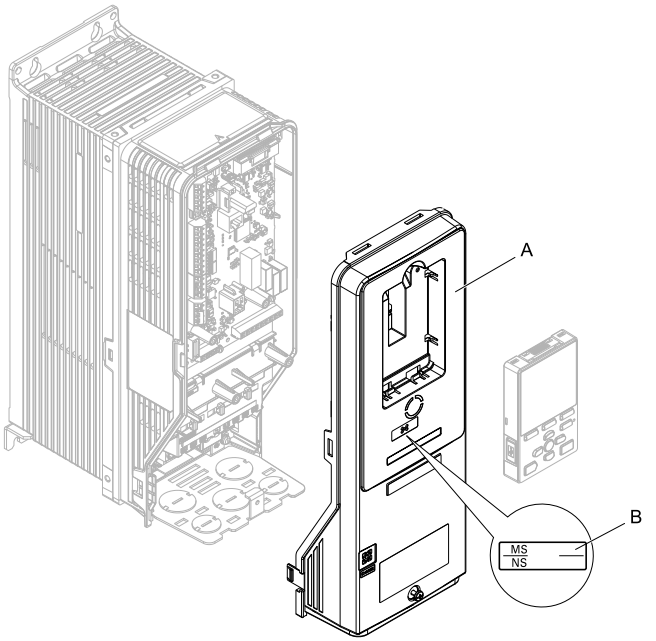
   NOTICE *Damage to Equipment. When you touch the option, make sure that you observe correct electrostatic discharge (ESD) procedures. If you do not follow procedures, it can cause ESD damage to the drive circuitry.*



A - Drive front cover **B - Keypad**

Figure 5.14 Remove the Front Cover and Keypad

2. Put the LED label (B) in the correct position on the drive front cover (A).

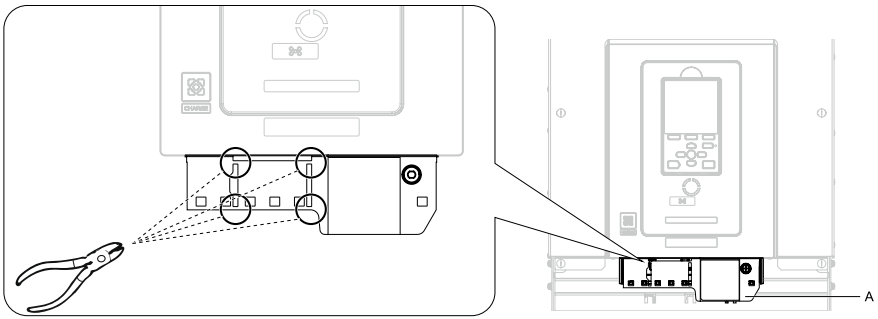


A - Drive front cover **B - LED label**

Figure 5.15 Put the LED Label on the Drive Front Cover

Note:

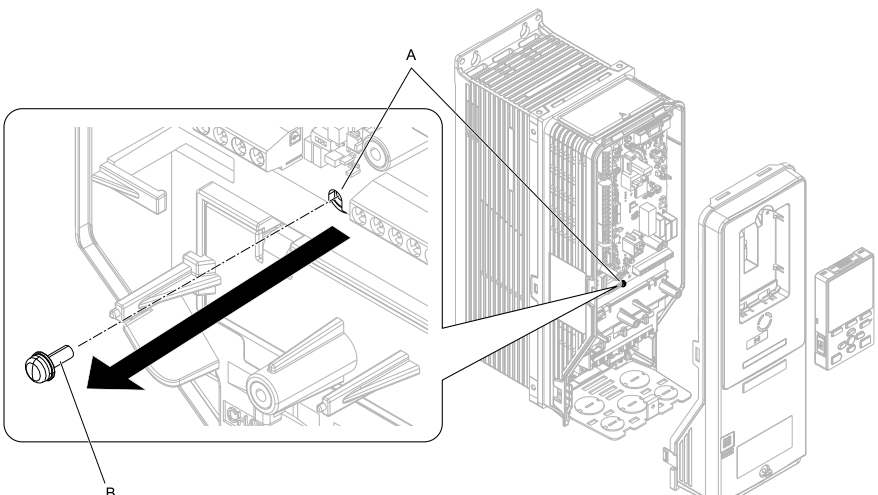
On FP605 drive models 2143 to 2396 and 4156 to 4720, attach the LED label after you cut the drive face plate as shown in Figure 5.16.



A - Drive face plate

Figure 5.16 Cut the Drive Face Plate on FP605 Models 2143 to 2396 and 4156 to 4720

3. Remove the screw (B) installed in the drive grounding terminal (A).



A - Drive grounding terminal (FE) **B - Included screw**

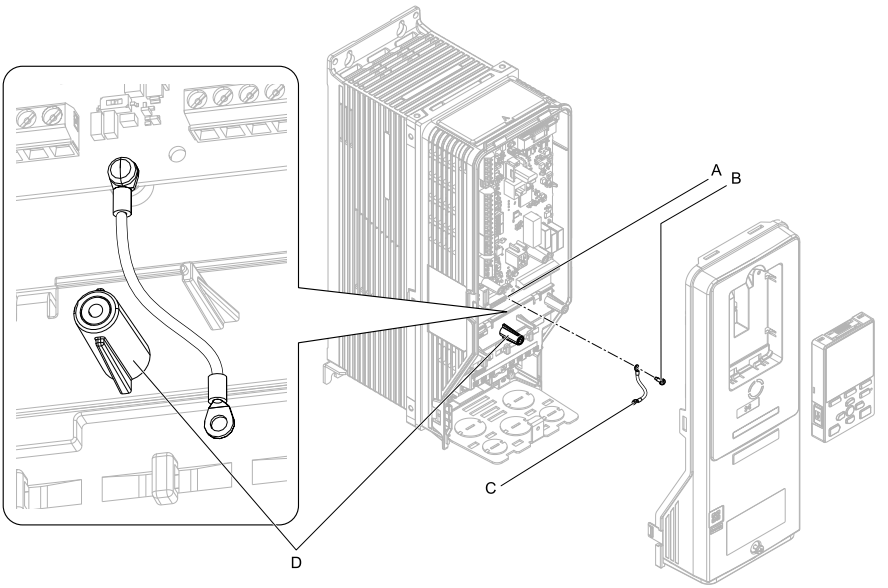
Figure 5.17 Remove the Screw from the Drive Grounding Terminal

4. Use the screw (B) installed in the FE ground terminal of the drive (A) to connect one end of the included ground wire (C) to the ground terminal on the drive.

   Tighten the screw to a correct tightening torque:

   - 0.5 N·m to 0.6 N·m (4.4 in·lb to 5.3 in·lb)

Note:
Route ground wire on the right side of the stud (D).

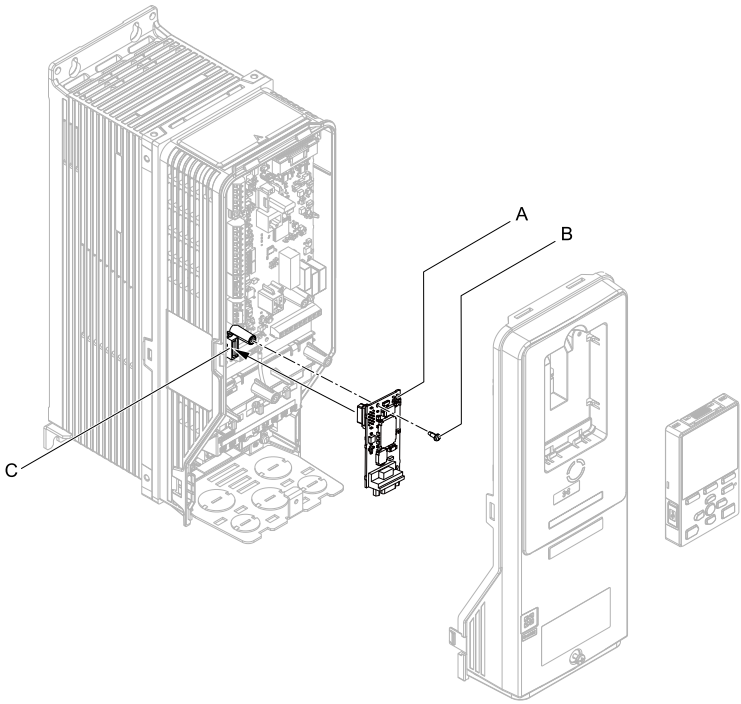


A - Drive grounding terminal (FE)
B - Included screw
C - Ground wire
D - Stud

Figure 5.18 Connect the Ground Wire

5. Install the option (A) into the CN5-A connector (C) on the drive and use one of the included screws (B) to put it in place.
   Tighten the screw to a correct tightening torque:
   - 0.5 N·m to 0.6 N·m (4.4 in·lb to 5.3 in·lb)

Note:
1. Only two screws are necessary to install the option on an FP605 drive.
2. The option package contains three screws and one ground wire.



A - Option
B - Included screw
C - Connector CN5

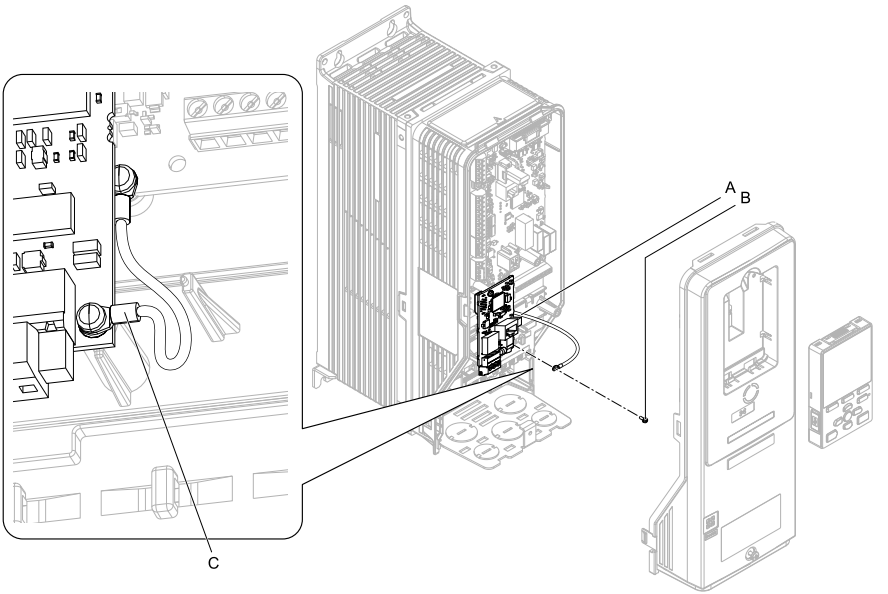
Figure 5.19 Install the Option

6. Use one of the remaining included screws (B) to connect the ground wire (A) to the ground terminal and installation hole on the option.

   Tighten the screw to a correct tightening torque:

   - 0.5 N·m to 0.6 N·m (4.4 in·lb to 5.3 in·lb)

Note:
Refer to Figure 5.20 for instructions about crimp terminal orientation (C) and wire routing.



A - Ground wire
B - Included screw
C - Crimp terminal

Figure 5.20 Connect the Ground Wire

7. Firmly connect the DeviceNet communication cable to the option terminal block (CN1).

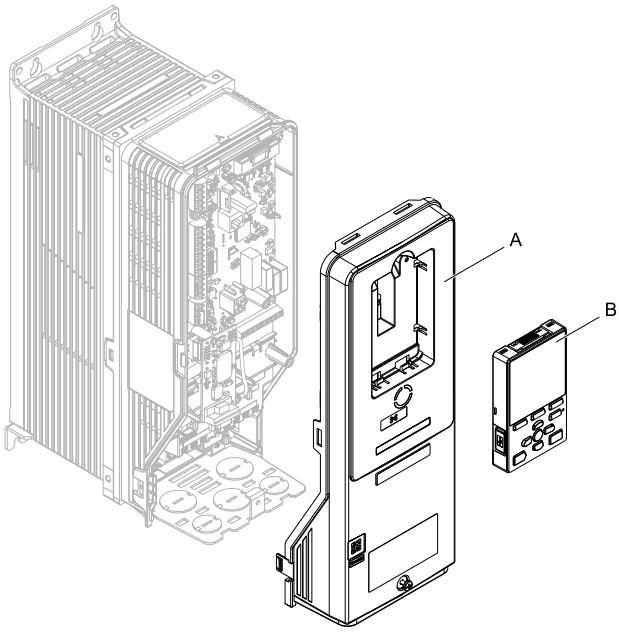
   Isolate communication cables from main circuit wiring and other electrical and power lines. Make sure that you firmly connect the cable end. (Refer to Figure 5.22). Refer to *Communication Cable Wiring on page 36* for more information.

   NOTICE *Damage to Equipment. When you touch the option, make sure that you observe correct electrostatic discharge (ESD) procedures. If you do not follow procedures, it can cause ESD damage to the drive circuitry.*

8. Reattach the drive front cover (A) and the keypad (B).

   Refer to the drive manuals for more information.

   NOTICE *Do not pinch cables between the front covers and the drive. Failure to comply could cause erroneous operation.*



A - Drive front cover **B - Keypad**

Figure 5.21 Replace the Front Cover and Keypad

9. Set drive parameters in *Related Drive Parameters on page 39* for correct option performance.

◆ Option Connection Diagram

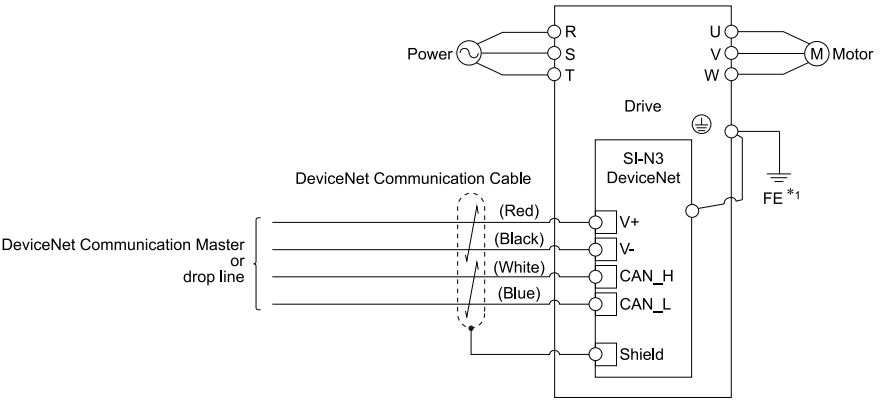


Figure 5.22 Option Connection Diagram

*1 Connect the included ground wire for installations on 1000-series, GA500, and FP605 drives. The ground wire is not necessary for installations on GA700 or GA800 drives.

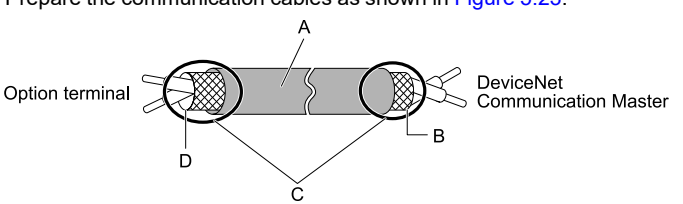
◆ Communication Cable Wiring

Route the option wiring as specified by these procedures.

Note:

Use only a DeviceNet dedicated communication cable. Refer to *Trunk Line and Drop Line Length on page 52* for more information about selecting trunk line and drop line lengths. Refer to the ODVA website (www.odva.org) for more information on network cabling.

1. Prepare the communication cables as shown in Figure 5.23.



A - Sheath
B - Shield
C - Use electrical tape or shrink tubing to insulate the cable.
D - Shield

Figure 5.23 Prepare Ends of Shielded Cable

2. Connect the communication cables to the terminal block as shown in Figure 5.24.

   When you attach the CN1 connector plug on the terminal block to the socket, make sure that you tighten the screws on the left and right sides of the plug.

   Tighten the screw to a correct tightening torque:

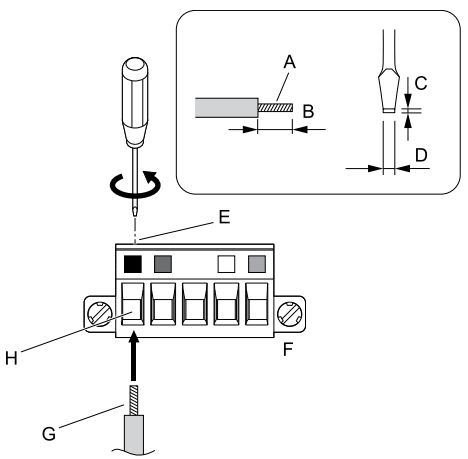
   • 0.5 N·m to 0.6 N·m (4.4 in·lb to 5.3 in·lb)

3. Make sure that you correctly connect the wires and that you did not accidentally pinch wire insulation in the terminals.

   Trim any frayed wires.

⚠ WARNING *Fire Hazard. Tighten all terminal screws to the correct tightening torque. Connections that are too loose or too tight can cause incorrect operation and damage to the drive. Incorrect connections can also cause death or serious injury from fire.*

NOTICE *Do not let wire shields touch other signal lines or equipment. Insulate the wire shields with electrical tape or shrink tubing. If you do not insulate the wire shields, it can cause a short circuit and damage the drive.*



A - Pull back the shielding and lightly twist the end with your fingers to keep the ends from fraying.

B - When you do not use crimp ferrules, remove approximately 5.5 mm (0.21 in) of the covering at the end of the wire.

C - Blade thickness of 0.4 mm (0.01 in) or less

D - Up to 2.5 mm

E - Tightening torque: 0.5 N·m to 0.6 N·m (4.4 in·lb to 5.3 in·lb)

F - Terminal block CN1

G - DeviceNet Communication Cable (do not solder ends)

H - Loosen the screws and put the wire into the opening on the terminal block.

Figure 5.24 Communication Cable Wiring

◆ Termination Resistor Connection

Only connect network termination resistors (121 Ω, ±1%, 1/4 W) to nodes of the two ends of trunk line. Refer to the ODVA website (www.odva.org) for more information on network cabling.

◆ Option MAC ID

■ Parameter F6-50 [DeviceNet MAC Address] (MAC ID Setting)

Setting range: 0 - 64

Parameter *F6-50* sets the option MAC ID. MAC ID settings between 0 to 63 are valid MAC IDs; setting 64 identifies a network-settable MAC ID.

The option reads the MAC ID value from *F6-50* upon power-up and upon a network reset.

◆ Communication Speed

Parameter *F6-51 [DeviceNet Baud Rate]* sets the option baud rate. The option supports standard baud rates of 125 kbps, 250 kbps, and 500 kbps.

Table 5.2 Parameter *F6-51 [DeviceNet Baud Rate]* Settings

Description	Value
125 kbps	0
250 kbps	1
500 kbps	2
Adjustable from Network	3
Detect Automatically	4

■ Auto Baud Rate Sensing (F6-51 = 4 [DeviceNet Baud Rate = Detect Automatically])

Set *F6-51 = 4 [DeviceNet Baud Rate = Detect Automatically]* to enable automatic baud rate detection and to allow the option to automatically determine the baud rate of the DeviceNet network.

Note:

Auto baud rate sensing is valid only when there is more than one node physically on the DeviceNet network segment. If the auto baud rate sensing does not detect the baud rate, the drive keypad will show "bUS" and the option LEDs will be OFF (NS) and solid green (MS).

◆ EDS Files

For easy network implementation of drives equipped with the option, an EDS file can be obtained from:

U.S.: http://www.yaskawa.com

Europe: http://www.yaskawa.eu.com

Japan: http://www.e-mechatronics.com

Other areas: Check the back cover of these manuals.

For questions, contact Yaskawa or a Yaskawa representative.

Note:

Download the EDS file for SI-N3 option. The SI-N3 will not function as a slave in the network without the appropriate EDS file.

6 Related Drive Parameters

These parameters set the drive for operation with the option. Make sure that the parameter settings in this table are correct before you start network communications.

Note:

Hex.: MEMOBUS addresses that you can use to change parameters over network communication are represented in hexadecimal numbers.

No. (Hex.)	Name	Description	Default (Range)
b1-01 (0180)	Frequency Reference Selection 1	Selects the input method for frequency reference. 0 : Keypad 1 : Analog Input 2 : Memobus/Modbus Communications 3 : Option PCB 4 : Pulse Train Input **Note:** • To start and stop the drive with the DeviceNet master device using serial communications, set *b1-02 = 3 [Run Command Selection 1 = Option PCB]* or set the Net Control bit in the assemblies or Control Supervisor Object. To control the frequency reference of the drive via the master device, set *b1-01 = 3* or set the Net Reference bit in the assemblies or AC/DC object. • The default setting is different for different drives. Refer to the instruction manual of your specific drive for more information.	1 (0 - 4)
b1-02 (0181)	Run Command Selection 1	Sets the input method for the Run command. 0 : Keypad 1 : Digital Input 2 : Memobus/Modbus Communications 3 : Option PCB **Note:** To start and stop the drive with the DeviceNet master device using serial communications, set *b1-02 = 3* or set	1 (0 - 3)

No. (Hex.)	Name	Description	Default (Range)
		the Net Control bit in the assemblies or Control Supervisor Object. To control the frequency reference of the drive via the master device, set *b1-01 = 3 [Frequency Reference Selection 1 = Option PCB]* or set the Net Reference bit in the assemblies or AC/DC object.	
F6-01 (03A2)	Communication Error Selection	Selects drive response when the drive detects a *bUS [Option Communication Error]* error during communications with the option. 0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use C1-09) 3 : Alarm Only 4 : Alarm (Run at d1-04) 5 : Alarm - Ramp Stop **Note:** • When you set this parameter to *3* or *4*, the drive will continue operation after it detects a fault. Separately prepare safety protection equipment and systems, for example fast-stop switches. • Refer to the drive manual to know if settings *4* and *5* are available. Settings 4 and 5 are available in A1000 software versions PRG: 1021 and later. • The setting range for 1000-Series drives is different for different software versions. Refer to the Peripheral Devices & Options section of the drive instruction manual for more information.	1 (0 - 5)
F6-02 (03A3)	Comm External Fault (EF0) Detect	Selects the conditions at which *EF0 [Option Card External Fault]* is detected. 0 : Always Detected 1 : Detected during RUN Only	0 (0, 1)
F6-03 (03A4)	Comm External Fault (EF0) Select	Sets the method to stop the motor or let the motor continue operating when the drive detects an *EF0 [Option Card External Fault]*. 0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use C1-09) 3 : Alarm Only **Note:** When you set this parameter to *3*, the drive will continue operation after it detects a fault. If you set this parameter to 3, make sure that you install an emergency stop switch.	1 (0 - 3)
F6-06 (03A7)	Torque Reference/Limit by Comm	Sets the function that enables and disables the torque reference and torque limit received from the communication option. 0 : Disabled 1 : Enabled	0 (0, 1)

No. (Hex.)	Name	Description	Default (Range)
		Note: • Control method availability of this parameter is different for different product series. –1000-Series Parameter is available in *A1-02 = 3, 6, 7 [Control Method Selection = Closed Loop Vector, PM Advanced Open Loop Vector, PM Closed Loop Vector]*. When you enable this parameter, *d5-01 [Torque Control Selection]* sets the drive to read the value as the Torque Limit value or the Torque Reference value. *d5-01 = 0 [Torque Control Selection = Speed Control]*: Torque Limit *d5-01 = 1 [Torque Control Selection = Torque Control*: Torque Reference In *A1-02 = 6*, this value is read as the Torque Limit. –GA500 Parameter is available in *A1-02 = 2, 6, 8 [Control Method Selection = Open Loop Vector, PM Advanced Open Loop Vector, EZ Vector Control]*. The drive reads this value as the Torque Limit. –GA700, GA800 Parameter is available in *A1-02 = 2, 3, 4, 6, 7, 8 [Control Method Selection = Open Loop Vector, Closed Loop Vector, Advanced Open Loop Vector, PM Advanced Open Loop Vector, PM Closed Loop Vector, EZ Vector Control]*. When you enable this parameter, *d5-01 [Torque Control Selection]* sets the drive to read the value as the Torque Limit value or the Torque Reference value. *d5-01 = 0 [Torque Control Selection = Speed Control]*: Torque Limit *d5-01 = 1 [Torque Control Selection = Torque Control*: Torque Reference In *A1-02 = 2, 8*, these values are read as the Torque Limit. –FP605 Torque Limit is enabled when *A1-02 = 8 [Control Method Selection = EZ Vector Control]*. • If the PLC does not supply a torque reference or torque limit when *F6-06 = 1 [Torque Reference/Limit by Comm = Enabled]*, the motor cannot rotate.	
F6-07 (03A8)	Multi-Step Ref @ NetRef/ ComRef	0 : Disable Multi-Step References 1 : Enable Multi-Step References **Note:** Default setting of *F6-07* is *1* for GA500.	0 (0, 1)
F6-08 (036A)	Comm Parameter Reset @Initialize	Selects whether communication-related parameters *F6-xx and F7-xx* are set back to original default values when you use parameter *A1-03 [Initialize Parameters]* to initialize the drive. 0 : No Reset - Parameters Retained 1 : Reset - Back to Factory Default	0 (0, 1)

No. (Hex.)	Name	Description	Default (Range)
		Note: When you set *F6-08* to *1* and you then use *A1-03* to initialize the drive, the drive will not change this setting value.	
F6-15 (0B5B)	Comm. Option Parameters Reload	Sets how the drive will enable the *F6-xx/F7-xx* communication-related parameters that you changed. 0 : Reload at Next Power Cycle 1 : Reload Now 2 : Cancel Reload Request **Note:** • *F6-15* is reset to *0* after setting *1* or *2*. • Available in option software versions 1115 and later. Not available on 1000-series drives.	0 (0 - 2)
F6-50 (03C1)	DeviceNet MAC Address	Selects the drive MAC address. **Note:** • All MAC addresses must be unique. Make sure that you do not use the setting MAC address for another node. • Cycle power for setting changes to take effect. • The default setting depends on region code. Default by region code (Example: CIMR-Vx or GA70x): −0: A (Japan), B (China), C (Europe), D (India), K (Korea), T (Asia) −64: U (The Americas)	0 (0 - 64)
F6-51 (03C2)	DeviceNet Baud Rate	0 : 125 kbps 1 : 250 kbps 2 : 500 kbps 3 : Adjustable from Network 4 : Detect Automatically **Note:** • Cycle power for setting changes to take effect. • The default setting depends on region code. Default by region code (Example: CIMR-Vx or GA70x): −0: A (Japan), B (China), C (Europe), D (India), K (Korea), T (Asia) −64: U (The Americas)	0 (0 - 4)
F6-52 (03C3)	DeviceNet PCA Setting	Sets the format of data that the DeviceNet communication master sends to the drive. **Note:** If *F6-52 [DeviceNet PCA Setting]* and *F6-53 [DeviceNet PPA Setting]* are not correct, the value is reset to default.	21 (0 - 255)
F6-53 (03C4)	DeviceNet PPA Setting	Sets the format of data that the drive sends to the DeviceNet communication master.	71 (0 - 255)

No. (Hex.)	Name	Description	Default (Range)
		Note: If *F6-52 [DeviceNet PCA Setting]* and *F6-53 [DeviceNet PPA Setting]* are not correct, the value is reset to default.	
F6-54 (03C5)	Net Idle Fault Detection	Determines what the drive should do when communication goes into idle mode. 0 : Enabled 1 : Disabled, No Fault Detection 2 : Vendor Specific 3 : RUN Forward 4 : RUN Reverse **Note:** • Cycle power for setting changes to take effect. • When setting *2*, drive will use to *F6-01 [Communication Error Selection]* to determine whether it should stop or continue.	0 (0 - 4)
F6-55 (03C6)	DeviceNet Baud Rate Monitor	Displays the baud rate currently being used for network communications. F6-55 is used only as a monitor. 0 : 125 kbps 1 : 250 kbps 2 : 500 kbps	0 (0 - 2)
F6-56 (03D7)	DeviceNet Speed Scaling	Sets the scaling factor for the Speed Monitor in the DeviceNet Object Class 2A hex.	0 (-15 - +15)
F6-57 (03D8)	DeviceNet Current Scaling	Sets the current scale of the DeviceNet communication master.	0 (-15 - +15)
F6-58 (03D9)	DeviceNet Torque Scaling	Sets the torque scale of the DeviceNet communication master.	0 (-15 - +15)
F6-59 (03DA)	DeviceNet Power Scaling	Sets the power scale of the DeviceNet communication master.	0 (-15 - +15)
F6-60 (03DB)	DeviceNet Voltage Scaling	Sets the voltage scale of the DeviceNet communication master.	0 (-15 - +15)
F6-61 (03DC)	DeviceNet Time Scaling	Sets the time scale of the DeviceNet communication master.	0 (-15 - +15)
F6-62 (03DD)	DeviceNet Heartbeat Interval	Sets the heartbeat interval. A setting of 0 disables the heartbeat function.	0 (0 - 10)
F6-63 (03DE)	DeviceNet Network MAC ID	Sets the function to see the actual DeviceNet MAC address using the keypad. This parameter functions as a monitor only.	0 (0 - 63)

No. (Hex.)	Name	Description	Default (Range)
		Note: The default setting depends on region code. Default by region code (Example: CIMR-Vx or GA70x): • 0: A (Japan), B (China), C (Europe), D (India), K (Korea), T (Asia) • 64: U (The Americas)	
F6-64 (03DF)	Dynamic Out Assembly 109 Param1	Sets Configurable Output 1 written to the MEMOBUS register. **Note:** The drive is compatible with option software versions 1111 and later.	0 (0 - FFFF)
F6-65 (03E0)	Dynamic Out Assembly 109 Param2	Sets Configurable Output 2 written to the MEMOBUS register. **Note:** The drive is compatible with option software versions 1111 and later.	0 (0 - FFFF)
F6-66 (03E1)	Dynamic Out Assembly 109 Param3	Sets Configurable Output 3 written to the MEMOBUS register. **Note:** The drive is compatible with option software versions 1111 and later.	0 (0 - FFFF)
F6-67 (03E2)	Dynamic Out Assembly 109 Param4	Sets Configurable Output 4 written to the MEMOBUS register. **Note:** The drive is compatible with option software versions 1111 and later.	0 (0 - FFFF)
F6-68 (03E3)	Dynamic In Assembly 159 Param 1	Sets Configurable Input 1 read from the MEMOBUS register. **Note:** The drive is compatible with option software versions 1111 and later.	0 (0 - FFFF)
F6-69 (03E4)	Dynamic In Assembly 159 Param 2	Sets Configurable Input 2 read from the MEMOBUS register. **Note:** The drive is compatible with option software versions 1111 and later.	0 (0 - FFFF)
F6-70 (03C7)	Dynamic In Assembly 159 Param 3	Sets Configurable Input 3 read from the MEMOBUS register. **Note:** The drive is compatible with option software versions 1111 and later.	0 (0 - FFFF)
F6-71 (03C8)	Dynamic In Assembly 159 Param 4	Sets Configurable Input 4 read from the MEMOBUS register.	0 (0 - FFFF)

No. (Hex.)	Name	Description	Default (Range)
		Note: The drive is compatible with option software versions 1111 and later.	
U6-97 (07F7)	OPT SPARE 4	Shows option software version.	-
U6-98 (07F8)	First Fault	Shows first option fault. 0 : No Fault 1 : Option Failure 2 : PLC in Idle State 3 : Force Fault 1000 : Network Power Loss 1001 : Connection Timeout 1002 : Duplicate MAC ID 1003 : Bus-off	-
U6-99 (07F9)	Current Fault	Shows current option fault. 0 : No Fault 1 : Option Failure 2 : PLC in Idle State 3 : Force Fault 1000 : Network Power Loss 1001 : Connection Timeout 1002 : Duplicate MAC ID 1003 : Bus-off	-

7 Configuring DeviceNet Messaging

This section provides information on the methods used to control the drive on DeviceNet.

◆ Drive Polled Configuration on DeviceNet

You must configure the drive DeviceNet polled connection before you can receive commands from a master device. Set these two parameters:

- *F6-52 [Polled Consuming Assembly]* (PCA)

  Note:
  This is the output assembly consumed by the drive.

- *F6-53 [Polled Producing Assembly]* (PPA)

  Note:
  This is the input assembly produced by the drive.

The default connection paths for the option are set for Extended Speed Control.

There are two ways to access PCA and PPA parameters:

- A software configuration tool (not supplied) and Yaskawa Electronic Data Sheet (EDS)

  Note:
  You can access the PCA and PPA parameters from the "DN: Polled Config" parameter group.

- A software configuration tool (not supplied) via a DeviceNet message path, for example, Extended Speed Control

  Note:
  Use a DeviceNet Connection Object to change the PCA or PPA if necessary for the application (Class 5, Instance 1, Attributes 14 and 16)

You must select one of each PCA and PPA assembly from Table 7.1 to configure the drive for polled operation.

Table 7.1 Supported Polled Assemblies (PCA and PPA)

Assembly Number (Hex.)	Description	Type	Bytes
20 (14)	DeviceNet Basic Speed Control Output	PCA	4
21 (15)	DeviceNet Extended Speed Control Output (Default Setting)	PCA	4
22 (16)	DeviceNet Speed and Torque Control Output	PCA	6
23 (17)	DeviceNet Extended Speed and Torque Control Output	PCA	6
70 (46)	DeviceNet Basic Speed Control Input	PPA	4
71 (47)	DeviceNet Extended Speed Control Input (Default Setting)	PPA	4
72 (48)	DeviceNet Speed and Torque Control Input	PPA	6
73 (49)	DeviceNet Extended Speed and Torque Control Input	PPA	6
100 (64)	MEMOBUS Message Command (Vendor Specific Yaskawa Electric (YE) Assy)	PCA	5
101 (65)	Standard Control (Vendor Specific Yaskawa Electric (YE) Assy)	PCA	8
102 (66)	Accel/Decel Time (Vendor Specific Yaskawa Electric (YE) Assy)	PCA	8
103 (67) *1	3-Wire Control 1 (Vendor Specific Yaskawa Electric (YE) Assy)	PCA	4
104 (68) *1	3-Wire Control Status 1 (Vendor Specific Yaskawa Electric (YE) Assy)	PPA	4
105 (69)	Enhanced Speed Control, Dynamic (Vendor Specific Yaskawa Electric (YE) Assy)	PCA	8
106 (6A)	Enhanced Control (Vendor Specific Yaskawa Electric (YE) Assy)	PCA	8
107 (6B)	Standard DI/DO Control (Vendor Specific Yaskawa Electric (YE) Assy)	PCA	8

Assembly Number (Hex.)	Description	Type	Bytes
108 (6C)	Enhanced Torque Control, Dynamic (Vendor Specific Yaskawa Electric (YE) Assy)	PCA	8
109 (6D) *2	Dynamic Output Assembly (Vendor Specific Yaskawa Electric (YE) Assy)	PCA	8
110 (6E) *3	3-Wire Control2 (Vendor Specific Yaskawa Electric (YE) Assy)	PCA	4
120 (78)	Speed Command 1 (Vendor Specific Yaskawa Electric (YE) Assy)	PCA	4
121 (79)	Torque Command 1 (Vendor Specific Yaskawa Electric (YE) Assy)	PCA	4
122 (7A)	Speed Command 2 (Vendor Specific Yaskawa Electric (YE) Assy)	PCA	6
123 (7B)	Torque Command 2 (Vendor Specific Yaskawa Electric (YE) Assy)	PCA	6
124 (7C)	Speed Dynamic Assy (Vendor Specific Yaskawa Electric (YE) Assy)	PCA	8
125 (7D)	Torque Dynamic Assy (Vendor Specific Yaskawa Electric (YE) Assy)	PCA	8
126 (7E)	Speed/Torque Assy (Vendor Specific Yaskawa Electric (YE) Assy)	PCA	8
130 (82)	Speed Status (Vendor Specific Yaskawa Electric (YE) Assy)	PPA	4
131 (83)	Current Status (Vendor Specific Yaskawa Electric (YE) Assy)	PPA	4
132 (84)	Current & Speed Status (Vendor Specific Yaskawa Electric (YE) Assy)	PPA	6
134 (86)	Speed Status Dynamic Assy (Vendor Specific Yaskawa Electric (YE) Assy)	PPA	8
135 (87)	Current Status Dynamic Assy (Vendor Specific Yaskawa Electric (YE) Assy)	PPA	8
136 (88)	Torque and Speed Status (Vendor Specific Yaskawa Electric (YE) Assy)	PPA	8
150 (96)	MEMOBUS Message Reply (Vendor Specific Yaskawa Electric (YE) Assy)	PPA	5
151 (97)	Standard Status 1 (Vendor Specific Yaskawa Electric (YE) Assy)	PPA	8
152 (98)	Standard Status 2 (Vendor Specific Yaskawa Electric (YE) Assy)	PPA	8
155 (9B)	Enhanced Speed Status, Dynamic (Vendor Specific Yaskawa Electric (YE) Assy)	PPA	8
156 (9C)	Enhanced Control Status (Vendor Specific Yaskawa Electric (YE) Assy)	PPA	8
157 (9D)	Standard DI/DO Status (Vendor Specific Yaskawa Electric (YE) Assy)	PPA	8
158 (9E)	Enhanced Torque Status, Dynamic (Vendor Specific Yaskawa Electric (YE) Assy)	PPA	8
159 (9F) *2	Dynamic Input Assembly (Vendor Specific Yaskawa Electric (YE) Assy)	PPA	8

Assembly Number (Hex.)	Description	Type	Bytes
160 (A0) *3	3-Wire Control Status2 (Vendor Specific Yaskawa Electric (YE) Assy)	PPA	4
199 (C7) *1	Change of State Response (Vendor Specific Yaskawa Electric (YE) Assy)	PPA	8

*1 The drive is compatible with option software versions 1107 and later.
*2 The drive is compatible with option software versions 1111 and later.
*3 The drive is compatible with option software versions 1114 and later.

◆ Drive Operation on DeviceNet

■ Polled Assemblies Quick Reference

Refer to the option Technical Manual for details on polled assemblies and other message types.

■ Output Assemblies/Drive Consumes

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
20 DeviceNet Basic Speed Control	0	-	-	-	-	-	Fault Reset	-	Run Fwd
	1	-							
	2	Speed Reference (Low Byte)							
	3	Speed Reference (High Byte)							

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
21 DeviceNet Extended Speed Control	0	-	NetRef	NetCtrl	-	-	Fault Reset	Run Rev	Run Fwd
	1	-							
	2	Speed Reference (Low Byte)							
	3	Speed Reference (High Byte)							

■ Input Assemblies/Drive Produces

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
70 DeviceNet Basic Speed Control	0	-	-	-	-	-	Running 1 (FWD)	-	Fault
	1	-							

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	2	Speed Actual (Low Byte)							
	3	Speed Actual (High Byte)							

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
71 DeviceNet Extended Speed Control	0	At Speed	Ref from Net	Ctrl from Net	Ready	Running 2 (REV)	Running 1 (FWD)	Warning	Fault
	1	State							
	2	Speed Actual (Low Byte)							
	3	Speed Actual (High Byte)							

8 Troubleshooting

◆ Drive-Side Error Codes

Drive-side error codes appear on the drive keypad. *Fault on page 49* lists causes of the errors and possible corrective actions. Refer to the drive Technical Manual for additional error codes that may appear on the drive keypad.

■ Fault

Both *bUS [Option Communication Error]* and *EF0 [Option Card External Fault]* can appear as a fault. When a fault occurs, the keypad ALM LED stays lit. When an alarm occurs, the ALM LED flashes.

If communication stops while the drive is running, use these questions as a guide to help remove the fault:

- Is the option properly installed?
- Is the communication line properly connected to the option? Is it loose?
- Is the PLC program working? Is the controller/PLC CPU stopped?
- Did a momentary power loss interrupt communications?

Code	Name	Causes	Possible Solutions
bUS	Option Communication Error	The drive did not receive a signal from the controller.	• Check for wiring errors. • Correct the wiring.
		The communications cable wiring is incorrect.	
		An existing short circuit or communications disconnection	Check disconnected cables and short circuits and repair as needed

Code	Name	Causes	Possible Solutions
		A data error occurred due to electric interference	• Prevent noise in the control circuit, main circuit, and ground wiring. • If you identify a magnetic contactor as a source of noise, install a surge absorber to the contactor coil. • Use only recommended cables or other shielded line. Ground the shield on the controller side or the drive input power side. • Separate all communication wiring from drive power lines. Install an EMC noise filter to the drive power supply input. • Counteract noise in the master controller (PLC).
		Option is damaged	If there are no problems with the wiring and the error continues to occur, replace the option.
		Connection Time-out	• The option Requested Packet Interval (RPI) timer timed out • Make sure that RPI time is set properly
		Duplicate MAC ID	The option MAC ID and at least one other node have the same MAC ID. Check the setting values of *F6-50 [DeviceNet MAC Address]*.
EF0	Option Card External Fault	The option received an external fault from the controller.	1. Find the device that caused the external fault and remove the caus. 2. Clear the external fault input from the controller.
		A programming error occurred on the controller side.	Examine the operation of the controller program.
oFA00	Option Not Compatible with Port	The option connected to connector CN5-A is not compatible.	Connect the option to the correct connector. • Use connector CN5-A when you connect the option. To use other options, refer to those option manuals.
oFA01	Option Card Fault (CN5-A)	The option connected to option port CN5-A was changed during run.	1. De-energize the drive. 2. Connect the option to the correct option port.
oFA03, oFA04	Option Card Error (CN5-A)	A fault occurred in the option.	1. De-energize the drive. 2. Make sure that the option is correctly connected to the connector. 3. If the problem continues, replace the option.

Code	Name	Causes	Possible Solutions
oFA30 to oFA43	Option Card Connection Error (CN5-A)	A fault occurred in the option.	1. De-energize the drive. 2. Make sure that the option is correctly connected to the connector. 3. If the problem continues, replace the option.
oFb00	Option Not Compatible with Port	The option connected to connector CN5-B is not compatible.	Connect the option to the correct connector. • Use connector CN5-A when you connect the option. To use other options, refer to those option manuals.
oFb02	Option Fault	An option of the same type is already installed in option port CN5-A, CN5-B, or CN5-C.	Connect the option to the correct option port.
oFC00	Option Fault (CN5-B)	The option connected to connector CN5-C is not compatible.	Connect the option to the correct connector. • Use connector CN5-A when you connect the option. To use other options, refer to those option manuals.
oFC02	Option Fault	An option of the same type is already installed in option port CN5-A, CN5-B, or CN5-C.	Connect the option to the correct option port.

■ Minor Faults and Alarms

Code	Name	Causes	Possible Solutions
CyPo	Cycle Power to Active Parameters	Comm. Option Parameter Not Upgraded	Re-energize the drive to update the communication option parameters.

◆ Option Compatibility

You can connect a maximum of 3 options at the same time depending on the type of option.

Note:
- You can only connect one option to a GA500 drive. Connect the option to the CN5 connector.
- You can connect two options to an FP605 drive. Connect the communication option to the CN5-A connector.
- Compatible communication options are different for different models. Refer to the drive manuals for more information.

Table 8.1 Option Compatibility

Option	Connector	Number of Options Possible
PG-B3 *1, PG-X3 *1	CN5-B, CN5-C	2 *2
PG-RT3 *1 *3 *4, PG-F3 *1 *3 *4	CN5-C	1
DO-A3 *5, AO-A3 *5	CN5-A, B, and C	1
SI-C3, SI-N3, SI-P3, SI-S3, SI-T3, SI-ET3, SI-ES3, SI-B3, SI-M3, SI-W3 *4, SI-EM3 *4, SI-EM3D *4, SI-EN3 *4, SI-EN3D *4, SI-EP3, JOHB-SMP3, AI-A3 *5 *6, DI-A3 *5 *6	CN5-A	1

*1 Not available for GA500 or FP605 drives.
*2 To connect two PG options, use the CN5-C and CN5-B connectors. To connect only one PG option, use the CN5-C connector.
*3 If you use the motor switching function, you cannot use this option.
*4 Not available for 1000-Series drive models with capacities between 450 and 630 kW (650 to 1000 HP).
*5 Not available for GA500 drives.
*6 To use AI-A3 and DI-A3 input statuses as monitors, connect the options to CN5-A, CN5-B, or CN5-C.

9 Trunk Line and Drop Line Length

Refer to the ODVA website (www.odva.org) for more information on network cabling.

◆ Trunk Line

The maximum allowable trunk line length depends on the type of cable used and the network baud rate. The total cable length includes the length of the trunk and the sum of all the drop lines.

Table 9.1 Trunk Line Cable Length

Baud Rate (kbps)	Thick Cable	Thin Cable
125	500 m (1640 ft)	100 m (328 ft)
250	250 m (787 ft)	100 m (328 ft)
500	100 m (328 ft)	100 m (328 ft)

To calculate the maximum total length for trunk lines of mixed thick and thin cables, use the following formulas:

- 125 kbps: $L_{thick} + (5 \times L_{thin}) \leq 500$ m (1640 ft)
- 250 kbps: $L_{thick} + (2.5 \times L_{thin}) \leq 250$ m (1640 ft)
- 500 kbps: $L_{thick} + L_{thin} \leq 100$ m (328 ft)

- thick: Thick cable thin: Thin cable

◆ Drop Line

The drop line is measured from the tap on the trunk line to the transceiver of the DeviceNet node. The total cable length includes the length of the trunk and the sum of all the drop lines.

Table 9.2 Drop Line Cable Length

Baud Rate (kbps)	Maximum at Each Drop	Maximum Total
125	6 m (20 ft)	156 m (511 ft)
250		78 m (256 ft)
500		39 m (128 ft)

10 European Standards

Figure 10.1 CE Mark

The CE mark indicates compliance with European safety and environmental regulations.

European standards include the Machinery Directive for machine manufacturers, the Low Voltage Directive for electronics manufacturers, and the EMC Directive for controlling noise.

It is required for engaging in business and commerce in Europe.

This option displays the CE mark based on the EMC Directive.

EMC Directive 2014/30/EU

Drives used in combination with this option and devices used in combination with the drive must also be CE certified and display the CE mark.

When using drives displaying the CE mark in combination with other devices, it is ultimately the responsibility of the user to ensure compliance with CE standards. Verify that conditions meet European standards after setting up the device.

◆ EMC Directive Compliance

This option is tested according to European standard EN 61800- 3:2004/A1:2012 and complies with the EMC Directive. The CE marking is declared based on the harmonized standards.

■ Option Installation

Verify the following installation conditions to make sure that other devices and machinery used with this option and drive also comply with EMC Directive:

1. Use dedicated shield cable for the option and external device (encoder, I/O device, master), or run the wiring through a metal conduit.
2. Keep wiring as short as possible and ground the largest possible surface area of the shield to the metal panel according to Figure 10.2, Figure 10.3, and Figure 10.4.

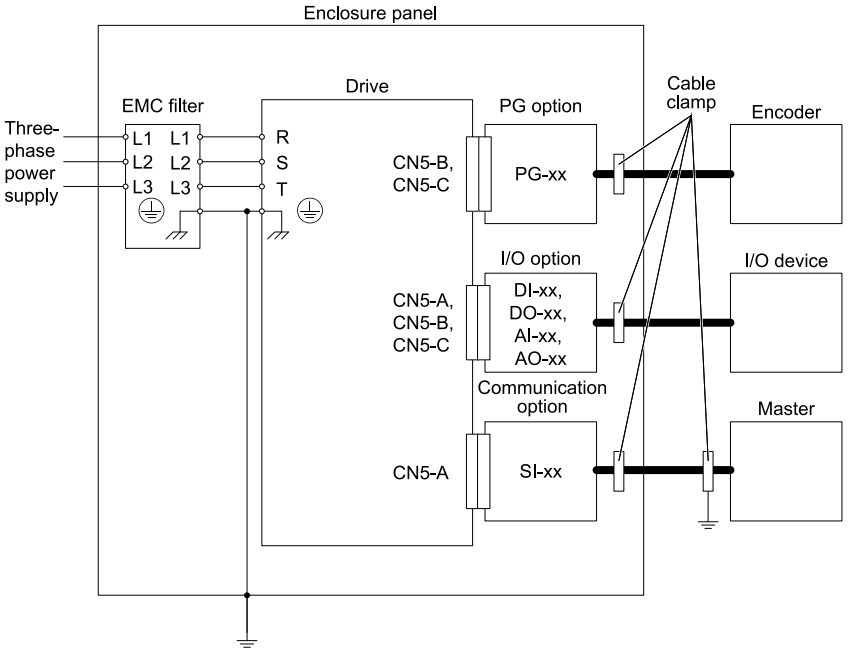


Figure 10.2 Option Installation for CE Compliance: 1000-Series, GA700, GA800

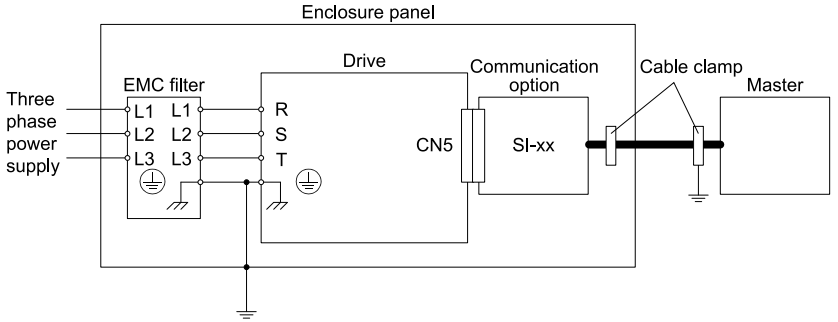


Figure 10.3 Option Installation for CE Compliance: GA500

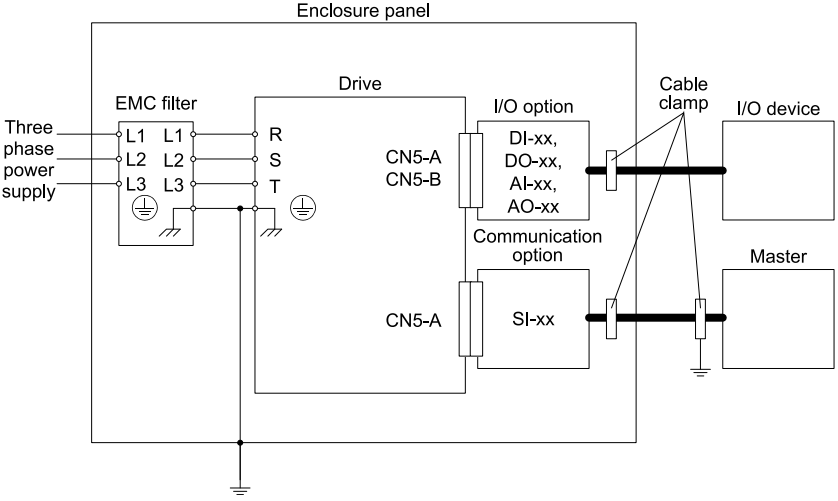
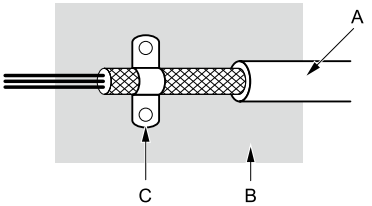


Figure 10.4 Option Installation for CE Compliance: FP605

3. Ground the largest possible surface area of the shield to the metal panel. Yaskawa recommends using cable clamps.



A - Braided shield cable
B - Metal panel
C - Cable clamp (conductive)

Figure 10.5 Ground Area

11 Precautions for Korean Radio Waves Act

Figure 11.1 KC Mark

This product confirms to broadcast and communications equipment for business use (Class A) and are designed for use in locations other than in ordinary houses.

Drives that bear the Korea Certification (KC) mark conform to the Korean Radio Waves Act. Be careful when you use the drive in Korea under the following conditions.

Table 11.1 Precaution When You Use this Drive

Precautions
This equipment is evaluated for compatibility for use in a business environment and may cause radio interference in a domestic environment.

Note:

The user guide applies only to “Business Broadcasting Communication Equipment”.

Comply with the EMC Directive to conform to the Korean Radio Act.

12 Specifications

◆ Specifications

Table 12.1 Option Specifications

Items	Specifications
Model	SI-N3
Supported Messages	• Group 2 Server (UCMM capable). • Explicit Messages: Fragmentation is supported. Up to 32 bytes can be input and output. • Polled I/O Messages: Fragmentation is not supported. Up to 8 bytes can be input and output. • Faulted Node Recovery/Offline Connection Set Messages/Automatic Device Replacement (ADR). • Change of State Message (COS). COS can be used as an I/O Input Assembly.
I/O Assembly Instance	Input: 21 types (4 - 8 bytes) Output: 21 types (4 - 8 bytes)
DeviceNet Specification	Conformance Level 27: Passed
DeviceNet Profile	AC Drive
Input Power	Power Supply Voltage: 11 Vdc - 25 Vdc Current: 40 mA
Connector Type	5-pin open-style screw connector
Physical Layer Type	Isolated Physical Layer CAN transceiver + photocoupler
MAC ID Setting	Programmable from drive keypad or network: MAC ID: 0 - 63
Communications Speed/Baud Rate	Programmable from drive keypad or network: • 125/250/500 kbps • Auto Baud Rate • Idle Mode Detect • Heartbeat
Ambient Temperature	-10 °C to +50 °C (14 °F to +122 °F)
Humidity	Up to 95% RH (non-condensing)
Storage Temperature	-20 °C to +60 °C (-4 °F to 140 °F) allowed for short-term transport of the product

Items	Specifications
Area of Use	Indoors and not near: • Oil mist, corrosive gas, flammable gas, or dust • Radioactive materials or flammable materials, including wood • Dangerous gases or fluids • Salt • Direct sunlight • Falling objects
Altitude	Up to 1000 m (3281 ft.)

13 Disposal

◆ Disposal Instructions

Correctly dispose of the product and packing material as specified by applicable regional, local, and municipal laws and regulations.

◆ WEEE Directive

The wheelie bin symbol on this product, its manual, or its packaging identifies that you must recycle it at the end of its product life.

You must discard the product at an applicable collection point for electrical and electronic equipment (EEE). Do not discard the product with usual waste.

Revision History

Date of Publication	Revision Number	Section	Revised Content
January 2026	3	Back cover	Revision: Address
March 2025	2	Back cover	Revision: Address
September 2022	1	All	Revision: Reviewed and corrected entire documentation
		Chapters 2 to 5	Deletion: Information on Z1000
		Chapters 3, 4	Revision: LED label for FP605
		Chapter 11	Addition: Precautions for Korean Radio Waves Act
March 2022	-	-	First Edition This manual is created based on TOBP C730600 84E<6>-0.

YASKAWA AC Drive Option

DeviceNet
Installation Manual

DRIVE CENTER (INVERTER PLANT)
2-13-1, Nishimiyaichi, Yukuhashi, Fukuoka,
824-8511, Japan
Phone: +81-930-25-2548 Fax: +81-930-25-3431
www.yaskawa.co.jp

YASKAWA ELECTRIC CORPORATION
New Pier Takeshiba South Tower, 1-16-1, Kaigan,
Minatoku, Tokyo, 105-6891, Japan
Phone: +81-3-5402-4502 Fax: +81-3-5402-4580
www.yaskawa.co.jp

YASKAWA AMERICA, INC.
2121, Norman Drive South, Waukegan, IL 60085, U.S.A.
Phone: +1-800-YASKAWA (927-5292) or +1-847-887-7000
Fax: +1-847-887-7310
www.yaskawa.com

YASKAWA ELÉTRICO DO BRASIL LTDA.
777, Avenida Piraporinha, Diadema, São Paulo,
09950-000, Brasil
Phone: +55-11-3585-1100 Fax: +55-11-3585-1187
www.yaskawa.com.br

YASKAWA EUROPE GmbH
Philipp-Reis-Str. 6, 65795 Hattersheim am Main, Germany
Phone: +49-6196-569-300
www.yaskawa.eu.com
E-mail: support@yaskawa.eu

YASKAWA ELECTRIC KOREA CORPORATION
6F, 112, LS-ro, Dongan-gu, Anyang-si, Gyeonggi-do, Korea
Phone: +82-31-8015-4224 Fax: +82-31-8015-5034
www.yaskawa.co.kr

YASKAWA ASIA PACIFIC PTE. LTD.
30A, Kallang Place, #06-01, 339213, Singapore
Phone: +65-6282-3003 Fax: +65-6289-3003
www.yaskawa.com.sg

YASKAWA ELECTRIC (THAILAND) CO., LTD.
59, 1F-5F, Flourish Building, Soi Ratchadapisek 18,
Ratchadapisek Road, Huaykwang, Bangkok, 10310,
Thailand
Phone: +66-2-017-0099 Fax: +66-2-017-0799
www.yaskawa.co.th

YASKAWA ELECTRIC (CHINA) CO., LTD.
22F, Link Square 1, No.222, Hubin Road, Shanghai,
200021, China
Phone: +86-21-5385-2200 Fax: +86-21-5385-3299
www.yaskawa.com.cn

YASKAWA ELECTRIC (CHINA) CO., LTD.
BEIJING OFFICE
Room 1011, Tower W3 Oriental Plaza, No. 1,
East Chang An Avenue,
Dong Cheng District, Beijing, 100738, China
Phone: +86-10-8518-4086 Fax: +86-10-8518-4082

YASKAWA ELECTRIC TAIWAN CORPORATION
12F, No. 207, Section 3, Beishin Road, Shindian District,
New Taipei City 23143, Taiwan
Phone: +886-2-8913-1333
Fax: +886-2-8913-1513 or +886-2-8913-1519
www.yaskawa.com.tw

YASKAWA INDIA PRIVATE LIMITED
#17/A, Electronics City, Hosur Road, Bengaluru,
560 100 (Karnataka), India
Phone: +91-80-4244-1900 Fax: +91-80-4244-1901
www.yaskawaindia.in

YASKAWA

YASKAWA ELECTRIC CORPORATION

In the event that the end user of this product is to be the military and said product is to be employed in any weapons systems or the manufacture thereof, the export will fall under the relevant regulations as stipulated in the Foreign Exchange and Foreign Trade Act. Therefore, be sure to follow all procedures and submit all relevant documentation according to any and all rules, regulations and laws that may apply.

Specifications are subject to change without notice for ongoing product modifications and improvements.

© 2022 YASKAWA ELECTRIC CORPORATION

TOEPC730600084

MANUAL NO. TOEP C730600 84B <3>-0
Published in Japan January 2026
25-9-27
Original Instructions