

YASKAWA AC Drive Option DeviceNet Installation Manual

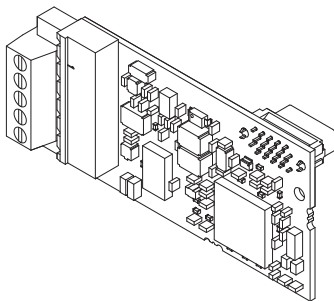
Type: SI-N3

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

安川インバータ オプション DeviceNet 通信 取扱説明書

形 式 SI-N3

製品を安全にお使いいただくために、本書を必ずお読みください。
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Table of Contents

1	PREFACE AND SAFETY	4
2	OVERVIEW	9
3	RECEIVING	12
4	OPTION COMPONENTS	13
5	INSTALLATION PROCEDURE	16
6	RELATED PARAMETERS	39
7	CONFIGURING DEVICENET MESSAGING	44
8	TROUBLESHOOTING	48
9	TRUNK LINE AND DROP LINE LENGTHS	52
10	EUROPEAN STANDARDS	53
11	SPECIFICATIONS	56
12	DISPOSAL	57

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:

DeviceNet SI-N3 Option

YASKAWA AC Drive Option DeviceNet Installation Manual Manual No: TOBP C730600 84 (This book)	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 DeviceNet Technical Manual Manual No: SIEP C730600 84	The technical manual contains detailed information about the option. Access the following sites to obtain the technical manual: U.S.: http://www.yaskawa.com Europe: http://www.yaskawa.eu.com Japan: http://www.e-mechatronics.com Other areas: Check the back cover of these manuals. For questions, contact Yaskawa or a Yaskawa representative.

Drive

YASKAWA AC Drive Manuals	<p>Drive manuals contain basic installation and wiring information in addition to detailed parameter setting, fault diagnostic, and maintenance information.</p> <p>The most recent versions of these manuals are available for download on our documentation websites:</p> <p>U.S.: http://www.yaskawa.com</p> <p>Europe: http://www.yaskawa.eu.com</p> <p>Japan: http://www.e-mechatronics.com</p> <p>Other areas: Check the back cover of these manuals.</p> <p>For questions, contact Yaskawa or a Yaskawa representative.</p>
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◆ Terms and Abbreviations

Note:	Indicates supplemental information that is not related to safety messages.
Option:	YASKAWA AC Drive DeviceNet Option
Drive:	<ul style="list-style-type: none">• YASKAWA AC Drive 1000-Series (A1000, E1000, H1000, L1000A, U1000, Z1000U, Z1000)• 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
OLV:	Open Loop Vector Control
CLV:	Closed Loop Vector Control
AOLV:	Advanced Open Loop Vector Control
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

- DeviceNet is a trademark of the ODVA.
- Trademarks are the property of their respective owners.

1 Preface and Safety

◆ 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 attempt to modify or alter the drive or drive circuitry in any way not explained in this manual.

Failure to comply could cause death or serious injury and will void warranty. Yaskawa is not responsible for any modification of the product made by the user. Do not modify this product.

NOTICE

Do not modify the drive or option circuitry.

Failure to comply could result in damage to the drive or option and will void warranty. Yaskawa is not responsible for any modification of the product made by the user.

Do not expose the drive or the option to halogen group disinfectants. Do not pack the drive or the option in fumigated or sterilized wooden materials. Do not sterilize the entire package after packing the product.

Failure to comply could damage electrical components in the option.

2 Overview

The SI-N3 Option provides a communications connection between the drive and an ODVA DeviceNet network. The SI-N3 Option connects the drive to a DeviceNet network and facilitates the exchange of data.

DeviceNet is a communications link that connects industrial devices (e.g., limit switches, photoelectric switches, valve manifolds, motor starters, smart motor controllers, operator interfaces, and variable frequency drives) and control devices (e.g., programmable controllers and computers) to a network. DeviceNet is a simple networking solution that reduces the cost and time to wire and install factory automation devices while providing interchangeability of similar components from multiple vendors.

Install the option/DeviceNet option on a drive to perform the following functions from a DeviceNet master device:

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



Figure 1 DeviceNet Approved

2 Overview

◆ Compatible Products

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

Table 1 Compatible Products

Product Series	Model(s)
A1000	All models
E1000	All models
H1000	All models
L1000A <1>	All models
U1000 <1>	All models
Z1000U <1>	All models
Z1000	All models
GA500 <2>	All models
GA700 <3>	All models
GA800 <3>	All models

<1> Before you install the option on a YASKAWA L1000A-, U1000-, or Z1000U-Series Drives, make sure that the option software version is PRG: 1112 or later.

<2> Before you install the option on a YASKAWA AC Drive GA500, make sure that the option software version is PRG: 1115 or later.

<3> Before you install the option on a YASKAWA AC Drive GA700 or GA800, make sure that the option software version is PRG: 1115 or later.

- Note:**
1. 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.
 2. 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.

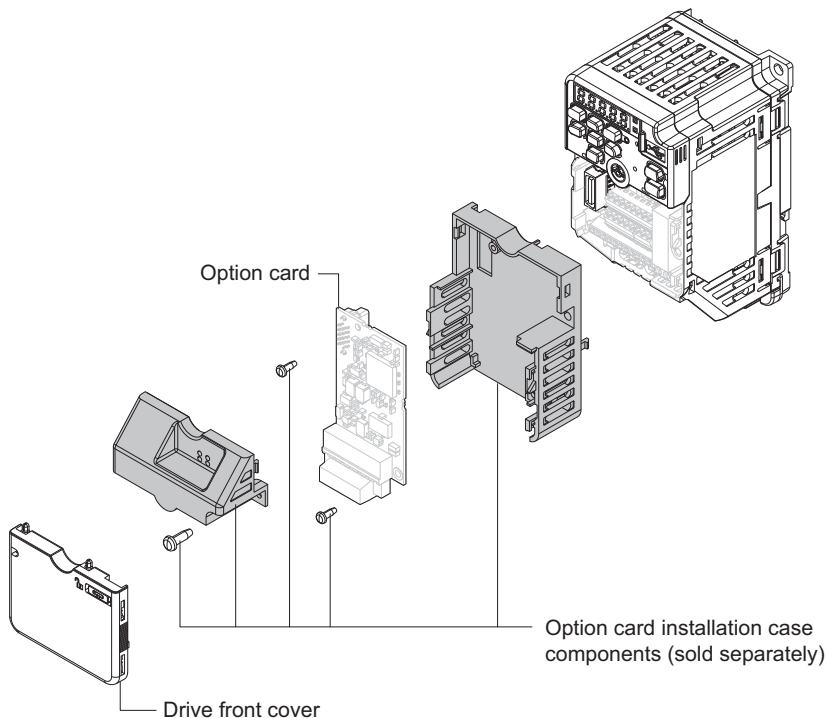


Figure 2 Option Card Installation Case

3 Receiving







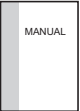
After receiving the option package:

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 3](#) on page 13 for details. Contact the distributor where the option was purchased or contact Yaskawa or a Yaskawa representative about any problems with the option.

◆ Option Package Contents

Description:	Option	Ground Wire <1>	Screws (M3)	LED Labels			Installation Manual
				A1000, E1000, H1000, L1000A, U1000, Z1000U	Z1000	GA500, GA700, and GA800	
—							
Quantity:	1	1	3 <2>	1	1	1	1

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

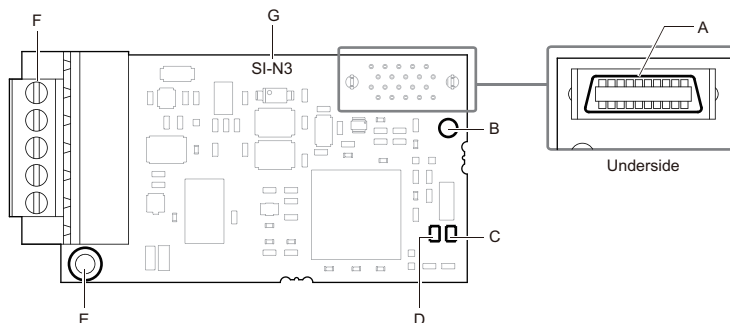
<2> GA700 and GA800 drives use two screws only.

◆ 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

◆ DeviceNet Option



A – Connector (CN5)

B – Installation hole

C – LED (MS) <2>

D – LED (NS) <1>

E – Ground terminal (FE) and installation hole <2>

F – Terminal block CN1

G – Option model number

<1> Refer to [Option LED Display on page 14](#) 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 3 DeviceNet Option Components

◆ Terminal Block CN1

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

Table 2 Terminal Descriptions

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

4 Option Components

◆ Option LED Display

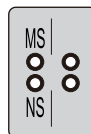
The option has two bicolor, red/green LEDs: one for Module Status (MS) and one for Network Status (NS).



A1000, E1000,
H1000, L1000A,
U1000, and
Z1000U Label



Z1000 Label



GA500, GA700,
and GA800 Label

Figure 4 Option LED Labels

The operational states of the LEDs after completion of the DeviceNet power-up diagnostic LED sequence are described in [Table 4](#). Wait at least 2 seconds for the power-up diagnostic process to complete before verifying the states of the LEDs.

Table 3 Option LED States

Name	Display		Operating Status	Description
	Color	Status		
MS	—	OFF	Power supply OFF	Power is not being supplied to the drive.
	Green	ON	Option operating	The option is operating normally.
	Green	Flashing	Option initializing	There is an incorrect baud rate setting or there is a MAC ID.
	Red	ON	Fatal error occurred	A fatal (irrecoverable) error occurred in the option.
	Red	Flashing	Non-fatal error occurred	A non-fatal (recoverable) error occurred.
	Green/Red	Flashing	Device self-test	Device in self-test mode.

Name	Display		Operating Status	Description
	Color	Status		
NS	–	OFF	Offline or Power supply OFF	–
	Green	ON	Online communications established	Device is on-line and has connections in the established state.
	Green	Flashing	Online communications not established	Device is on-line but has no connections in the established state. Duplicate MAC ID test has been passed and is on-line but has no open connections to other nodes.
	Red	ON	Communications error	An error occurred disabling DeviceNet communications. <ul style="list-style-type: none"> • MAC ID duplication • Bus off detected
	Red	Flashing	Communications time-out	A communications time-out occurred with the master.
	Green/Red	Flashing	Communication faulted	Specific communication faulted device. <ul style="list-style-type: none"> • The device has detected a network access error and is in the communications faulted state. • The device has then received and accepted an Identify communication fault request-long protocol message.

■ Power-Up Diagnostics

An LED test is performed each time the drive is powered up. The initial boot sequence may take several seconds. The option is successfully initialized when the LEDs complete the diagnostic LED sequence. The LEDs then assume operational conditions shown in [Table 3](#).

Table 4 Power-Up Diagnostic LED Sequence

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

5 Installation Procedure

◆ Section Safety

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.

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.



WARNING

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.

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.

5 Installation Procedure

◆ Procedures for Installing and Wiring Options on a Drive

Procedures for installing and wiring options differ depending on the drive model.

Refer to [Table 5](#) to check the procedures for installing and wiring options on a drive.

Table 5 Procedures for Installing and Wiring Options on a Drive

Product Series	Procedures for Installing and Wiring Options on a Drive	Page
A1000	Procedure A	19
E1000	Procedure A	19
H1000	Procedure A	19
L1000A	Procedure A	19
U1000	Procedure A	19
Z1000U	Procedure A	19
Z1000	Procedure B	24
GA500	<1> <2>	–
GA700	Procedure C	30
GA800	Procedure C	30

[<1>](#) Use the option card installation case manual to install the option on GA500 drives.

[<2>](#) Before you install the option on a YASKAWA AC Drive GA500, make sure that the option software version is PRG: 1115 or later.

■ Procedure A

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

Prepare the Drive for the Option

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

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 5** for an exploded view of the drive with the option and related components for reference in the installation procedure.

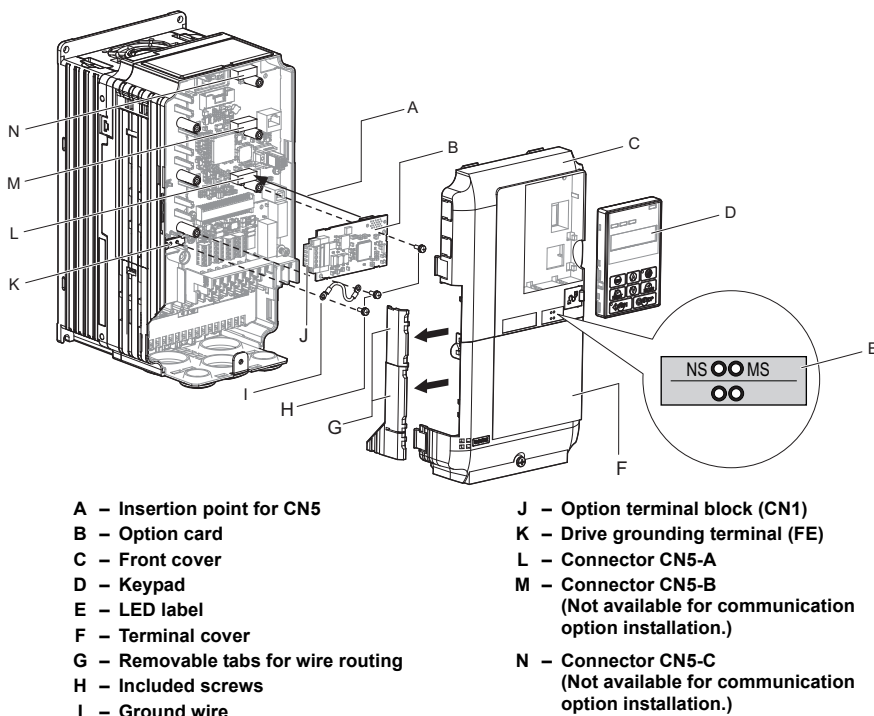


Figure 5 Drive Components with Option

5 Installation Procedure

Install the Option

Remove the front covers of the drive before you install the option. Refer to the drive manual for information about how to remove the front covers. 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. 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.*

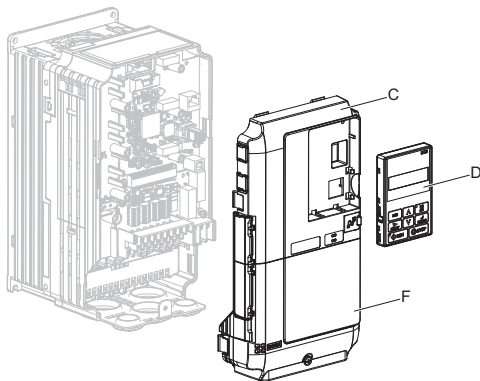


Figure 6 Remove the keypad, Front Cover, and Terminal Cover

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

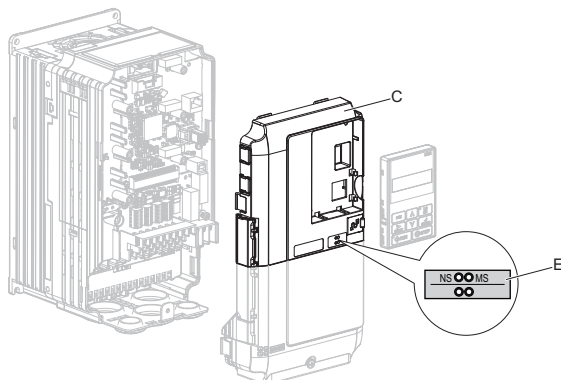


Figure 7 Affix the LED Label

3. Insert the option card (B) into the CN5-A (L) 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).

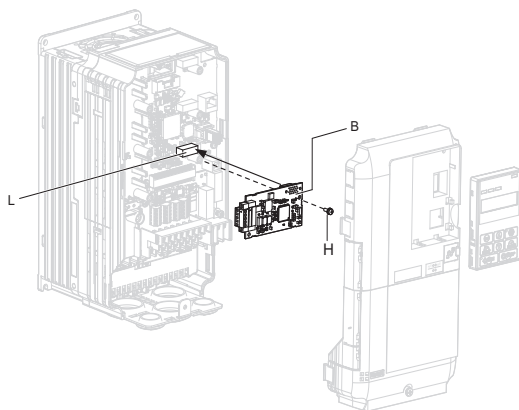


Figure 8 Insert the Option Card

5 Installation Procedure

4. Connect one end of the ground wire (I) to the ground terminal (K) using one of the remaining provided screws (H). Connect the other end of the ground wire (I) to the remaining ground terminal and installation hole on the option (B) using the last remaining provided screw (H). Tighten both screws to 0.5 to 0.6 N·m (4.4 to 5.3 in·lb).

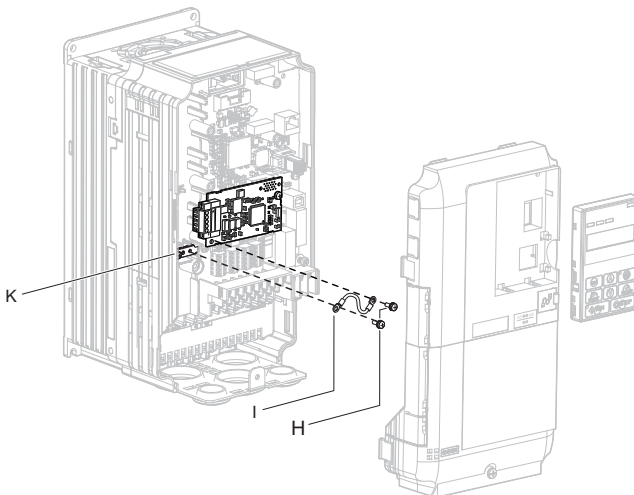


Figure 9 Connect the Ground Wire

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

5. Firmly connect the DeviceNet communication cable to option terminal block (CN1). Install DeviceNet communications cables apart from main-circuit wiring and other electrical and power lines. Ensure the cable end is firmly connected (see [Figure 23](#)). Refer to [Communication Cable Topology on page 36](#) for details.

6. 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.

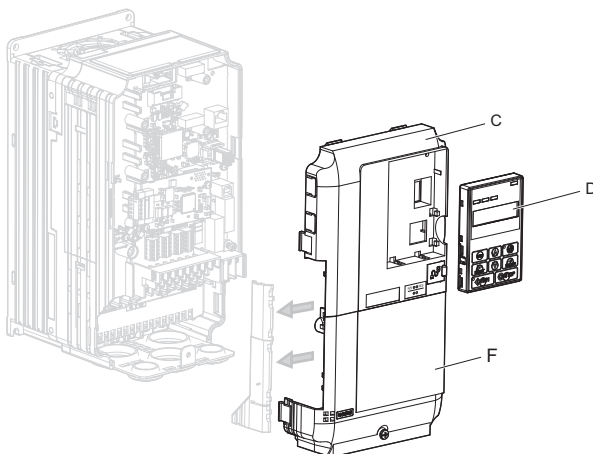


Figure 10 Replace the Front Covers and Keypad

7. Set drive parameters in [Table 7](#) for correct option performance.

5 Installation Procedure

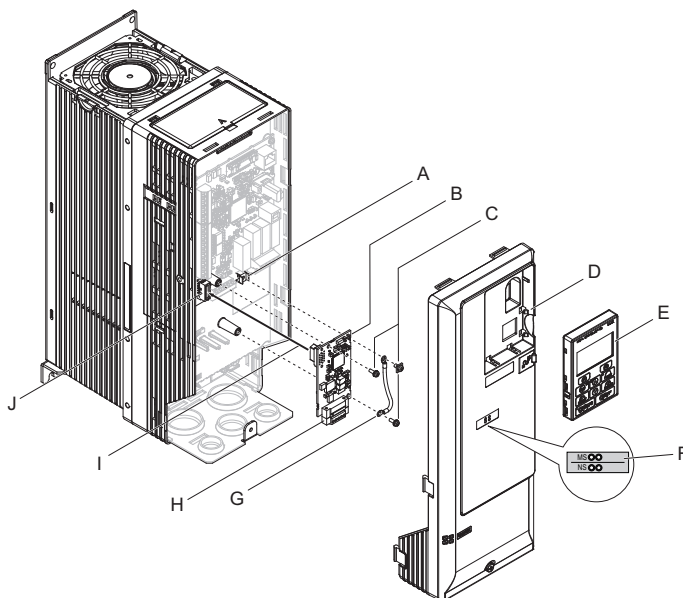
■ Procedure B

This section shows the procedure to install and wire the option on a Z1000 drive.

Prepare the Drive for the Option

Prior to installing the option, wire the drive, make necessary connections to the drive terminals, and verify that the drive functions normally without the option installed. Refer to the User Manual packaged with the drive for information on wiring and connecting the drive.

Figure 11 shows an exploded view of the drive with the option and related components for reference.



A – Drive grounding terminal (FE)

B – SI-N3 option

C – Mounting screw

D – Mounting front cover

E – HOA keypad

F – LED label

G – Ground wire

H – Terminal block CN1

I – Insert connector CN5 here

J – Connector CN5

Figure 11 Drive Components with Option

Installing 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 covers. Different drive sizes have different cover removal procedures.

DANGER! Electrical Shock Hazard. Do not connect or disconnect wiring while the power is on. Failure to comply could result in death or serious injury. Before installing the option, disconnect all power to the drive and wait at least the amount of time specified on the drive front cover safety label. After all indicators are off, measure the DC bus voltage to confirm safe level, and check for unsafe voltages before servicing. The internal capacitor remains charged after the power supply is turned off.

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

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

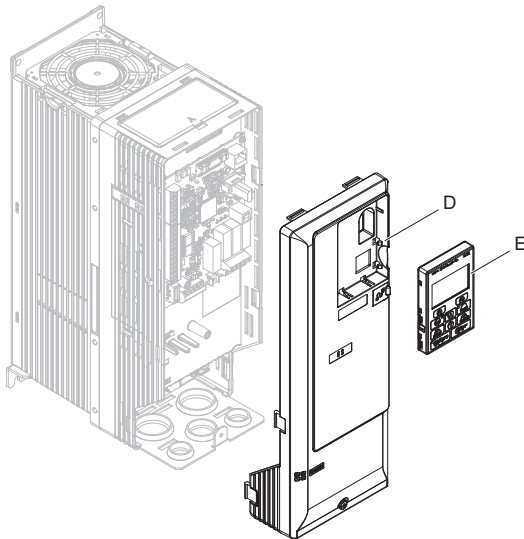


Figure 12 Remove the Front Cover and HOA Keypad

5 Installation Procedure

2. With the front cover and HOA keypad removed, apply the LED label (F) in the appropriate position on the drive front cover (D).

Note: Place the LED label vertically on Z1000 drives as shown in [Figure 13](#).

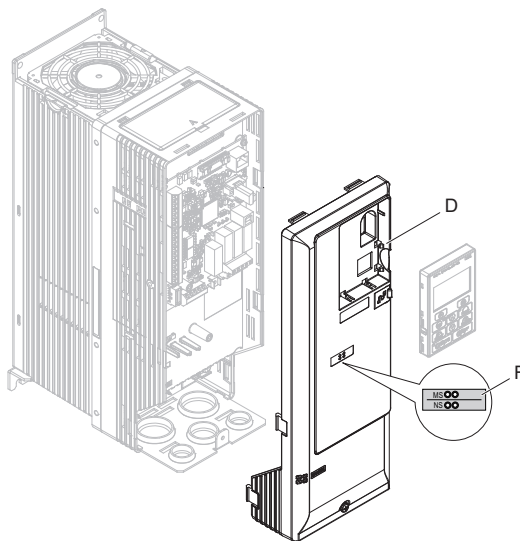


Figure 13 Apply the LED Label

3. Make sure the screws on the left and right sides of the option terminal block (H) are tightened with a tightening torque of 0.5 to 0.6 N·m (4.4 to 5.3 in·lb), then insert the option (B) into the CN5 connector (J) located on the drive and fasten it using one of the included screws (C).

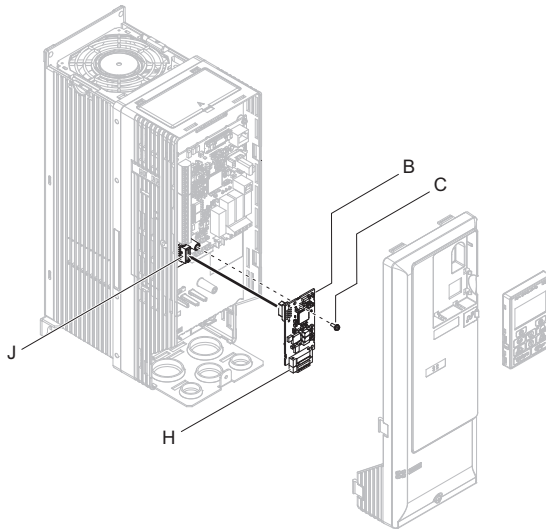


Figure 14 Insert the Option

5 Installation Procedure

4. Connect the ground wire (G) to the ground terminal (A) using one of the remaining provided screws (C). Connect the other end of the ground wire (G) to the ground terminal and installation hole on the option using the last remaining provided screw (C) and tighten both screws to 0.5 to 0.6 N·m (4.4 to 5.3 in·lb).

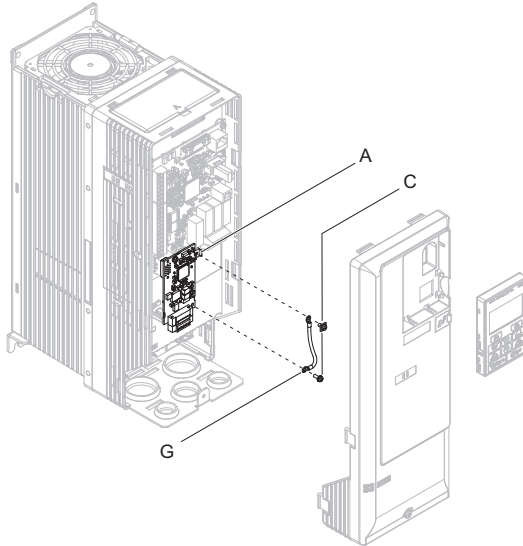


Figure 15 Connect the Ground Wire

5. Wire the communication cables.

Note: Separate communication cables from main circuit wiring and other electrical lines.

6. Firmly connect the Ethernet communication cable to the option modular connector (CN1).
Install Ethernet communications cables apart from main-circuit wiring and other electrical and power lines. Ensure the cable end is firmly connected (see [Figure 23](#)). Refer to [Communication Cable Topology on page 36](#) for details of installing.
7. Reattach the drive front cover (D) and the HOA Keypad (E).

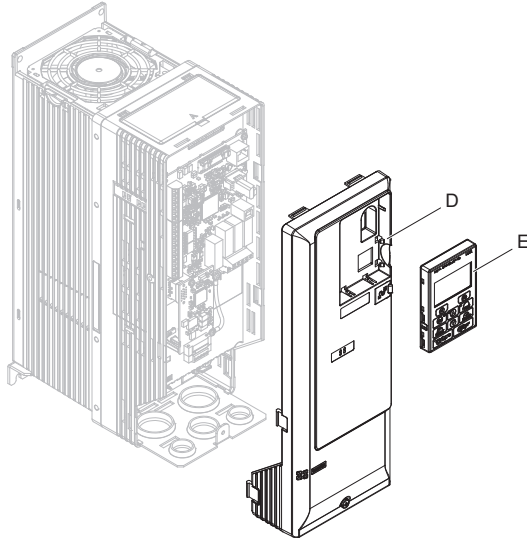


Figure 16 Replace the Front Cover and HOA Keypad

Note: Take proper precautions when wiring the option so that the front covers will easily fit back onto the drive. Make sure no cables are pinched between the front covers and the drive when replacing the covers.

8. Set drive parameters in [Table 7](#) for correct option performance.

5 Installation Procedure

■ Procedure C

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

Prepare the Drive for the Option

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

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 17](#) for an exploded view of the drive with the option and related components for reference in the installation procedure.

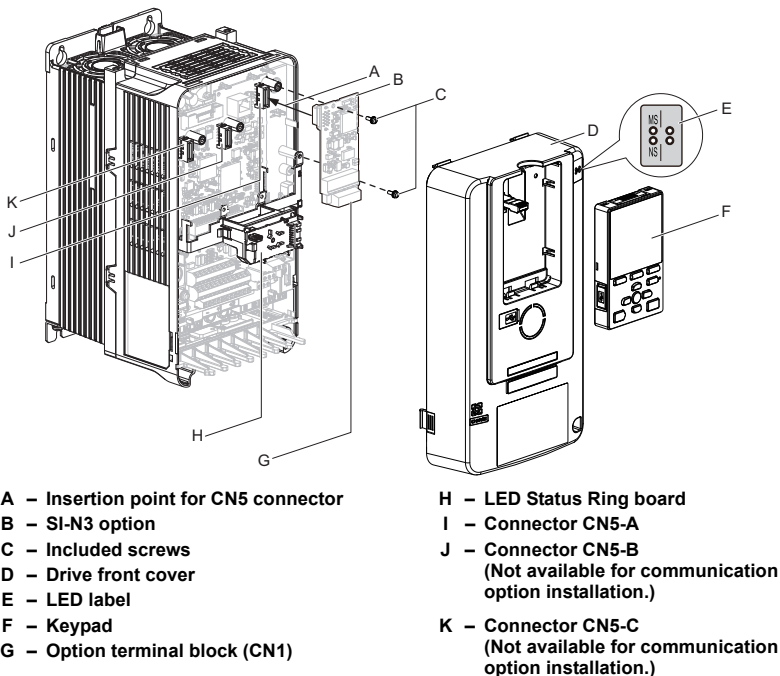


Figure 17 Drive Components with Option

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).

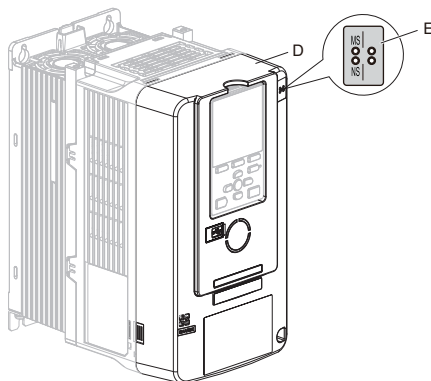


Figure 18 Affix the LED Label

5 Installation Procedure

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.

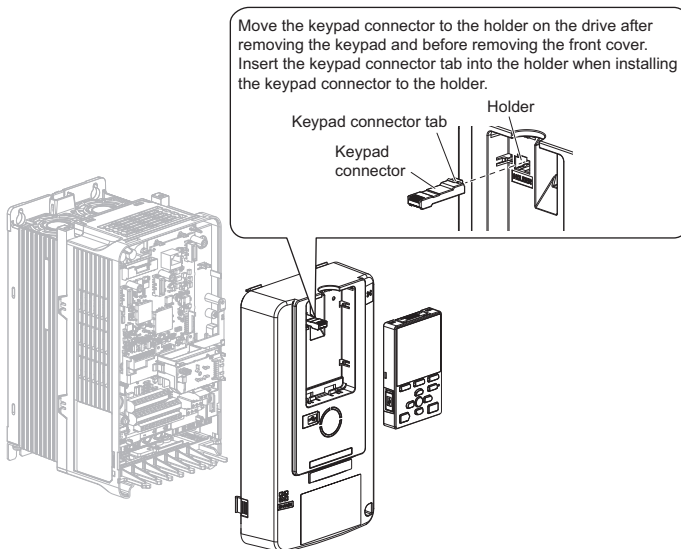


Figure 19 Remove the Front Cover and Keypad

3. Carefully remove the LED Status Ring board (H) 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.

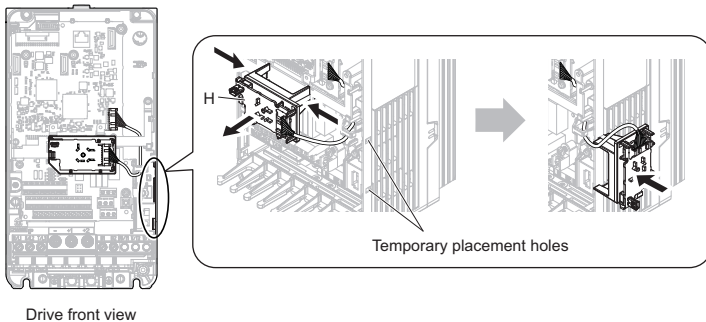


Figure 20 Remove the LED Status Ring Board

5 Installation Procedure

4. Insert the option card (B) into the CN5-A connector (I) 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: Installing the option card on GA700 and GA800 drives requires only two screws and does not require a ground wire. 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.

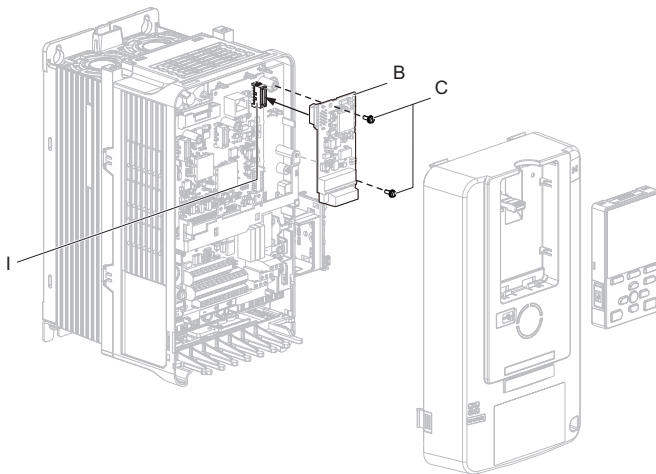


Figure 21 Insert the Option Card

5. Firmly connect the DeviceNet communication cable to option terminal block(CN1). Install DeviceNet communications cables apart from main-circuit wiring and other electrical and power lines. Ensure the cable end is firmly connected (see [Figure 23](#)). Refer to [Communication Cable Topology on page 36](#) for details.

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

6. Reattach the LED Status Ring board (H).

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.

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

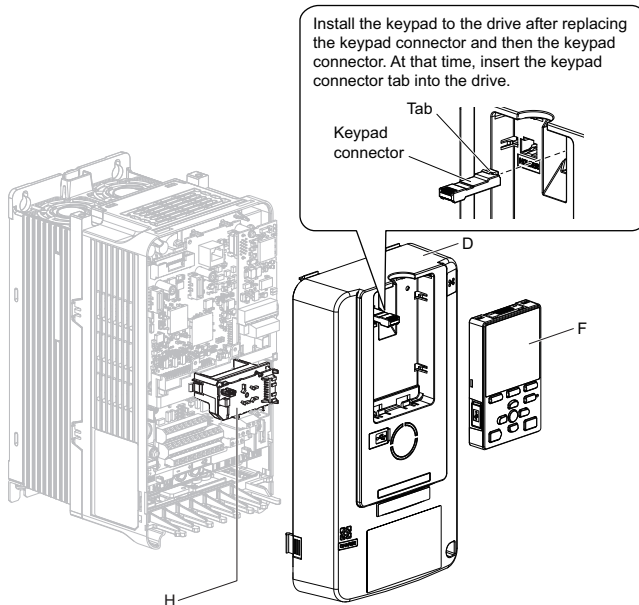


Figure 22 Replace the Front Cover and Keypad

8. Set drive parameters in [Table 7](#) for correct option performance.

5 Installation Procedure

◆ Option Connection Diagram

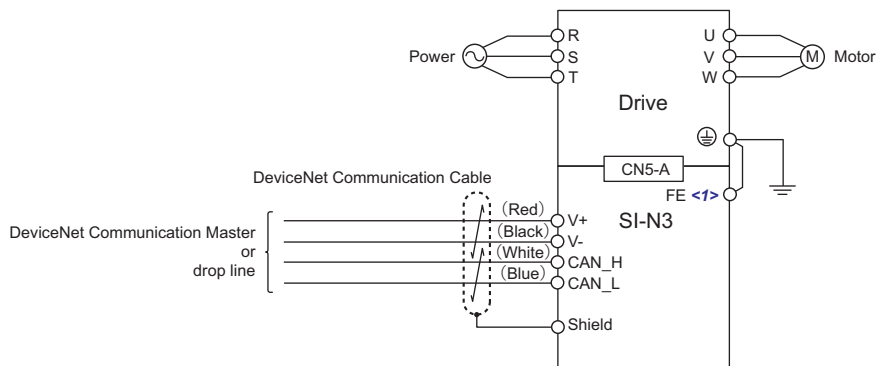


Figure 23 Option Connection Diagram

<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.

◆ Communication Cable Topology

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

Refer to *Trunk Line and Drop Line Lengths on page 52* for details on selecting trunk line and drop line lengths.

Route the option wiring according to the following procedures.

1. Prepare the communication cables as shown in *Figure 24*.

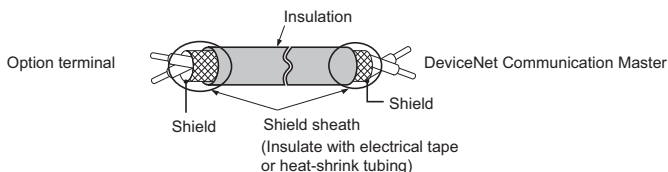


Figure 24 Prepare Ends of Shielded Cable

2. Connect the communication cables to the terminal block as shown in [Figure 25](#). When attaching the CN1 connector plug on the terminal block to the socket, make sure the screws on the left and right sides of the plug are tightened with a tightening torque of 0.5 to 0.6 (N·m) or 4.4 to 5.43 (in·lb).
3. Take particular caution to ensure that each wire is properly connected and wire insulation is not accidentally pinched into electrical terminals. Trim any frayed wires.

WARNING! 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: Heat shrink tubing or electrical tape may be required to ensure that cable shielding does not come into contact with other wiring. Insufficient insulation may cause a short circuit that can damage the option or the drive.

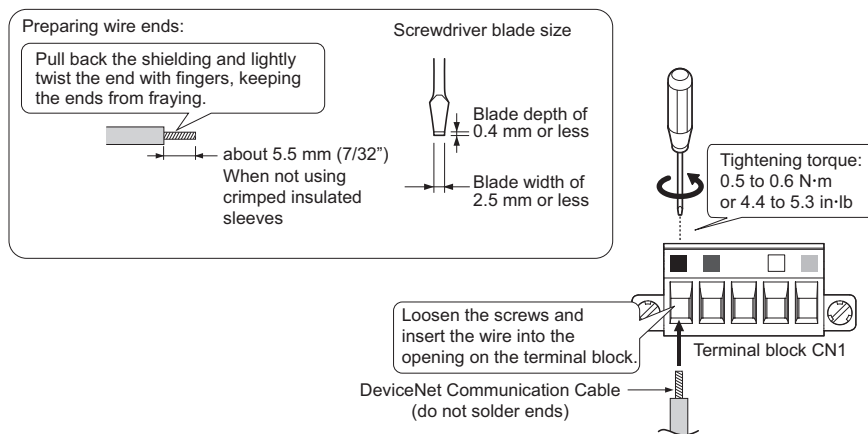


Figure 25 Connect Cable Wiring

◆ Termination Resistor Connection

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

Only connect network termination resistors (121 Ω , $\pm 1\%$, 1/4 W) to nodes of the two ends of trunk line. Refer to ODVA specifications for more details on DeviceNet termination.

5 Installation Procedure

◆ Option MAC ID

■ Parameter F6-50, MAC ID Setting 0 to 64

The option MAC ID is set with drive parameter F6-50. MAC ID settings between 0 to 63 are considered valid MAC IDs; setting 64 indicates a network-settable MAC ID.

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

◆ Option Baud Rate

The option supports standard baud rates of 125 kbps, 250 kbps, and 500 kbps.

Table 6 Parameter F6-51 Baud Rate Setting

Description	Value
125 kbps	0
250 kbps	1
500 kbps	2
Programmable from Network	3
Auto Detect	4

■ Auto Baud Rate Sensing (F6-51 = 4)

Setting parameter F6-51 to 4 enables automatic baud rate detection and allows the option to automatically determine the baud rate of the DeviceNet network.

Note: Auto baud rate sensing is valid only when there is more than one node physically on the DeviceNet network segment. If the auto baud rate sensing fails to detect the baud rate, the drive keypad will display "bUS" and the option LEDs will be OFF (NS) and solid green (MS).

◆ EDS Files

To facilitate network implementation, obtain an EDS 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.

6 Related Parameters

The parameters in **Table 7** set the drive for operation with the option. Confirm proper setting of all parameters in **Table 7** 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 7 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
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
d5-01 (029A)	Torque Control Selection	0: Speed Control 1: Torque Control	Default: 0 Range: 0, 1
F6-01 (03A2)	Communications 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	Enabling this parameter allows d5-01 to determine whether the value is read as the Torque Limit value (d5-01 = 0) or the Torque Reference value (d5-01 = 1). 0: Disabled 1: Enabled </>	Default: 0 Range: 0, 1

6 Related Parameters

No. (Hex.)	Name	Description	Values
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
F6-15 (0B5B) <8>	Comm. Option Parameters Reload	Selects whether F6-□□/F7-□□ communication-related parameters changed are enabled. 0: Reload at Next Power Cycle 1: Reload Now 2: Cancel Reload Request Note: F6-15 is reset to 0 after setting 1 or 2.	Default: 0 Range: 0 to 2
F6-50 (03C1) <9> <10>	DN MAC Address	Selects the drive MAC address Note: Used in the DeviceNet Object	Default: 0 <11> Min: 0 Max: 64
F6-51 (03C2) <10>	DN Baud Rate	DeviceNet communication speed 0: 125 kbps 1: 250 kbps 2: 500 kbps 3: Adjustable from network 4: Detect automatically Note: Used in the DeviceNet Object	Default: 0 <11> Range: 0 to 4
F6-52 (03C3) <12>	DeviceNet PCA Setting	I/O Polled Consuming Assembly data instance Note: Used in the Connection Object	Default: 21 Min: 0 Max: 255
F6-53 (03C4) <12>	DeviceNet PPA Setting	I/O Polled Producing Assembly data instance Note: Used in the Connection Object	Default: 71 Min: 0 Max: 255
F6-54 (03C5) <10>	DN Idle Flt Det	Determines what the drive should do when communication goes into idle mode. 0: Stop, drive will stop 1: Ignore, drive will continue what it was doing 2: Vendor Specific, drive will use to F6-01 to determine whether it should stop or continue 3: Run Fwd, the drive will run in the forward direction 4: Run Rev, the drive will run in the reverse direction	Default: 0 Range: 0 to 4
F6-55 (03C6)	DN BAUD RATE MEM	Displays the baud rate currently being used for network communications. F6-55 is used only as a monitor. 0: 125 kbps 1: 250 kbps 2: 500 kbps Note: Used in the DeviceNet Object	Default: 0 Range: 0 to 2

6 Related Parameters

No. (Hex.)	Name	Description	Values
F6-56 (03D7)	DeviceNet Speed Scaling	Sets the scaling factor for the Speed Monitor in the DeviceNet Object Class 2A hex Note: Used in the AC/DC Drive Object	Default: 0 Min: -15 Max: 15
F6-57 (03D8)	DeviceNet Current Scaling	Sets the scaling factor for the Output Current Monitor in the DeviceNet Object Class 2A hex Note: Used in the AC/DC Drive Object	Default: 0 Min: -15 Max: 15
F6-58 (03D9)	DeviceNet Torque Scaling	Sets the scaling factor for the Torque Monitor in the DeviceNet Object Class 2A hex Note: Used in the AC/DC Drive Object	Default: 0 Min: -15 Max: 15
F6-59 (03DA)	DeviceNet Power Scaling	Sets the scaling factor for the Power Monitor in the DeviceNet Object Class 2A hex Note: Used in the AC/DC Drive Object	Default: 0 Min: -15 Max: 15
F6-60 (03DB)	DeviceNet Voltage Scaling	Sets the scaling factor for the Voltage Monitor in the DeviceNet Object Class 2A Note: Used in the AC/DC Drive Object	Default: 0 Min: -15 Max: 15
F6-61 (03DC)	DeviceNet Time Scaling	Sets the scaling factor for the Time Monitor in the DeviceNet Object Class 2A hex Note: Used in the AC/DC Drive Object	Default: 0 Min: -15 Max: 15
F6-62 (03DD)	DeviceNet Heartbeat Interval	Sets the heartbeat interval. A setting of 0 disables the heartbeat function. Note: Used in the Identity Object	Default: 0 Min: 0 Max: 10
F6-63 (03DE)	DeviceNet Network MAC ID	Displays the MAC ID assigned to the drive. F6-63 is used only as a monitor. Note: Used in the DeviceNet Object	Default: 0 <H> Min: 0 Max: 63
F6-64 (03DF) <I>	Dynamic Out Assembly 109 Param1 (DOA109 1)	The data in configurable output 1 is written to the MEMOBUS/Modbus address defined by this parameter.	Default: 0x0000 Min: 0x0000 Max: 0xFFFF
F6-65 (03E0) <I>	Dynamic Out Assembly 109 Param2 (DOA109 2)	The data in configurable output 2 is written to the MEMOBUS/Modbus address defined by this parameter.	Default: 0x0000 Min: 0x0000 Max: 0xFFFF
F6-66 (03E1) <I>	Dynamic Out Assembly 109 Param3 (DOA109 3)	The data in configurable output 3 is written to the MEMOBUS/Modbus address defined by this parameter.	Default: 0x0000 Min: 0x0000 Max: 0xFFFF
F6-67 (03E2) <I>	Dynamic Out Assembly 109 Param4 (DOA109 4)	The data in configurable output 4 is written to the MEMOBUS/Modbus address defined by this parameter.	Default: 0x0000 Min: 0x0000 Max: 0xFFFF
F6-68 (03E3) <I>	Dynamic In Assembly 159 Param 1 (DIA159 1)	The data in configurable input 1 is read from the MEMOBUS/Modbus address defined by this parameter.	Default: 0x0000 Min: 0x0000 Max: 0xFFFF
F6-69 (03E4) <I>	Dynamic In Assembly 159 Param 2 (DIA159 2)	The data in configurable input 2 is read from the MEMOBUS/Modbus address defined by this parameter.	Default: 0x0000 Min: 0x0000 Max: 0xFFFF

6 Related Parameters

No. (Hex.)	Name	Description	Values
F6-70 (03C7) <13>	Dynamic In Assembly 159 Param 3 (DIA159 3)	The data in configurable input 3 is read from the MEMOBUS/Modbus address defined by this parameter.	Default: 0x0000 Min: 0x0000 Max: 0xFFFF
F6-71 (03C8) <13>	Dynamic In Assembly 159 Param 4 (DIA159 4)	The data in configurable input 4 is read from the MEMOBUS/Modbus address defined by this parameter.	Default: 0x0000 Min: 0x0000 Max: 0xFFFF
U6-97 (07F7)	OPT SPARE 4	Displays option software version	—
U6-98 (07F8)	First Fault	Displays previous faulted status. 0: No fault 1: Option failure 2: PLC in idle state 3: Force fault 1000: Network power loss 1001: Connection timeout 1002: Duplicate MAC ID 1003: Bus-off Note: Used in option faults	—
U6-99 (07F9)	Current Fault	Displays the most recent fault status. 0: No fault 1: Option failure 2: PLC in idle state 3: Force fault 1000: Network power loss 1001: Connection timeout 1002: Duplicate MAC ID 1003: Bus-off Note: Used in option faults	—

- <1> To start and stop the drive with the DeviceNet master device using serial communications, set b1-02 to 3 or set the Net Control bit in the assemblies or Control Supervisor Object. To control the frequency reference of the drive via the master device, set b1-01 to 3 or set the Net Reference bit in the assemblies or AC/DC object.
- <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> Supported on PRG: 1115 and later. Not available on 1000-series drives.
- <9> All MAC addresses must be unique.

<10> Cycle power for setting changes to take effect.

<11> The default setting depends on region code. Refer to [Table 8](#) on page 43 for more information.

<12> Setting unavailable values will initialize Polled Consuming Assembly (PCA) and Polled Producing Assembly (PPA).

<13> Available in the option software versions PRG: 1111 and later.

Table 8 Regional Default Setting

No.	Name	Default by Region Code Example: CIMR-V□ or GA70□	
		Code: A, B, C, D, K, T (Japan, China, Europe, India, Korea, Asia)	Code: U (The Americas)
F6-50	DeviceNet MAC Address	0	64
F6-51	DeviceNet Baud Rate	0	4
F6-63	DeviceNet Network MAC ID	0	63

7 Configuring DeviceNet Messaging

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

◆ Drive Configuration on DeviceNet

■ Polled Configuration

Configure the drive DeviceNet polled connection before receiving commands from a master device. The two parameters that must be configured are:

- F6-52: Polled Consuming Assembly (PCA)

Note: Output assembly consumed by the drive.

- F6-53: Polled Producing Assembly (PPA)

Note: Input assembly produced by the drive.

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

The PCA and PPA parameters can be accessed by two methods:

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

Note: The PCA and PPA parameters can be accessed from the “DN: Polled Config” parameter group.

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

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

One of each PCA and PPA assembly from the following table must be selected to configure the drive for polled operation.

Refer to the option Technical Manual for details on each assembly.

Table 9 Supported Polled Assemblies (PCA and PPA)

Assy Number (decimal)	Description	Type	Bytes
20	Basic Speed Control Output - 20 (0x14)	PCA	4
21	Extended Speed Control Output - 21 (0x15) (Default Setting)	PCA	4
22	Speed and Torque Control Output - 22 (0x16)	PCA	6
23	Extended Speed and Torque Control Output - 23 (0x17)	PCA	6
70	Basic Speed Control Input - 70 (0x46)	PPA	4
71	Extended Speed Control Input - 71 (0x47) (Default Setting)	PPA	4
72	Speed and Torque Control Input - 72 (0x48)	PPA	6
73	Extended Speed and Torque Control Input - 73 (0x49)	PPA	6

7 Configuring DeviceNet Messaging

Assy Number (decimal)	Description	Type	Bytes
100	MEMOBUS/Modbus Message Command (Vendor Specific Yaskawa Electric (YE) Assy) - 100 (0x64)	PCA	5
101	Standard Control (Vendor Specific Yaskawa Electric (YE) Assy) - 101 (0x65)	PCA	8
102	Accel/Decel Time (Vendor Specific Yaskawa Electric (YE) Assy) - 102 (0x66)	PCA	8
103 <1>	3-Wire Control1 (Vendor Specific Yaskawa Electric (YE) Assy) - 103 (0x67)	PCA	4
104 <1>	3-Wire Control Status1 (Vendor Specific Yaskawa Electric (YE) Assy) - 104 (0x68)	PPA	4
105	Enhanced Speed Control, Dynamic (Vendor Specific Yaskawa Electric (YE) Assy) - 105 (0x69)	PCA	8
106	Enhanced Control (Vendor Specific Yaskawa Electric (YE) Assy) - 106 (0x6A)	PCA	8
107	Standard DI/DO Control (Vendor Specific Yaskawa Electric (YE) Assy) - 107 (0x6B)	PCA	8
108	Enhanced Torque Control, Dynamic (Vendor Specific Yaskawa Electric (YE) Assy) - 108 (0x6C)	PCA	8
109 <2>	Dynamic Output Assembly (Vendor Specific Yaskawa Electric (YE) Assy) - 109 (0x6D)	PCA	8
110 <3>	3-Wire Control2 (Vendor Specific Yaskawa Electric (YE) Assy) - 110 (0x6E)	PCA	4
120	Speed Command 1 (Vendor Specific Yaskawa Electric (YE) Assy) - 120 (0x78)	PCA	4
121	Torque Command 1 (Vendor Specific Yaskawa Electric (YE) Assy) - 121 (0x79)	PCA	4
122	Speed Command 2 (Vendor Specific Yaskawa Electric (YE) Assy) - 122 (0x7A)	PCA	6
123	Torque Command 2 (Vendor Specific Yaskawa Electric (YE) Assy) - 123 (0x7B)	PCA	6
124	Speed Dynamic Assy (Vendor Specific Yaskawa Electric (YE) Assy) - 124 (0x7C)	PCA	8
125	Torque Dynamic Assy (Vendor Specific Yaskawa Electric (YE) Assy) - 125 (0x7D)	PCA	8
126	Speed/Torque Assy (Vendor Specific Yaskawa Electric (YE) Assy) - 126 (0x7E)	PCA	8
130	Speed Status (Vendor Specific Yaskawa Electric (YE) Assy) - 130 (0x82)	PPA	4
131	Current Status (Vendor Specific Yaskawa Electric (YE) Assy) - 131 (0x83)	PPA	4
132	Current & Speed Status (Vendor Specific Yaskawa Electric (YE) Assy) - 132 (0x84)	PPA	6
134	Speed Status Dynamic Assy (Vendor Specific Yaskawa Electric (YE) Assy) - 134 (0x86)	PPA	8
135	Current Status Dynamic Assy (Vendor Specific Yaskawa Electric (YE) Assy) - 135 (0x87)	PPA	8
136	Torque and Speed Status (Vendor Specific Yaskawa Electric (YE) Assy) - 136 (0x88)	PPA	8
150	MEMOBUS/Modbus Message Reply (Vendor Specific Yaskawa Electric (YE) Assy) - 150 (0x96)	PPA	5
151	Standard Status 1 (Vendor Specific Yaskawa Electric (YE) Assy) - 151 (0x97)	PPA	8
152	Standard Status 2 (Vendor Specific Yaskawa Electric (YE) Assy) - 152 (0x98)	PPA	8

7 Configuring DeviceNet Messaging

Assy Number (decimal)	Description	Type	Bytes
155	Enhanced Speed Status, Dynamic (Vendor Specific Yaskawa Electric (YE) Assy) - 155 (0x9B)	PPA	8
156	Enhanced Control Status (Vendor Specific Yaskawa Electric (YE) Assy) - 156 (0x9C)	PPA	8
157	Standard DI/DO Status (Vendor Specific Yaskawa Electric (YE) Assy) - 157 (0x9D)	PPA	8
158	Enhanced Torque Status, Dynamic (Vendor Specific Yaskawa Electric (YE) Assy) - 158 (0x9E)	PPA	8
159 <2>	Dynamic Input Assembly (Vendor Specific Yaskawa Electric (YE) Assy) - 159 (0x9F)	PPA	8
160 <2>	3-Wire Control Status2 (Vendor Specific Yaskawa Electric (YE) Assy) - 160 (0xA0)	PPA	4
199 <1>	Change of State Response (Vendor Specific Yaskawa Electric (YE) Assy) - 199 (0xC7)	PPA	8

<1> Available in option software versions PRG: 1107 and later.

<2> Available in option software versions PRG: 1111 and later.

<3> Available in option software versions PRG: 1114 and later.

◆ Drive Operation on DeviceNet

■ Polled Assemblies Quick Reference

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

Output Assemblies/Drive Consumes

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

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

Input Assemblies/Drive Produces

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

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

8 Troubleshooting

◆ Drive-Side Error Codes

Drive-side error codes appear on the drive keypad. [Table 10](#) 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 10 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.
Network power loss		The power on the DeviceNet network cable is 0. Verify power is available between option terminals V+ (red) and V- (black).
Connection timeout		<ul style="list-style-type: none">• The option Requested Packet Interval (RPI) timer timed out.• The option Expected Packet Rate (EPR) timer timed out.• Make sure that EPR time is set properly.
Duplicate MAC ID		The option MAC ID and at least one other node have the same MAC ID. Verify F6-50 is set properly. All MAC IDs must be unique.
Keypad Display		Fault Name
	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	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: PG option cards are supported by option ports CN5-B and CN5-C only.
Keypad Display		Fault Name
	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 16 .
Keypad Display		Fault Name
	oFA03, oFA04	Option Card Error (CN5-A)
		Option Card Error (CN5-A)
Cause		Possible Solutions
A fault occurred in the option.		<ol style="list-style-type: none">1. De-energize the drive.2. Make sure that the option is correctly connected to the connector.3. If the problem continues, replace the option.

8 Troubleshooting

Keypad Display		Fault Name
oFA30 to oFA43	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.		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	
	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 does 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

9 Trunk Line and Drop Line Lengths

Refer to www.odva.org for more information regarding wiring DeviceNet networks.

◆ Trunk Line

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

Table 11 Trunk Line Cable Length

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

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

- 125 kbps: $L_{\text{thick}} + (5 \times L_{\text{thin}}) \leq 500 \text{ m (1640 ft)}$
- 250 kbps: $L_{\text{thick}} + (2.5 \times L_{\text{thin}}) \leq 250 \text{ m (787 ft)}$
- 500 kbps: $L_{\text{thick}} + L_{\text{thin}} \leq 100 \text{ m (328 ft)}$

◆ Drop Line

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

Table 12 Drop Line Cable Length

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

10 European Standards



Figure 26 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.

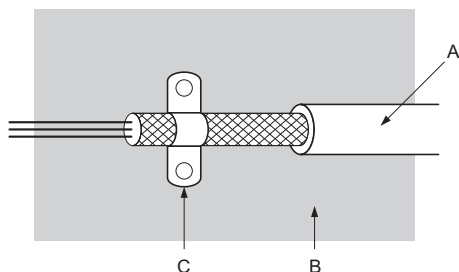
◆ EMC Guidelines Compliance

This drive 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 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 28](#).



A – Braided shield cable

C – Cable clamp (conductive)

B – Metal panel

Figure 27 Ground Area

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

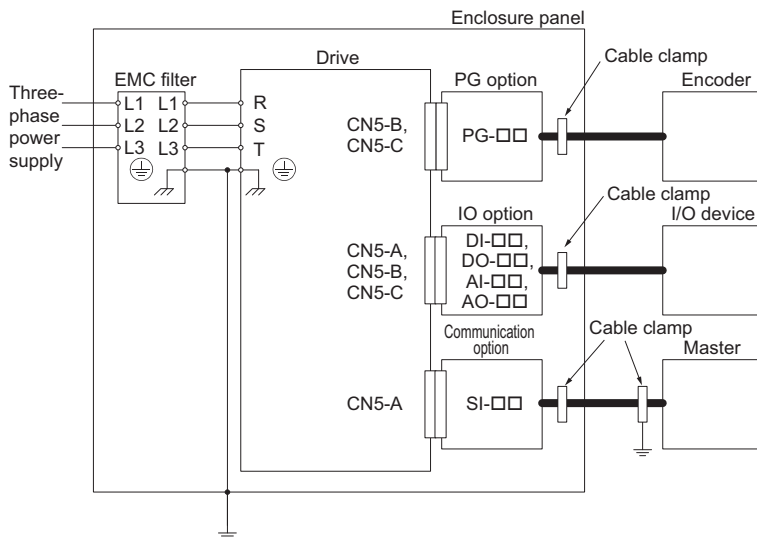


Figure 28 Option Installation for CE Compliance (PG-□□, DI-□□, DO-□□, AI-□□, AO-□□, SI-□□)

■ Option Installation for CE Compliance with GA500

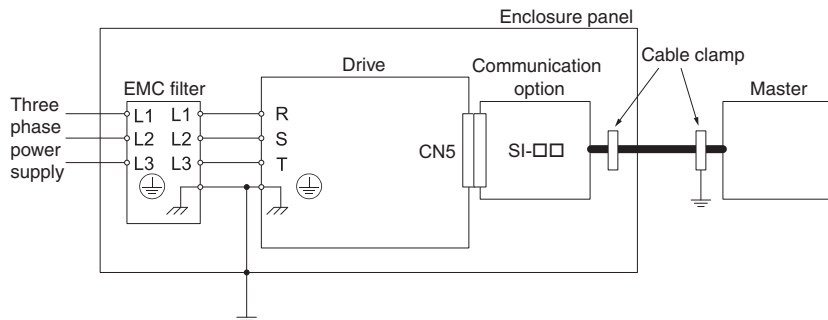


Figure 29 Option Installation for CE Compliance with GA500

11 Specifications

Table 13 Option Specifications

Items	Specifications
Model	SI-N3
SI-N3 Supported Messages	<ul style="list-style-type: none"> • Group 2 Server (UCMM capable). • Explicit Messages: Fragmentation is supported. Up to 32 bytes can be input and output. • Polled I/O Messages: Fragmentation is not supported. Up to 8 bytes can be input and output. • Faulted Node Recovery / Offline Connection Set Messages / Automatic Device Replacement (ADR). • Change of State Message (COS). COS can be used as an I/O Input Assembly.
I/O Assembly Instance	Input: 20 types (4 to 8 bytes) Output: 20 types (4 to 8 bytes)
DeviceNet Specification	Conformance Level 27: Passed
DeviceNet Profile	AC Drive
Input Power	Voltage: 11 to 25 Vdc Current: 40 mA
Connector Type	5-pin open-style screw connector
Physical Layer Type	Isolated Physical Layer CAN transceiver + photocoupler
MAC ID Setting	Programmable from drive keypad or network: MAC ID 0 to 63
Communications Speed/Baud Rate	Programmable from drive keypad or network: <ul style="list-style-type: none"> • 125/250/500 kbps • Auto Baud Rate • Idle Mode Detect • Heartbeat
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 30 WEEE Mark

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

You must discard the product at an applicable collection point for electrical and electronic equipment (EEE).

Do not discard the product with usual waste.

12 Disposal

◆ Revision History

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

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Date of publication

Date of Publication	Revision Number	Section	Revised Content
February 2019	<4>	All	Addition: Applicable product series Revision: Reviewed and corrected entire documentation.
		Chapter 12	Addition: Disposal
January 2019	<3>	All	Addition: Applicable product series Revision: Reviewed and corrected entire documentation.
		Back cover	Revision: Address
June 2017	<2>	Chapter 2	Addition: Note in Table 1
		Back cover	Revision: Address
October 2016	<1>	All	Revision: Applicable product series
		Back cover	Revision: Address
April 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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