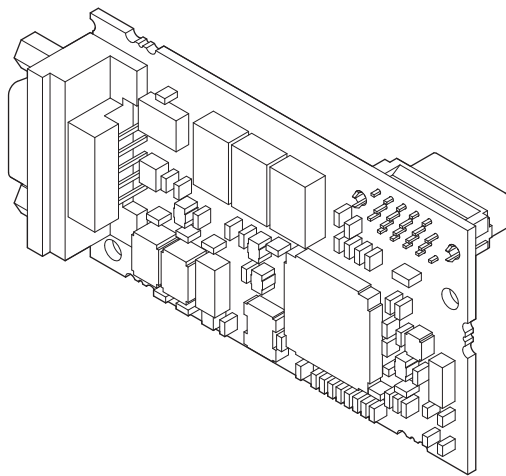


YASKAWA AC Drive Option **PROFIBUS-DP** Technical Manual

Type: SI-P3

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



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Table of Contents

1	PREFACE AND SAFETY	4
2	OVERVIEW	7
3	RECEIVING	9
4	OPTION COMPONENTS	10
5	INSTALLATION PROCEDURE	13
6	RELATED PARAMETERS	24
7	CONVENTIONAL FORMATS	27
8	PARAMETER PROCESS DATA OBJECT FORMATS	35
9	TROUBLESHOOTING	46
10	EUROPEAN STANDARDS	49
11	SPECIFICATIONS	51
12	DISPOSAL	52

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

The following manuals are available for the option:

SI-P3 Option

YASKAWA AC Drive Option SI-P3 PROFIBUS-DP Installation Manual Manual No: TOBP C730600 82	This guide is packaged together with the product and contains information necessary to install the option and set related drive parameters.
YASKAWA AC Drive Option SI-P3 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.

Drive

YASKAWA AC Drive Manuals	Drive manuals contain basic installation and wiring information in addition to detailed parameter setting, fault diagnostic, and maintenance information. 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.
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◆ Terms and Abbreviations

Note:	Indicates supplemental information that is not related to safety messages.
Option:	YASKAWA AC Drive Option PROFIBUS-DP
Drive:	<ul style="list-style-type: none"> • YASKAWA AC Drive 1000-Series (A1000, U1000, Z1000U) • YASKAWA AC Drive GA500 • YASKAWA AC Drive GA700 • YASKAWA AC Drive GA800
Keypad:	<ul style="list-style-type: none"> • LCD Operator for YASKAWA AC Drive 1000-Series • LED Operator for YASKAWA AC Drive 1000-Series • LCD Keypad for YASKAWA AC Drive GA500, GA700, and GA800 • LED Keypad for YASKAWA AC Drive GA500, GA700, and GA800
V/f:	V/f Control
OLV:	Open Loop Vector Control
CLV:	Closed Loop Vector Control
AOLV:	Advanced Open Loop Vector Control
OLV/PM:	Open Loop Vector Control for PM
AOLV/PM:	Advanced Open Loop Vector Control for PM
CLV/PM:	Closed Loop Vector Control for PM
EZOLV:	EZ Open Loop Vector Control

◆ Registered Trademarks

- PROFIBUS-DP is a registered trademark of PROFIBUS & PROFINET International.
- Trademarks are the property of their respective owners.

◆ Supplemental Safety Information

Read and understand this manual before installing, operating, or servicing this option. Install the option according to this manual and local codes.

The following conventions indicate safety messages in this manual. Failure to heed these messages could cause fatal injury or damage products and related equipment and systems.

DANGER

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

WARNING

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

CAUTION

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

NOTICE

Indicates an equipment damage message.

■ General Safety

General Precautions

- The diagrams in this book may include options and drives without covers or safety shields to illustrate details. Be sure to reinstall covers or shields before operating any devices. Use the option 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

Heed the safety messages in this manual.

Failure to comply will cause death or serious injury.

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

WARNING

Electrical Shock Hazard

Do not modify the drive or option circuitry.

Modifications to circuitry can cause serious injury or death, will cause damage to the drive and option, and will void the warranty. Yaskawa is not responsible for modifications of the product made by the user.

NOTICE

Do not use steam or other disinfectants to fumigate wood for packaging the drive or option. 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 and option.

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. This option connects a Yaskawa drive to a field network using the PROFIBUS-DP protocol.

PROFIBUS-DP is included into 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

The option can be used with the products in [Table 1](#).

Table 1 Compatible Products

Product Series	Model(s)
A1000	All models
U1000	All models
Z1000U	All models
GA500	All models
GA700	All models
GA800	All models

Note: For Yaskawa customers in the North or South America region:

If your product is not listed in [Table 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.

Scan QR code



Or refer to: <http://www.yaskawa.com/optionlookup>

◆ Install the Option on a GA500 Drive

An option card installation case is necessary to install the option on a GA500 drive. The option card installation case model is: JOHB-GA500. This case is sold separately. Refer to the option card installation case manual for more information about installation.

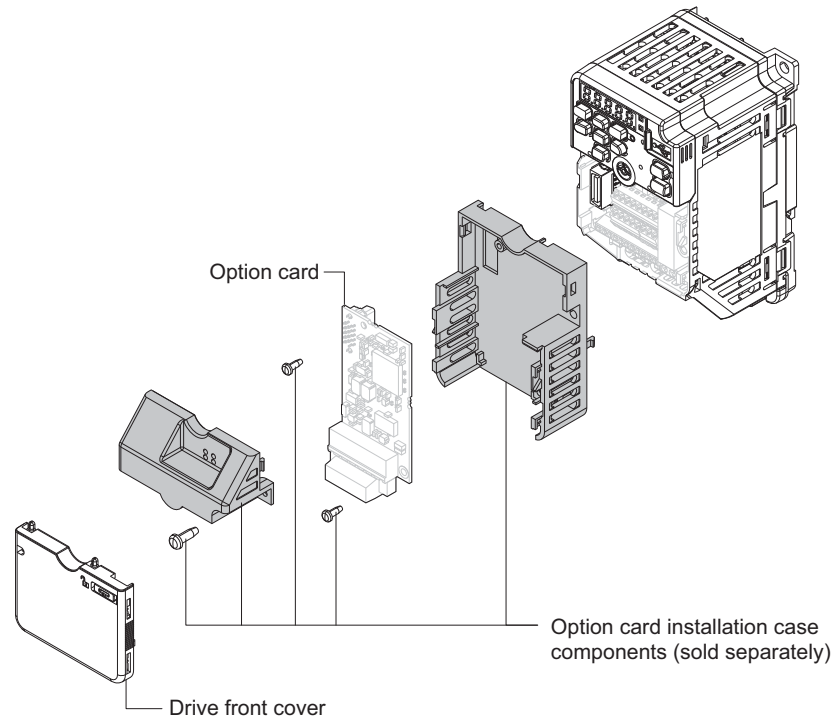


Figure 1 Option Card Installation Case

3 Receiving

After receiving the option package:

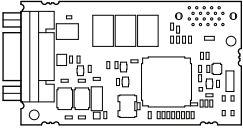




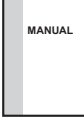
1. Make sure that the option is not damaged and no parts are missing. Contact your sales outlet if the option or other parts appear damaged.

NOTICE: Do not use damaged parts to connect the drive and the option. Failure to comply could damage the drive and option.

2. Confirm that the model number on the option nameplate and the model listed in the purchase order are the same. Refer to **Figure 2** on page **10** for details. Contact the distributor where the option was purchased or contact Yaskawa or a Yaskawa representative about any problems with the option.

◆ Contents and Packaging

Table 2 Contents of Package

Description:	Option	Ground Wire <1>	Screws (M3)	LED Labels		Installation Manual
				1000-Series	GA500, GA700, and GA800	
-						
Quantity:	1	1	3 <2>	1	1	1

<1> GA700 and GA800 drives do not use the ground wire.

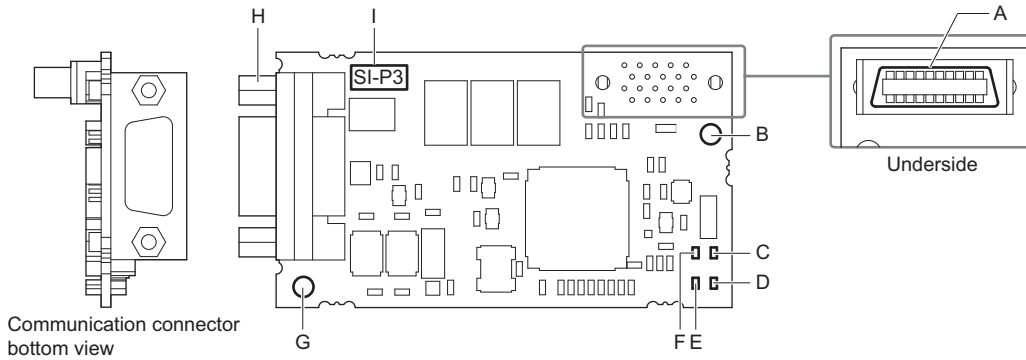
<2> GA700 and GA800 drives use two screws only.

◆ Installation Tools

- A Phillips screwdriver. Phillips screw sizes vary by drive capacity.
- A flat-blade screwdriver (blade depth: 0.4 mm (0.02 in), width: 2.5 mm (0.1 in)).
- A pair of diagonal cutting pliers.
- A small file or medium-grit sandpaper.

4 Option Components

◆ PROFIBUS-DP 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 cable connector (CN4)**
- I – Option model number**

<1> Refer to Option LED Display on page 11 for details on the LEDs.

<2> Connect the provided ground wire during installation. Installation on GA700 and GA800 drives does not require the ground wire.

Figure 2 PROFIBUS-DP Option Components

◆ Communication Connector

The drive has a 9-pin D-sub connector to connect to a PROFIBUS network.

Table 3 Communication Connector Description (9-pin D-sub)

PROFIBUS Connector	Pin	Signal	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	Power supply output for bus termination (for termination resistor)
	7	–	–
	8	RxD/TxD-N	Receive/Transmit data; line A (green)
	9	–	–

◆ Option LED Display



1000-Series Label

GA500, GA700, and GA800 Label

Figure 3 Option LED Labels

The option has four bicolor, red/green LEDs to relay information about power, communication status, and errors. The operational states of the LEDs after completion of the power-up diagnostic process are described in [Table 5](#). Wait at least 2 seconds for the power-up diagnostic process to complete before verifying the states of the LEDs.

Table 4 Option LED States

LED	Display		Operating Status	Description
	Color	Status		
RUN (Power)	Green	ON	Power supply ON	Power is supplied to the option, and the option hardware self-diagnostics check is complete.
		OFF	Power supply OFF	<ul style="list-style-type: none"> The drive has no power supply. Option and drive are not connected properly and/or no power is supplied to the option. An internal, self-diagnostic error occurred in the option.
ERR (Option Error)	Red	ON	Option error	Self-diagnostic error occurred in the option.
		Flashing	Drive connection error	Connection error between option and drive. This includes node address setting errors to parameter F6-30 on the drive side.
		OFF	Normal operation	Drive and option are properly connected.
COMM (Communication Status)	Green	ON	Communication connected	Normal send/receive between the option and the PROFIBUS-DP master.
		OFF	No data exchange	There is a problem establishing communication between the option 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 operation	LED shuts off when the PROFIBUS-DP master is finished setting communication-related parameters.

4 Option Components

Table 5 LED Operation After Power-up Diagnostic

LED				Communication Status	Possible Cause	Solution
RUN	ERR	COMM	BF			
●	●	●	●	No power	Drive has no power.	Check all wiring to the drive, then turn on the power.
					Option is not properly connected to the drive or is not receiving enough power.	Shut off the drive and make sure the option is connected properly. Turn the power back on.
○	●	●	●	<ul style="list-style-type: none"> • Checking connection with the drive • Waiting for data from the master 	<ul style="list-style-type: none"> • Option is reading the node address or parameter configuration. • Waiting for initial input data from master device. 	–
●	○	●	●	Option self-diagnostics error	The option is damaged.	Cycle power to the drive. If the LED status does not change, replace the option.
●	◐	●	●	Problem connecting to the drive	<ul style="list-style-type: none"> • Problem initializing the drive and the option. • Incorrect node address. 	<ul style="list-style-type: none"> • Cycle power to the drive. If the LED status does not change, replace the option. • Check the node address setting in the drive (F6-30)
○	●	●	○	Waiting for data from the master device	Waiting for data from the master device. (Set_Parm_Message or Chk_Cfg_Message)	<ul style="list-style-type: none"> • Check master network settings. • Make sure the master device is operating normally. • Check terminal resistance settings on the data line. • Check for problems with the data line and connector. • Check if the data line is connected properly to communication connector CN5.
○	●	●	◐	Incorrect data or option time out waiting for data	The communication settings in the master are set incorrectly.	Check the communication settings in the master.
○	●	○	●	Sending or receiving data	–	–

○: On / ◐ : Flashing / ●: Off

5 Installation Procedure

◆ Section Safety

DANGER

Electric Shock Hazard

Do not inspect, connect, or disconnect any wiring while the drive is energized.

Failure to comply will cause death or serious injury.

Before servicing, disconnect all power to the equipment and wait for at least the time specified on the warning label. The internal capacitor remains charged even after the drive is de-energized. The charge indicator LED will extinguish when the DC bus voltage is below 50 Vdc. When all indicators are OFF, measure for unsafe voltages to confirm the drive is safe.

WARNING

Electrical Shock Hazard

Do not operate equipment with covers removed.

Failure to comply could cause death or serious injury.

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

Do not allow unqualified personnel to perform work on the drive or option.

Failure to comply could cause death or serious injury.

Only authorized personnel familiar with installation, adjustment, and maintenance of AC drives and options may perform work.

Do not remove covers or touch circuit boards while the drive is energized.

Failure to comply could cause death or serious injury.

Do not use damaged wires, stress the wiring, or damage the wire insulation.

Failure to comply could cause death or serious injury.

Fire Hazard

Tighten all terminal screws to the specified tightening torque.

Loose or overtightened connections could cause erroneous operation and damage to the terminal block or start a fire and cause death or serious injury.

NOTICE

Damage to Equipment

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

Failure to comply could cause ESD damage to circuitry.

Never connect or disconnect the motor from the drive while the drive is outputting voltage.

Improper equipment sequencing could damage the drive.

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

Failure to comply could further damage the equipment.

Do not use unshielded wire for control wiring.

Failure to comply may cause electrical interference resulting in poor system performance. Use shielded, twisted-pair wires and ground the shield to the ground terminal of the drive.

NOTICE

Properly connect all pins and connectors on the option and drive.

Failure to comply could prevent proper operation and damage equipment.

Confirm that all connections are correct after installing the option and connecting peripheral devices.

Failure to comply could damage the option.

◆ **Procedures for Installing and Wiring Options on a Drive**

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

Refer to **Table 6** to check the procedures to install and wire the option on a drive.

Table 6 Procedures for Installing and Wiring Options on a Drive

Product Series	Procedures for Installing and Wiring Options on a Drive	Page
A1000	Procedure A	14
U1000	Procedure A	14
Z1000U	Procedure A	14
GA500	<I>	–
GA700	Procedure B	18
GA800	Procedure B	18

<I> Use the option card installation case manual to install the option on GA500 drives.

■ **Procedure A**

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

Prepare the Drive for the Option

1. Correctly wire the drive as specified by the manual packaged with the drive.
2. Make sure that the drive functions correctly.

Refer to **Figure 4** for an exploded view of the drive with the option and related components for reference in the installation procedure.

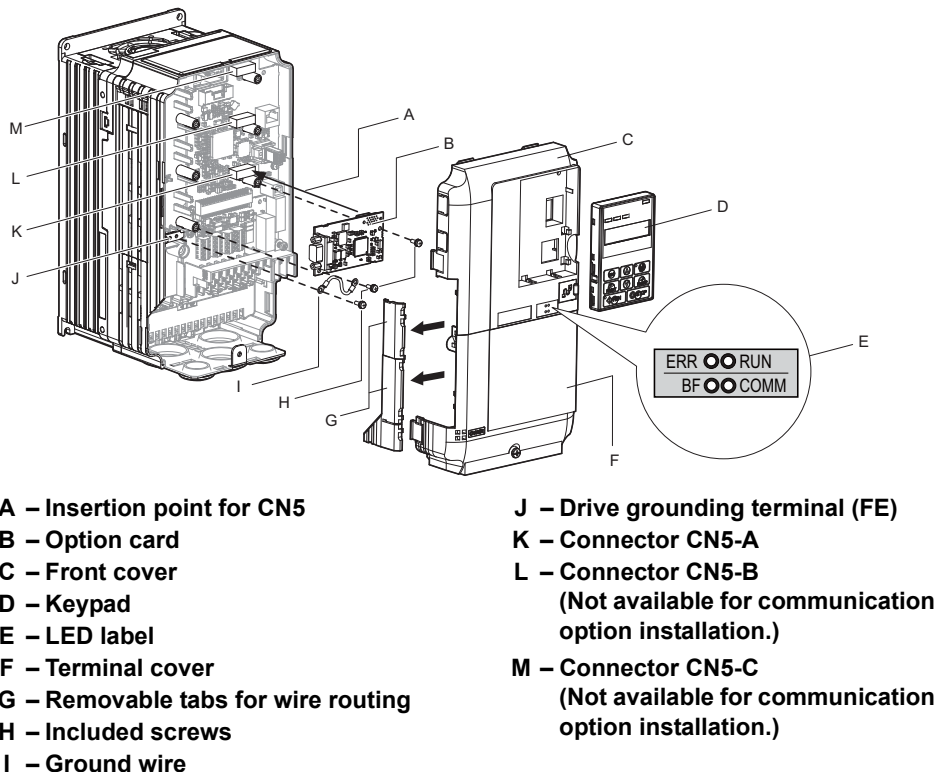


Figure 4 Drive Components with Option

Install the Option

Remove the front covers of the drive before installing the option. Refer to the drive instruction manual for directions on removing the front cover. Cover removal varies depending on drive size. This option can be inserted only into the **CN5-A** connector located on the drive control board.

DANGER! Electrical Shock Hazard. Do not inspect, connect, or disconnect any wiring while the drive is energized. Failure to comply will cause death or serious injury. Before servicing, disconnect all power to the equipment and wait for at least the time specified on the warning label. The internal capacitor remains charged even after the drive is de-energized. The charge indicator LED will extinguish when the DC bus voltage is below 50 Vdc. When all indicators are OFF, measure for unsafe voltages to confirm the drive is safe.

1. Shut off power to the drive, wait the appropriate amount of time for voltage to dissipate, then remove the keypad (D) and front covers (C, F).

Refer to the manual packaged with the drive for details on keypad and cover removal.

NOTICE: Damage to Equipment. Observe proper electrostatic discharge (ESD) procedures when handling the option, drive, and circuit boards. Failure to comply could cause ESD damage to circuitry.

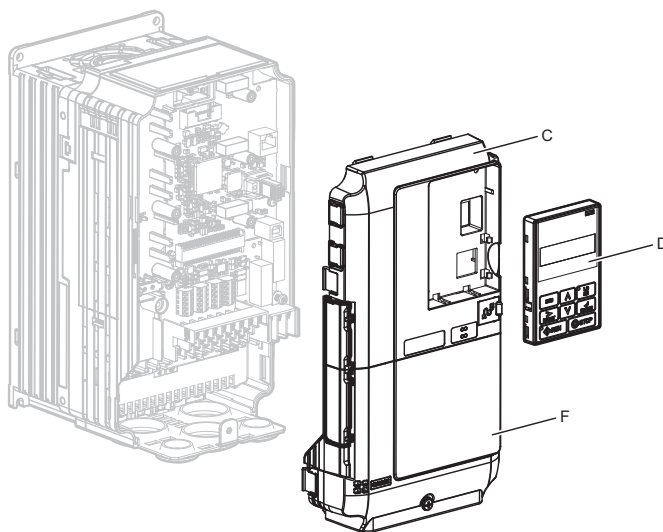


Figure 5 Remove the Keypad, Front Cover, and Terminal Cover

2. Affix the LED label (E) in the appropriate position on the drive front cover (C).

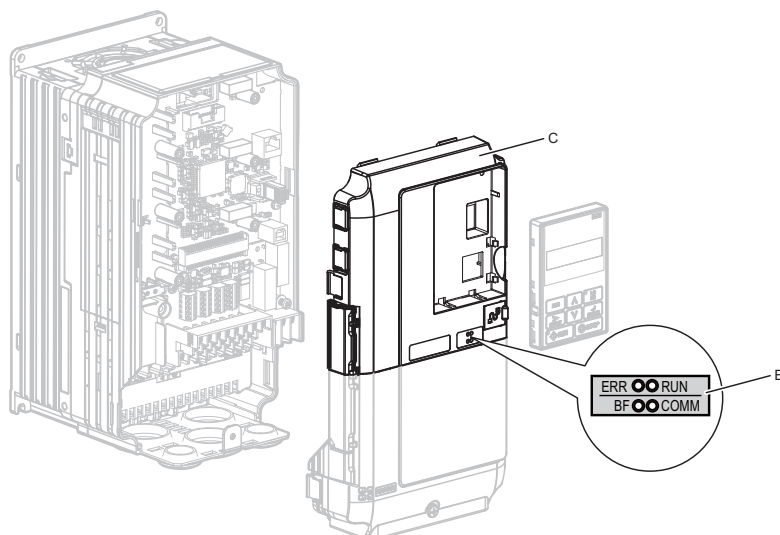


Figure 6 Affix the LED Label

5 Installation Procedure

3. Insert the option card (B) into the CN5-A (K) connector on the drive and fasten it into place using one of the included screws (H). Tighten the screw to 0.5 to 0.6 N·m (4.4 to 5.3 in·lb).

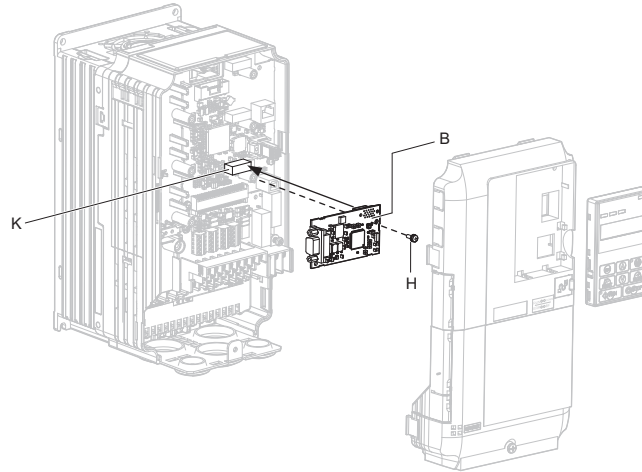


Figure 7 Insert the Option Card

4. Connect one end of the ground wire (I) to the ground terminal (J) using one of the remaining provided screws (H). Connect the other end of the ground wire (I) to the remaining ground terminal using the last remaining provided screw (H).

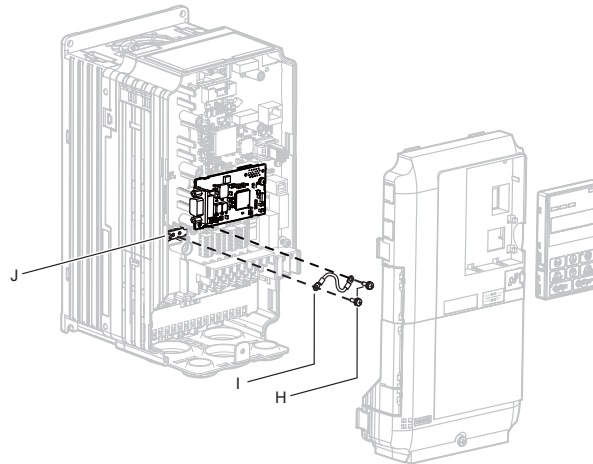
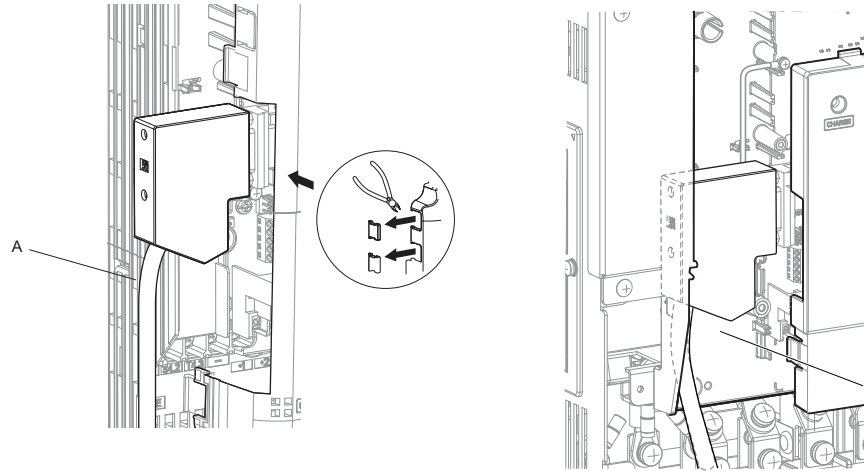


Figure 8 Connect the Ground Wire

Note: The drive has only two ground terminal screw holes (J). Two ground wires should share the same ground terminal when connecting three options.

5. Select the proper PROFIBUS-DP dedicated communication cable according to [Table 7](#) and [Table 8](#). Route the option wiring inside the enclosure as shown in [Figure 9-B](#). Take proper precautions so that the front covers will easily fit back onto the drive. Users may also choose to 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 9-A](#) to create the necessary openings on these models. Refer to the Peripheral Devices & Options section of the drive instruction manual for more information.



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.

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

Figure 9 Wire Routing Examples

6. Firmly connect the PROFIBUS-DP communication cable to option communication connector CN4. Install PROFIBUS-DP communications cables apart from main-circuit wiring and other electrical and power lines. Ensure the cable end is firmly connected (see [Figure 19](#)). Refer to [Communication Cable Specifications on page 22](#) for details.
7. Reattach the drive front covers (C, F) and the keypad (D).

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

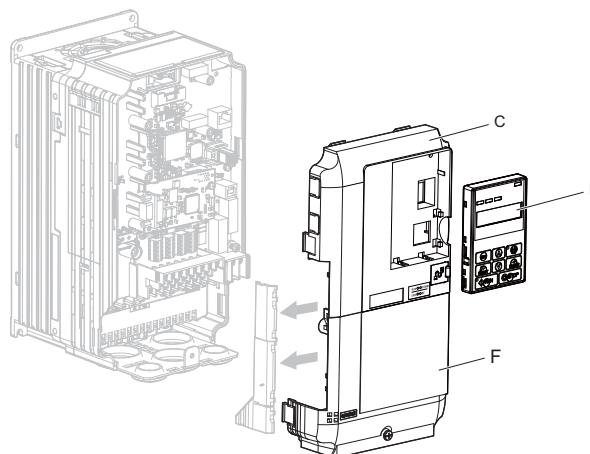


Figure 10 Replace the Front Covers and Keypad

8. Set drive parameters in [Table 9](#) for correct option performance. Be sure to set parameter F6-30 to a node address unique to 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

1. Correctly wire the drive as specified by the manual packaged with the drive.
2. Make sure that the drive functions correctly.

Refer to **Figure 11** for an exploded view of the drive with the option and related components for reference in the installation procedure.

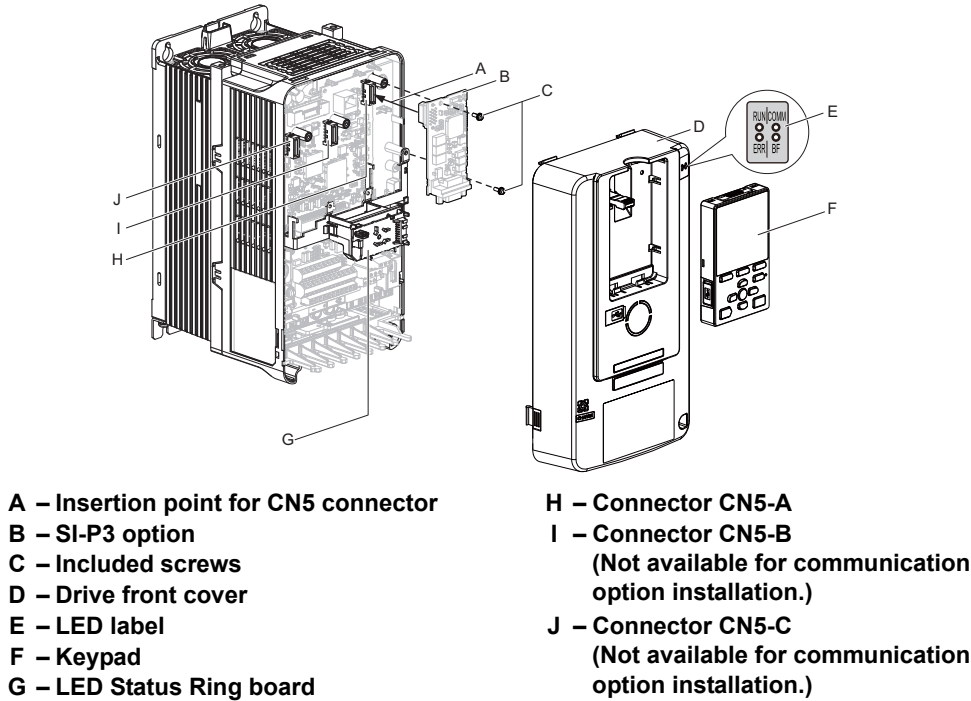


Figure 11 Drive Components with Option

Install the Option

Remove the front cover of the drive before you install the option.

Refer to the drive manual for information about how to remove the front cover. Different drive sizes have different cover removal procedures.

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

DANGER! Electrical Shock Hazard. Do not inspect, connect, or disconnect any wiring while the drive is energized. Failure to comply will cause death or serious injury. Before servicing, disconnect all power to the equipment and wait for at least the time specified on the warning label. The internal capacitor remains charged even after the drive is de-energized. The charge indicator LED will extinguish when the DC bus voltage is below 50 Vdc. When all indicators are OFF, measure for unsafe voltages to confirm the drive is safe.

1. Affix the LED label (E) in the appropriate position on the drive front cover (D).

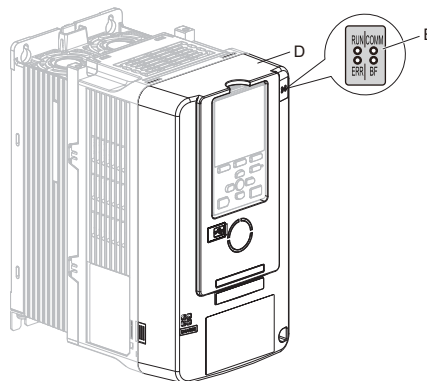


Figure 12 Affix the LED Label

2. Shut off power to the drive, wait the appropriate amount of time for voltage to dissipate, then remove the front cover (D).
Refer to the manual packaged with the drive for details on cover removal.

NOTICE: *Damage to Equipment. Observe proper electrostatic discharge (ESD) procedures when handling the option, drive, and circuit boards. Failure to comply could cause ESD damage to circuitry.*

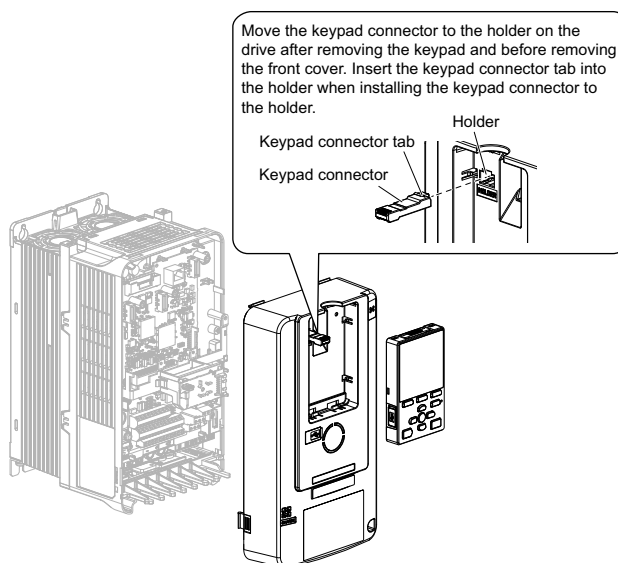


Figure 13 Remove the Front Cover and Keypad

3. Carefully remove the LED Status Ring board (G) and place it on the right side of the drive using the temporary placement holes.
Refer to the manual packaged with the drive for details on removing the LED Status Ring board.

NOTICE: *Do not remove the LED Status Ring board cable connector. Failure to comply could cause erroneous operation and damage the drive.*

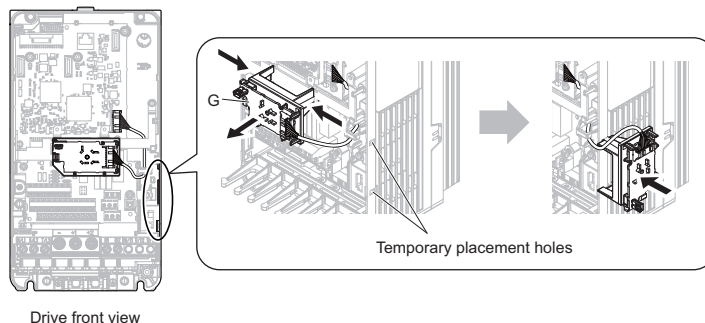


Figure 14 Remove the LED Status Ring Board

5 Installation Procedure

4. Insert the option card (B) into the CN5-A connector (H) on the drive and fasten it into place using the included screws (C). Tighten both screws to 0.5 to 0.6 N·m (4.4 to 5.3 in·lb).

Note: Only two screws are necessary to install the option on a GA700 or GA800 drive. A ground wire is not necessary. The option package ships with three screws and a ground wire for installation on other product series. Do not use the ground wire or the extra screw.

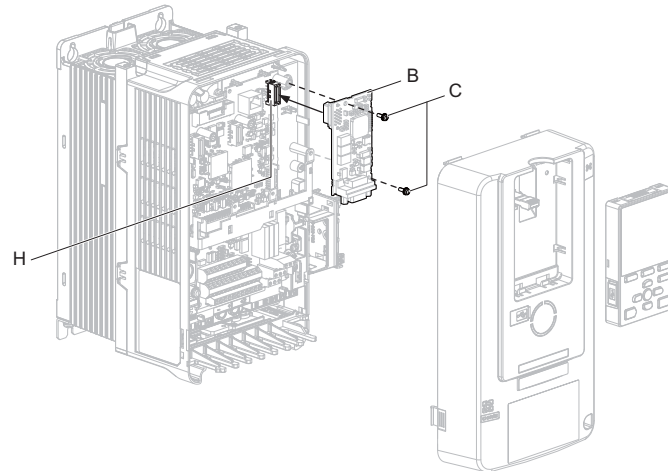


Figure 15 Insert the Option Card

5. Confirm proper option wiring.
Depending on the drive model, some drives may require routing the wiring to the outside as shown in [Figure 16](#). Route the wiring inside the enclosure through the lower wiring cover to the outside as shown in [Figure 17](#) for the drives that do not require routing the wiring to the outside.

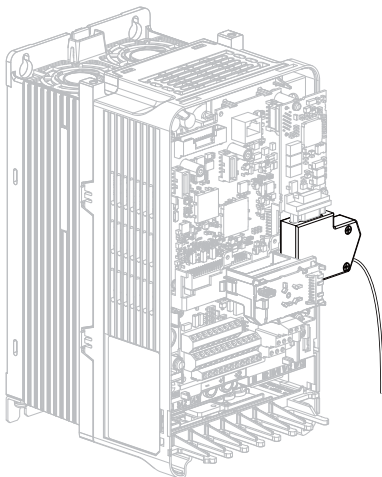


Figure 16 Wire Routing Examples

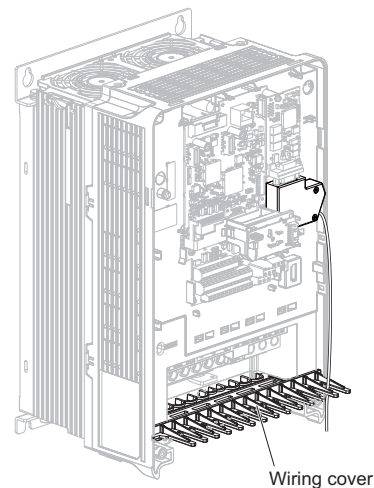


Figure 17 Wire Routing Examples

6. Select the proper PROFIBUS-DP dedicated communication cable according to [Table 7](#) and [Table 8](#). Firmly connect the PROFIBUS-DP communication cable to option communication connector CN4. Install PROFIBUS-DP communications cables apart from main-circuit wiring and other electrical and power lines. Ensure the cable end is firmly connected (see [Figure 19](#)). Refer to [Communication Cable Specifications on page 22](#) for details.

Note: Maximum transmission distance is 100 m (328 ft). Minimum wiring distance between stations is 0.2 m (7.9 in).

7. After you connect the prepared cable for the 9-pin D-sub communication connector CN5, make sure that the option wire routing from Step 6. is correct.

8. Reattach the LED Status Ring board (G).
Use the open space provided inside the LED Status Ring board to route option wiring.

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.

9. Reattach the drive front cover (D) and the keypad (F).

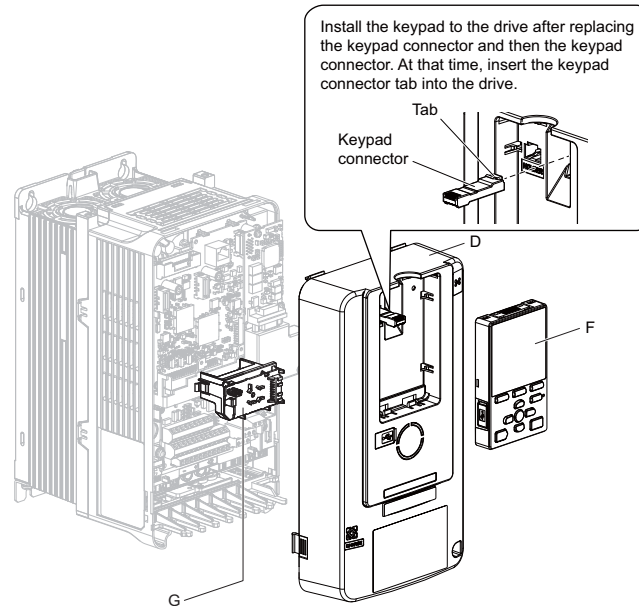
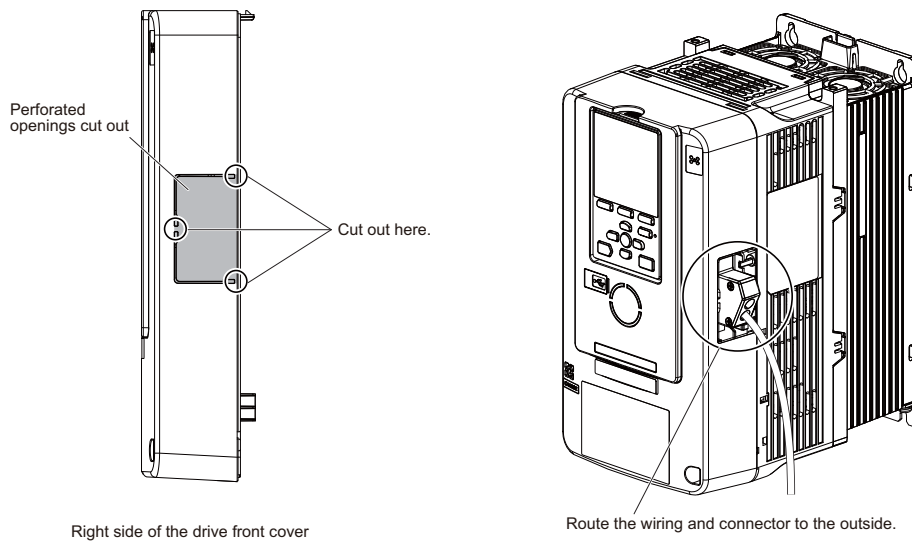


Figure 18 Replace the Front Cover and Keypad

Note: Depending on the drive model, some drives may require replacing the front cover of the drive after routing the wiring to the outside. In these cases, use diagonal cutters to cut out the perforated openings in the right side of the drive front cover and leave no sharp edges to damage wiring. The drive will not meet IP20 conformity if wiring is exposed outside the enclosure.



10. Set drive parameters in [Table 9](#) for correct option performance. Be sure to set parameter F6-30 to a node address unique to the network.

5 Installation Procedure

◆ Communication Cable Specifications

To ensure proper performance, Yaskawa recommends using PROFIBUS-DP-dedicated cables. 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 listed in [Table 7](#) and [Table 8](#).

Table 7 Communication Cable Requirements

Condition	Specifications
Impedance	135 to 165 Ω at a frequency of (3 to 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 8 Communication Cable Length

Communication Speed (kbps)	Distance per Segment
9.6	1200 m (3937 ft)
19.2	1200 m (3937 ft)
45.45	1200 m (3937 ft)
93.75	1200 m (3937 ft)
187.5	1000 m (3280 ft)
500	400 m (1312 ft)
1500	200 m (656 ft)
3000	100 m (328 ft)
6000	100 m (328 ft)
12000	100 m (328 ft)

◆ Option Connection Diagram

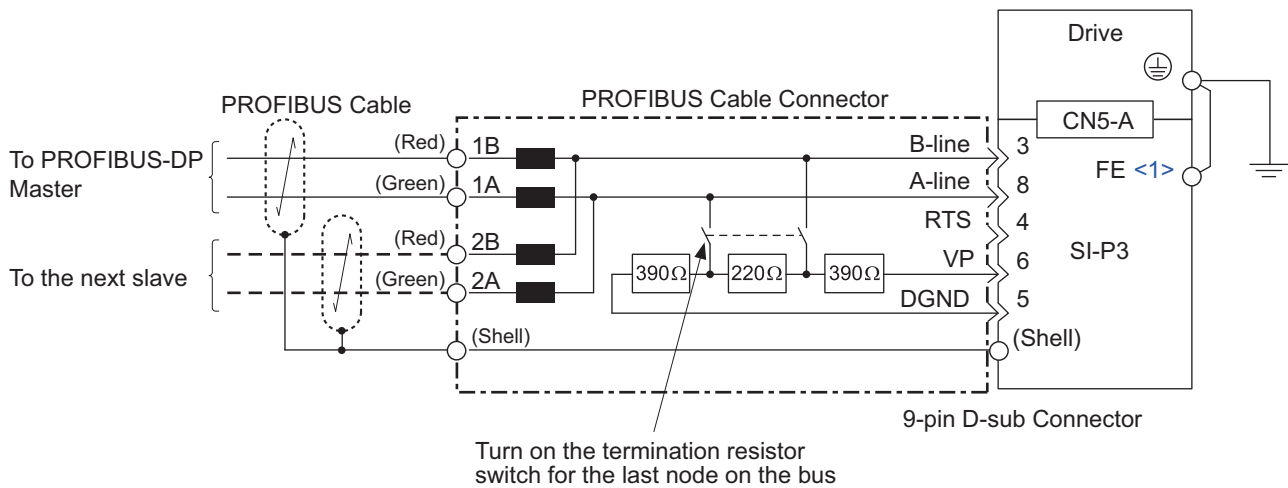


Figure 19 Option Connection Diagram

<1> Connect the provided ground wire for installations on 1000-series drives and GA500 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. The termination resistance must be set on the final drive in the network using a switch on the 9-pin D-sub connector. Make sure that only the connector for the final drive in the network has a termination resistor; communication problems may arise if any other network drive has a termination resistor.

Use only the input side cable entry as shown in [Figure 20](#) when connecting both ends of the network. Most 9-pin D-sub connectors have a function for disconnecting the output side of the cable. Communication will not be possible between devices if the connector is reversed. Most connectors have arrows indicating the input and output sides.

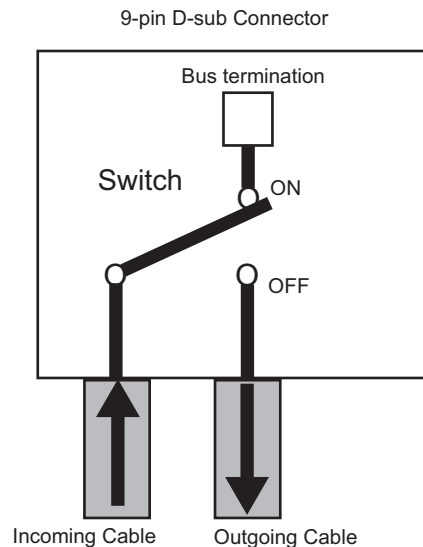
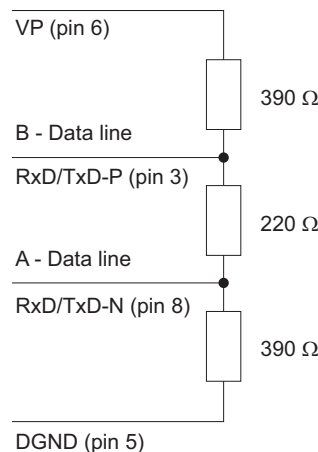


Figure 20 PROFIBUS Cable Connection with Termination Resistors

Bus termination ON = incoming and outgoing cables not connected.

Bus termination OFF = incoming and outgoing cables connected.

Termination resistors without inductors as shown in [Figure 21](#) can only be used for baud rates below 1.5 Mbps. Baud rates 1.5 Mbps and higher require termination with resistors and inductors as shown in [Figure 19](#).



**Figure 21 Cable Termination of the Option Cable to EN50170
(Pin Numbers for a 9-pin D-sub Connector)**

◆ GSD Files

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

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

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

Japan: <http://e-mechatronics.com>

Other areas: Check the back cover of these manuals.

For questions, contact Yaskawa or a Yaskawa representative.

6 Related Parameters

The parameters in **Table 9** set the drive for operation with the option. Confirm proper setting of all parameters in **Table 9** before starting network communications. Refer to the manual packaged with the drive for details on setting parameters.

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

Table 9 Related Parameters

No. (Hex.)	Name	Description	Values
b1-01 (0180) </>	Reference 1 Source	Selects the input method for frequency reference. 0: Keypad 1: Analog Input 2: Memobus/Modbus Communications 3: Option PCB 4: Pulse Train Input	Default: 1 Range: 0 to 4 (Set to 3 for SI-P3)
b1-02 (0181) </>	Run Command 1 Source	Selects the input method for the Run command. 0: Keypad 1: Digital Input 2: Memobus/Modbus Communications 3: Option PCB	Default: 1 Range: 0 to 3 (Set to 3 for SI-P3)
F6-01 (03A2)	Communication Error Selection	Selects drive response when a bUS error is detected 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 to Stop <>	Default: 1 Range: 0 to 5 <>
F6-02 (03A3)	Comm External Fault (EF0) Detect	Selects the condition for external fault detection (EF0). 0: Always detected 1: Detection during run only	Default: 0 Range: 0, 1
F6-03 (03A4)	Comm External Fault (EF0) Select	Selects drive response for external fault input (EF0) detection during option communications. 0: Ramp to Stop 1: Coast to Stop 2: Fast Stop (Use C1-09) 3: Alarm Only <>	Default: 1 Range: 0 to 3
F6-06 (03A7) <>	Torque Reference/Limit by Comm	Selects whether to enable or disable the torque reference and torque limit received from the communication option card. 0: Disabled 1: Enabled <6>	Default: 0 Range: 0, 1
F6-07 (03A8)	MultiStep Ref Priority Select	0: MultiStep References Disabled 1: MultiStep References Enabled	Default: 0 <7> Range: 0, 1
F6-08 (036A)	Comm Parameter Reset @Initialize	Selects whether communication-related parameters F6-□□ and F7-□□ are set back to original default values when the drive is initialized using parameter A1-03. 0: No Reset - Parameters retained 1: Reset - Back to factory default Note: The setting value is not changed even when F6-08 is set to 1 and the drive is initialized using A1-03.	Default: 0 Range: 0, 1
F6-14 (03BB) <8> <9>	Communication Error Auto Reset	Enables or disables the Communication Error Auto Reset. 0: Disabled 1: Enabled	Default: 0 Range: 0, 1
F6-30 (03CB) <10> <11>	PROFIBUS-DP Node Address	Sets the node address.	Default: 0 Min: 0 Max: 125
F6-31 (03CC)	PROFIBUS-DP Clear Mode Selection	Selects the action to take after a “Clear Mode” command is received. 0: Resets to 0 1: Maintains the previous value	Default: 0 Range: 0, 1

No. (Hex.)	Name	Description	Values
F6-32 (03CD) <11>	PROFIBUS-DP Data Format Selection	0: PPO Type 1: Conventional 2: PPO (bit0) <8> <12> <13> 3: PPO Type (Enter) <8> <13> <14> 4: Conv (Enter) <8> <13> <14> 5: PPO (bit0, Enter) <8> <12> <13> <14>	Default: 0 Range: 0 to 5
F7-16 (03F4) <8> <9>	Timeout Value	Sets the detection time for a communications timeout. Note: Set this parameter to 0.0 to disable the connection timeout function.	Default: 0.0 s Min: 0.0 s Max: 30.0 s
F7-60 (0780) <8> <9>	PZD1 Write	Sets MEMOBUS/Modbus address for PZD1 Write (PPO Write). The value of 0 to 2 enables the PZD1 Write as STW.	Default: 0H Min: 0H Max: FFFFH
F7-61 (0781) <8> <9>	PZD2 Write	Sets MEMOBUS/Modbus address for PZD2 Write (PPO Write). The value of 0 to 2 enables the PZD2 Write as HSW.	Default: 0H Min: 0H Max: FFFFH
F7-62 (0780) <8> <9>	PZD3 Write	Sets MEMOBUS/Modbus address for PZD3 Write (PPO Write). The value of 0 to 2 disables the PZD3 Write.	Default: 0H Min: 0H Max: FFFFH
F7-63 (0783) <8> <9>	PZD4 Write	Sets MEMOBUS/Modbus address for PZD4 Write (PPO Write). The value of 0 to 2 disables the PZD4 Write.	Default: 0H Min: 0H Max: FFFFH
F7-64 (0784) <8> <9>	PZD5 Write	Sets MEMOBUS/Modbus address for PZD5 Write (PPO Write). The value of 0 to 2 disables the PZD5 Write.	Default: 0H Min: 0H Max: FFFFH
F7-65 (0785) <8> <9>	PZD6 Write	Sets MEMOBUS/Modbus address for PZD6 Write (PPO Write). The value of 0 to 2 disables the PZD6 Write.	Default: 0H Min: 0H Max: FFFFH
F7-66 (0786) <8> <9>	PZD7 Write	Sets MEMOBUS/Modbus address for PZD7 Write (PPO Write). The value of 0 to 2 disables the PZD7 Write.	Default: 0H Min: 0H Max: FFFFH
F7-67 (0787) <8> <9>	PZD8 Write	Sets MEMOBUS/Modbus address for PZD8 Write (PPO Write). The value of 0 to 2 disables the PZD8 Write.	Default: 0H Min: 0H Max: FFFFH
F7-68 (0788) <8> <9>	PZD9 Write	Sets MEMOBUS/Modbus address for PZD9 Write (PPO Write). The value of 0 to 2 disables the PZD9 Write.	Default: 0H Min: 0H Max: FFFFH
F7-69 (0789) <8> <9>	PZD10 Write	Sets MEMOBUS/Modbus address for PZD10 Write (PPO Write). The value of 0 to 2 disables the PZD10 Write.	Default: 0H Min: 0H Max: FFFFH
F7-70 (078A) <8> <9>	PZD1 Read	Sets MEMOBUS/Modbus address for PZD1 Read (PPO Read). The value of 0 to 2 enables the PZD1 Read as ZSW.	Default: 0H Min: 0H Max: FFFFH
F7-71 (078B) <8> <9>	PZD2 Read	Sets MEMOBUS/Modbus address for PZD2 Read (PPO Read). The value of 0 to 2 enables the PZD2 Read as HIW.	Default: 0H Min: 0H Max: FFFFH
F7-72 (078C) <8> <9>	PZD3 Read	Sets MEMOBUS/Modbus address for PZD3 Read (PPO Read). The value of 0 to 2 disables the PZD3 Read.	Default: 0H Min: 0H Max: FFFFH
F7-73 (078D) <8> <9>	PZD4 Read	Sets MEMOBUS/Modbus address for PZD4 Read (PPO Read). The value of 0 to 2 disables the PZD4 Read.	Default: 0H Min: 0H Max: FFFFH
F7-74 (078E) <8> <9>	PZD5 Read	Sets MEMOBUS/Modbus address for PZD5 Read (PPO Read). The value of 0 to 2 disables the PZD5 Read.	Default: 0H Min: 0H Max: FFFFH
F7-75 (078F) <8> <9>	PZD6 Read	Sets MEMOBUS/Modbus address for PZD6 Read (PPO Read). The value of 0 to 2 disables the PZD6 Read.	Default: 0H Min: 0H Max: FFFFH
F7-76 (0790) <8> <9>	PZD7 Read	Sets MEMOBUS/Modbus address for PZD7 Read (PPO Read). The value of 0 to 2 disables the PZD7 Read.	Default: 0H Min: 0H Max: FFFFH

6 Related Parameters

No. (Hex.)	Name	Description	Values
F7-77 (0791) <8> <9>	PZD8 Read	Sets MEMOBUS/Modbus address for PZD8 Read (PPO Read). The value of 0 to 2 disables the PZD8 Read.	Default: 0H Min: 0H Max: FFFFH
F7-78 (0792) <8> <9>	PZD9 Read	Sets MEMOBUS/Modbus address for PZD9 Read (PPO Read). The value of 0 to 2 disables the PZD9 Read.	Default: 0H Min: 0H Max: FFFFH
F7-79 (0793) <8> <9>	PZD10 Read	Sets MEMOBUS/Modbus address for PZD10 Read (PPO Read). The value of 0 to 2 disables the PZD10 Read.	Default: 0H Min: 0H Max: FFFFH

- <1> Set b1-02 = 3 to start and stop the drive with the PROFIBUS-DP master device using serial communications.
Set b1-01 = 3 to control the frequency reference of the drive via the master device.
- <2> Setting this parameter to 3 or 4 will cause the drive to continue operation after detecting a fault. Take proper measures such as installing an emergency stop switch when using settings 3 or 4.
- <3> Refer to the drive manual to know if settings 4 and 5 are available. Settings 4 and 5 are available in A1000 software versions PRG: 1021 and later.
- <4> The setting range for 1000-Series drives is different for different software versions. Refer to the instruction manual of a specific drive for more information.
- <5> Control method availability of this parameter depends on product series.
 - 1000-Series Drives: Parameter is available in CLV, AOLV/PM, and CLV/PM.
In AOLV/PM, this value is read as the Torque Limit.
 - GA500 Drive: Parameter is available in OLV, AOLV/PM, and EZOLV.
This value is read as the Torque Limit.
 - GA700, GA800 Drives: Parameter is available in OLV, CLV, AOLV, AOLV/PM, CLV/PM, and EZOLV.
In OLV and EZOLV, this value is read as the Torque Limit.
- <6> The setting specifies that network communications provide the torque reference or torque limit. The motor may not rotate if the PLC does not supply a torque reference or torque limit.
- <7> Default setting is 1 for GA500.
- <8> Available in A1000 software versions PRG: 1021 and later.
- <9> Available in option software versions PRG: 2103 and 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.
- <10> All node addresses must be unique. Node addresses 0, 1, and 2 are typically reserved for control, maintenance, and diagnostic equipment. The “Err” LED will illuminate when a value of 0 or a value greater than 125 is entered.
- <11> Cycle power for setting changes to take effect.
- <12> Requires also setting bit 0 and 4 to issue Run command. *Refer to STW/ZSW on page 36* for more information.
- <13> Available in option software versions PRG: 2104 and 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.
- <14> When writing this parameter to the drive through the PROFIBUS-DP network, the parameter is validated by automatically executing the Enter command.

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).

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 Message

MEMOBUS/Modbus message data is transferred between the drive and controller or PLC using MEMOBUS/Modbus messages. All drive parameters and data can be accessed 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.

Refer to Handshaking Register on page 32 for more information.

◆ 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	Bytes 0 to 5	Bytes 0 to 15	Bytes 0 to 3
MEMOBUS/Modbus Data	–	Bytes 16 to 31	Bytes 4 to 11

Table 10 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 Status High Byte
1	Operation Command Low Byte	1	Drive Status 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 (0.1 A units)
5	Torque Reference/Torque Limit Low Byte <1>	5	Output Current High Byte (0.1 A units)

<1> Available when F6-06 is set to 1 (Enabled).

Control method availability of this parameter depends on product series.

- 1000-Series Drives: Parameter is available in CLV, AOLV/PM, and CLV/PM.

In AOLV/PM, this value is read as the Torque Limit.

- GA500 Drives: Parameter is available in OLV, AOLV/PM, and EZOLV.

This value is read as the Torque Limit.

- GA700, GA800 Drives: Parameter is available in OLV, CLV, AOLV, AOLV/PM, CLV/PM, and EZOLV.

In OLV and EZOLV, this value is read as the Torque Limit.

<2> Unit depends on the setting of o1-03 (Frequency Display Unit Selection). When the drive is operating in V/f Control or OLV/PM, the drive output frequency becomes the input data.

Table 11 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 Status High Byte
1	Operation Command Low Byte	1	Drive Status 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 (0.1 A units)
13	Analog Output Channel 2 Low Byte <3>	13	Output Current Low Byte (0.1 A units)
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> Available when F6-06 is set to 1 (Enabled).

Control method availability of this parameter depends on product series.

- 1000-Series Drives: Parameter is available in CLV, AOLV/PM, and CLV/PM.

In AOLV/PM, this value is read as the Torque Limit.

- GA500 Drives: Parameter is available in OLV, AOLV/PM, and EZOLV.

This value is read as the Torque Limit.

- GA700, GA800 Drives: Parameter is available in OLV, CLV, AOLV, AOLV/PM, CLV/PM, and EZOLV.

In OLV and EZOLV, this value is read as the Torque Limit.

<2> Enabled in CLV, AOLV, AOLV/PM, and CLV/PM control modes (A1-02 = 3, 4, 6, or 7).

<3> To select drive analog output channel for communications, set parameters as follows:

Analog Output Channel 1: H4-01 (Multi-Function Analog Output Terminal FM) = 000 (through-mode)

Analog Output Channel 2: H4-04 (Multi-Function Analog Output Terminal AM) = 000 (through-mode)

For GA500:

Analog Output Channel 1: H4-01 (Multi-Function Analog Output Terminal AM) = 000 (through-mode)

<4> Drive digital output ON/OFF during communications, Set H2-01 to H2-04 (Multi-Function Digital Output Function Selection) to F (through-mode). Refer to the instruction manual of a specific drive for more information.

<5> Unit depends on the setting of o1-03 (Frequency Display Unit Selection). Input data is 0 when the drive is set for V/f Control or OLV/PM.

<6> Not possible when using V/f control, V/f with PG, or OLV/PM (A1-02 = 0, 1, or 5).

Table 12 Operation Command

Command Signal	Description	Command Signal	Description
0	Forward Run/Stop 1: FRUN	8	External Fault, 1: Fault (EF0)
1	Reverse Run/Stop 1: RRUN	9	Fault Reset, 1: Fault Reset
2	Multi-function digital input command 3	A	Reserved
3	Multi-function digital input command 4	B	
4	Multi-function digital input command 5	C	
5	Multi-function digital input command 6	D	
6	Multi-function digital input command 7	E	Fault Trace and Fault History Reset 1: Fault information is reset by the rising edge of this bit.
7	Multi-function digital input command 8	F	Baseblock command 1: Ext Baseblock

Table 13 Drive Status: U1-12

Drive Status	Description	Drive Status	Description
0	1: During run	8	1: During operation error (oPE□□)
1	1: During zero speed	9	1: During momentary power loss
2	1: During reverse run	A	1: NetCtrl status
3	1: During fault reset signal input	B	1: M1-M2 relay closed
4	1: During speed agree	C	1: Photocoupler output 1 closed
5	1: Drive ready	D	1: Photocoupler output 2 closed
6	1: Alarm	E	1: Motor 2 selected
7	1: Fault	F	1: Zero Servo Complete

Table 14 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 Status High Byte
1	Operation Command Low Byte	1	Drive Status Low Byte
2	Frequency Reference High Byte	2	Motor Speed High Byte </>
3	Frequency Reference Low Byte	3	Motor Speed Low Byte </>
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

</> Unit depends on the setting of o1-03 (Frequency Display Unit Selection). 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 32* for details.

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 of the drive Technical Manual for details on the Enter command and for a list of monitor data using the MEMOBUS/Modbus message area.

■ Configuration of MEMOBUS/Modbus Command Message

Table 15 shows the configuration of MEMOBUS/Modbus command messages when the Extended Data 1 is selected.

Table 15 MEMOBUS/Modbus Command Message

Byte	Name	Function	
16	Function code	MEMOBUS/Modbus command code: 03H: Read command (reading Drive internal data) 08H: Loop back 10H: Write command (writing data into the drive) Other codes: Not supported.	
17	Starting Resistor No.	Starting resistor No.	High Byte
18			Low Byte
19	Number of Data Items	Sets the number of bytes to read or write (only 2, 4, 6, or 8 allowed)	
20	Data 1 <I>	Data word 1	High Byte
21			Low Byte
22	Data 2 <I>	Data word 2	High Byte
23			Low Byte
24	Data 3 <I>	Data word 3	High Byte
25			Low Byte
26	Data 4 <I>	Data word 4	High Byte
27			Low Byte
28 to 30	Reserved	Reserved	
31	Handshaking Register	<i>Refer to Handshaking Register on page 32</i> for details.	

<I> Setting is needed only for the write command. Select 00H for the read command.

■ Configuration of MEMOBUS/Modbus Response Messages

Table 16 shows the configuration of MEMOBUS/Modbus response messages when the Extended Data 1 is selected.

Table 16 MEMOBUS/Modbus Response Messages

Byte	Name	Function	
16	Function code	MEMOBUS/Modbus response codes 00H: Waiting for response from drive 03H: Response to read operation 10H: Response to write operation 83H: Read command error 90H: Write command error Other codes: Not supported.	
17	Starting resistor No.	Starting resistor No.	High Byte
18			Low Byte
19	Number of data items	Write: Set double number of written data items Read: Set double number of read data items	
20	Data 1 <I>	Data word 1	High Byte
21			Low Byte
22	Data 2 <I>	Data word 2	High Byte
23			Low Byte

Byte	Name	Function	
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 to 30	Reserved		
31	Handshaking register	<i>Refer to Handshaking Register on page 32</i> for details.	

<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 02H and an error code is written into the Low Byte of Data. Refer to the MEMOBUS/Modbus Communications chapter in the drive Technical Manual for the details on 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 30Hz.

30 Hz/0.01 Hz = 3000 → BB8H

Example 2: -5% is assigned as the bias for terminal FM of multi-function analog output 1.

5/0.1 = 50 → 32H

Converted into a two complement → FFCEH

Example 3: 60.00 Hz is assigned for d1-01 (register No.: 0280H).

60.00 Hz/0.01 Hz = 6000 → 1770H

Table 17 Parameter Settings Using MEMOBUS/Modbus Commands

Byte	Name		Data		
			Command Message	Response Message	Response Message (at Fault) <2>
16	Function code		10H	10H	90H
17	Starting Register No.	High Byte	02H	02H	00H
18		Low Byte	80H	80H	00H
19	Number of Data Items		02H	02H	02H
20	Data 1	High Byte	17H	00H	00H
21		Low Byte	70H	00H	02H
22	Data 2	High Byte	00H	00H	00H
23		Low Byte	00H	00H	00H
24	Data 3	High Byte	00H	00H	00H
25		Low Byte	00H	00H	00H
26	Data 4	High Byte	00H	00H	00H
27		Low Byte	00H	00H	00H
28 to 30	Reserved		00H	00H	00H
31	Handshaking Register <1>		80H	80H	80H

<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. Ensure that the data in the MEMOBUS/Modbus registers is valid before toggling 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

Bit 7	6	5	4	3	2	1	0
HS	–	–	–	–	–	–	INIT

Bit	Name	Function
7	HS	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.
1 to 6	–	Not used.
0	INIT	Clears the handshaking bit to 0.

Handshaking Input Register

Option to PROFIBUS-DP Master

Bit 7	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. This bit is reset to 0 at power up or by initializing the handshaking output register bit INIT back to 0.
5 to 6	STATUS <I>	Status of the data exchange between the PROFIBUS-DP master and the drive. 00H: Idle 01H: SI-P3 sends a MEMOBUS/Modbus command to the drives 10H: SI-P3 waits for a MEMOBUS/Modbus response from the drives 11H: SI-P3 receives a MEMOBUS/Modbus response from the drives
1 to 4	WD <I>	Counter increases every 64 ms
0	–	Not used

<I> 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. *Figure 22* describes the handshaking function. The arrows indicate whether the PROFIBUS-DP master or the option has the control for the protocol.

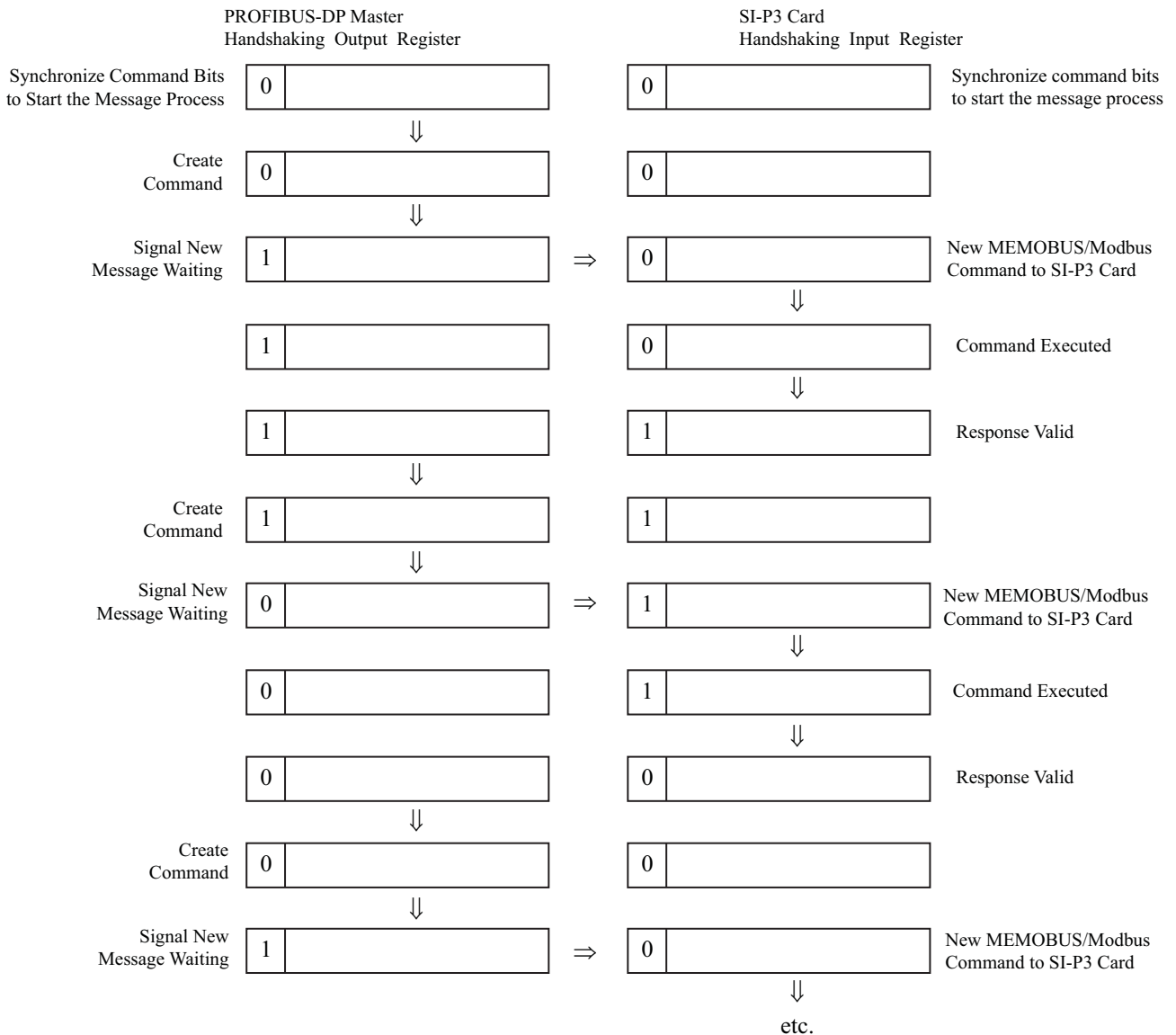


Figure 22 Example of Handshaking

■ Flowchart

Figure 23 illustrates the handshaking function when using a MEMOBUS/Modbus message.

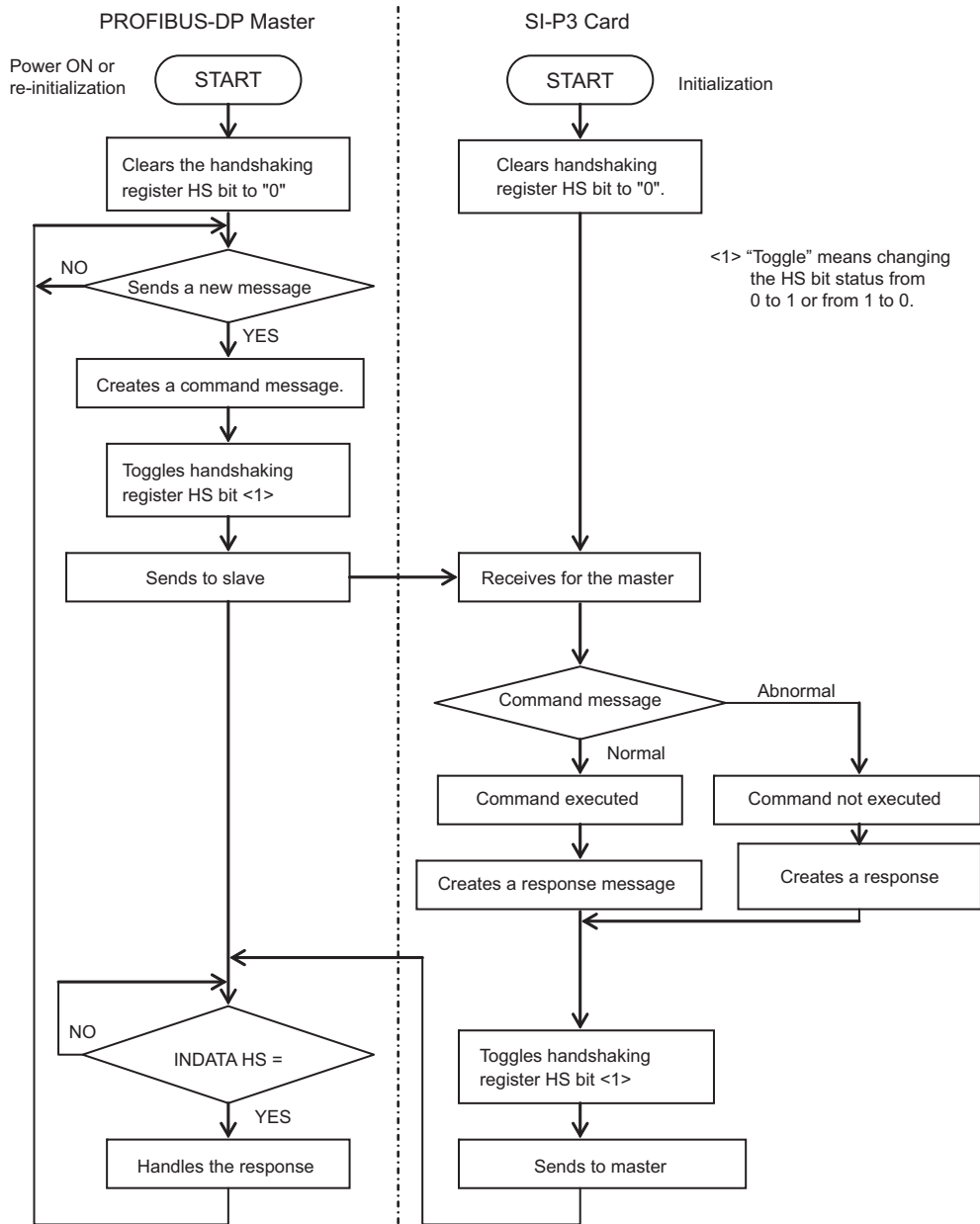


Figure 23 MEMOBUS/Modbus Message Flowchart

8 Parameter Process Data Object Formats

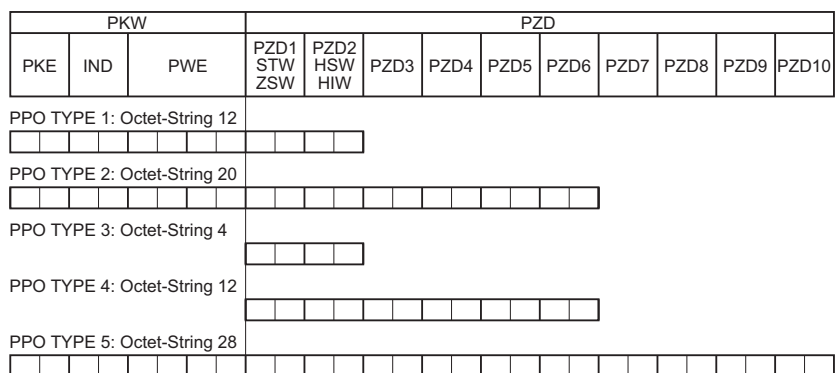
◆ Supported Parameter Process Data Object (PPO) Type Formats

Set drive parameter F6-32 to 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. Refer to the PROFIBUS specification for more information on PPO types 1~5.

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: 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	PNU number <i>(Refer to Supported PNU on page 40 for details)</i>	
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11	SPM always 0	SPM always 0
12	See Task ID	See Response ID 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)
9		
10		
11		
12		
13		
14		
15		

■ PWE

Bit	PPO Write	PPO Read
0 to 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 setting 3 is available in these software versions:

- Option software versions PRG: 2104 and later
- A1000 software versions PRG: 1021 and later

Bit	PPO Write	PPO Read
0	OFF1: reserved	Ready to switch on: always 1
1	OFF2: reserved	Ready to switch on: always 1
2	OFF3: reserved	1: Ready
3	Enable to RUN 0: Baseblock + Stop 1: Not Baseblock	1: Fault condition
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: Alarm condition
8	0: Stop 1: JOG RUN forward (Fmax/10 speed)	1: Speed agree condition
9	0: Stop 1: JOG RUN reverse (Fmax/10 speed)	0: Local control 1: Control from PROFIBUS
10	0: Local control 1: Control from PROFIBUS	Always 0
11 to 15	Reserved	

F6-32 = 2, 5

Note: Parameter F6-32 setting 2 or 5 is available in these software versions:

- Option software versions PRG: 2104 and later
- A1000 software versions PRG: 1021 and later

Bit	PPO Write	PPO Read
0	0: STOP 1: RUN </>	Ready to switch on: always 1
1	OFF2: reserved	Ready to switch on: always 1
2	OFF3: reserved	1: Ready
3	Enable to RUN 0: Baseblock + Stop 1: Not Baseblock	1: Fault condition
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: Alarm condition
8	0: Stop 1: JOG RUN forward (Fmax/10 speed)	1: Speed agree condition
9	0: Stop 1: JOG RUN reverse (Fmax/10 speed)	0: Local control 1: Control from PROFIBUS
10	0: Local control 1: Control from PROFIBUS	Always 0
11 to 15	Reserved	

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

■ HSW/HIW

Bit	PPO Write	PPO Read
0 to 15	Setting Frequency ($\pm 10000/100\%$)	Output Frequency or Motor speed (with PG) ($\pm 10000/100\%$)

■ 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	Note
GSD_Revision	3	GSD file revision 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 revision 1.0
Hardware_Release	“V1.0”	Hardware revision 1.0
Software_Release	“V1.0”	Software revision 1.0
Implementation_type	“DPC31”	DP protocol
Redundancy	0	Redundancy NOT supported
Repeater_Ctrl_Sig	2	Supported, TTL level
24V_Pins	0	No external 24 Volt input
Set_Slave_Add_supp = 1	1	Station address is set remotely
Auto_Baud_supp	1	Automatic baud rate select
9.6_supp	1	9600 Baud
19.2_supp	1	19.2 kBaud
45.45_supp	1	45.45 kBaud
93.75_supp	1	93.75 kBaud
187.5_supp	1	187.5 kBaud
500_supp	1	500 kBaud
1.5M_supp	1	1.5 MBaud
3M_supp	1	3 MBaud
6M_supp	1	6 MBaud
12M_supp	1	12 MBaud
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_Interval	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

Parameter	Setting Value	Note
Max_Output_Len	32	Maximum # of output bytes
Max_Data_Len	64	Maximum # of data bytes
Max_User_Prm_Data_Len	4	
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		O	Type 1 PPO-Write
901	Octet String 20		O	Type 2 PPO-Write
902	Octet String 4		O	Type 3 PPO-Write (DP-V1 only)
903	Octet String 12		O	Type 4 PPO-Write (DP-V1 only)
904	Unsigned 16		O	Current PPO-Write
905	Octet String 28		O	Type 5 PPO-Write
907	Octet String 12		O	Type 1 PPO-Read
908	Octet String 20		O	Type 2 PPO-Read
909	Octet String 4		O	Type 3 PPO-Read (DP-V1 only)
910	Octet String 12		O	Type 4 PPO-Read (DP-V1 only)
911	Unsigned 16		O	Current PPO-Read
912	Octet String 28		O	Type 5 PPO-Read
915	Array[10] Unsigned 16	O	O	Assign MEMOBUS/Modbus Write Command to PZD in PPO-Write
916	Array[10] Unsigned 16	O	O	Assign MEMOBUS/Modbus response to PZD in PPO-Read
918	Unsigned 16		O	Node address
947	Array[10] Unsigned 16		O	Fault number
948	Array[10] Unsigned 16		O	Fault time (Elapsed time between fault occurrence)
963	Unsigned 16		O	Current baud rate
964	Unsigned 16		O	Device identification (<i>Refer to PNU964 on page 42 for details</i>)
965	Octet String 2		O	Profile code: 0x0302
967	V2	O	O	Read or Write Control word
968	V2		O	Read Status word
971	Unsigned 16	O		Start Store in non-volatile memory (Enter code with EEPROM) <I>

<I> The maximum number of times data can be written to the EEPROM used for the drive is 100,000 times. Do not use this write command frequently.

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

Command setting

Data type	Settings	Description
PKE	6384H	6: Request parameter value from array 384H=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	4384H	4: Transfer parameter value (array word) 384H=900 dec (PNU 900)
IND	5	5th Word data of PPO type 1
PWE	(STW)	STW data
ZSW	–	up to drive status
HIW	–	up to drive status

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

Command setting

Data type	Settings	Description
PKE	638BH	6: Request parameter value from array 38BH=907 dec (PNU 907)
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	438BH	4: Transfer parameter value (array word) 38BH=907 dec (PNU 907)
IND	5	5th Word data of PPO type 1
PWE	(ZSW)	ZSW data
ZSW	–	up to drive status
HIW	–	up to drive status

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

Command setting

Data type	Settings	Description
PKE	6384H	6: Request parameter value from array 384H=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	4384H	4: Transfer parameter value (array word) 384H=900 dec (PNU 900)
IND	1	First Word data of PPO type 1
PWE	6384H	PPO-Write 1st Word data
ZSW	–	up to drive status
HIW	–	up to drive status

■ Example: To read current PPO-Write

Command setting

Data type	Settings	Description
PKE	1388H	1: Request parameter value 388H=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	1388H	1: Transfer parameter value (word) 388H=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 4: Type 4 PPO-Write 5: Type 5 PPO-Write
ZSW	–	up to drive status
HIW	–	up to drive status

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

PZD #	PNU	INDX	Assigned PNU	Description
PZD1	915	1	P0.1	Operation command
PZD2	915	2	P0.2	Frequency Reference
PZD3	915	3	P0.6	PID set point
PZD4	915	4	P0.7	Analog Output
PZD5	915	5	P0.9	Digital Output
PZD6	915	6	P0.15	PID set point 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	INDX	Assigned PNU	Description
PZD1	916	1	P0.32	Drive Status
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	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	Baud rate (kbit/s)	Value	Baud rate (kbit/s)
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 Data (year)
5	0220 dec	Firmware Data (month/day)
6	1	DO

◆ PNU Numbers for Drive Parameters

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

<1> The maximum number of times data can be written to the EEPROM used for the drive is 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	0001H MEMOBUS/Modbus #	1	0	0020H MEMOBUS/Modbus #	32
0	0002H MEMOBUS/Modbus #	2	0	0021H MEMOBUS/Modbus #	33
0	0003H MEMOBUS #	3	0	0022H MEMOBUS/Modbus #	34
0	0004H MEMOBUS #	4	0	0023H MEMOBUS/Modbus #	35
0	0005H MEMOBUS #	5	0	0024H MEMOBUS/Modbus #	36
0	0006H MEMOBUS #	6	0	0025H MEMOBUS/Modbus #	37
0	0007H MEMOBUS/Modbus #	7	0	0026H MEMOBUS/Modbus #	38
0	0008H MEMOBUS #	8	0	0027H MEMOBUS/Modbus #	39
0	0009H MEMOBUS/Modbus #	9	0	0028H MEMOBUS/Modbus #	40
0	000AH MEMOBUS/Modbus #	10	0	0029H MEMOBUS/Modbus #	41
0	000FH MEMOBUS/Modbus #	15	0	002AH MEMOBUS/Modbus #	42
0	0010H MEMOBUS/Modbus #	16	0	002BH MEMOBUS/Modbus #	43
0	0011H MEMOBUS/Modbus #	17	0	002CH MEMOBUS/Modbus #	44
0	001BH MEMOBUS #	27	0	002DH MEMOBUS/Modbus #	45
0	001CH MEMOBUS #	28	0	002EH MEMOBUS/Modbus #	46
0	001DH MEMOBUS #	29	0	002FH MEMOBUS/Modbus #	47
–	–	–	0	0030H MEMOBUS/Modbus #	48
–	–	–	0	0031H MEMOBUS/Modbus #	49
–	–	–	0	0032H MEMOBUS/Modbus #	50
–	–	–	0	0033H MEMOBUS/Modbus #	51
–	–	–	0	0034H MEMOBUS/Modbus #	52
–	–	–	0
–	–	–	0	00FFH MEMOBUS/Modbus #	255

- Note:**
- When PNU is set to 0 and INDEX is set to MEMOBUS/Modbus register number, parameter values can be read and written instead of using PNU number.
 - MEMOBUS/Modbus register C1-01 is 200Hex
When PNU is 0 and INDEX is 200H(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 setting

Data type	Settings	Description
PKE	701FH	7: Change parameter value in array (word) 1FH = 31 (C1 parameter)
IND	1	C1-01
PWE	10	Assign 10
STW	–	up to Master command
HSW	–	up to Master command

Response

Data type	Settings	Description
PKE	401FH	4: Transfer parameter value (array word) 1FH = 31 (C1 parameter)
IND	1	C1-01
PWE	0	N/A
STW	–	up to drive status
HSW	–	up to drive status

■ Example: Reading to d1-17

Command setting

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

Response

Data type	Settings	Description
PKE	4029H	4: Transfer parameter value (array word) 29H = 41 (d1 parameter)
IND	11H	d1-17
PWE	258H	d1-17 value
STW	–	up to drive status
HSW	–	up to drive status

■ Example: Writing to RAM with the Enter command

Command setting

Data type	Settings	Description
PKE	212CH	2: Change parameter value (word) 12CH = 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	112CH	1: Transfer parameter value (word) 12CH = 300
IND	0	N/A
PWE	0	N/A
STW	–	up to drive status
HSW	–	up to drive status

9 Troubleshooting

◆ Drive-Side Error Codes

Drive-side error codes appear on the drive keypad. [Table 18](#) lists causes of the errors and possible corrective actions. Refer to the drive Technical Manual for additional error codes that may appear on the drive keypad.

■ Faults

Both bUS (Option Communication Error) and EF0 (Option Card External Fault) can appear as either an alarm or as a fault. When a fault occurs, the keypad ALM LED remains lit. When an alarm occurs, the keypad ALM LED flashes.

Check the following items first when an error code occurs on the drive:

- Communication cable connections
- Make sure the option is properly installed to the drive
- Operation status of the controller program and controller CPU
- Did a momentary power loss interrupt communications?

Table 18 Fault Displays, Causes, and Possible Solutions

Keypad Display		Fault Name
bUS	bUS	Option Communication Error
		<ul style="list-style-type: none"> • After establishing initial communication, the connection was lost. • Only detected when the run command frequency reference is assigned to the option (bl-01 = 3 or bl-02 = 3).
Cause		Possible Solution
No signal was received from the PLC.		<ul style="list-style-type: none"> • Check for faulty wiring. • Correct any wiring problems.
Faulty communications wiring		
An existing short circuit or communications disconnection		Check disconnected cables and short circuits and repair as needed.
A data error occurred due to electric interference		<ul style="list-style-type: none"> • Counteract noise in the control circuit, main circuit, and ground wiring. • If a magnetic contactor is identified 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).
The option is not properly connected to the drive.		Reinstall the option.
Option is damaged.		If there are no problems with the wiring and the error continues to occur, replace the option.
Keypad Display		Fault Name
EF0	EF0	Option Card External Fault
		The alarm function for an external device has been triggered.
Cause		Possible Solution
An external fault was received from the PLC.		<ol style="list-style-type: none"> 1. Remove the cause of the external fault. 2. Reset the external fault input from the PLC.
Problem with the PLC program.		Check the PLC program.
Keypad Display		Fault Name
oFA00	oFA00	Option Card Connection Error (CN5-A)
		Option is not properly connected.
Cause		Possible Solution
The option card installed into port CN5-A is incompatible with the drive.		Connect the option to the correct option port. Note: Connect the SI-P3 to CN5-A. For other option connections, refer to the Installation Manual for those options.

Keypad Display		Fault Name
oFR01	oFA01	Option Card Fault (CN5-A)
		Option is not properly connected.
Cause		Possible Solution
The option connected to option port CN5-A was changed during run.		De-energize the drive and plug the option into the drive according to Installation Procedure on page 13 .
Keypad Display		Fault Name
oFR03, oFR04	oFA03, oFA04	Option Card Error (CN5-A)
		Option Card Error (CN5-A)
Cause		Possible Solutions
A fault occurred in the option card.		<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Keypad Display		Fault Name
oFR30 to oFR43	oFA30 to oFA43	Option Card Connection Error (CN5-A)
		Communication ID error.
Cause		Possible Solution
The option card connection to port CN5-A is faulty.		<ol style="list-style-type: none"> 1. Turn off the power. 2. Check if the option is properly plugged into the option port. 3. Replace the option if the fault continues to occur.
Keypad Display		Fault Name
oFb00	oFb00	Option Fault (CN5-B)
		Non-compatible option is connected.
Cause		Possible Solution
The option card installed into port CN5-A is incompatible with the drive.		Connect the option to the correct option port. Note: Use connector CN5-B when connecting DO-A3, AO-A3, or two PG options. Use connector CN5-C when connecting only one PG option.
Keypad Display		Fault Name
oFb02	oFb02	Option Fault (CN5-B)
		Two identical options are connected at the same time.
Cause		Possible Solution
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.
Keypad Display		Fault Name
oFc00	oFc00	Option Fault (CN5-C)
		Non-compatible option is connected.
Cause		Possible Solution
The option card installed into port CN5-C is incompatible with the drive.		Connect the option to the correct option port. Note: AI-A3, DI-A3, and communication options are not supported by option port CN5-C.
Keypad Display		Fault Name
oFc02	oFc02	Option Fault
		Option Flash write mode.
Cause		Possible Solution
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

Keypad Display		Minor Fault Name	
bb	bb	Baseblock	
		Data format and setting contents do not match.	
Cause		Possible Solution	Minor Fault (H2-□□ = 10)
The drive output is disabled. “bb” is displayed on the keypad when the drive is set for control by PROFIBUS-DP, and a conventional data format is used, and the operation command bit F is set to 1, or a PPO type data format is used, and the control word (STW) bit 3 is set to 0.		Set either of the bits depending on the data format used.	No output
External baseblock signal was entered via one of the multi-function input terminals (S1 to S8).		Check external sequence and baseblock signal input timing.	
Keypad Display		Minor Fault Name	
[CALL	CALL	Serial communication transmission error	
		Communication is not established.	
Cause		Possible Solution	Minor Fault (H2-□□ = 10)
Communication wiring is faulty.		<ul style="list-style-type: none"> • Check for wiring errors. • Correct the wiring. 	YES
An existing short circuit or communications disconnection		Check disconnected cables and short circuits and repair as needed.	
Programming error on the master side.		Check communications at start-up and correct programming errors.	
Communication circuitry is damaged.		<ul style="list-style-type: none"> • Perform a self-diagnostics check • If the problem continues, replace either the control board or the entire drive. For instructions on replacing the control board, contact Yaskawa or a Yaskawa representative. 	
Termination resistor of the MEMOBUS/ Modbus communications is not enabled.		Set DIP switch S2 to the ON position to enable the termination resistor on a drive located at the end of a network line.	
Keypad Display		Minor Fault Name	
[CyPo	CyPo	Cycle Power to Active Parameters	
		Comm. Option Parameter Not Upgraded	
Cause		Possible Solution	Minor Fault (H2-□□ = 10)
Although F6-15 = 1 [Comm. Option Parameters Reload = Reload Now], the drive did not update the communication option parameters.		Re-energize the drive to update the communication option parameters. Note: If the option software version is not compatible or if you install an incorrect option to the drive, it will trigger an alarm.	YES

10 European Standards



Figure 24 CE Mark

The CE mark indicates compliance with European safety and environmental regulations. It is required for engaging in business and commerce in Europe.

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

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

EMC Guidelines: 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 Guidelines Compliance

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

■ EMC Guidelines Installation Conditions

Verify the following installation conditions to ensure that other devices and machinery used in combination with this option and drives 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 26](#).

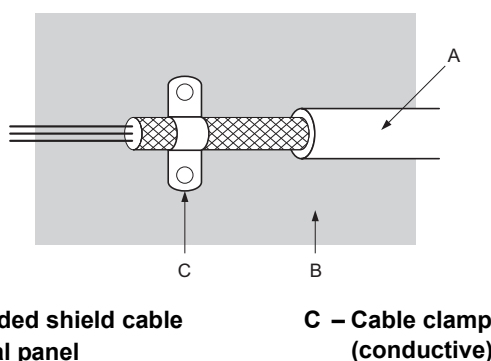


Figure 25 Ground Area

■ Option Installation for CE Compliance: Models PG-□□, DI-□□, DO-□□, AI-□□, AO-□□, SI-□□

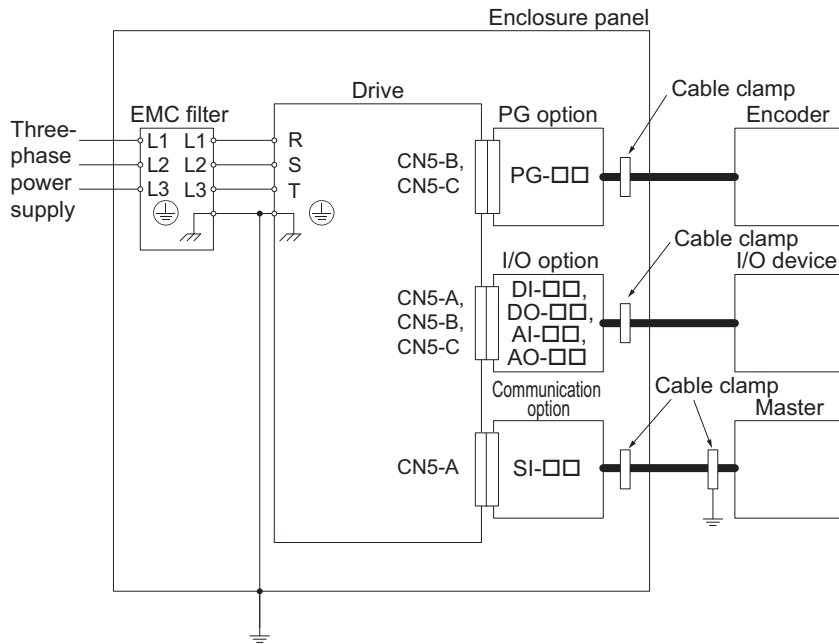


Figure 26 Option Installation for CE Compliance (PG-□□, DI-□□, DO-□□, AI-□□, AO-□□, SI-□□)

■ Option Installation for CE Compliance with GA500

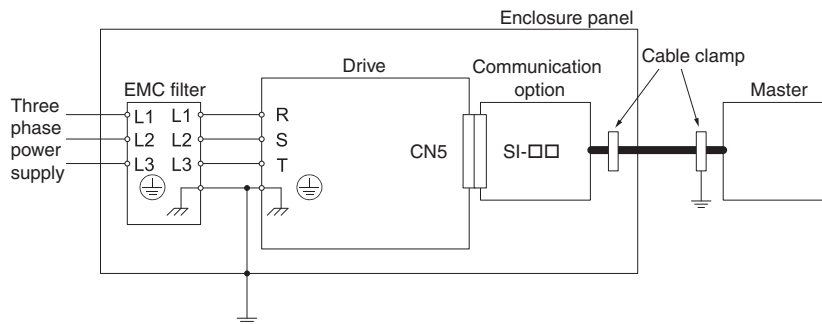


Figure 27 Option Installation for CE Compliance with GA500

11 Specifications

Table 19 Option Specifications

Items	Specifications
Model	SI-P3
PROFIBUS-DP Data	<ul style="list-style-type: none"> • 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 bytes, outputs: 16 bytes) • Extended data 2 High-speed I/O data (inputs: 4 bytes, outputs: 4 bytes) MEMOBUS/Modbus message (inputs: 8 bytes, outputs: 8 bytes) • Basic data High-speed I/O data (inputs: 6 bytes, outputs: 6 bytes)
Connector	9-pin D-sub connector (#4/40 UNC thread)
Communications Speed	9.6 kbps to 12 Mbps
Ambient Temperature	-10 °C to +50 °C (14 °F to 122 °F)
Humidity	95% RH or lower with no condensation
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 free from: <ul style="list-style-type: none"> • Oil mist, corrosive gas, flammable gas, and dust • Radioactive materials or flammable materials, including wood • Harmful gas or fluids • Salt • Direct sunlight • Falling foreign objects
Altitude	1000 m (3280 ft) or lower

12 Disposal

◆ Disposal Instructions

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

◆ WEEE Directive



Figure 28 WEEE Mark

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

Revision dates and manual numbers appear on the bottom of the back cover.

MANUAL NO. SIEP C730600 82B <1>

Published in Japan October 2016

Revision number

Date of publication

Date of Publication	Revision Number	Section	Revised Content
February 2019	<3>	All	Addition: Applicable product series Revision: Reviewed and corrected entire documentation.
		Chapter 12	Addition: Disposal
		Back cover	Revision: Address
August 2018	<2>	All	Addition: Applicable product series
		Back cover	Revision: Address
October 2016	<1>	All	Revision: · Applicable product series · Reviewed and corrected entire documentation.
		Back cover	Revision: Address
June 2016	—	—	First Edition

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

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

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MANUAL NO. SIEP C730600 82D <3>-0

Published in Japan February 2019
18-11-20