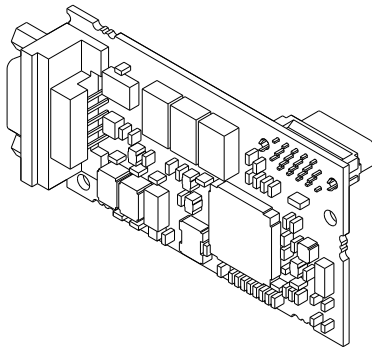


YASKAWA AC Drive Option **PROFIBUS-DP** Installation Manual

Model SI-P3

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.



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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 PROFIBUS-DP 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 PROFIBUS-DP Technical Manual Manual No.: SIEP C730600 82	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 PROFIBUS-DP
Keypad	<ul style="list-style-type: none"> • 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

- PROFIBUS-DP is a registered trademark of PROFIBUS and PROFINET International (PI).
- 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

The SI-P3 PROFIBUS-DP Option is an open digital communication system supporting a wide range of fast, time-critical applications.

PROFIBUS Decentralized Periphery (PROFIBUS-DP) is one of the three PROFIBUS variants. DP is dedicated to fast data communication between systems and peripherals at a field level.

PROFIBUS-DP is included into the International Standard (IEC61158) and the European Fieldbus Standard EN 50170. The network is primarily used in process and factory automation.

Install the option/PROFIBUS option on a drive to perform the following functions from a PROFIBUS-DP master device:

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

◆ Compatible Products

You can use the option with these products:

Table 2.1 Compatible Products

Drive	Model
A1000	All
U1000	All
Z1000U	All
GA500	All
GA700	All
GA800	All
FP605	All

Note:

For Yaskawa customers in the North or South America regions:

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:

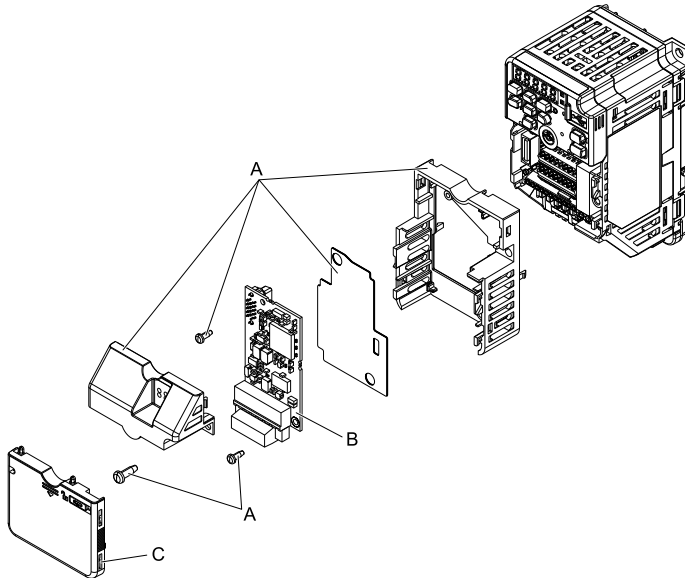
<http://www.yaskawa.com/optionlookup>



◆ 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 2.1 Option Card Mounting Kit (JOHB-GA50)

3 Receiving

After you receive the option package:

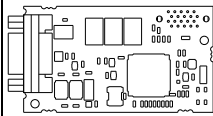




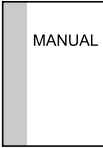
- Make sure that there is no damage to the option and no parts are missing. The Yaskawa warranty does not include damage from shipping. If there is damage to the option or other parts, contact the shipping company immediately.

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:

LED label for FP605 is packaged with FP605 drive itself.

UNP00694-1 LED indicator labels for optional network communication cards. If required, install on the front cover of drive over the LED indicators.		OPTION	
<u>RUN</u> ERR	<u>COMM</u> BF		SI-P3
<u>RUN</u> ERR	—		SI-S3
<u>MS</u> NS	—		SI-N3

◆ Installation Tools

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

- A Phillips screwdriver or slotted screwdriver (blade depth: 0.4 mm (0.02 in), width: 2.5 mm (0.1 in)) ^{*1}.
- 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

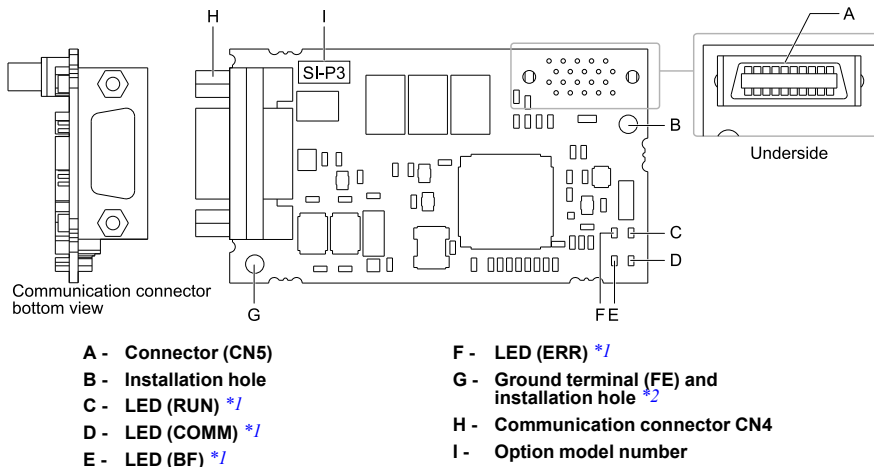


Figure 4.1 Option

*1 Refer to *Option LED States on page 13* for more information about the LEDs.

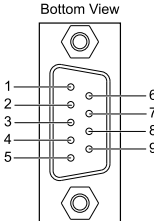
*2 Connect the included ground wire during installation.

The ground wire is not necessary for installations on GA700 and GA800 drives.

◆ Communication Connector

Communication connector CN4 on the option is a 9-pin D-sub female connector. The connector is the connection point for a customer-supplied male PROFIBUS network communication cable.

Table 4.1 Communication Connector

CN4 9-pin D-sub Female Connector	Pin	Symbol	Description
	1	Shield	Connected to the metal-shell (no direct FG-connection)
	2	-	-
	3	RxD/TxD-P	Receive/Transmit data: line B (red)
	4	CNTR-P	Control signal for repeaters (direction control)
	5	DGND	Data ground (reference voltage to VP)
	6	VP	+5 V power supply (for termination resistor)
	7	-	-
	8	RxD/TxD-N	Receive/Transmit data: line A (green)
	9	-	-

◆ Option LED States

The option has four LEDs:

- RUN (Power Supply)
- ERR (Option Error)
- COMM (Communication Status)
- BF (PROFIBUS-DP Error)

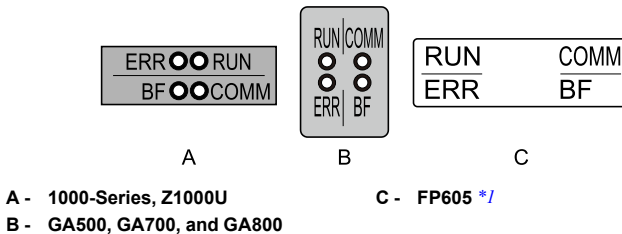


Figure 4.2 Option LED Labels

*1 LED label has transparent background and white letters. Please make sure that you use the correct label for FP605.

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		
RUN (Power Supply)	Green	ON	Power supply on	The SI-P3 has power, is prepared for operation, and the internal self-diagnostic check is complete.
		OFF	Power supply off	<ul style="list-style-type: none"> The drive has no power. The SI-P3 is not properly connected to the drive, or the SI-P3 has no power. An internal, self-diagnostic check completed in the SI-P3
ERR (Option Error)	Red	ON	SI-P3 error	Error found during the SI-P3 self-diagnostic check
		Flashing	Connection error	The SI-P3 is not properly connected to the drive. (This includes node address setting errors to F6-30 [PROFIBUS-DP Node Address] on the drive side.)
		OFF	Normal operation	Drive and SI-P3 are properly connected.
COMM (Communication Status)	Green	ON	Communication connected	Normal send/receive between the SI-P3 and the PROFIBUS-DP master.
		OFF	No data exchange	There is a problem establishing communication between the SI-P3 and the PROFIBUS-DP master.
BF (PROFIBUS-DP Error)	Red	ON	Waiting for communication procedure setting	Communication-related parameters are in the process of being set or initialized by the PROFIBUS-DP master.
		Flashing	Communication setting error	Communication parameter error from PROFIBUS-DP master.
		OFF	Normal parameter settings operation	LED shuts off when the PROFIBUS-DP master is finished setting communication-related parameters.

Table 4.3 LED Operation After Power-up Diagnostic

Option LED States				Description	Cause	Possible Solutions
RUN	ERR	COMM	BF			
•	•	•	•	Power supply off	The drive has no power.	Check all wiring to the drive, then turn on the power.

Option LED States				Description	Cause	Possible Solutions
RUN	ERR	COMM	BF			
					The SI-P3 is not properly connected to the drive, or the SI-P3 has no power.	Shut off the drive and make sure the SI-P3 is connected properly. Cycle drive power.
○	●	●	●	<ul style="list-style-type: none"> Checking connection with the drive Waiting for data from the master 	<ul style="list-style-type: none"> The SI-P3 is reading the node address or parameter configuration. Waiting for initial input data from master device. 	-
●	○	●	●	Error during the SI-P3 self-diagnostic check	SI-P3 error	Cycle drive power. If the LED status does not change, replace the SI-P3.
●	◐	●	●	Connection error	<ul style="list-style-type: none"> Problem initializing the drive and the SI-P3. Incorrect node address. 	<ul style="list-style-type: none"> Cycle drive power. If the LED status does not change, replace the SI-P3 or the drive. Check F6-30 [PROFIBUS-DP Node Address] setting in the drive.
○	●	●	○	Waiting for data from the master device	Waiting for data from the master device. (Set_Parm_Message or Chk_Cfg_Message)	<ul style="list-style-type: none"> Check master network settings. Make sure the master device is operating normally. Check terminal resistance settings on the data line. Check for problems with the data line and connector. Check if the data line is isolated from the main circuit wiring.
○	●	●	◐	Incorrect data from the master device	Incorrect data from the master device. (Set_Parm_Message)	Check master network settings.
○	●	○	●	Sending or receiving data	-	-

○: ON, ◐: Flashing, ●: OFF

◆ Node Address Setting

Use a parameter *F6-30* within 0 to 125. Be sure to set an address that is different than all other node addresses.

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
U1000	Procedure A	17
Z1000U	Procedure A	17
GA500	<i>*1</i>	-
GA700	Procedure B	23
GA800	Procedure B	23
FP605	Procedure C	31

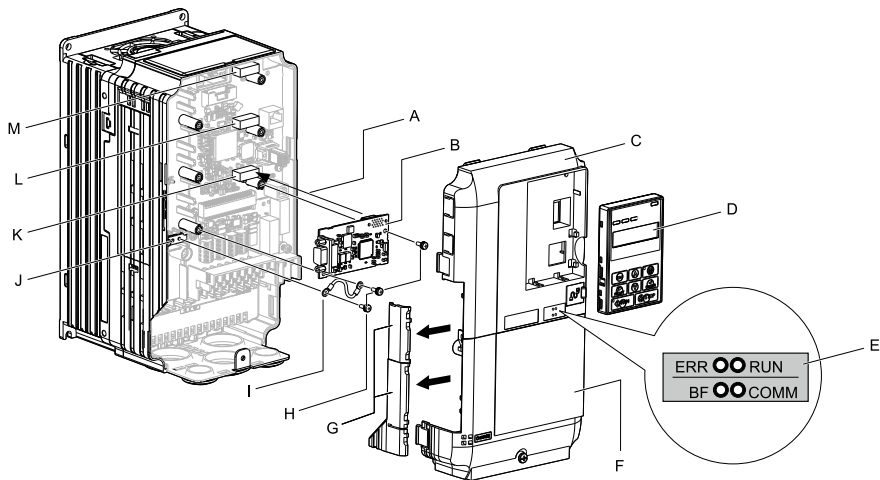
*1 To install the option on GA500 drives, use the option mounting kit (JOHB-GA50) and manual.

■ Procedure A

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

Prepare the Drive for the Option

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

Figure 5.1 Drive Components with Option

Install the Option

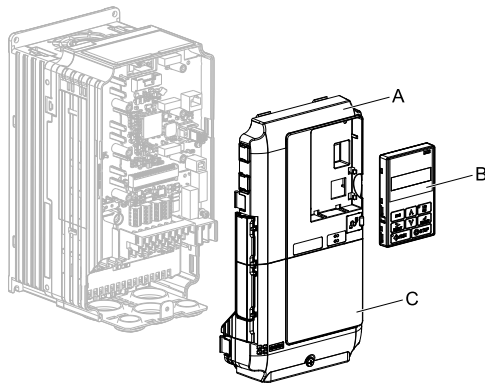
Use this procedure to install the option.

⚠ 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.

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.

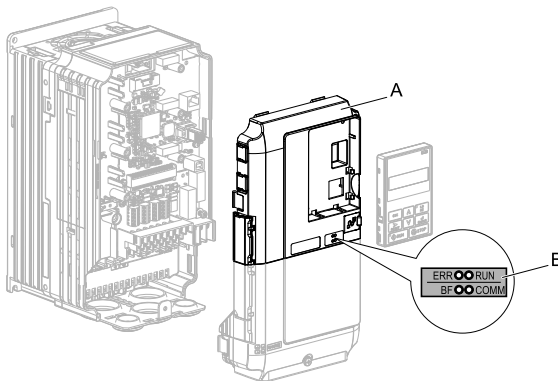


A - Drive front cover
B - Keypad

C - Drive terminal cover

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

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

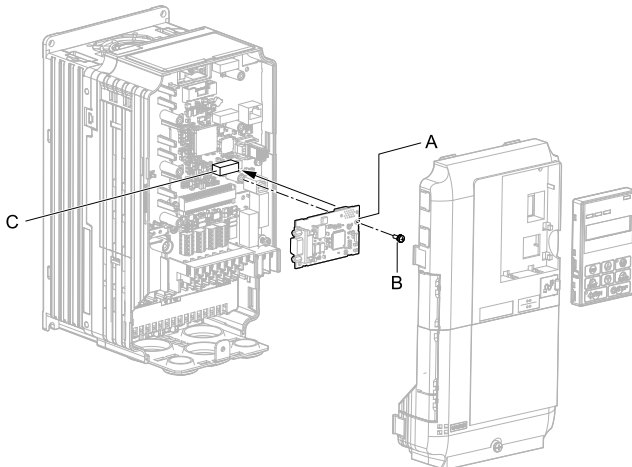


A - Drive front cover

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

C - Connector CN5-A

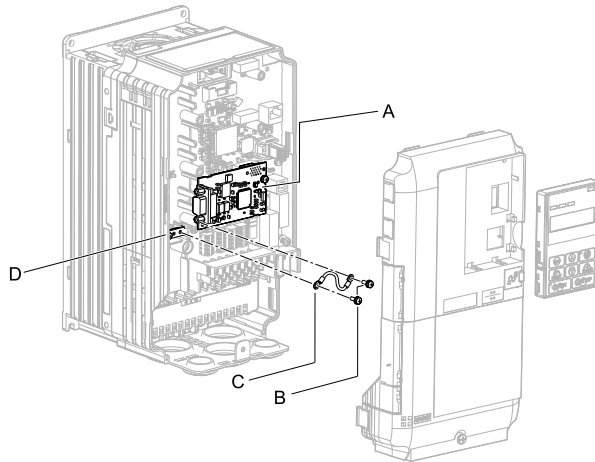
B - Included screw

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.

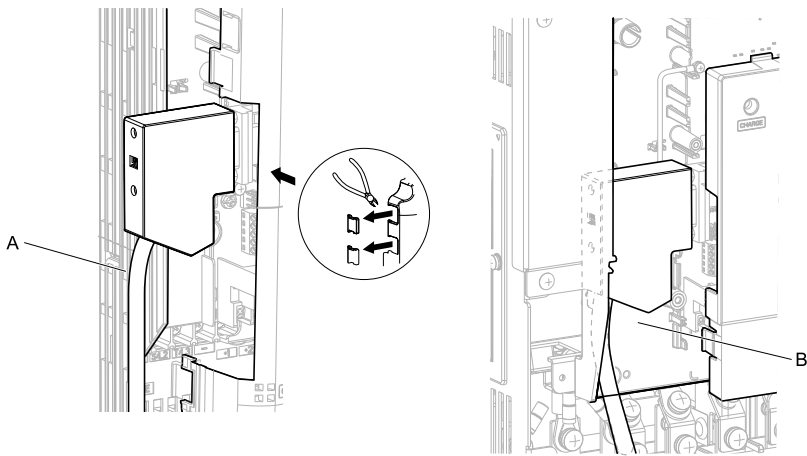
Procedures to wire the option are different for different drive models.

- You can route the option wiring through openings on the front cover of some models. Remove the perforated tabs on the left side of the front cover as shown in [Figure 5.6-A](#) to create the necessary openings on these models. To prevent damage to the cable from the cut end, treat the cut surface with sandpaper.
- Route the option wiring inside the enclosure as shown in [Figure 5.6-B](#). Make sure that the front covers will easily fit back onto the drive.

Refer to the drive manual for more information.

Note:

Isolate communication cables from main circuit wiring and other electrical and power lines.



- A - Route wires through the openings provided on the left side of the front cover. *1** **B - Use the open space provided inside the drive to route option wiring.**

Figure 5.6 Wire Routing Examples

*1 If there is wiring outside the enclosure, the drive will not meet Enclosed wall-mounted type (IP20/UL Type 1) requirements.

6. Firmly connect the PROFIBUS-DP communication cable to option communication connector CN4.

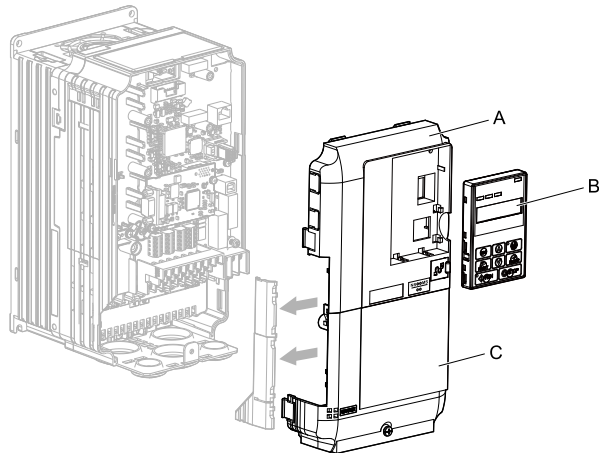
Isolate communication cables from main circuit wiring and other electrical and power lines. Make sure that you firmly connect the cable end. (Refer to [Figure 5.24](#)). Refer to [Communication Cable Specifications on page 39](#) for more information.

Note:

Do not connect or disconnect the communication cable while the drive is energized or while the drive is in operation. Failure to obey can cause a static discharge, which will cause the option to stop working correctly. Cycle power on the drive and option to start using the option again.

7. 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 5.7 Replace the Front Cover, Terminal Cover, and Keypad

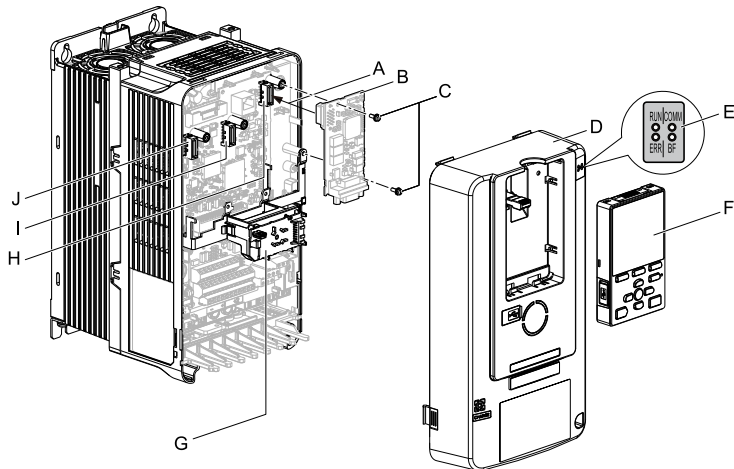
8. Set drive parameters in [Related Drive Parameters on page 42](#) for correct option performance.
Make sure that you set parameter *F6-30* to a node address that is unique on the network.

■ 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

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 - LED Status Ring board
- H - Connector CN5-A
- I - Connector CN5-B (Not available for communication option installation.)
- J - Connector CN5-C (Not available for communication option installation.)

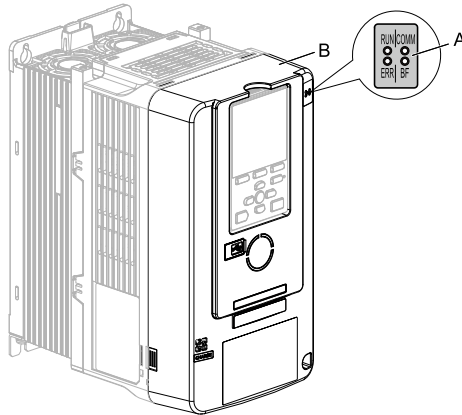
Figure 5.8 Drive Components with Option

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 5.9 Put the LED Label on the Drive Front Cover

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

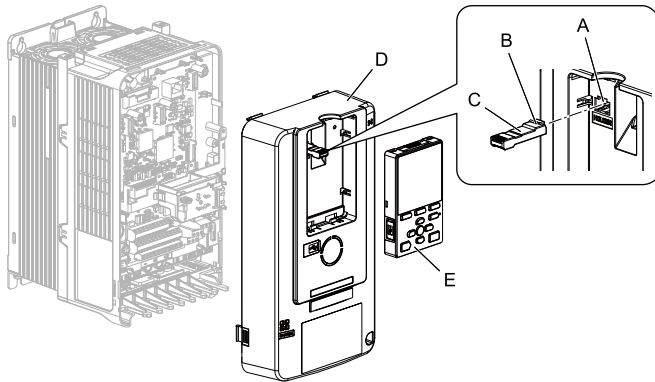
Shut off power to the drive and wait for the time specified on the drive warning label at a minimum. Make sure that the charge indicator LED is unlit, then remove the keypad and front cover. Refer to the drive manuals for more information.

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.

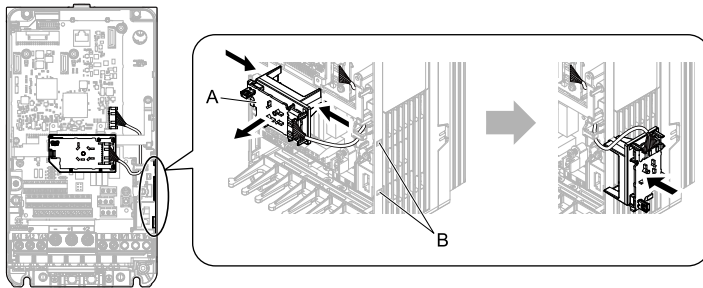


- A - Holder
- B - Keypad connector tab
- C - Keypad connector
- D - Drive front cover
- E - Keypad

Figure 5.10 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 5.11 Remove the LED Status Ring Board

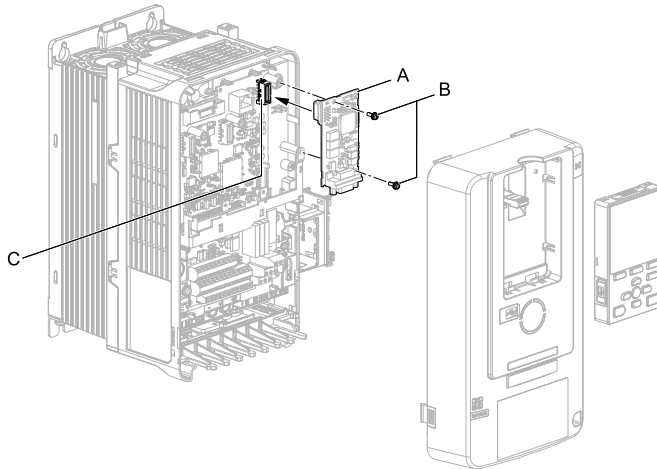
4. Install the option (A) into the CN5-A connector (C) on the drive and use the included screws (B) to put it in place.

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.



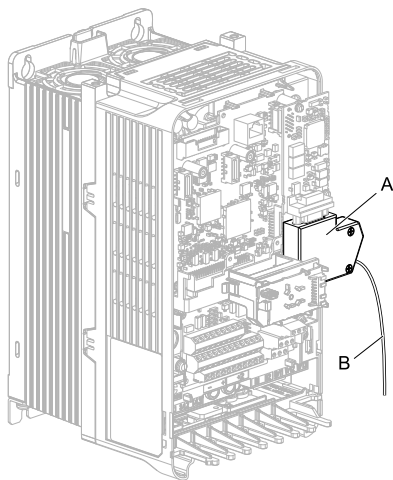
A - Option

C - Connector CN5-A

B - Included screws

Figure 5.12 Install the Option

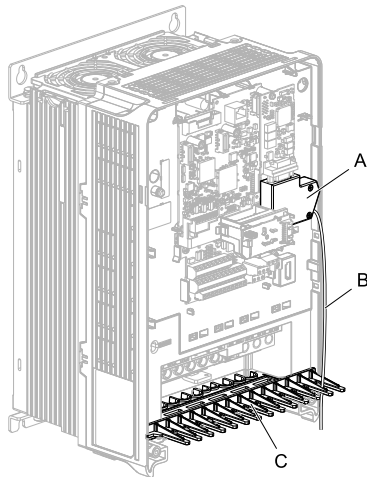
5. Confirm proper option wiring.
Procedures to wire the option are different for different drive models. Route the wiring to the outside as shown in [Figure 5.13](#) for drives that require routing the wiring to the outside. Route the wiring inside the enclosure through the lower wiring cover to the outside as shown in [Figure 5.14](#) for drives that do not require routing the wiring to the outside.



A - Connector

B - Cable

Figure 5.13 Example of Routing the Wiring to the Outside



A - Connector

B - Cable

C - Wiring cover

Figure 5.14 Example of Not Routing the Wiring to the Outside

6. Firmly connect the PROFIBUS-DP communication cable to the option communication connector CN4.

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 5.24](#)). Refer to [Communication Cable Specifications on page 39](#) for more information.

Note:

Do not connect or disconnect the communication cable while the drive is energized or while the drive is in operation. Failure to obey can cause a static discharge, which will cause the option to stop working correctly. Cycle power on the drive and option to start using the option again.

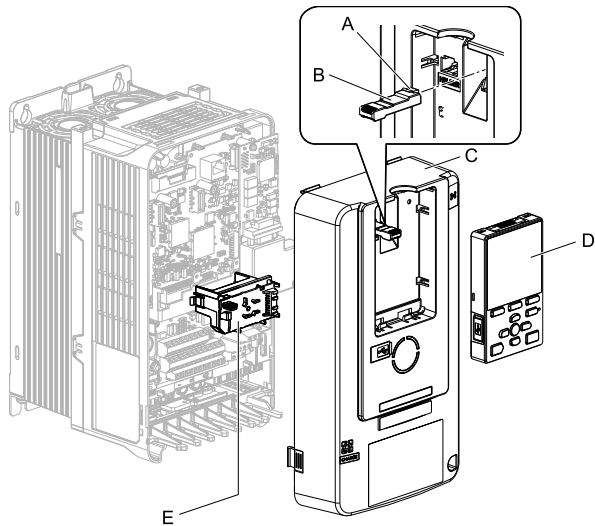
7. Make sure that the option wire routing is correct after you connect the prepared cable.
8. Reattach the LED Status Ring board (E), front cover (C), and keypad (D).
Refer to the drive manuals for more information.

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

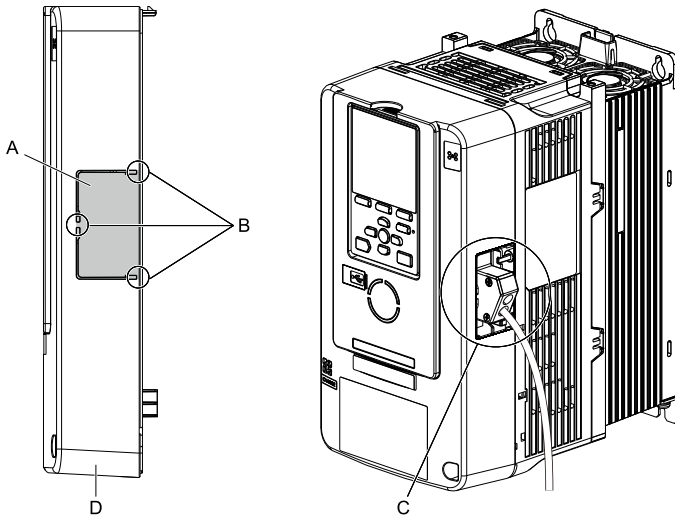
E - LED status ring board

Figure 5.15 Install the LED Status Ring board, Front Cover, and Keypad

Note:

Use diagonal cutters to cut out the perforated openings in the right side of the drive front cover and route the wiring and connector to the outside through the hole to attach the front cover for drives that require routing the wiring to the outside. To prevent damage to the cable from the cut end, treat the cut surface with sandpaper.

The drive will not meet Enclosed wall-mounted type (IP20/UL Type 1) requirements if wiring is exposed outside the enclosure.



A - Cutaway sections
B - Cutting locations

C - Route the wiring and connector to the outside.
D - Right side of the drive front cover

9. Set drive parameters in [Related Drive Parameters on page 42](#) for correct option performance.
Make sure that you set parameter *F6-30* to a node address that is unique on the network.

■ Procedure C

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

Prepare the Drive for the Option

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.

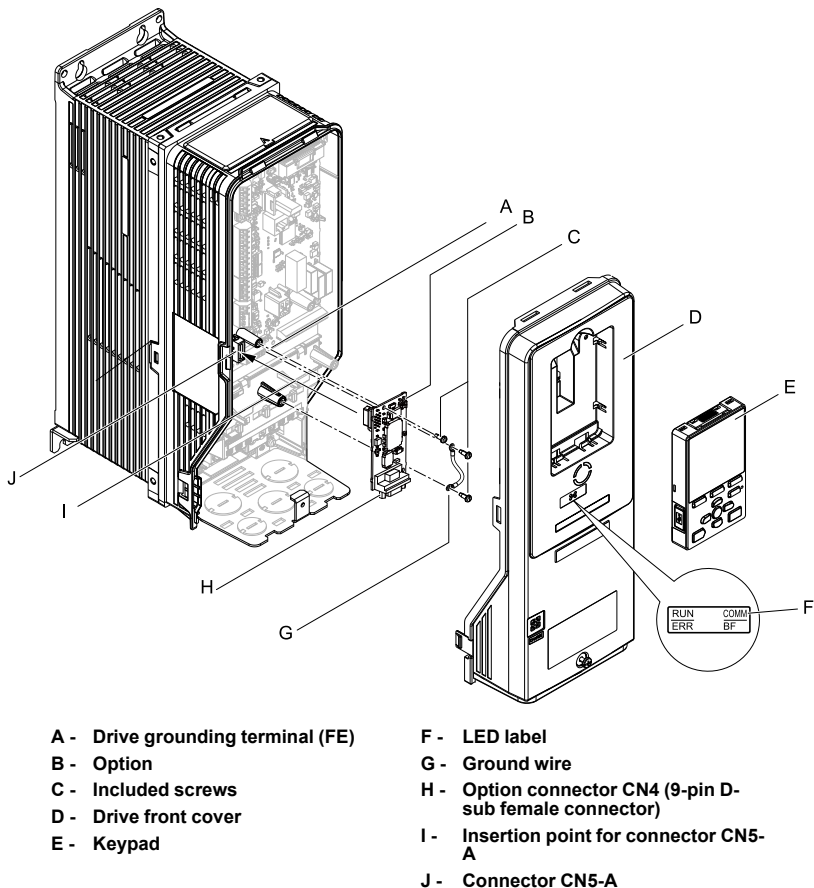


Figure 5.16 Drive Components with Option

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.

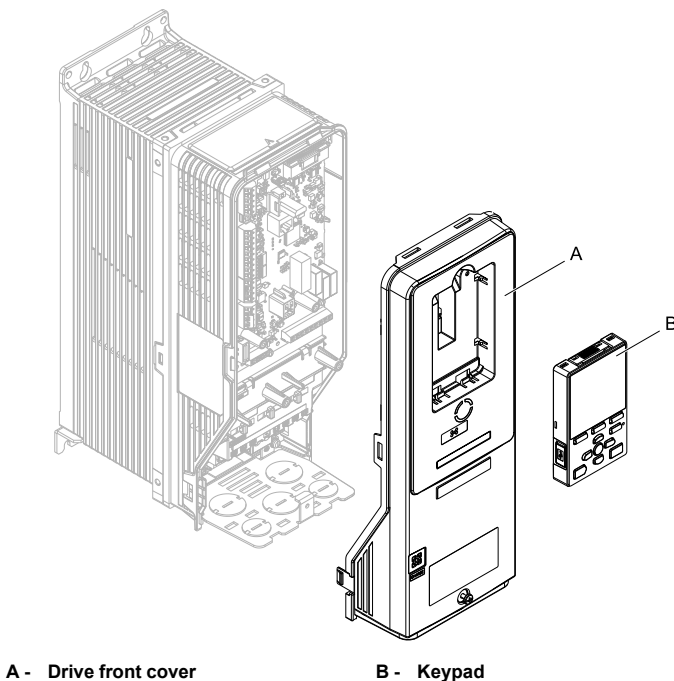
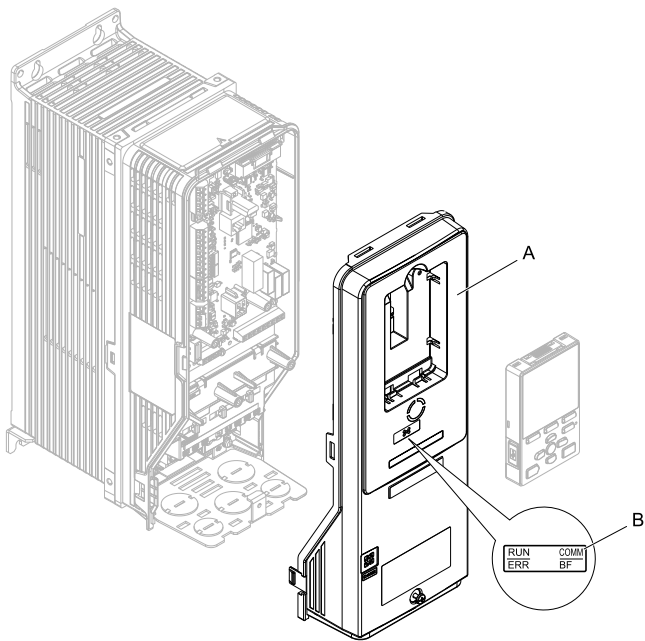


Figure 5.17 Remove the Front Cover and Keypad

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



A - Drive front cover

B - LED label

Figure 5.18 Put the LED Label on the Drive Front Cover

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

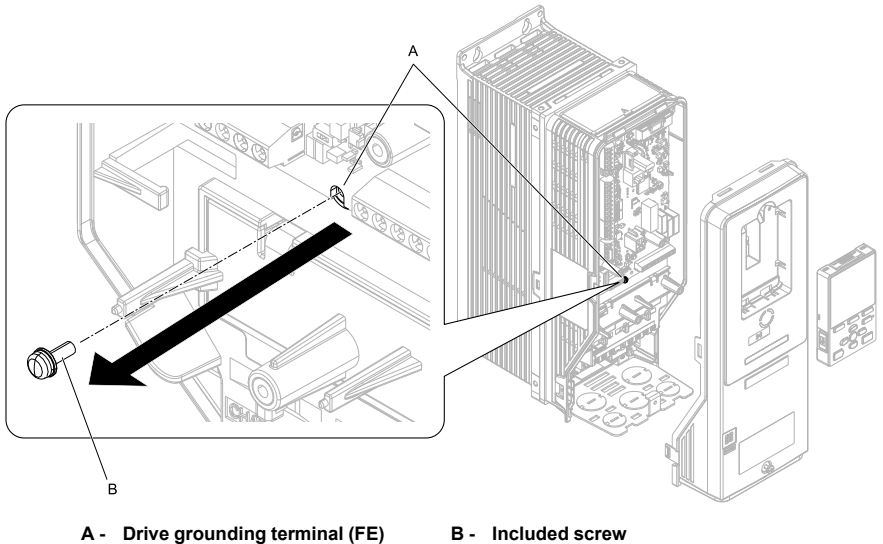


Figure 5.19 Remove the Screw from the Drive Grounding Terminal

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).

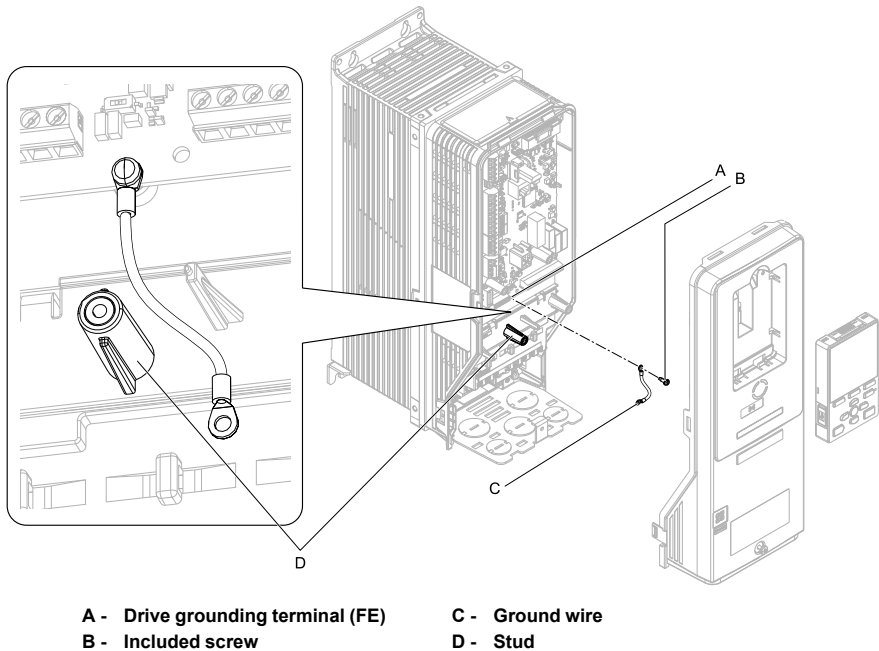
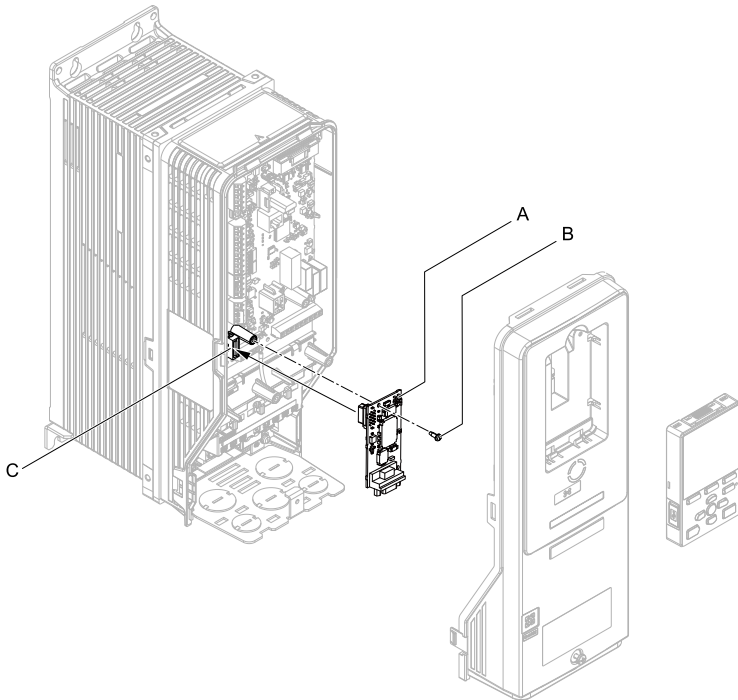


Figure 5.20 Connect the Ground Wire

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 screws 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 screws

C - Connector CN5

Figure 5.21 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 5.22](#) for instructions about crimp terminal orientation (C) and wire routing.

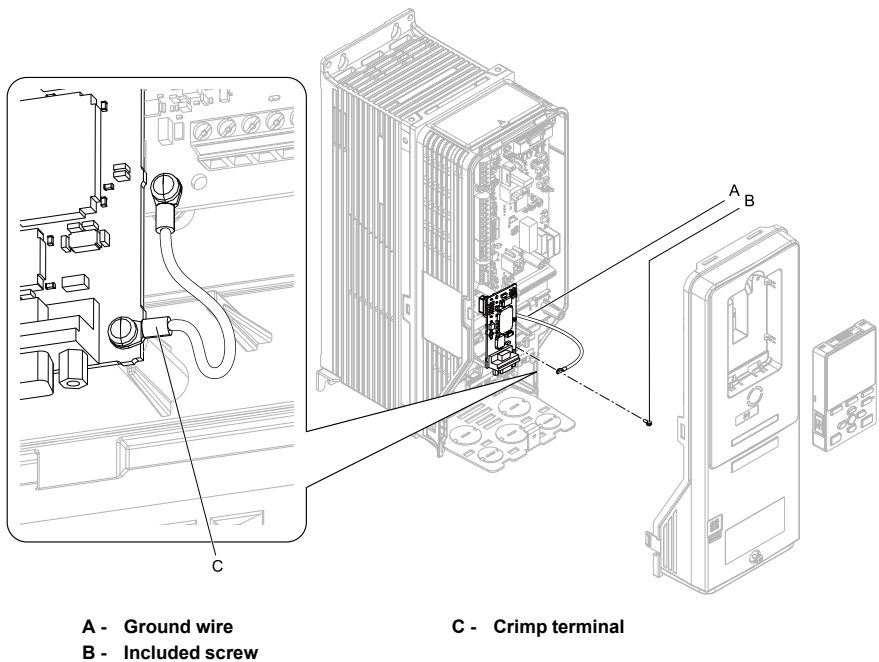


Figure 5.22 Connect the Ground Wire

7. Firmly connect the PROFIBUS-DP communication cable to the option 9-pin D-sub connector (CN4).

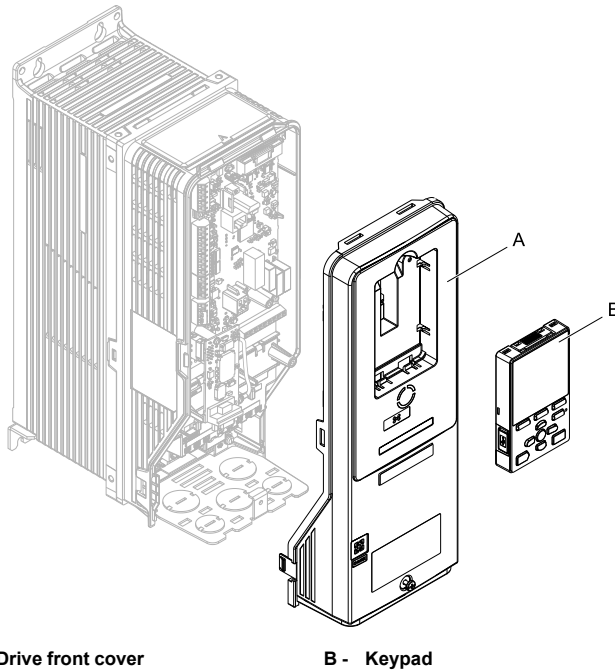
Isolate communication cables from main circuit wiring and other electrical and power lines. Make sure that you firmly connect the cable end. (Refer to [Figure 5.24](#)). Refer to [Communication Cable Specifications on page 39](#) for more information.

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 5.23 Replace the Front Cover and Keypad

9. Set drive parameters in [Related Drive Parameters on page 42](#) for correct option performance.

◆ Communication Cable Specifications

Use only PROFIBUS-DP-dedicated communication cable. The Yaskawa warranty does not cover other cable types. Refer to the PROFIBUS-DP website at www.profibus.com for more information on cables.

Yaskawa recommends using PROFIBUS-DP cables suitable for the conditions.

Table 5.2 Communication Cable (Type A) Specifications

Condition	Specifications
Impedance	135 - 165 Ω , 3 - 20 MHz
Capacity	30 pF/m maximum
Loop Resistance	110 Ω /km maximum

Condition	Specifications
Core Cross-Section	0.34 mm ² minimum
Core Diameter	0.64 mm minimum

Table 5.3 Communication Cable Length

Communication Speed (kbps)	Distance per Segment (m)	Communication Speed (kbps)	Distance per Segment (m)
9.6	1200	500	400
19.2	1200	1500	200
45.45	1200	3000	100
93.75	1200	6000	100
187.5	1000	12000	100

◆ **Option Connection Diagram**

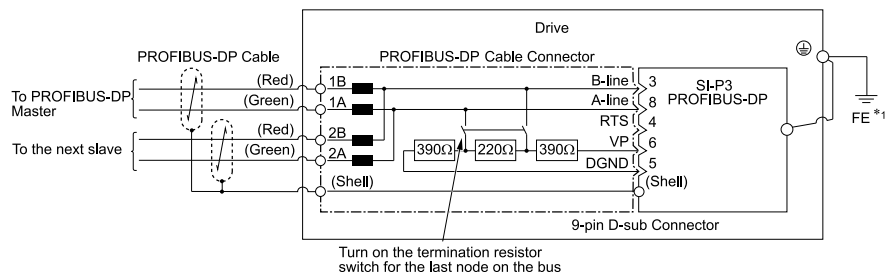


Figure 5.24 Option Connection Diagram

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

■ **PROFIBUS-DP Termination**

The option does not have a built-in termination resistor. You must use a switch on the 9-pin D-sub connector to set the termination resistance on the final drive in the network. Make sure that only the connector for the final drive in the network has a termination resistor. If any other network drive has a termination resistor, it can cause communication problems.

Use only the input side cable entry as shown in [Figure 5.25](#) when connecting both ends of the network. Most 9-pin D-sub connectors have a function to disconnect the output side of

the cable. Communication will not be possible between devices if the connector is reversed. Most connectors have arrows identifying the input and output sides.

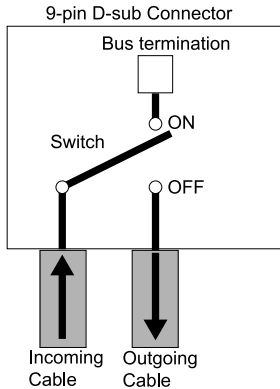


Figure 5.25 PROFIBUS Cable Connection with Termination Resistors

Bus termination ON = incoming and outgoing cables not connected.

Bus termination OFF = incoming and outgoing cables connected.

You can only use termination resistors without inductors as shown in [Figure 5.26](#) for baud rates less than 1.5 Mbps. Baud rates 1.5 Mbps and higher require termination with resistors and inductors as shown in [Figure 5.24](#).

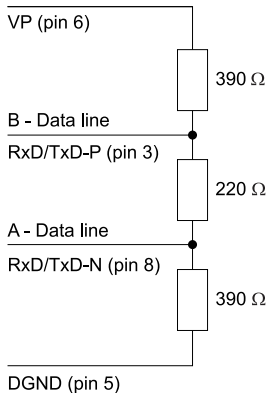


Figure 5.26 PROFIBUS Cable Termination

◆ GSD File

To facilitate network implementation, obtain a GSD file from one of the following websites depending on your region:

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 GSD file for YASKAWA AC Drive Option SI-P3. If you download an incorrect GSD file, this product will not operate as a slave in the network.

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:

1. Hex.: MEMOBUS addresses that you can use to change parameters over network communication are represented in hexadecimal numbers.
2. Parameter *F7-16 [Timeout Value]* to *F7-79 [PZD10 Read]*
 - This setting is available in A1000 software versions PRG: 1021 or later.
 - The drive is compatible with option software versions PRG: 2103 or later. Refer to the option package labeling in the field designated "PRG (four digit number)" or the option labeling in the field designated "C/N (S + four digit number)" to identify the option software version.

No. (Hex.)	Name	Description	Default (Range)
b1-01 (0180)	Frequency Reference Selection 1	<p>Selects the input method for frequency reference.</p> <p>0 : Keypad 1 : Analog Input 2 : Memobus/Modbus Communications 3 : Option PCB 4 : Pulse Train Input</p> <p>Note:</p> <ul style="list-style-type: none"> • Set $b1-02 = 3$ [Run Command Selection 1 = Option PCB] to use the master device and serial communications to start and stop the drive. Set $b1-01 = 3$ to use the master device to control the frequency reference of the drive. • 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	<p>Selects the input method for the Run command.</p> <p>0 : Keypad 1 : Digital Input 2 : Memobus/Modbus Communications 3 : Option PCB</p> <p>Note:</p> <p>Set $b1-02 = 3$ to start and stop the drive with the master device using serial communications. Set $b1-01 = 3$ [Frequency Reference Selection 1 = Option PCB] to use the master device to control the frequency reference of the drive.</p>	1 (0 - 3)
F6-01 (03A2)	Communication Error Selection	<p>Selects drive response when the drive detects a <i>bUS</i> [Option Communication Error] error during communications with the option.</p> <p>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</p> <p>Note:</p> <ul style="list-style-type: none"> • 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 or later. • The setting range for 1000-Series drives is different for different software versions. Refer to the Peripheral 	1 (0 - 5)

No. (Hex.)	Name	Description	Default (Range)
		Devices & Options section of the drive instruction manual for more information.	
F6-02 (03A3)	Comm External Fault (EF0) Detect	Selects the conditions at which <i>EF0 [Option Card External Fault]</i> is detected. 0 : Always Detected 1 : Detected during RUN Only	0 (0, 1)
F6-03 (03A4)	Comm External Fault (EF0) Select	Selects drive response when the drive detects an external fault input [<i>EF0</i>] during option communications. 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. Separately prepare safety protection equipment and systems, for example fast-stop switches.	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 Note: • Control method availability of this parameter is different for different product series. –1000-Series Parameter is available in <i>A1-02 = 3, 6, 7 [Control Method Selection = Closed Loop Vector, PM Advanced Open Loop Vector, PM Closed Loop Vector]</i> . When you enable this parameter, <i>d5-01 [Torque Control Selection]</i> sets the drive to read the value as the Torque Limit value or the Torque Reference value. <i>d5-01 = 0 [Speed Control]</i> : Torque Limit <i>d5-01 = 1 [Torque Control]</i> : Torque Reference In <i>A1-02 = 6 [Control Method Selection = PM Advanced Open Loop Vector]</i> , this value is read as the Torque Limit. –GA500 Parameter is available in <i>A1-02 = 2, 6, 8 [Control Method Selection = Open Loop Vector, PM Advanced Open Loop Vector, EZ Vector Control]</i> . The drive reads this value as the Torque Limit. –GA700, GA800 Parameter is available when <i>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]</i> .	0 (0, 1)

No. (Hex.)	Name	Description	Default (Range)
		<p>When you enable this parameter, <i>d5-01 [Torque Control Selection]</i> sets the drive to read the value as the Torque Limit value or the Torque Reference value.</p> <p><i>d5-01 = 0 [Speed Control]:</i> Torque Limit</p> <p><i>d5-01 = 1 [Torque Control]:</i> Torque Reference</p> <p>When <i>A1-02 = 2, 8 [Control Method Selection = Open Loop Vector, EZ Vector Control]</i>, this value is read as the Torque Limit.</p> <p>–FP605 Torque Limit is enabled when <i>A1-02 = 8 [Control Method Selection = EZ Vector Control]</i>.</p> <ul style="list-style-type: none"> • If the PLC does not supply a torque reference or torque limit when <i>F6-06 = 1 [Torque Reference/Limit by Comm = Enabled]</i>, the motor cannot rotate. 	
F6-07 (03A8)	Multi-Step Ref @ NetRef/ ComRef	<p>0 : Disable Multi-Step References</p> <p>1 : Enable Multi-Step References</p> <p>Note: Default setting of <i>F6-07</i> is 1 for GA500.</p>	0 (0, 1)
F6-08 (036A)	Comm Parameter Reset @Initialize	<p>Selects whether communication-related parameters <i>F6-xx and F7-xx</i> are set back to original default values when you use parameter <i>A1-03 [Initialize Parameters]</i> to initialize the drive.</p> <p>0 : No Reset - Parameters Retained</p> <p>1 : Reset - Back to Factory Default</p> <p>Note: When you set <i>F6-08</i> to 1 and you then use <i>A1-03</i> to initialize the drive, the drive will not change this setting value.</p>	0 (0, 1)
F6-14 (03BB)	Bus Error Auto Reset	<p>Sets the automatic reset function for <i>bUS [Option Communication Error]</i>.</p> <p>0 : Disabled</p> <p>1 : Enabled</p> <p>Note:</p> <ul style="list-style-type: none"> • This setting is available in A1000 software versions PRG: 1021 or later. • The drive is compatible with option software versions PRG: 2103 or later. Refer to the option package labeling in the field designated "PRG (four digit number)" or the option labeling in the field designated "C/N (S + four digit number)" to identify the option software version. 	0 (0, 1)
F6-30 (03CB)	PROFIBUS-DP Node Address	<p>Sets the node address for PROFIBUS-DP communication. Restart the drive after you change this parameter setting.</p> <p>Note:</p> <ul style="list-style-type: none"> • All station addresses must be unique. Node addresses 0, 1, and 2 are usually reserved for control, maintenance, and device self-diagnosis. If you enter a value of 0 or a value higher than 125, the "Err" LED will illuminate. • Cycle power for setting changes to take effect. 	0 (0 - 125)

6 Related Drive Parameters

No. (Hex.)	Name	Description	Default (Range)
F6-31 (03CC)	PROFIBUS-DP Clear Mode Selection	Selects what the drive will do after it receives the Clear Mode command. 0 : Reset 1 : Hold Previous State	0 (0, 1)
F6-32 (03CD)	PROFIBUS-DP Data Format Select	0 : PPO Type 1 : Conventional 2 : PPO (bit0) 3 : PPO (Enter) 4 : Conventional (Enter) 5 : PPO (bit0, Enter) Note: • Cycle power for setting changes to take effect. • This setting is available in A1000 software versions PRG: 1021 or later. • This function operates when bit 0 and bit 4 in the register STW have values of 1 (operate). • The drive is compatible with option software versions PRG: 2104 or later. Refer to the option package labeling in the field designated "PRG (four digit number)" or the option labeling in the field designated "C/N (S + four digit number)" to identify the option software version. • When writing this parameter to the drive through the PROFIBUS-DP network, the parameter is validated by automatically executing the Enter command.	0 (0 - 5)
F7-16 (03F4)	Timeout Value	Sets the detection time for a communications timeout. Note: Set this parameter to 0.0 to disable the connection timeout function.	0.0 s (0.0 s - 30.0 s)
F7-60 (0780)	PZD1 Write (Control Word)	Sets the MEMOBUS/Modbus address for PZD1 (PPO Write). PZD1 (PPO Write) functions as the STW when <i>F7-60 = 0 to 2</i> .	0 (Hex.) (0 (Hex.) - FFFF (Hex.))
F7-61 (0781)	PZD2 Write (Frequency Reference)	Sets the MEMOBUS/Modbus address for PZD2 (PPO Write). PZD2 (PPO Write) functions as the HSW when <i>F7-61 = 0 to 2</i> .	0 (Hex.) (0 (Hex.) - FFFF (Hex.))
F7-62 (0782)	PZD3 Write	Sets the MEMOBUS/Modbus address for PZD3 (PPO Write). When <i>F7-62 = 0, 1, or 2</i> , the write operation to the MEMOBUS register performed by the PZD3 (PPO Write) is disabled.	0 (Hex.) (0 (Hex.) - FFFF (Hex.))
F7-63 (0783)	PZD4 Write	Sets the MEMOBUS/Modbus address for PZD4 (PPO Write). When <i>F7-63 = 0, 1, or 2</i> , the write operation to the MEMOBUS register performed by the PZD4 (PPO Write) is disabled.	0 (Hex.) (0 (Hex.) - FFFF (Hex.))

No. (Hex.)	Name	Description	Default (Range)
F7-64 (0784)	PZD5 Write	Sets the MEMOBUS/Modbus address for PZD5 (PPO Write). When $F7-64 = 0, 1, \text{ or } 2$, the write operation to the MEMOBUS register performed by the PZD5 (PPO Write) is disabled.	0 (Hex.) (0 (Hex.) - FFFF (Hex.))
F7-65 (0785)	PZD6 Write	Sets the MEMOBUS/Modbus address for PZD6 (PPO Write). When $F7-65 = 0, 1, \text{ or } 2$, the write operation to the MEMOBUS register performed by the PZD6 (PPO Write) is disabled.	0 (Hex.) (0 (Hex.) - FFFF (Hex.))
F7-66 (0786)	PZD7 Write	Sets the MEMOBUS/Modbus address for PZD7 (PPO Write). When $F7-66 = 0, 1, \text{ or } 2$, the write operation to the MEMOBUS register performed by the PZD7 (PPO Write) is disabled.	0 (Hex.) (0 (Hex.) - FFFF (Hex.))
F7-67 (0787)	PZD8 Write	Sets the MEMOBUS/Modbus address for PZD8 (PPO Write). When $F7-67 = 0, 1, \text{ or } 2$, the write operation to the MEMOBUS register performed by the PZD8 (PPO Write) is disabled.	0 (Hex.) (0 (Hex.) - FFFF (Hex.))
F7-68 (0788)	PZD9 Write	Sets the MEMOBUS/Modbus address for PZD9 (PPO Write). When $F7-68 = 0, 1, \text{ or } 2$, the write operation to the MEMOBUS register performed by the PZD9 (PPO Write) is disabled.	0 (Hex.) (0 (Hex.) - FFFF (Hex.))
F7-69 (0789)	PZD10 Write	Sets the MEMOBUS/Modbus address for PZD10 (PPO Write). When $F7-69 = 0, 1, \text{ or } 2$, the write operation to the MEMOBUS register performed by the PZD10 (PPO Write) is disabled.	0 (Hex.) (0 (Hex.) - FFFF (Hex.))
F7-70 (078A)	PZD1 Read	Sets the MEMOBUS/Modbus address for PZD1 (PPO Read). PZD1 (PPO input) functions as the ZSW when $F7-70 = 0$.	0 (Hex.) (0 (Hex.) - FFFF (Hex.))
F7-71 (078B)	PZD2 Read	Sets the MEMOBUS/Modbus address for PZD2 (PPO Read). PZD2 (PPO input) functions as the HIW when $F7-71 = 0$.	0 (Hex.) (0 (Hex.) - FFFF (Hex.))
F7-72 (078C)	PZD3 Read	Sets the MEMOBUS/Modbus address for PZD3 (PPO Read). When $F7-72 = 0$, the load operation from the MEMOBUS register performed by the PZD3 (PPO Read) is disabled.	0 (Hex.) (0 (Hex.) - FFFF (Hex.))
F7-73 (078D)	PZD4 Read	Sets the MEMOBUS/Modbus address for PZD4 (PPO Read). When $F7-73 = 0$, the load operation from the MEMOBUS register performed by the PZD4 (PPO Read) is disabled.	0 (Hex.) (0 (Hex.) - FFFF (Hex.))
F7-74 (078E)	PZD5 Read	Sets the MEMOBUS/Modbus address for PZD5 (PPO Read). When $F7-74 = 0$, the load operation from the MEMOBUS register performed by the PZD5 (PPO Read) is disabled.	0 (Hex.) (0 (Hex.) - FFFF (Hex.))
F7-75 (078F)	PZD6 Read	Sets the MEMOBUS/Modbus address for PZD6 (PPO Read). When $F7-75 = 0$, the load operation from the MEMOBUS register performed by the PZD6 (PPO Read) is disabled.	0 (Hex.) (0 (Hex.) - FFFF (Hex.))

No. (Hex.)	Name	Description	Default (Range)
F7-76 (0790)	PZD7 Read	Sets the MEMOBUS/Modbus address for PZD7 (PPO Read). When $F7-76 = 0$, the load operation from the MEMOBUS register performed by the PZD7 (PPO Read) is disabled.	0 (Hex.) (0 (Hex.) - FFFF (Hex.))
F7-77 (0791)	PZD8 Read	Sets the MEMOBUS/Modbus address for PZD8 (PPO Read). When $F7-77 = 0$, the load operation from the MEMOBUS register performed by the PZD8 (PPO Read) is disabled.	0 (Hex.) (0 (Hex.) - FFFF (Hex.))
F7-78 (0792)	PZD9 Read	Sets the MEMOBUS/Modbus address for PZD9 (PPO Read). When $F7-78 = 0$, the load operation from the MEMOBUS register performed by the PZD9 (PPO Read) is disabled.	0 (Hex.) (0 (Hex.) - FFFF (Hex.))
F7-79 (0793)	PZD10 Read	Sets the MEMOBUS/Modbus address for PZD10 (PPO Read). When $F7-79 = 0$, the load operation from the MEMOBUS register performed by the PZD10 (PPO Read) is disabled.	0 (Hex.) (0 (Hex.) - FFFF (Hex.))

7 Conventional Formats

◆ Conventional Formats

The configuration tool of PROFIBUS-DP master sets the input and output data length of SI-P3 from Extended Data 1 (32 bytes), Extended Data 2 (12 bytes), and Basic Data (6 bytes). Sets the data format of PROFIBUS-DP communication.

Conventional formats have two message types: High-speed I/O Data and MEMOBUS/Modbus message. Set parameter $F6-32$ to 1 to use conventional formats.

■ High-speed I/O Data

High-speed I/O data is directly transferred between the drive and controller or PLC. When the drive is set for PROFIBUS-DP communications, the drive Run/Stop and Frequency Reference commands are transferred within 2 ms after being received by the option.

■ MEMOBUS/Modbus Data

MEMOBUS/Modbus message data is transferred between the drive and controller or PLC using MEMOBUS/Modbus messages. You can access all drive parameters and data through MEMOBUS/Modbus. The data in this message type is transferred to the drive after being received and edited by the option and more time is required to return the data to the master. The master must synchronize the timing of sending and receiving the data by a process called handshaking.

◆ Memory Maps

The following register maps show the I/O data bytes.

■ Basic and Extended Register Maps

-	Basic Data (6 bytes)	Extended Data 1 (32 bytes)	Extended Data 2 (12 bytes)
High-speed I/O Data	0 - 5 bytes	0 - 15 bytes	0 - 3 bytes
MEMOBUS/Modbus Data	-	16 - 31 bytes	4 - 11 bytes

Table 7.1 Basic Data Register Map Detail

Output (Master Device to Drive)		Input (Drive to Master Device)	
Byte	Description	Byte	Description
0	Operation Command High Byte	0	Drive State High Byte
1	Operation Command Low Byte	1	Drive State Low Byte
2	Frequency Reference High Byte	2	Motor Speed High Byte *2
3	Frequency Reference Low Byte	3	Motor Speed Low Byte *2
4	Torque Reference/Torque Limit High Byte *1	4	Output Current High Byte (units: 0.1 A)
5	Torque Reference/Torque Limit Low Byte *1	5	Output Current Low Byte (units: 0.1 A)

7 Conventional Formats

- *1 Only usable when $F6-06 = 1$ [Torque Reference/Limit by Comm = Enabled].
Control method availability of this parameter is different for different products.
- 1000-Series
Parameter is available if $A1-02 = 3, 6, 7$ [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.
 $d5-01 = 0$ [Speed Control]: Torque Limit
 $d5-01 = 1$ [Torque Control]: Torque Reference
If $A1-02 = 6$ [Control Method Selection = PM Advanced Open Loop Vector], this value is read as the Torque Limit.
 - GA500
Parameter is available if $A1-02 = 2, 6, 8$ [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 if $A1-02 = 2, 3, 4, 6, 7, 8$ [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.
 $d5-01 = 0$ [Speed Control]: Torque Limit
 $d5-01 = 1$ [Torque Control]: Torque Reference
When $A1-02 = 2, 8$ [Control Method Selection = Open Loop Vector; EZ Vector Control], this value is read as the Torque Limit.
 - FP605
Parameter is available if $A1-02 = 8$ [Control Method Selection = EZ Vector Control].
If $A1-02 = 8$, this value is read as the Torque Limit.
- *2 $ol-03$ [Frequency Display Unit Selection] sets the units. When the drive is operating in V/f Control or OLV/PM, the drive output frequency becomes the input data.

Table 7.2 Extended Data 1 Register Map

Output (Master Device to Drive)		Input (Drive to Master Device)	
Byte	Description	Byte	Description
0	Operation Command High Byte	0	Drive State High Byte
1	Operation Command Low Byte	1	Drive State Low Byte
2	Frequency Reference High Byte	2	Motor Speed High Byte *5
3	Frequency Reference Low Byte	3	Motor Speed Low Byte *5
4	Torque Reference High Byte *1	4	Torque Reference Monitor High Byte *6
5	Torque Reference Low Byte *1	5	Torque Reference Monitor Low Byte *6
6	Torque Compensation High Byte *2	6	Speed Detection PG Pulse Count 1 High Byte
7	Torque Compensation Low Byte *2	7	Speed Detection PG Pulse Count 1 Low Byte
8	Reserved	8	Frequency Reference High Byte

Output (Master Device to Drive)		Input (Drive to Master Device)	
Byte	Description	Byte	Description
9		9	Frequency Reference Low Byte
10	Analog Output Channel 1 High Byte *3	10	Output Frequency High Byte
11	Analog Output Channel 1 Low Byte *3	11	Output Frequency Low Byte
12	Analog Output Channel 2 High Byte *3	12	Output Current High Byte (units: 0.1 A)
13	Analog Output Channel 2 Low Byte *3	13	Output Current Low Byte (units: 0.1 A)
14	Digital Output High Byte *4	14	Analog Input Channel 1 High Byte
15	Digital Output Low Byte *4	15	Analog Input Channel 1 Low Byte
16	MEMOBUS/Modbus Function Code	16	MEMOBUS/Modbus Function Code
17	MEMOBUS/Modbus Starting Register Address High Byte	17	MEMOBUS/Modbus Starting Register Address High Byte
18	MEMOBUS/Modbus Starting Register Address Low Byte	18	MEMOBUS/Modbus Starting Register Address Low Byte
19	MEMOBUS/Modbus Number of Data	19	MEMOBUS/Modbus Number of Data
20	MEMOBUS/Modbus Data 1 High Byte	20	MEMOBUS/Modbus Data 1 High Byte
21	MEMOBUS/Modbus Data 1 Low Byte	21	MEMOBUS/Modbus Data 1 Low Byte
22	MEMOBUS/Modbus Data 2 High Byte	22	MEMOBUS/Modbus Data 2 High Byte
23	MEMOBUS/Modbus Data 2 Low Byte	23	MEMOBUS/Modbus Data 2 Low Byte
24	MEMOBUS/Modbus Data 3 High Byte	24	MEMOBUS/Modbus Data 3 High Byte
25	MEMOBUS/Modbus Data 3 Low Byte	25	MEMOBUS/Modbus Data 3 Low Byte
26	MEMOBUS/Modbus Data 4 High Byte	26	MEMOBUS/Modbus Data 4 High Byte
27	MEMOBUS/Modbus Data 4 Low Byte	27	MEMOBUS/Modbus Data 4 Low Byte
28	Reserved	28	Reserved
29		29	
30		30	
31	Handshaking Register	31	Handshaking Register

7 Conventional Formats

- *1 Only usable when $F6-06 = 1$ [Torque Reference/Limit by Comm = Enabled].
Control method availability of this parameter is different for different products.
- 1000-Series
Parameter is available if $A1-02 = 3, 6, 7$ [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.
 $d5-01 = 0$ [Speed Control]: Torque Limit
 $d5-01 = 1$ [Torque Control]: Torque Reference
If $A1-02 = 6$ [Control Method Selection = PM Advanced Open Loop Vector], this value is read as the Torque Limit.
 - GA500
Parameter is available if $A1-02 = 2, 6, 8$ [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 if $A1-02 = 2, 3, 4, 6, 7, 8$ [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.
 $d5-01 = 0$ [Speed Control]: Torque Limit
 $d5-01 = 1$ [Torque Control]: Torque Reference
When $A1-02 = 2, 8$ [Control Method Selection = Open Loop Vector; EZ Vector Control], this value is read as the Torque Limit.
 - FP605
Parameter is available if $A1-02 = 8$ [Control Method Selection = EZ Vector Control].
If $A1-02 = 8$, this value is read as the Torque Limit.
- *2 When $A1-02 = 3, 4, 5, 6$, or 7 [Control Method Selection = Closed Loop Vector; Advanced Open Loop Vector; PM Open Loop Vector; PM Advanced Open Loop Vector; PM Advanced Open Loop Vector; or PM Closed Loop Vector], this value is enabled.
- *3 To select drive MFAO channel for communications, set these parameters:
Analog output CH1: $H4-01$ [Terminal FM Analog Output Select] = 000 [Not Used]
Analog output CH2: $H4-04$ [Terminal AM Analog Output Select] = 000 [Not Used]
- GA500
Analog output CH1: $H4-01$ [Terminal AM Analog Output Select] = 000 [Not Used]
- *4 To select drive MFAO channel (ON/OFF) for communications, set $H2-01$ to $H2-04$ to F [Not Used].
Refer to the drive manuals for more information.
- *5 $01-03$ [Frequency Display Unit Selection] sets the units. When the drive is operating in V/f Control or OLV/PM, the input data becomes 0.
- *6 If $A1-02 = 0, 1, 5$ [Control Method Selection = V/f Control, V/f Control with Encoder, or PM Open Loop Vector], you cannot use this value.

Table 7.3 Run Command

Command Signal	Description	Command Signal	Description
0	Forward run/Stop 1: Forward run	7	Multi-function input 8
1	Reverse run/Stop 1: Reverse run	8	External Fault 1: External Fault (EF0)
2	Multi-function input 3	9	Fault Reset

Command Signal	Description	Command Signal	Description
			1: Reset command
3	Multi-function input 4	A - D	Reserved
4	Multi-function input 5	E	Fault Trace and Clear Fault History 1: Fault information is reset by the rising edge of this bit.
5	Multi-function input 6	F	Baseblock command 1: Baseblock
6	Multi-function input 7	-	-

Table 7.4 Drive State

Drive State	Description	Drive State	Description
0	1: Running	8	1: During Operation Error (oPExx)
1	1: Zero Speed	9	1: Momentary Power Loss Recovery 0: Power Loss Recovery
2	1: During Reverse Running	A	1: NetCtrl status
3	1: During Fault Reset Signal Input	B	1: MFDO (terminal M1-M2)
4	1: During Speed Agree	C	1: Photocoupler Output 1
5	1: Drive Operation Ready	D	1: Photocoupler Output 2
6	1: Alarm	E	1: Motor 2 Selected
7	1: Fault	F	1: Zero Servo Completed

Table 7.5 Extended Data 2 Register Map

Output (Master Device to Drive)		Input (Drive to Master Device)	
Byte	Description	Byte	Description
0	Operation Command High Byte	0	Drive State High Byte
1	Operation Command Low Byte	1	Drive State Low Byte
2	Frequency Reference High Byte	2	Motor Speed High Byte <i>*/</i>
3	Frequency Reference Low Byte	3	Motor Speed Low Byte <i>*/</i>
4	MEMOBUS/Modbus Function Code	4	MEMOBUS/Modbus Function Code

Output (Master Device to Drive)		Input (Drive to Master Device)	
Byte	Description	Byte	Description
5	MEMOBUS/Modbus Starting Register Address High Byte	5	MEMOBUS/Modbus Starting Register Address High Byte
6	MEMOBUS/Modbus Starting Register Address Low Byte	6	MEMOBUS/Modbus Starting Register Address Low Byte
7	MEMOBUS/Modbus Data Length	7	MEMOBUS/Modbus Data Length
8	MEMOBUS/Modbus Data 1 High Byte	8	MEMOBUS/Modbus Data 1 High Byte
9	MEMOBUS/Modbus Data 1 Low Byte	9	MEMOBUS/Modbus Data 1 Low Byte
10	Reserved	10	Reserved
11	Handshaking Register	11	Handshaking Register

*1 *01-03 [Frequency Display Unit Selection]* sets the units. When the drive is operating in V/f Control or OLV/PM, the drive output frequency becomes the input data.

8 Parameter Process Data Object Formats

◆ Supported Parameter Process Data Object (PPO) Type Formats

Set drive parameter $F6-32 = 0$ to use PPO type formats. The PPO is defined for cyclic data transfer, allowing the master and the slave to exchange process data (PZD) and parameters.

The option supports five possible PPO type formats:

- PPO type 1 (8 octets PKW + 4 octets PZD)
- PPO type 2 (8 octets PKW + 12 octets PZD)
- PPO type 3 (4 octets PZD)
- PPO type 4 (12 octets PZD)
- PPO type 5 (8 octets PKW + 20 octets PZD)

All PPO Types have the registers STW, ZSW, HSW, and HIW. These registers are not mapped directly to drive registers.

PKW			PZD									
PKE	IND	PWE	PZD1 STW ZSW	PZD2 HSW HIW	PZD3	PZD4	PZD5	PZD6	PZD7	PZD8	PZD9	PZD10
PPO TYPE 1: Octet-String 12												
PPO TYPE 2: Octet-String 20												
PPO TYPE 3: Octet-String 4												
PPO TYPE 4: Octet-String 12												
PPO TYPE 5: Octet-String 28												

PKW: Parameter ID/value

PZD: Process Data, cyclically transferred

PKE: Parameter ID (1st and 2nd octet)

IND: Sub-index (3rd octet), 4th octet is reserved

PWE: Parameter value (5th until 8th octet)

STW: Control word

HSW: Main setpoint

ZSW: Status word

HIW: Main actual value

9 Troubleshooting

◆ Drive-Side Error Codes

Drive-side error codes appear on the drive keypad. *Fault on page 55* lists causes of the errors and possible corrective actions. Refer to the drive Technical Manual for additional error codes that can 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.	<ul style="list-style-type: none"> • 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
		A data error occurred due to electric interference	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • The option Requested Packet Interval (RPI) timer timed out • Make sure that RPI time is set properly 	
EF0	Option Card External Fault	The option received an external fault from the controller.	<ol style="list-style-type: none"> 1. Find the device that caused the external fault and remove the cause. 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.	<p>Connect the option to the correct connector.</p> <ul style="list-style-type: none"> • Use connector CN5-A when you connect the option. <p>To use other options, refer to those option manuals.</p>
oFA01	Option Card Fault (CN5-A)	The option connected to option port CN5-A was changed during run.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Connect the option to the correct option port.

Code	Name	Causes	Possible Solutions
oFA03, oFA04	Option Card Error (CN5-A)	A fault occurred in the option.	<ol style="list-style-type: none"> 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.
oFA30 to oFA43	Option Card Connection Error (CN5-A)	A fault occurred in the option.	<ol style="list-style-type: none"> 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.	<p>Connect the option to the correct connector.</p> <ul style="list-style-type: none"> • 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.	<p>Connect the option to the correct connector.</p> <ul style="list-style-type: none"> • 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
bb	Baseblock	The drive output is disabled and <i>bb</i> is shown on the keypad when the drive is set for control by PROFIBUS-DP, and either of the following conditions is met: <ul style="list-style-type: none"> • A conventional data format is used, and the operation command bit F is set to 1, • A PPO type data format is used, and the control word (STW) bit 3 is set to 0 (baseblock + stop). 	Set either of the bits depending on the data format used.
		An external baseblock command was entered through one of the MFDI terminals S1 to S8, and the drive output stopped as shown by an external baseblock command.	Examine the external sequence and timing of the baseblock command input.
CALL	Serial Comm Transmission Error	The communications cable wiring is incorrect.	Correct wiring errors.
		There is a short circuit in the communications cable or the communications cable is not connected.	<ul style="list-style-type: none"> • Repair the short-circuited or disconnected portion of the cable. • Replace the defective communications cable.
		A programming error occurred on the controller side.	Examine communications at start-up and correct programming errors.
		There is damage to the communications circuitry.	<ul style="list-style-type: none"> • Do a self-diagnostics check. • If the problem continues, replace the control board or the drive. Contact Yaskawa or your nearest sales representative to replace the control board.
		The termination resistor setting for MEMOBUS/Modbus communications is incorrect.	On the last drive in a MEMOBUS/Modbus network, set DIP switch S2 to the ON position to enable the termination resistor.
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 9.1 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.

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 guidelines.

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 guidelines:

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](#) and [Figure 10.3](#).

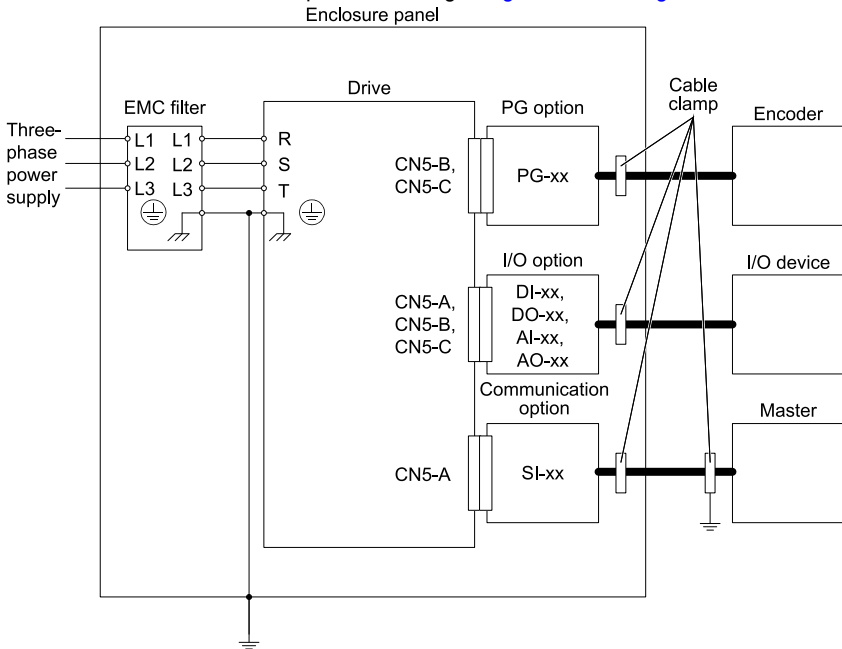


Figure 10.2 Option Installation for CE Compliance: 1000-Series, GA700, GA800

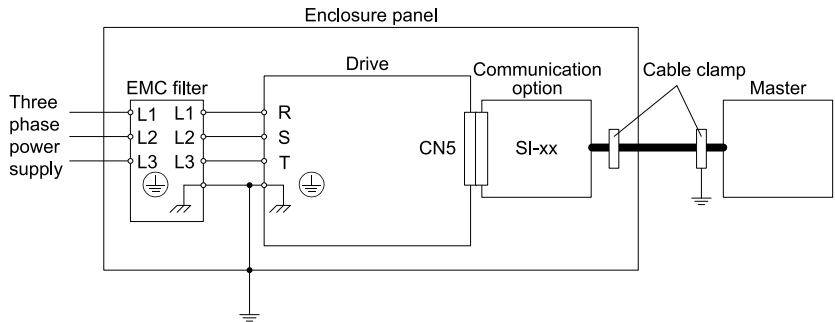


Figure 10.3 Option Installation for CE Compliance: GA500

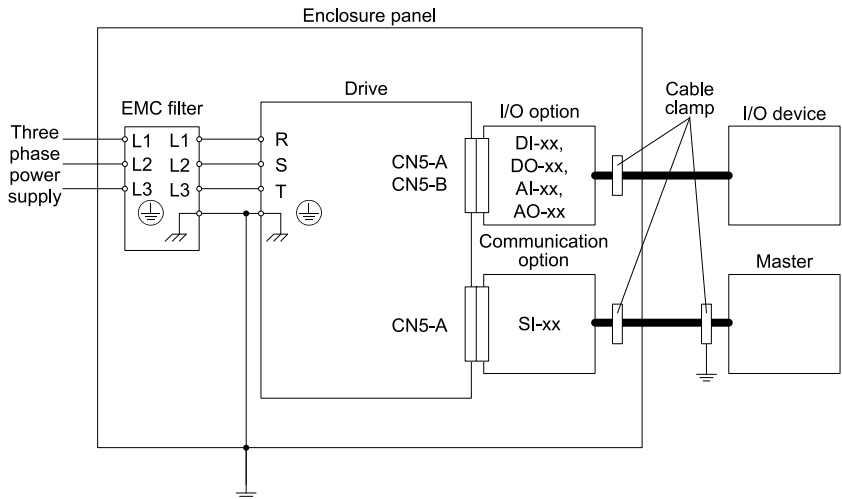
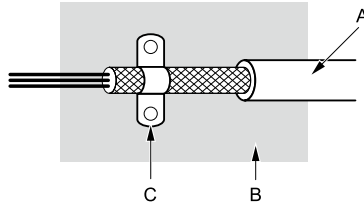


Figure 10.4 Option Installation for CE Compliance: FP605

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 Specifications

◆ Specifications

Table 11.1 Option Specifications

Items	Specifications
Model	SI-P3
PROFIBUS-DP Data	PROFIBUS DP-V0, V1 <ul style="list-style-type: none"> • PPO TYPE: 1 - 5 (No. 3.072, Profile for Variable Speed Drives) • Extended data 1 High-speed I/O data (inputs: 16 bytes, outputs: 16 bytes) MEMOBUS/Modbus message (inputs: 16 bytes, outputs: 16 bytes) • Extended data 2 High-speed I/O data (inputs: 4 bytes, outputs: 4 bytes) MEMOBUS/Modbus message (inputs: 8 bytes, outputs: 8 bytes) • Basic data High-speed I/O data (inputs: 6 bytes, outputs: 6 bytes)
Connector	9-pin D-sub connector (#4/40 UNC thread)
Communication Speed	9.6 kbps - 12 Mbps
Ambient Temperature	-10 °C - +50 °C (14 °F - 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

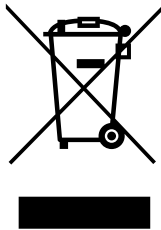
Items	Specifications
Area of Use	Indoors and not near: <ul style="list-style-type: none"> • Oil mist, corrosive gas, flammable gas, or dust • Radioactive materials or flammable materials, including wood • Dangerous gases or fluids • Salt • Direct sunlight • Falling objects
Altitude	Up to 1000 m (3280 ft.)

12 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 wheeled 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
July 2022	1	Chapters 3, 4	Revision: LED label for FP605
March 2022	-	-	First Edition This manual is created based on TOBP C730600 82E<7>-0.

YASKAWA AC Drive Option PROFIBUS-DP Installation Manual

DRIVE CENTER (INVERTER PLANT)

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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 Regulations. 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.

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