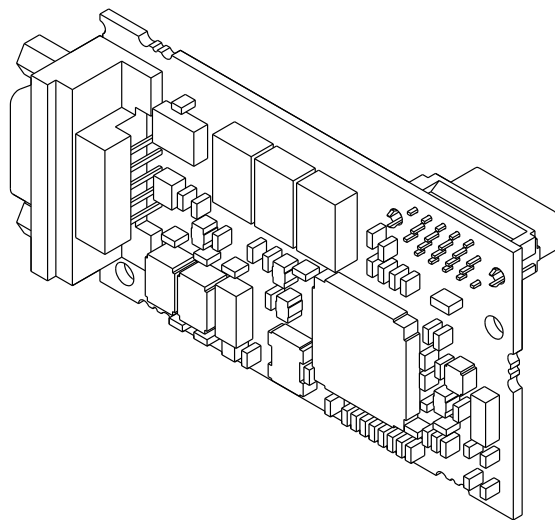# YASKAWA

YASKAWA AC Drive Option

PROFIBUS-DP
Technical 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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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 PROFIBUS-DP Installation Manual	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 (This book)	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	• 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.
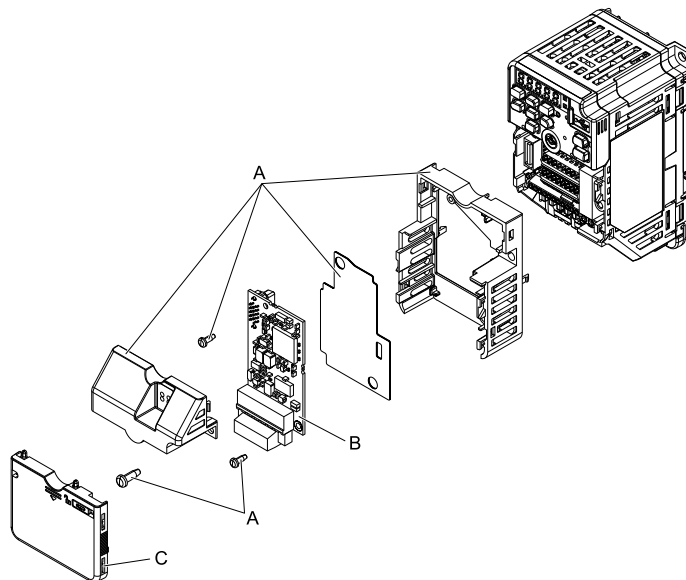
A - **Option card mounting kit components (sold separately)**

B - **Option**

C - **Drive front cover**

Figure 2.1 Option Card Mounting Kit (JOHB-GA50)

3   Receiving

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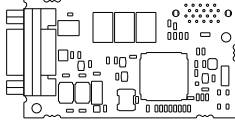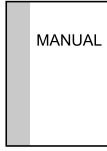
- Make sure that there is no damage to the option and no parts are missing.
  The Yaskawa warranty does not include damage from shipping. If there is damage to the option or other parts, contact the shipping company immediately.

  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	ERR○○RUN BF○○COMM	1
	GA500, GA700, and GA800	RUN COMM ○ ○ ERR BF	1
Manuals		MANUAL	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.

◆ 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
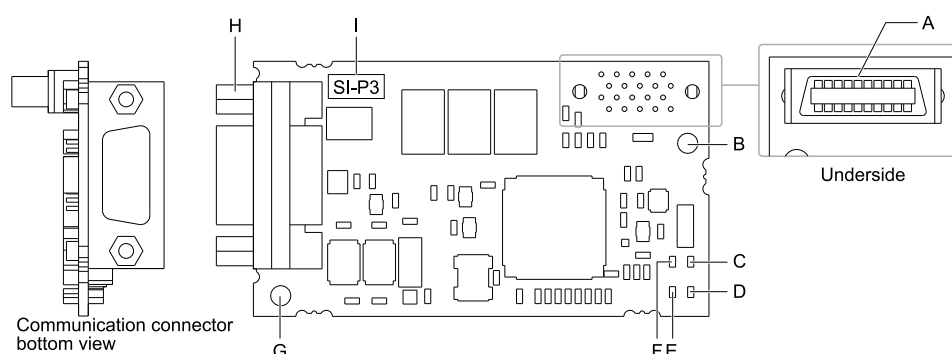
A - **Connector (CN5)**
B - **Installation hole**
C - **LED (RUN)** *1
D - **LED (COMM)** *1
E - **LED (BF)** *1

F - **LED (ERR)** *1
G - **Ground terminal (FE) and installation hole** *2
H - **Communication connector CN4**
I - **Option model number**

Figure 4.1 Option

*1   Refer to *Option LED States on page 9* 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
Bottom View	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)
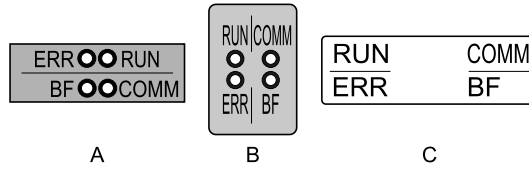
A - 1000-Series, Z1000U **C - FP605** *1
B - GA500, GA700, and GA800

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	• 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.
					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.
○	●	●	●	• Checking connection with the drive • Waiting for data from the master	• 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	• Problem initializing the drive and the SI-P3. • Incorrect node address.	• 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)	• 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.

Option LED States				Description	Cause	Possible Solutions
RUN	ERR	COM M	BF			
						• 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	12
U1000	Procedure A	12

Drive	Procedures to Install and Wire Options on a Drive	Reference Page
Z1000U	Procedure A	12
GA500	*1	-
GA700	Procedure B	15
GA800	Procedure B	15
FP605	Procedure C	19

*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.
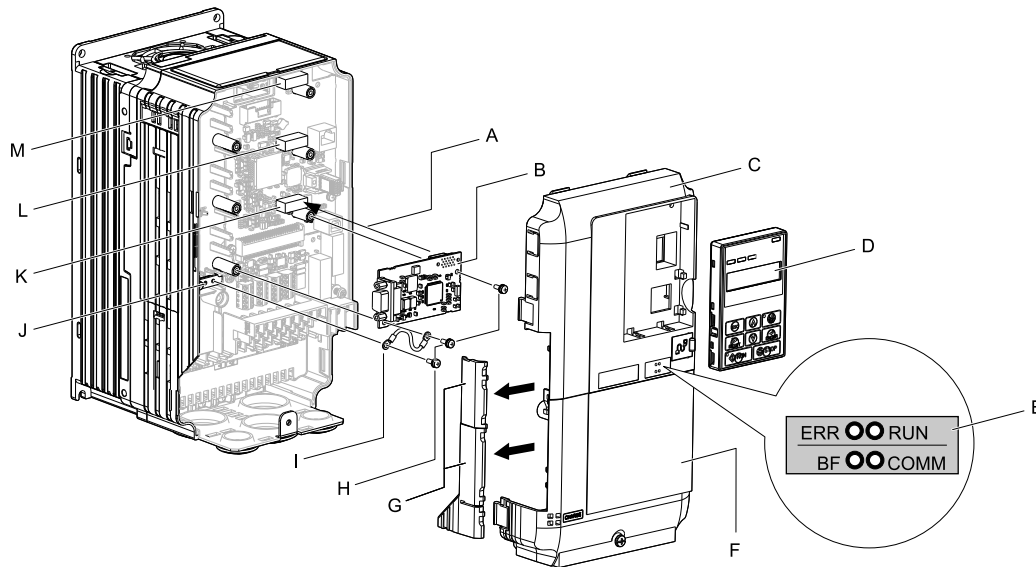
A - Insertion point for CN5 connector
B - Option
C - Drive front cover
D - Keypad
E - LED label
F - Drive terminal cover
G - Removable tabs for wire routing

H - Included screws
I - Ground wire
J - Drive grounding terminal (FE)
K - Connector CN5-A
L - Connector CN5-B (Not available for communication option installation.)
M - 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.

    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.*
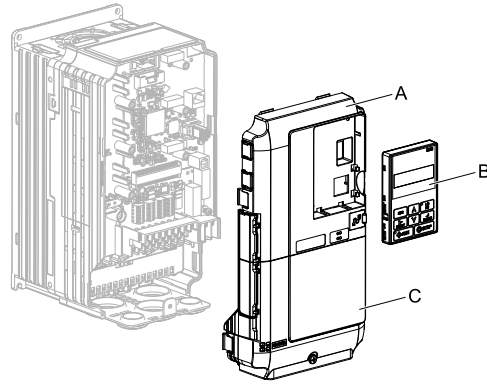
A - Drive front cover
B - Keypad

C - Drive terminal cover

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

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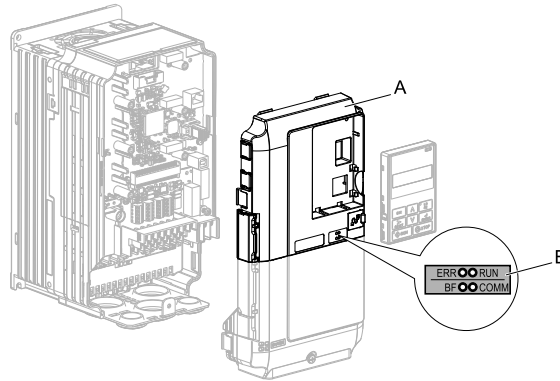
A - Drive front cover

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.
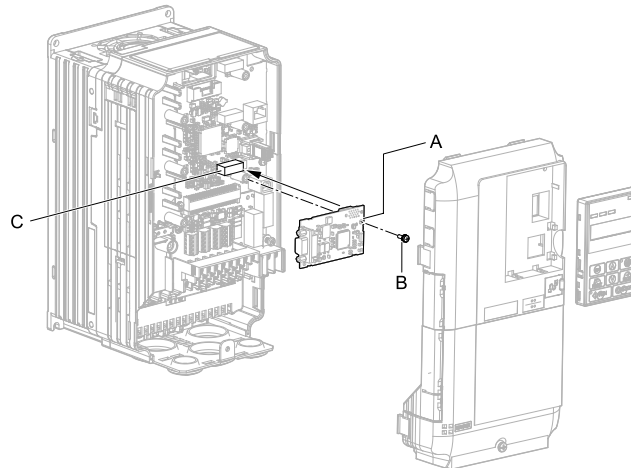
A - Option
B - Included screw

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)
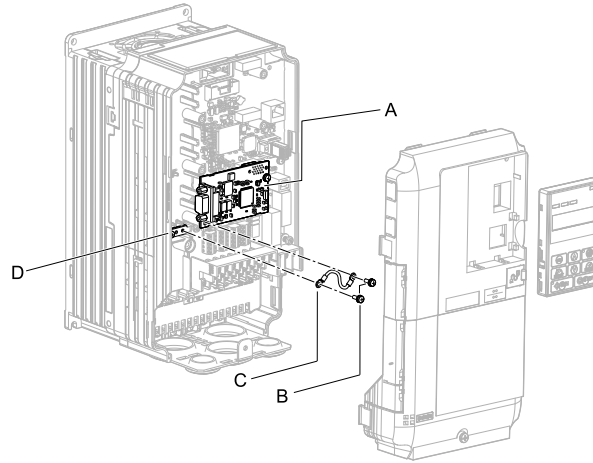
A - Option
B - Included screws

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.

   • 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.
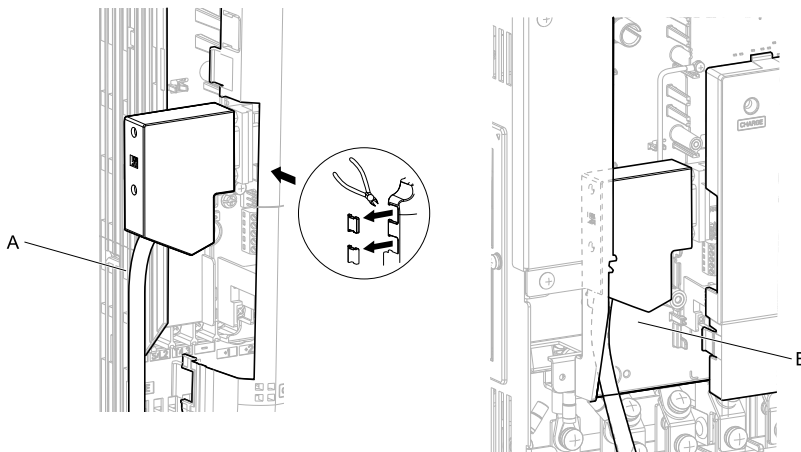
A - Route wires through the openings provided on the left side of the front cover. *1

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 25* 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.*
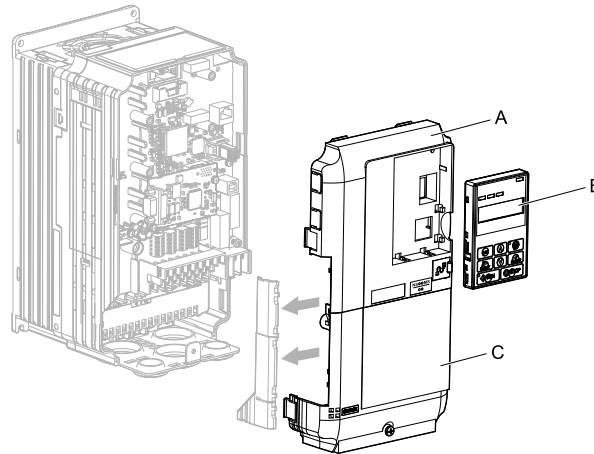
A - **Drive front cover**
B - **Keypad**

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 26* 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.
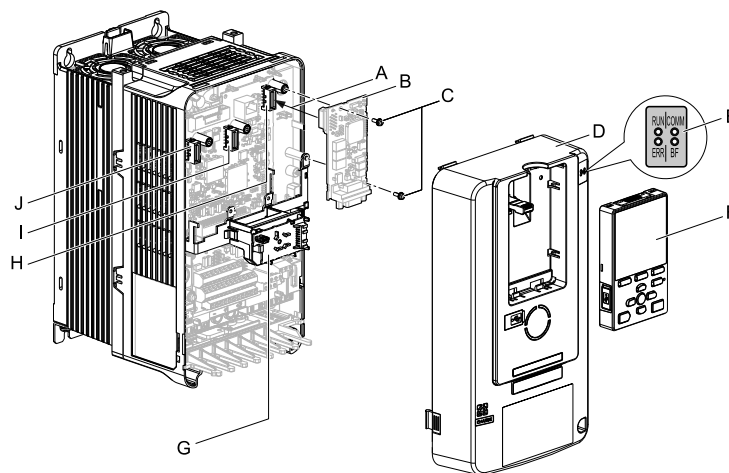
A - **Insertion point for CN5 connector**
B - **Option**
C - **Included screws**
D - **Drive front cover**
E - **LED label**

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).
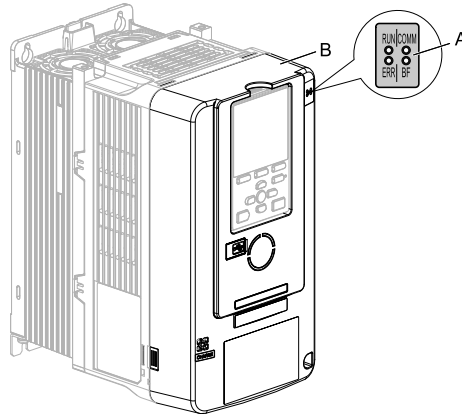
A - LED label   B - Drive front cover

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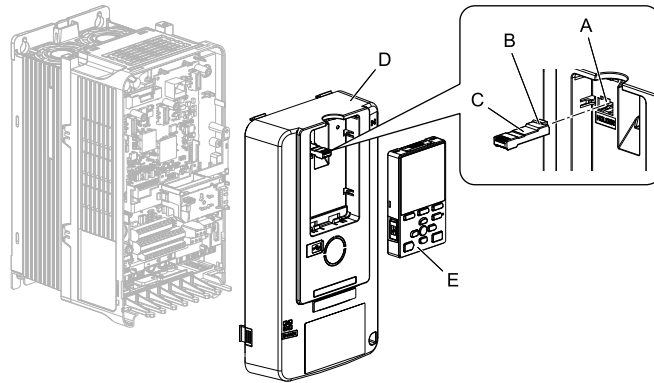
A - Holder   D - Drive front cover
B - Keypad connector tab   E - Keypad
C - Keypad connector

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.*
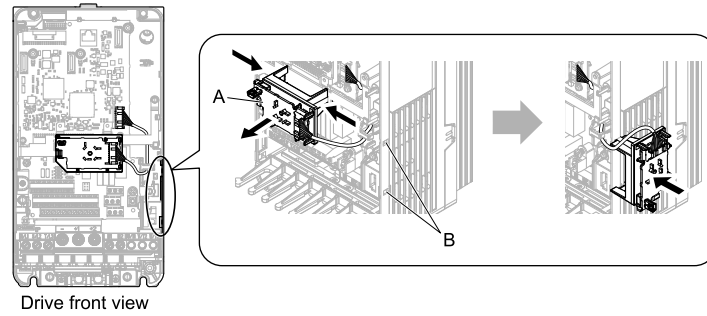
A - LED status ring board   **B - Temporary placement holes**

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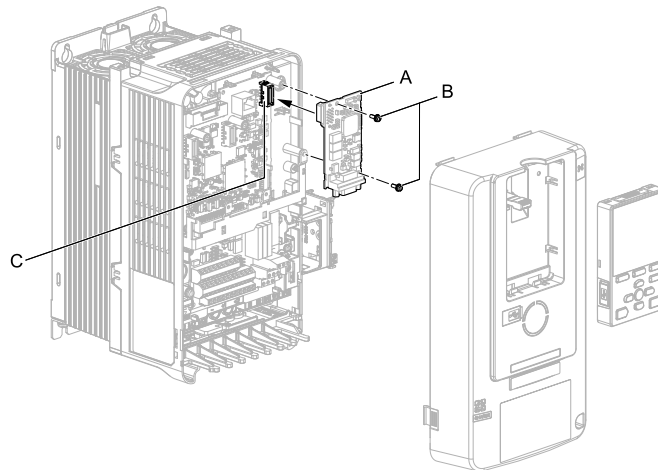
A - Option   **C - Connector CN5-A**
B - Included screws

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.
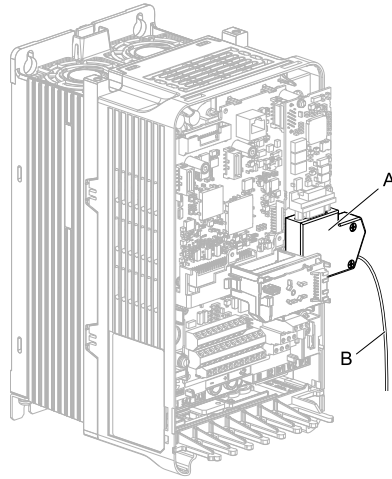
A - Connector   B - Cable

Figure 5.13 Example of Routing the Wiring to the Outside
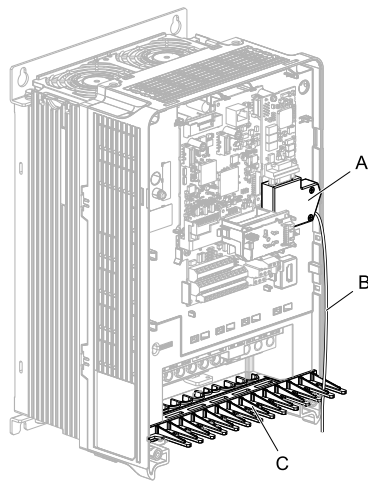
A - Connector   C - Wiring cover
B - Cable

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 25* 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.
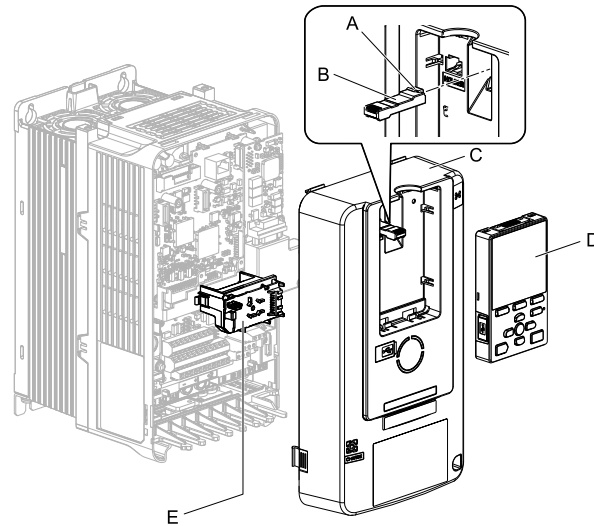
A - **Keypad connector tab**
B - **Keypad connector**
C - **Drive front cover**

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.
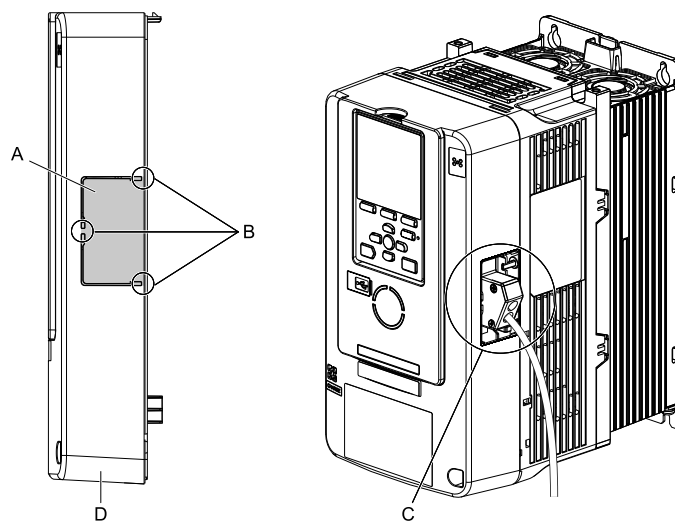
A - **Cutaway sections**
B - **Cutting locations**

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 26* 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.

A - **Drive grounding terminal (FE)**
B - **Option**
C - **Included screws**
D - **Drive front cover**
E - **Keypad**

F - **LED label**
G - **Ground wire**
H - **Option connector CN4 (9-pin D-sub female connector)**
I - **Insertion point for connector CN5-A**
J - **Connector CN5-A**

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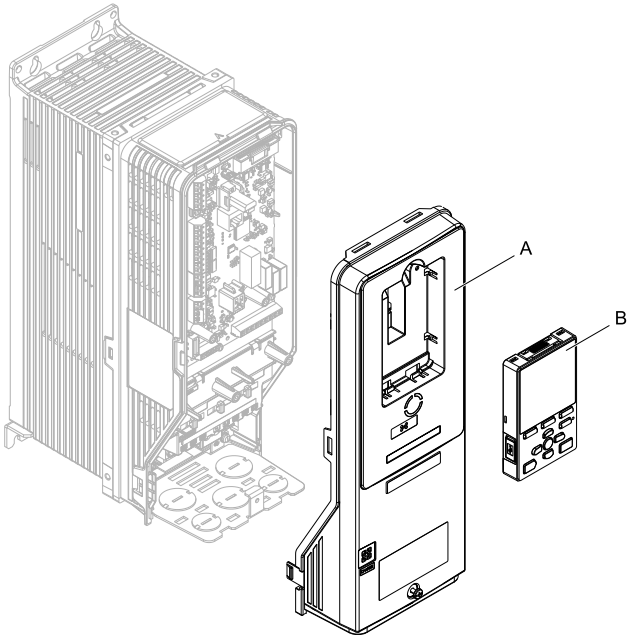
A - Drive front cover   **B - Keypad**

Figure 5.17 Remove the Front Cover and Keypad

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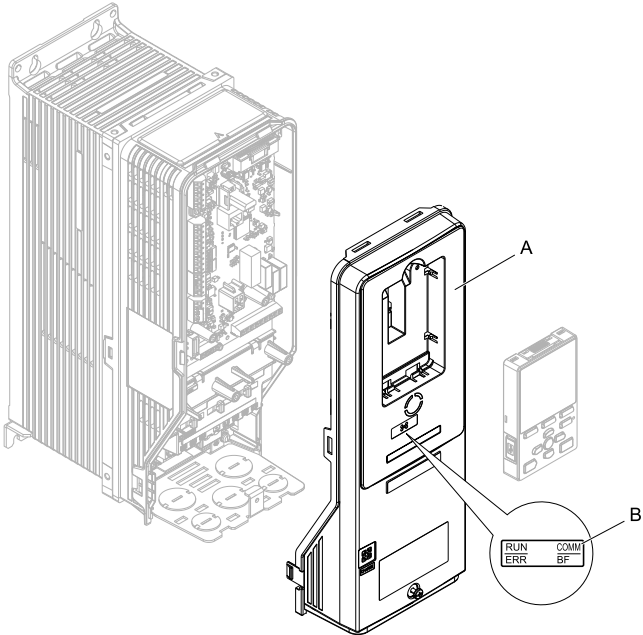
A - Drive front cover   **B - LED label**

Figure 5.18 Put the LED Label on the Drive Front Cover

3. Remove the screw (B) installed in the drive grounding terminal (A).
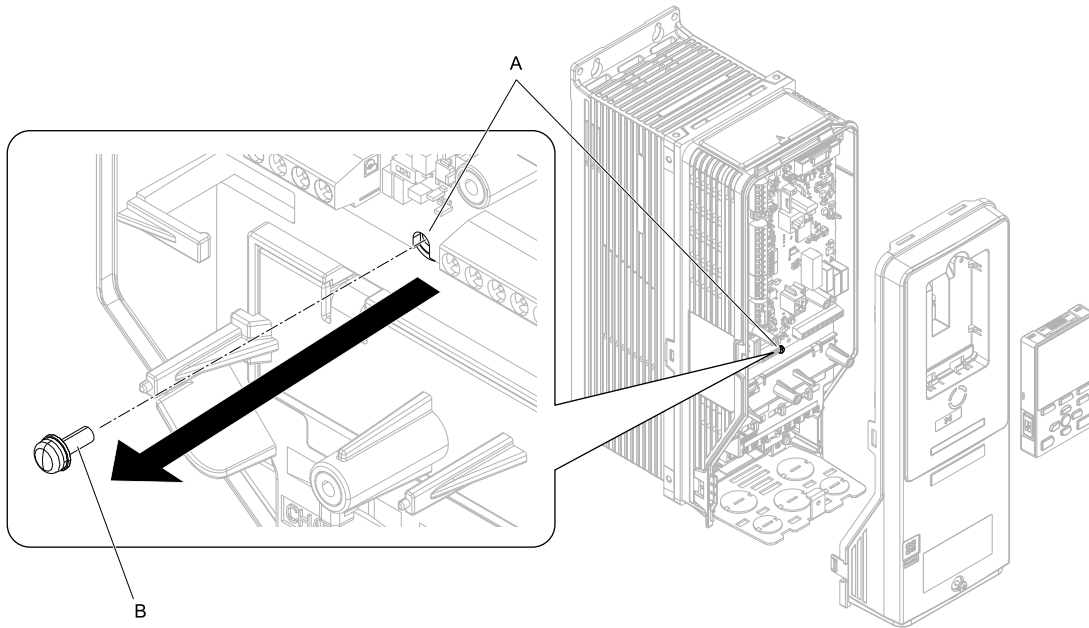
A - Drive grounding terminal (FE)   **B - Included screw**

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).

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

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.
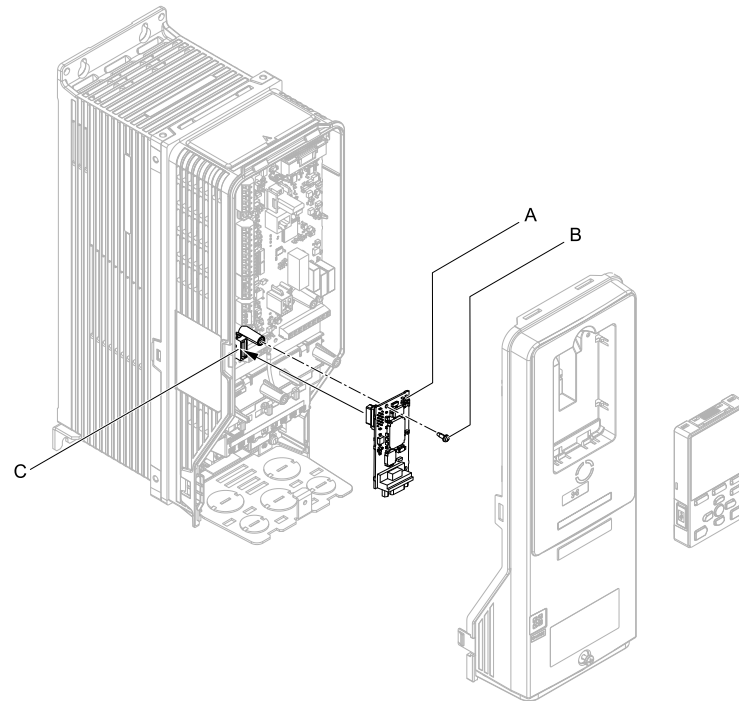
A - Option
B - Included screws

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.
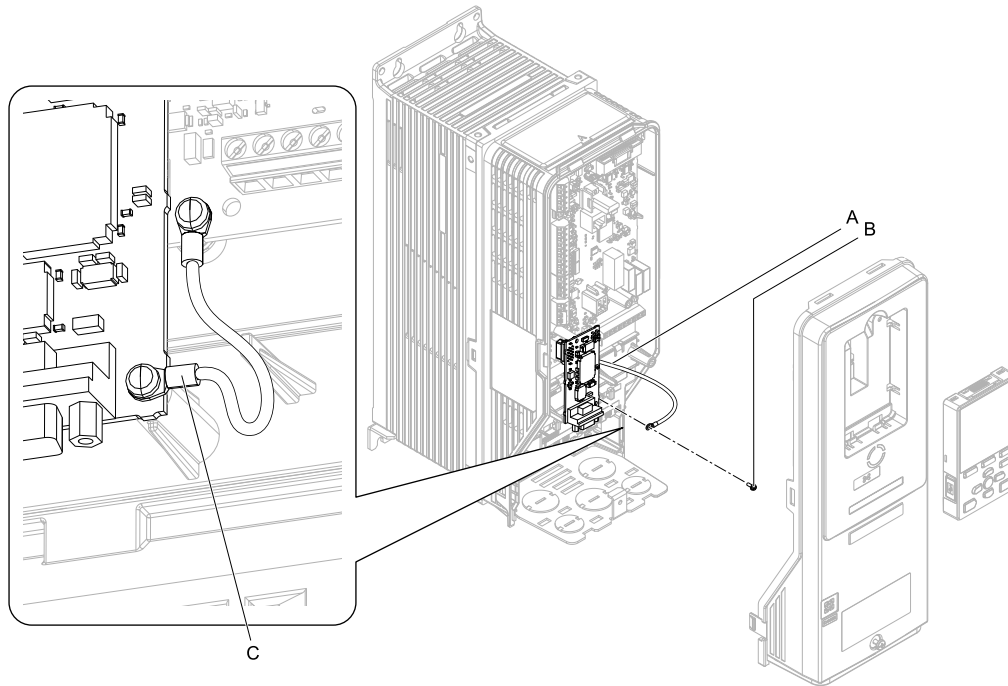
A - **Ground wire**

B - **Included screw**

C - **Crimp terminal**

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 25* 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.*
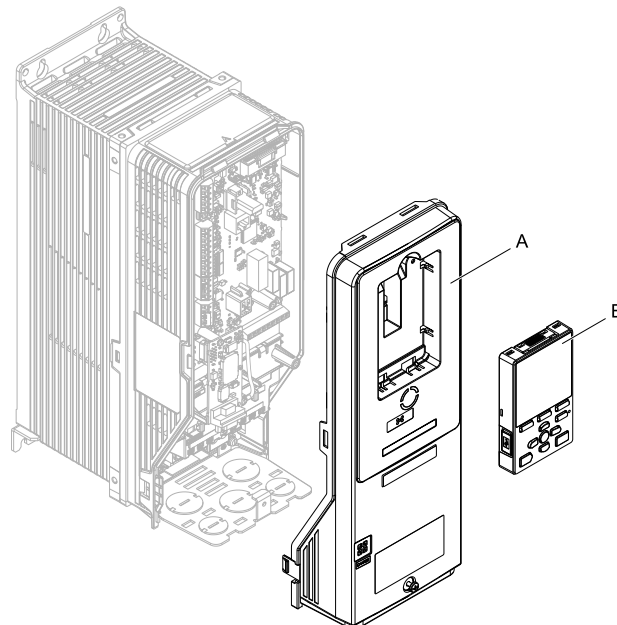
A - **Drive front cover**

B - **Keypad**

Figure 5.23 Replace the Front Cover and Keypad

9. Set drive parameters in *Related Drive Parameters on page 26* 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
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
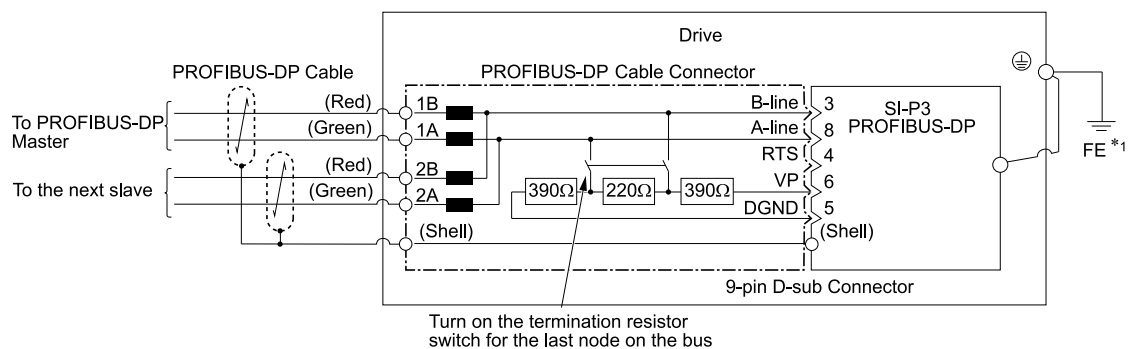
Figure 5.24 Option Connection Diagram

*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.
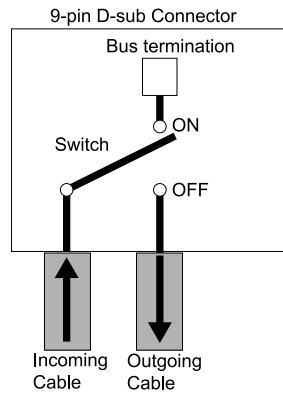
Figure 5.25 PROFIBUS Cable Connection with Termination Resistors

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.
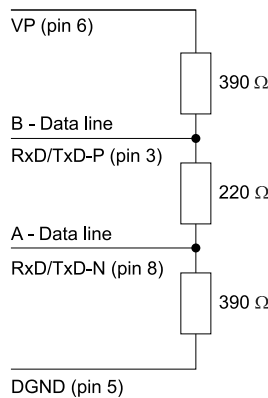
Figure 5.26 PROFIBUS Cable Termination

◆ 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	Selects the input method for frequency reference. 0 : Keypad 1 : Analog Input 2 : Memobus/Modbus Communications 3 : Option PCB 4 : Pulse Train Input **Note:** • 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	Selects the input method for the Run command. 0 : Keypad 1 : Digital Input 2 : Memobus/Modbus Communications 3 : Option PCB **Note:** 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.	1 (0 - 3)
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 or 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	Selects drive response when the drive detects an external fault input *[EF0]* 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 *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 In *A1-02 = 6 [Control Method Selection = PM Advanced Open Loop Vector]*, 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 when *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.	0 (0, 1)

No. (Hex.)	Name	Description	Default (Range)
		$d5$-$01 = 0$ [*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 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 **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.	0 (0, 1)
F6-14 (03BB)	Bus Error Auto Reset	Sets the automatic reset function for *bUS [Option Communication Error]*. 0 : Disabled 1 : Enabled **Note:** • 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	Sets the node address for PROFIBUS-DP communication. Restart the drive after you change this parameter setting. **Note:** • 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)
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 *F7-60 = 0 to 2*.	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 *F7-61 = 0 to 2*.	0 (Hex.) (0 (Hex.) - FFFF (Hex.))
F7-62 (0782)	PZD3 Write	Sets the MEMOBUS/Modbus address for PZD3 (PPO Write). When *F7-62 = 0, 1, or 2*, 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 *F7-63 = 0, 1, or 2*, the write operation to the MEMOBUS register performed by the PZD4 (PPO Write) is disabled.	0 (Hex.) (0 (Hex.) - FFFF (Hex.))
F7-64 (0784)	PZD5 Write	Sets the MEMOBUS/Modbus address for PZD5 (PPO Write). When *F7-64 = 0, 1, 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, 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, or 2*, the write operation to the MEMOBUS register performed by the PZD7 (PPO Write) is disabled.	0 (Hex.) (0 (Hex.) - FFFF (Hex.))

No. (Hex.)	Name	Description	Default (Range)
F7-67 (0787)	PZD8 Write	Sets the MEMOBUS/Modbus address for PZD8 (PPO Write). When *F7-67 = 0, 1, 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, 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, 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.))
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)

*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   *o1-03 [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
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)

Output (Master Device to Drive)		Input (Drive to Master Device)	
Byte	**Description**	**Byte**	**Description**
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

*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   *o1-03 [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 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 *1
3	Frequency Reference Low Byte	3	Motor Speed Low Byte *1
4	MEMOBUS/Modbus Function Code	4	MEMOBUS/Modbus Function Code
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 *o1-03 [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.

◆ MEMOBUS/Modbus Message Area

In the MEMOBUS/Modbus message area, MEMOBUS/Modbus messages are transferred to the option, and the parameters in the drive can be set, read, and monitored. Up to four data items can be written or read at one time.

The option edits the MEMOBUS/Modbus message internally and transfers the message to the drive after receiving the message; more time is required to return the message. Use the handshaking register to synchronize sending or receiving of the data between the PROFIBUS-DP master and the option. Refer to *Handshaking Register on page 34* for more information.

Execute an Enter command to validate the written data and write a parameter to the drive. When *F6-32 = 4*, this parameter is validated by writing the parameter to the drive and automatically executing the Enter command at the same time. Refer to the MEMOBUS/Modbus Communications chapter in the drive Technical Manual for details on the Enter command. Refer to the MEMOBUS/Modbus Data Table in the drive Technical Manual for a list of monitor data using the MEMOBUS/Modbus message area.

■ **Configuration of MEMOBUS/Modbus Command Message**

The Table 7.6 shows the configuration of MEMOBUS/Modbus command messages when the Extended Data 1 is selected.

Table 7.6 MEMOBUS/Modbus Command Message

Byte	Name	Function	
16	Function Code	MEMOBUS/Modbus command code: 03 (Hex.): Read command (reading Drive internal data) 08 (Hex.): Loopback Test 10 (Hex.): Write command (writing data into the drive) Other codes: Not supported.	
17	Starting Register Number	Starting Register Number	High Byte
18			Low Byte
19	Data Quantity	Sets the number of bytes to read or write (only 2, 4, 6, or 8 allowed)	
20	Data 1 *1	Data word 1	High Byte
21			Low Byte
22	Data 2 *1	Data word 2	High Byte
23			Low Byte
24	Data 3 *1	Data word 3	High Byte
25			Low Byte
26	Data 4 *1	Data word 4	High Byte
27			Low Byte
28 - 30	Reserved	Reserved	
31	Handshaking Register	Refer to page 34.	

*1   Setting is needed only for the write command. Select *00* (Hex.)for the read command.

■ **Configuration of MEMOBUS/Modbus Response Messages**

The Table 7.7 shows the configuration of MEMOBUS/Modbus response messages when the Extended Data 1 is selected.

Table 7.7 MEMOBUS/Modbus Response Messages

Byte	Name	Function	
16	Function Code	MEMOBUS/Modbus response codes 00 (Hex.): Waiting for response from drive 03 (Hex.): Response to read operation 10 (Hex.): Response to write operation 83 (Hex.): Read command error 90 (Hex.): Write command error Other codes: Not supported.	
17	Starting Register Number	Starting Register Number	High Byte
18			Low Byte
19	Data Quantity	Write: Set double number of written data items. Read: Set double number of read data items.	
20	Data 1 *1	Data word 1	High Byte
21			Low Byte
22	Data 2 *1	Data word 2	High Byte
23			Low Byte
24	Data 3 *1	Data word 3	High Byte
25			Low Byte

Byte	Name	Function	
26	Data 4 *1	Data word 4	High Byte
27			Low Byte
28 - 30	Reserved		
31	Handshaking Register	Refer to page 34.	

*1   Data is returned only for the read command.

If an error occurs, the option sets the Most Significant Bit (MSB) in the MEMOBUS/Modbus response code to *1* and returns the error response. The number of data items is set to *02* (Hex.) and an error code is written into the Low Byte of Data 1. Refer to the MEMOBUS/Modbus Communications chapter in the drive Technical Manual for details on the MEMOBUS/Modbus error codes.

■ Parameter Settings Using MEMOBUS/Modbus Commands

The written or read data of each parameter is transferred in a hexadecimal value.

Negative values are expressed as a two complement.

- Example 1: The frequency reference is 30H z.
  30 Hz/0.01 Hz = 3000 → BB8 (Hex.)
- Example 2: -5% is assigned as the bias for terminal FM of multi-function analog output 1.
  5/0.1 = 50 → 32 (Hex.)
  Converted into a two complement → FFCE (Hex.)
- Example 3: 60.00 Hz is assigned for d1-01 (register No.: 0280 (Hex.)).
  60.00 Hz/0.01 Hz = 6000 → 1770 (Hex.)

Table 7.8 Parameter Settings Using MEMOBUS/Modbus Commands

Byte	Name		Data		
			Command Message (Hex.)	Response Message (Hex.)	Response Message at Fault (Hex.) *2
16	Function Code		10	10	90
17	Starting Register Number	High Byte	02	02	00
18		Low Byte	80	80	00
19	Data Quantity		02	02	02
20	Data 1	High Byte	17	00	00
21		Low Byte	70	00	02
22	Data 2	High Byte	00	00	00
23		Low Byte	00	00	00
24	Data 3	High Byte	00	00	00
25		Low Byte	00	00	00
26	Data 4	High Byte	00	00	00
27		Low Byte	00	00	00
28 -30	Reserved		00	00	00
31	Handshaking Register *1		80	80	80

*1   Depends on the status of the previous data.
*2   Depends on the status of the fault.

■ Handshaking Register

Handshaking synchronizes the timing of the sending or receiving of MEMOBUS/Modbus message data between the option and the PROFIBUS-DP master.

When the master toggles bit 7 of the handshaking register in the output data, the option starts to process the data in the MEMOBUS/Modbus registers. Make sure that the data in the MEMOBUS/Modbus registers is valid before you toggle bit 7.

When the option toggles bit 7 of the handshaking register in the input data to the same value as handshaking register bit 7 in the output data, the content of the input data MEMOBUS/Modbus registers is valid.

Handshaking Output Register

PROFIBUS-DP Master to option

Bit7	6	5	4	3	2	1	0
HS	–	–	–	–	–	–	INIT

Bit	Name	Function
7		Handshaking bit. Synchronizes send and receive timing. Changes status when sending new command messages. This bit is reset to 0 at power up or by setting the handshaking output register bit INIT to 1.
6 - 1	-	Reserved
0	INIT	Clears the handshaking bit to 0.

Handshaking Input Register

Option to PROFIBUS-DP Master

Bit7	6	5	4	3	2	1	0
HS	STATUS		WD				–

Bit	Name	Function
7	HS	Handshaking bit. Synchronizes send and receive timing. Changes status when sending new command messages. **Note:** This bit is reset to 0 at power up or by initializing the handshaking output register bit INIT back to 0.
6 - 5	STATUS *1	Status of the data exchange between the PROFIBUS-DP master and the drive. 00 (Hex.): Idle 01 (Hex.): SI-P3 sends a MEMOBUS/Modbus command to the drives 10 (Hex.): SI-P3 waits for a MEMOBUS/Modbus response from the drives 11 (Hex.): SI-P3 receives a MEMOBUS/Modbus response from the drives
4 - 1	WD *1	Counter increases every 64 ms.
0	-	Reserved

*1   STATUS and WD are for reference.

■ Example of Handshaking

Clear the handshaking register HS bit (bit 7) to 0 for the PLC program after turning on the power supply or after re-initializing. The Figure 7.1 describes the handshaking function. The arrows identify if the PROFIBUS-DP master or the option has the control for the protocol.
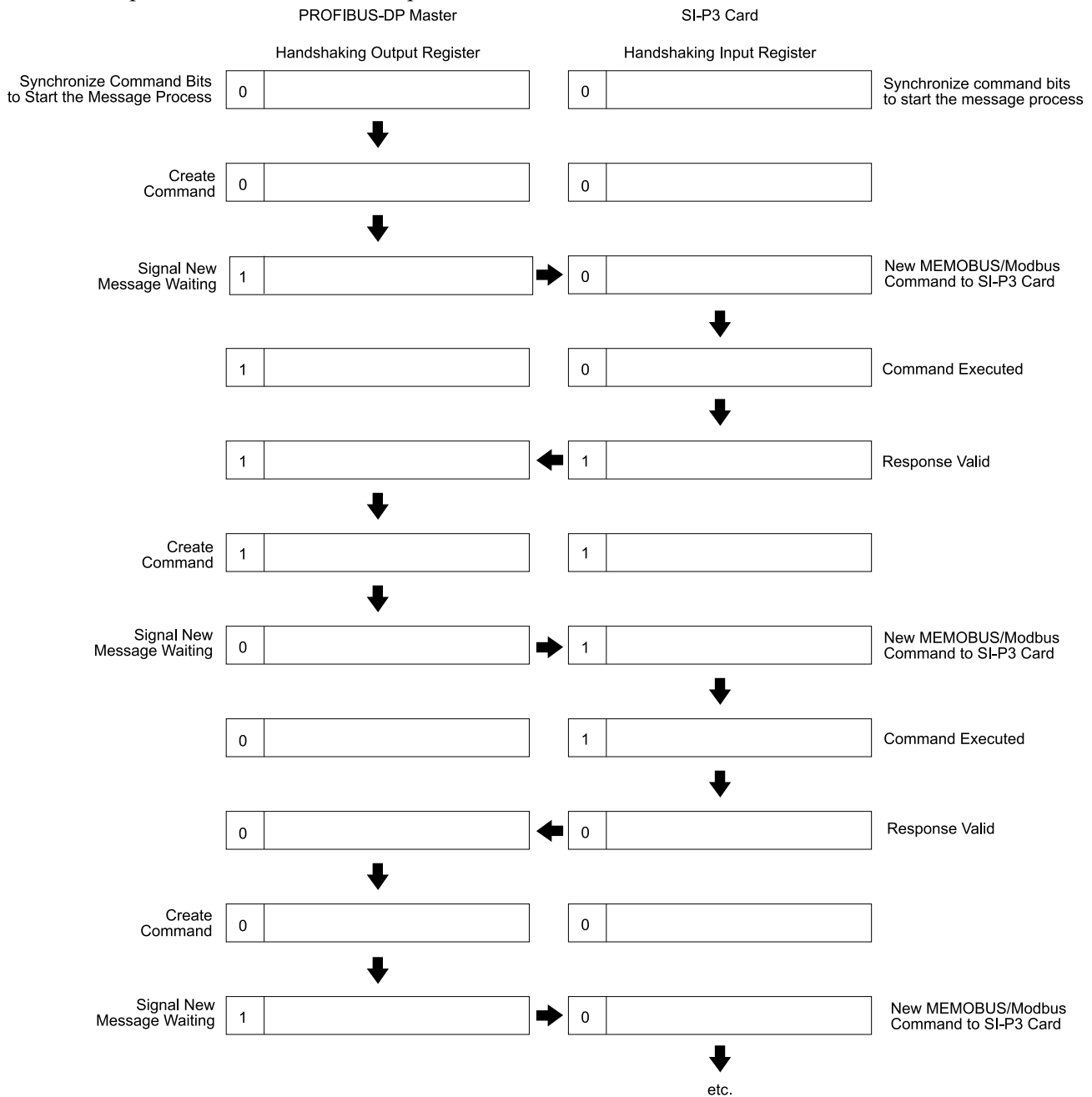
Figure 7.1 Example of Handshaking

■ **Flowchart**

The Figure 7.2 illustrates the handshaking function when using a MEMOBUS/Modbus message.
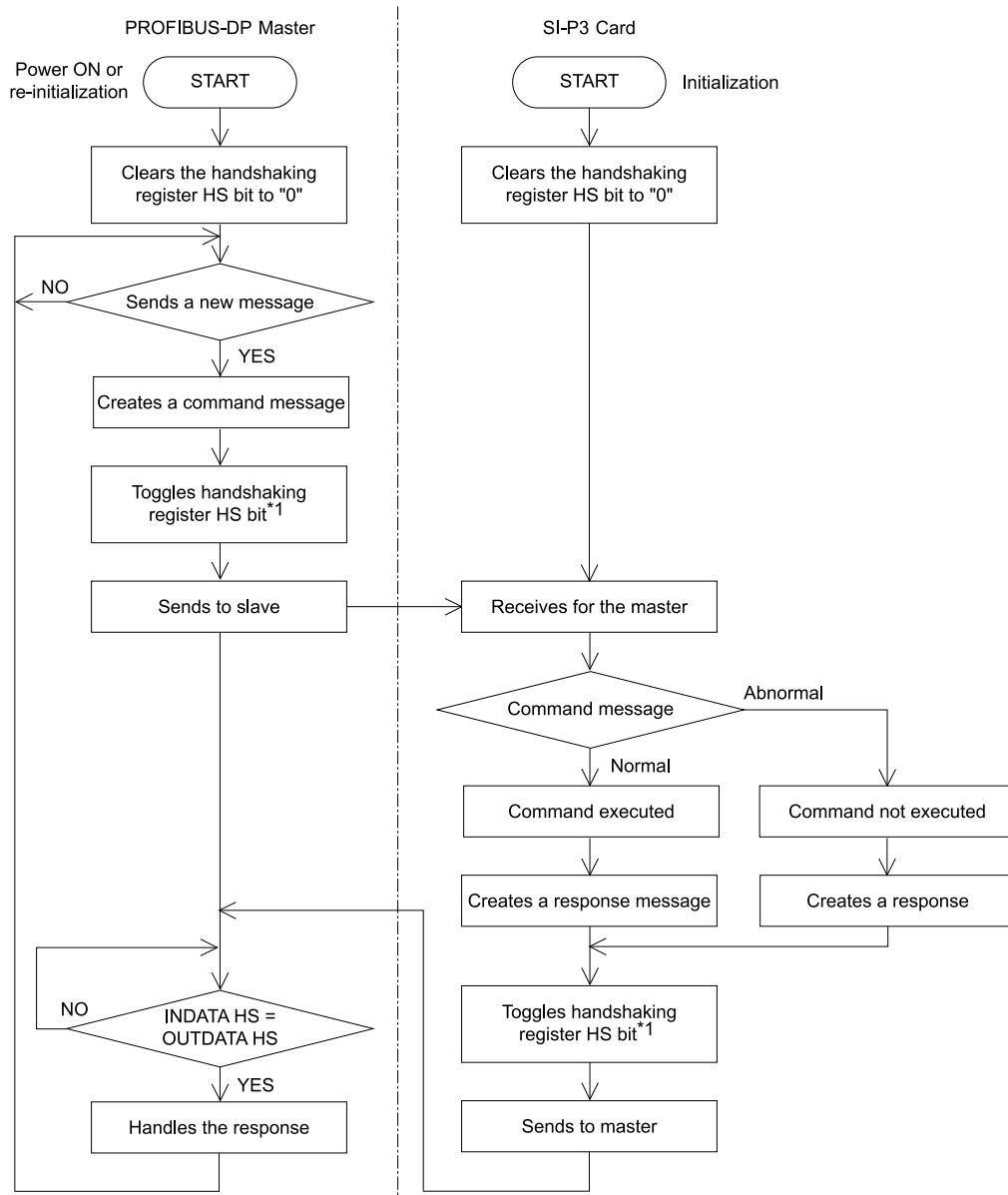
Figure 7.2 MEMOBUS/Modbus Message Flowchart

*1   Toggle" means changing the HS bit status from 0 to 1 or from 1 to 0.

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

◆ Configuration of Registers

■ PKE

Bit	PPO Write	PPO Read
0	Refer to page 42.	-
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11	SPM always 0	SPM always 0
12	Refer to page 40.	Refer to page 40. When Response ID is 7, see PWE error code.
13		
14		
15		

■ IND

Bit	PPO Write	PPO Read
0	Sub-Index for parameter number (F6-33 = 0)	Sub-Index for parameter number (F6-33 = 0)
1		
2		
3		
4		
5		
6		
7		
8	Sub-Index for parameter number (F6-33 = 1)	Sub-Index for parameter number (F6-33 = 1)

Bit	PPO Write	PPO Read
9		
10		
11		
12		
13		
14		
15		

■ PWE

Bit	PPO Write	PPO Read
0 - 31	Setting Data	Error code when Response ID is 7 0: Incorrect PNU number 1: Write mode error 2: Lower or upper limit violated 3: Disabled IND is set 17: Write mode error during Uv condition or Write mode error during parameter processing

■ STW/ZSW

F6-32 = 0, 3

Note:

Parameter *F6-32 = 3* is available in these software versions:
- Option software versions PRG: 2104 or later
- A1000 software versions PRG: 1021 or later

Bit	PPO Write	PPO Read
0	OFF1: reserved	Ready to switch on: always 1
1	OFF2: reserved	Ready: always 1
2	OFF3: reserved	1: Ready
3	Enable to RUN 0: Baseblock + Stop 1: Not Baseblock	1: Fault
4	0: Stop 1: Run	Always 1
5	Ramp function generation enable: reserved	Always 1
6	Enable ramp function generator set-point: reserved	Switch-on inhibit: always 0
7	1: Fault Reset	1: Warning Occurred
8	0: Stop 1: JOG RUN forward (Fmax/10 speed)	1: During Speed Agree
9	0: Stop 1: JOG RUN reverse (Fmax/10 speed)	0: LOCAL 1: Control from PROFIBUS
10	0: LOCAL 1: Control from PROFIBUS	Always 0
11 - 15	reserved	

F6-32 = 2, 5

Note:

Parameter *F6-32 = 2, 5* is available in these software versions:
- Option software versions PRG: 2104 or later
- A1000 software versions PRG: 1021 or later

Bit	PPO Write STW	PPO Read ZSW
0	0: Stop 1: Run *1	Ready to switch on: always 1
1	OFF2: reserved	Ready: always 1

Bit	PPO Write STW	PPO Read ZSW
2	OFF3: reserved	1: Ready
3	Enable to RUN 0: Baseblock + Stop 1: Not Baseblock	1: Fault
4	0: Stop 1: Run *1	always 1
5	Ramp function generation enable: reserved	always 1
6	Enable ramp function generator set-point: reserved	Switch-on inhibit: always 0
7	1: Fault Reset	1: Warning Occurred
8	0: Stop 1: JOG RUN forward (Fmax/10 speed)	1: During Speed Agree
9	0: Stop 1: JOG RUN reverse (Fmax/10 speed)	0: LOCAL 1: Control from PROFIBUS
10	0: LOCAL 1: Control from PROFIBUS	Always 0
11 - 15	reserved	

*1   Setting 1 (RUN) of Bit 0 and Bit 4 operates the drive.

■ HSW/HIW

Bit	PPO Write	PPO Read
0 - 15	Setting Frequency (±10000/100%)	Output Frequency or Motor speed with PG (±10000/100%)

■ Task ID

ID	Description	ID	Description
0	No action	6	Request parameter value from array
1	Request parameter value	7	Change parameter value in array (word)
2	Change parameter value (word)	8	Change parameter value in array (double word)
3	Change parameter value (double word)	9	Request number of array elements

■ Response ID

ID	Description	ID	Description
0	No action	5	Transfer parameter value (array double word)
1	Transfer parameter value (word)	6	Transfer number of array element
2	Transfer parameter value (double word)	7	Task cannot be executed (with error number)
4	Transfer parameter value (array word)	-	-

◆ SI-P3 Device Data

Parameter	Setting Value	Contents
GSD_Revision	3	GSD file version 3.0.
Vendor_Name	"YASKAWA ELECTRIC"	-
Model_Name	"PROFIBUS-DP INTERFACE CARD SI-P3"	-
Ident_Number	0x0ACF	-
FMS_supp	0	PROFIBUS-FMS not supported
Protocol_Ident	0	PROFIBUS-DP supported
Station_Type	0	DP-Slave
Slave_Family	3	-
Revision	"V1.0"	Device version 1.0
Hardware_Release	"V1.0"	Hardware version 1.0

Parameter	Setting Value	Contents
Software_Release	"V1.0"	Software version 1.0
Implementation_type	"DPC31"	DP protocol
Redundancy	0	Redundancy NOT supported
Repeater_Ctrl_Sig	2	Supported as TTL level via RTS signal from module
24V_Pins	0	No external 24 V power supply input for maintenance and device connections
Set_Slave_Add_supp = 1	1	Station address is set remotely
Auto_Baud_supp	1	Automatic baud rate select
9.6_supp	1	9600 bps
19.2_supp	1	19.2 kbps
45.45_supp	1	45.45 kbps
93.75_supp	1	93.75 kbps
187.5_supp	1	187.5 kbps
500_supp	1	500 kbps
1.5M_supp	1	1.5 Mbps
3M_supp	1	3 Mbps
6M_supp	1	6 Mbps
12M_supp	1	12 Mbps
MaxTsdr_9.6	60	60 Tbit = 6.25 msec
MaxTsdr_19.2	60	60 Tbit = 3.125 msec
MaxTsdr_45.45	60	60 Tbit = 1.32 msec
MaxTsdr_93.75	60	60 Tbit = 640 μsec
MaxTsdr_187.5	60	60 Tbit = 320 μsec
MaxTsdr_500	100	100 Tbit = 200 μsec
MaxTsdr_1.5M	150	150 Tbit = 100 μsec
MaxTsdr_3M	250	250 Tbit = 83 μsec
MaxTsdr_6M	450	450 Tbit = 75 μsec
MaxTsdr_12M	800	800 Tbit = 67 μsec
Min_Slave_Intervall	5	Minimum slave interval = 0.5 ms
Freeze_Mode_supp	1	Freeze mode not supported
Sync_Mode_supp	1	Sync mode not supported
Fail_Safe	1	Fail safe supported
DPV1_Slave	1	-
DPV1_Data_Types	1	-
C1_Read_Write_supp	0	-
C2_Read_Write_supp	1	-
C2_Max_Data_Len	240	-
C2_Response_Timeout	100	-
C2_Read_Write_required	0	-
C2_Max_Count_Channels	1	-
Max_Initiate_PDU_Length	52	-
Modular_Station	1	Modular station
Max_Module	1	Maximum # of modules: 1
Max_Input_Len	32	Maximum # of input bytes: 32
Max_Output_Len	32	Maximum # of output bytes: 32
Max_Data_Len	64	Maximum # of data bytes: 64
Max_User_Prm_Data_Len	4	-

Parameter	Setting Value	Contents
Ext_User_Prm_Data_Const (0)	0x40, 0x01, 0x00, 0x01	-
Ext_User_Prm_Data_Ref (0)	1	-
Ext_User_Prm_Data_Ref (0)	2	-
Max_Diag_Data_Len	11	Maximum diagnostic length
Unit_Diag_Bit (0024)	"Undervoltage Condition"	-
Unit_Diag_Bit (0025)	"Inverter Communications Error"	-
Unit_Diag_Bit (0026)	"PNU915: Illegal PNU configured"	-
Unit_Diag_Bit (0027)	"PNU916: Illegal PNU configured"	-

```
Module = "Basic data" 0x72
1
EndModule
```

```
Module = "Extended Data 1" 0x5F, 0x6F
2
EndModule
```

```
Module = "Extended Data 2" 0x55, 0x65
3
EndModule
```

```
Module = "PPO Type 1" 0xF3, 0xF1
4
EndModule
```

```
Module = "PPO Type 2" 0xF3, 0xF5
5
EndModule
```

```
Module = "PPO Type 3" 0xF1
6
EndModule
```

```
Module = "PPO Type 4" 0xF5
7
EndModule
```

```
Module = "PPO Type 5" 0xF3, 0xF9
8
EndModule
```

```
Module = "PPO Type 1 (No Cons.)" 0x73, 0x71
9
EndModule
```

```
Module = "PPO Type 2 (No Cons.)" 0x73, 0x75
10
EndModule
```

```
Module = "PPO Type 3 (No Cons.)" 0x71
11
EndModule
```

```
Module = "PPO Type 4 (No Cons.)" 0x75
12
EndModule
```

```
Module = "PPO Type 5 (No Cons.)" 0x73, 0x79
13
EndModule
```

◆ Supported PNU

Supported PNU No.	Data Type	Write	Read	Description
900	Octet String 12	-	○	Type 1 PPO-Write
901	Octet String 20	-	○	Type 2 PPO-Write
902	Octet String 4	-	○	Type 3 PPO-Write (DP-V1 only)
903	Octet String 12	-	○	Type 4 PPO-Write (DP-V1 only)
904	Unsigned 16	-	○	Current PPO-Write

Supported PNU No.	Data Type	Write	Read	Description
905	Octet String 28	-	○	Type 5 PPO-Write
907	Octet String 12	-	○	Type 1 PPO-Read
908	Octet String 20	-	○	Type 2 PPO-Read
909	Octet String 4	-	○	Type 3 PPO-Read (DP-V1 only)
910	Octet String 12	-	○	Type 4 PPO-Read (DP-V1 only)
911	Unsigned 16	-	○	Current PPO-Read
912	Octet String 28	-	○	Type 5 PPO-Read
915	Array [10] Unsigned 16	○	○	Assign MEMOBUS/Modbus Write Command to PZD in PPO-Write
916	Array [10] Unsigned 16	○	○	Assign MEMOBUS/Modbus response to PZD in PPO-Read
918	Unsigned 16	-	○	Node address
947	Array [10] Unsigned 16	-	○	Fault number
948	Array [10] Unsigned 16	-	○	Fault time (Elapsed time between fault occurrence)
963	Unsigned 16	-	○	Current baud rate
964	Unsigned 16	-	○	Device identification (PNU964)
965	Octet String 2	-	○	Profile code: 0x0302
967	V2	○	○	Read or Write Control word
968	V2	-	○	Read Status word
971	Unsigned 16	○	-	Start Store in non-volatile memory (Enter code with EEPROM) *1

*1   You can write the EEPROM to the drive a maximum of 100,000 times. Do not use this write command frequently.

■ **Example: To read the Drive Command (STW) using PNU900**

Command

Data Type	Settings	Description
PKE	6384 (Hex.)	6: Request parameter value from array
		384 (Hex.) = 900 dec (PNU 900)
IND	5	5th Word data of PPO Type 1
PWE	0	N/A
STW	-	up to Master command
HSW	-	up to Master command

Response

Data Type	Settings	Description
PKE	4384 (Hex.)	4: Transfer parameter value (array word)
		384 (Hex.) = 900 dec (PNU 900)
IND	5	5th Word data of PPO Type 1
PWE	(STW)	STW data
ZSW	-	up to drive state
HIW	-	up to drive state

■ **Example: To read the Drive State (ZSW) using PNU907**

Command

Data Type	Settings	Description
PKE	638B (Hex.)	6: Request parameter value from array
		38B (Hex.) = 907 dec (PNU 907)
IND	5	5th Word data of PPO Type 1
PWE	0	N/A

Data Type	Settings	Description
STW	-	up to Master command
HSW	-	up to Master command

Response

Data Type	Settings	Description
PKE	438B (Hex.)	4: Transfer parameter value (array word)
		388 (Hex.) = 907 dec (PNU 907)
IND	5	5th Word data of PPO Type 1
PWE	(ZSW)	ZSW data
ZSW	-	up to drive state
HIW	-	up to drive state

■ **Example: To read the data Type 1 PPO-Write 1st word**

Command

Data Type	Settings	Description
PKE	6384 (Hex.)	6: Request parameter value from array
		384 (Hex.) = 900 dec (PNU 900)
IND	1	First Word data of PPO type 1
PWE	0	N/A
STW	-	up to Master command
HSW	-	up to Master command

Response

Data Type	Settings	Description
PKE	4384 (Hex.)	4: Transfer parameter value (array word)
		384 (Hex.) = 900 dec (PNU 900)
IND	1	First Word data of PPO Type 1
PWE	6384 (Hex.)	First Word data of PPO-Write
ZSW	-	up to drive state
HIW	-	up to drive state

■ **Example: To read current PPO-Write**

Command

Data Type	Settings	Description
PKE	1388 (Hex.)	1: Request parameter value
		388 (Hex.) = 904 dec (PNU 904)
IND	0	Not array type
PWE	0	N/A
STW	-	up to Master command
HSW	-	up to Master command

Response

Data Type	Settings	Description
PKE	1388 (Hex.)	1: Transfer parameter value (word)
		388 (Hex.) = 904 dec (PNU 904)
IND	0	Not array type
PWE	1	1: Type 1 PPO-Write 2: Type 2 PPO-Write 3: Type 3 PPO-Write

Data Type	Settings	Description
		4: Type 4 PPO-Write 5: Type 5 PPO-Write
ZSW	-	up to drive state
HIW	-	up to drive state

■ How to use PNU 915 (Assignment, PZD in PPO-Write)

PZD #	PNU	INDEX	Assigned PNU	Description
PZD1	915	1	P0.1	Run Command
PZD2	915	2	P0.2	Frequency Reference
PZD3	915	3	P0.6	PID Setpoint Value
PZD4	915	4	P0.7	Analog Output
PZD5	915	5	P0.9	Digital Output
PZD6	915	6	P0.15	PID Setpoint Value enable
PZD7	915	7	-	-
PZD8	915	8	-	-
PZD9	915	9	-	-
PZD10	915	10	-	-

■ How to use PNU 916 (Assignment, PZD in PPO-Read)

PZD #	PNU	INDEX	Assigned PNU	Description
PZD1	916	1	P0.32	Drive State
PZD2	916	2	P0.2	Frequency Reference
PZD3	916	3	P0.36	Output Frequency
PZD4	916	4	P0.38	Output Current
PZD5	916	5	P0.68	Motor Speed
PZD6	916	6	P0.69	Output Voltage
PZD7	916	7	P0.70	DC Bus Voltage
PZD8	916	8	P0.72	Torque Monitor
PZD9	916	9	P0.71	Output Power
PZD10	916	10	P0.73	Input Terminal Status

■ PNU963

Value	Communication Speed (kbps)	Value	Communication Speed (kbps)
0	9.6	6	1500
1	19.2	7	3000
2	93.75	8	6000
3	187.5	9	12000
4	500	-	-

■ PNU964

Sub-Index	Settings	Description
1	273 dec	Manufacturer Coding
2	1	Device type
3	0	Software version
4	2007 dec	Firmware date (year)
5	0220 dec	Firmware date (day/month)
6	1	DO

■ PNU Numbers for Drive Parameters

DPV0 PNU Number (Dec)	Description	INDEX (Dec)	DPV0 PNU Number (Dec)	Description	INDEX (Dec)
11	A1-xx parameters	00 – 99	83	H3-xx parameters	00 – 99
12	A2-xx parameters	00 – 99	84	H4-xx parameters	00 – 99
21	b1-xx parameters	00 – 99	85	H5-xx parameters	00 – 99
22	b2-xx parameters	00 – 99	86	H6-xx parameters	00 – 99
23	b3-xx parameters	00 – 99	121	L1-xx parameters	00 – 99
24	b4-xx parameters	00 – 99	122	L2-xx parameters	00 – 99
25	b5-xx parameters	00 – 99	123	L3-xx parameters	00 – 99
26	b6-xx parameters	00 – 99	124	L4-xx parameters	00 – 99
27	b7-xx parameters	00 – 99	125	L5-xx parameters	00 – 99
28	b8-xx parameters	00 – 99	126	L6-xx parameters	00 – 99
29	b9-xx parameters	00 – 99	127	L7-xx parameters	00 – 99
31	C1-xx parameters	00 – 99	128	L8-xx parameters	00 – 99
32	C2-xx parameters	00 – 99	141	n1-xx parameters	00 – 99
33	C3-xx parameters	00 – 99	142	n2-xx parameters	00 – 99
34	C4-xx parameters	00 – 99	143	n3-xx parameters	00 – 99
35	C5-xx parameters	00 – 99	145	n5-xx parameters	00 – 99
36	C6-xx parameters	00 – 99	146	n6-xx parameters	00 – 99
41	d1-xx parameters	00 – 99	148	n8-xx parameters	00 – 99
42	d2-xx parameters	00 – 99	151	o1-xx parameters	00 – 99
43	d3-xx parameters	00 – 99	152	o2-xx parameters	00 – 99
44	d4-xx parameters	00 – 99	153	o3-xx parameters	00 – 99
45	d5-xx parameters	00 – 99	154	o4-xx parameters	00 – 99
46	d6-xx parameters	00 – 99	171	q1-xx parameters	00 – 99
47	d7-xx parameters	00 – 99	181	r1-xx parameters	00 – 99
51	E1-xx parameters	00 – 99	201	T1-xx parameters	00 – 99
52	E2-xx parameters	00 – 99	202	T2-xx parameters	00 – 99
53	E3-xx parameters	00 – 99	203	T3-xx parameters	00 – 99
54	E4-xx parameters	00 – 99	211	U1-xx parameters	00 – 99
55	E5-xx parameters	00 – 99	212	U2-xx parameters	00 – 99
61	F1-xx parameters	00 – 99	213	U3-xx parameters	00 – 99
62	F2-xx parameters	00 – 99	214	U4-xx parameters	00 – 99
63	F3-xx parameters	00 – 99	215	U5-xx parameters	00 – 99
64	F4-xx parameters	00 – 99	216	U6-xx parameters	00 – 99
65	F5-xx parameters	00 – 99	217	U7-xx parameters	00 – 99
66	F6-xx parameters	00 – 99	218	U8-xx parameters	00 – 99
67	F7-xx parameters	00 – 99	300	RAM Enter Command	0
81	H1-xx parameters	00 – 99	301	ROM Enter Command [1]	0
82	H2-xx parameters	00 – 99	-	-	-

*1   You can write the EEPROM to the drive a maximum of 100,000 times. Do not use this write command frequently.

■ PNU Numbering for MEMOBUS/Modbus Registers

DPV0 PNU Number	Description	INDEX	DPV0 PNU Number	Description	INDEX
	Command			Monitor	
0	0001 (Hex.) MEMOBUS/Modbus #	1	0	0020 (Hex.) MEMOBUS/Modbus #	32
0	0002 (Hex.) MEMOBUS/Modbus #	2	0	0021 (Hex.: MEMOBUS/Modbus #	33
0	0003 (Hex.) MEMOBUS/Modbus #	3	0	0022 (Hex.) MEMOBUS/Modbus #	34
0	0004 (Hex.) MEMOBUS/Modbus #	4	0	0023 (Hex.) MEMOBUS/Modbus #	35
0	0005 (Hex.) MEMOBUS/Modbus #	5	0	0024 (Hex.) MEMOBUS/Modbus #	36
0	0006 (Hex.) MEMOBUS/Modbus #	6	0	0025 (Hex.) MEMOBUS/Modbus #	37
0	0007 (Hex.) MEMOBUS/Modbus #	7	0	0026 (Hex.) MEMOBUS/Modbus #	38
0	0008 (Hex.) MEMOBUS/Modbus #	8	0	0027 (Hex.) MEMOBUS/Modbus #	39
0	0009 (Hex.) MEMOBUS/Modbus #	9	0	0028 (Hex.) MEMOBUS/Modbus #	40
0	000A (Hex.) MEMOBUS/Modbus #	10	0	0029 (Hex.) MEMOBUS/Modbus #	41
0	000F (Hex.) MEMOBUS/Modbus #	15	0	002A (Hex.) MEMOBUS/Modbus #	42
0	0010 (Hex.) MEMOBUS/Modbus #	16	0	002B (Hex.) MEMOBUS/Modbus #	43
0	0011 (Hex.) MEMOBUS/Modbus #	17	0	002C (Hex.) MEMOBUS/Modbus #	44
0	001B (Hex.) MEMOBUS/Modbus #	27	0	002D (Hex.) MEMOBUS/Modbus #	45
0	001C (Hex.) MEMOBUS/Modbus #	28	0	002E (Hex.) MEMOBUS/Modbus #	46
0	001D (Hex.) MEMOBUS/Modbus #	29	0	002F (Hex.) MEMOBUS/Modbus #	47
-	-	-	0	0030 (Hex.): MEMOBUS/Modbus #	48
-	-	-	0	0031 (Hex.): MEMOBUS/Modbus #	49
-	-	-	0	0032 (Hex.): MEMOBUS/Modbus #	50
-	-	-	0	0033 (Hex.): MEMOBUS/Modbus #	51
-	-	-	0	0034 (Hex.): MEMOBUS/Modbus #	52
-	-	-	0	...	-
-	-	-	0	00FF (Hex.) MEMOBUS/Modbus #	255

Note:

1. When *PNU = 0* and INDEX is set to MEMOBUS/Modbus register number, parameter values can be read and written instead of using PNU number.
2. MEMOBUS/Modbus register *C1-01* is 200 (Hex.).
   When *PNU = 0* and INDEX is 200 (Hex.) (512 dec), *C1-01* setting value can be read and written instead of using PNU 31 (dec) and INDEX 01.

■ Example: Writing to C1-01

Command

Data Type	Settings	Description
PKE	701F (Hex.)	7: Change parameter value in array (word)
		1F (Hex.) = 31 (C1 parameter)
IND	1	C1-01
PWE	10	Assign 10

Data Type	Settings	Description
STW	-	up to Master command
HSW	-	up to Master command

Response

Data Type	Settings	Description
PKE	401F (Hex.)	4: Transfer parameter value (array word)
		1F (Hex.) = 31 (C1 parameter)
IND	1	C1-01
PWE	0	N/A
STW	-	up to drive state
HSW	-	up to drive state

■ Example: Reading to d1-17

Command

Data Type	Settings	Description
PKE	6029 (Hex.)	6: Request parameter value from array
		29 (Hex.) = 41 (d1 parameter)
IND	11 (Hex.)	11 (Hex.) = 17 (d1-17)
PWE	0	N/A
STW	-	up to Master command
HSW	-	up to Master command

Response

Data Type	Settings	Description
PKE	4029 (Hex.)	4: Transfer parameter value (array word)
		29 (Hex.) = 41 (d1 parameter)
IND	11 (Hex.)	d1-17
PWE	258 (Hex.)	d1-17 value
STW	-	up to drive state
HSW	-	up to drive state

■ Example: Writing to RAM with the Enter command

Command

Data Type	Settings	Description
PKE	212C (Hex.)	2: Change parameter value (word)
		12C (Hex.) = 300
IND	0	N/A
PWE	0	N/A
STW	-	up to Master command
HSW	-	up to Master command

Note:

When *F6-32 = 3* or *5*, parameters are validated by writing these parameters to the drive and automatically executing the Enter command at the same time.

Response

Data Type	Settings	Description
PKE	112C (Hex.)	1: Transfer parameter value (word)
		12C (Hex.) = 300

Data Type	Settings	Description
IND	0	N/A
PWE	0	N/A
STW	-	up to drive state
HSW	-	up to drive state

9 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 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.	• 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	• 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
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.
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.

Code	Name	Causes	Possible Solutions
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
bb	Baseblock	The drive output is disabled and *bb* is shown on the keypad when the drive is set for control by PROFIBUS-DP, and either of the following conditions is met: • 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.	• 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.	• 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.
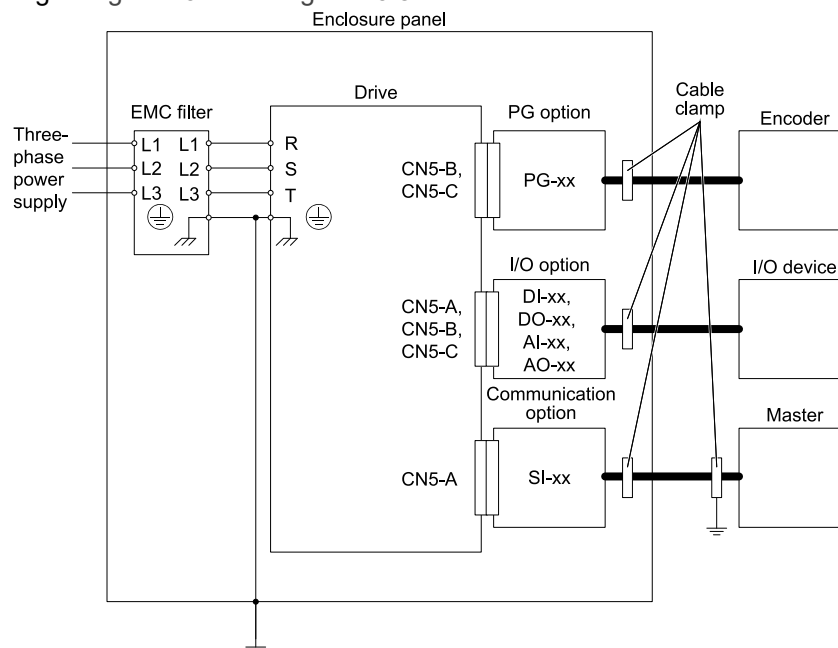
Figure 10.2 Option Installation for CE Compliance: 1000-Series, GA700, GA800
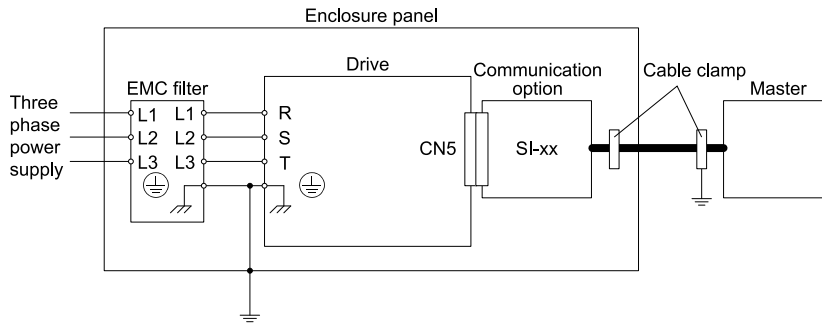
Figure 10.3 Option Installation for CE Compliance: GA500
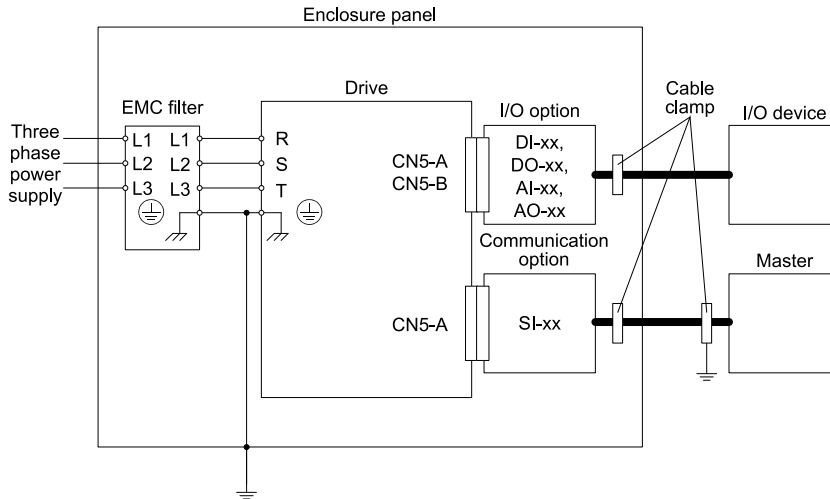
Figure 10.4 Option Installation for CE Compliance: FP605

3. Ground the largest possible surface area of the shield to the metal panel.

   Yaskawa recommends using cable clamps.
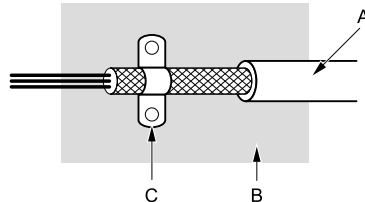
A - Braided shield cable
B - Metal panel

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 • 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 byes, outputs: 16 bytes) • Extended data 2 High-speed I/O data (inputs: 4 bytes, outputs: 4 bytes) MEMOBUS/Modbus message (inputs: 8 byes, 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)

Items	Specifications
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
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 (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 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
July 2022	5	Chapters 3, 4	Revision: LED label for FP605
March 2022	4	All	Addition: Information on FP605 Revision: Reviewed and corrected entire documentation
February 2019	3	All	Addition: Applicable product series Revision: Reviewed and corrected entire documentation
		Chapter 12	Addition: Disposal
August 2018	2	All	Addition: Applicable product series
October 2016	1	All	Revision: • Applicable product series • Reviewed and corrected entire documentation
June 2016	-	-	First Edition

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