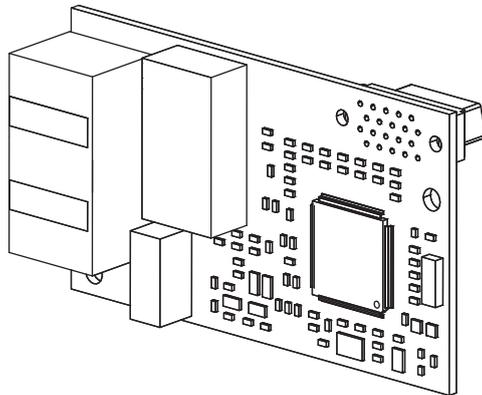


YASKAWA AC Drive 1000-Series Option EtherNet/IP Installation Manual

Type: SI-EN3D

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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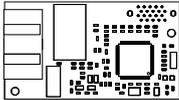
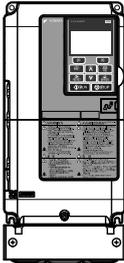
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1 Preface and Safety

Yaskawa manufactures products used as components in a wide variety of industrial systems and equipment. The selection and application of Yaskawa products remain the responsibility of the equipment manufacturer 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 systems or equipment designed to incorporate a product 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 Yaskawa 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 SI-EN3D option:

| | |
|--|--|
|  | <p>Yaskawa AC Drive 1000-Series Option SI-EN3D Dual-Port EtherNet/IP Installation Manual (TOEPYAICOM16)</p> <p>The Installation Manual contains information required to install the option and set up related drive parameters.</p> <p>Yaskawa AC Drive 1000-Series Option SI-EN3D Dual-Port EtherNet/IP Technical Manual (SIEPYAICOM16)</p> <p>The Technical Manual contains detailed information about the option. In the U.S., access http://www.yaskawa.com to obtain the Technical Manual. Customers in other areas should contact a Yaskawa representative.</p> |
|  | <p>1000-Series AC Drive Safety Precautions</p> <p>Read this manual first. This manual contains essential safety information and simplified information for the drive. This document also provides basic instructions on mechanical installation, a connection diagram, main circuit and control circuit connections, switch and jumper configuration, basic troubleshooting, standards compliance and fusing, drive specifications, and an abbreviated parameter list.</p> <p>1000-Series AC Drive Quick Start Guide</p> <p>This guide contains basic information required to install and wire the drive. It also gives an overview of fault diagnostics, maintenance, and parameter settings. The purpose of this guide is to prepare the drive for a trial run with an application and for basic operation. This manual is available for download on our documentation website, www.yaskawa.com.</p> <p>1000-Series AC Drive Technical Manual</p> <p>This manual provides detailed information on parameter settings, drive functions, and MEMOBUS/Modbus specifications. Use this manual to expand drive functionality and to take advantage of higher performance features. This manual is available for download on our documentation website, www.yaskawa.com.</p> |

◆ Terms

Note: Indicates supplemental information that is not related to safety messages.

Drive: Yaskawa 1000-Series AC Drive

Option: Yaskawa AC Drive 1000-Series SI-EN3D Dual-Port EtherNet/IP Option

◆ Registered Trademarks

- EtherNet/IP is a trademark of the ODVA.
 - All trademarks are the property of their respective owners.
-

◆ Supplemental Safety Information

Read and understand this manual before installing, operating, or servicing this option. The option must be installed according to this manual and local codes.

The following conventions are used to indicate safety messages in this manual. Failure to heed these messages could result in serious or possibly even fatal injury or damage to the products or to related equipment and systems.

DANGER

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

WARNING

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

WARNING! *may also be indicated by a bold key word embedded in the text followed by an italicized safety message.*

CAUTION

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

CAUTION! *may also be indicated by a bold key word embedded in the text followed by an italicized safety message.*

1 Preface and Safety

NOTICE

Indicates a property damage message.

NOTICE: *may also be indicated by a bold key word embedded in the text followed by an italicized safety message.*

■ General Safety

General Precautions

- The diagrams in this manual may be indicated without covers or safety shields to show details. Replace the covers or shields before operating the drive and run the drive according to the instructions described in this manual.
- Any illustrations, photographs, or examples used in this manual are provided as examples only and may not apply to all products to which this manual is applicable.
- 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.
- When ordering a new copy of the manual due to damage or loss, contact your Yaskawa representative or the nearest Yaskawa sales office and provide the manual number shown on the front cover.
- If nameplate becomes worn or damaged, order a replacement from your Yaskawa representative or the nearest Yaskawa sales office.

DANGER

Heed the safety messages in this manual.

Failure to comply will result in 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.

Electrical Shock Hazard

Do not connect or disconnect wiring while the power is on.

Failure to comply will result in death or serious injury.

Failure to comply will result in death or serious injury. Before servicing, disconnect all power to the equipment. The internal capacitor remains charged even after the power supply is turned off. The charge indicator LED will extinguish when the DC bus voltage is below 50 Vdc. To prevent electric shock, wait for at least the time specified on the warning label once all indicators are OFF, and then measure the DC bus voltage level to confirm it has reached a safe level.

NOTICE

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

Failure to comply may result in ESD damage to the drive circuitry.

Do not perform a withstand voltage test on any part of the drive.

Failure to comply could result in damage to the sensitive devices within the drive.

Do not operate damaged equipment.

Failure to comply could result in further damage to the equipment.

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

Do not expose the drive to halogen group disinfectants.

Failure to comply may cause damage to the electrical components in the drive.

Do not pack the drive in wooden materials that have been fumigated or sterilized.

Do not sterilize the entire package after the product is packed.

2 Product Overview

◆ About this Product

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

This manual explains the handling, installation and specifications of this product.

EtherNet/IP is a communications link to connect industrial devices (such as smart motor controllers, operator interfaces, and variable frequency drives) as well as control devices (such as programmable controllers and computers) to a network. EtherNet/IP is a simple, networking solution that reduces the cost and time to wire and install factory automation devices, while providing interchangeability of like components from multiple vendors.

EtherNet/IP is an open device network standard.

By installing the option to a drive, it is possible to do the following from an EtherNet/IP master device:

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



◆ Applicable Models

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

Table 1 Applicable Models

| Drive Series | Drive Model Number | Software Version <1> |
|--------------|---------------------------|----------------------|
| A1000 | CIMR-A□2A□□□□ | 1010 and later |
| | CIMR-A□4A0002□ to 4A0675□ | |
| | CIMR-A□4A0930 and 4A1200 | 301□ |
| | CIMR-A□5A□□□□ | 504□; 1017 and later |

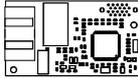
<1> See “PRG” on the drive nameplate for the software version number.

3 Receiving

Please perform the following tasks upon receipt of the option:

- Inspect the option for damage. Contact the shipper immediately if the option appears damaged upon receipt.
- Verify receipt of the correct model by checking the model number printed on the name plate of the option package.
- Contact your supplier if you have received the wrong model or the option does not function properly.

◆ Option Package Contents

| Description | Option | Ground Wire | Screws (M3) | LED Label | Installation Manual |
|-------------|---|---|---|---|---|
| – |  |  |  |  |  |
| Quantity | 1 | 1 | 3 | 1 | 1 |

◆ Tools Required for Installation

- A Phillips screwdriver (M3 metric or #1, #2 U.S. standard) is required to install the option and remove drive front covers. Screw sizes vary by drive capacity. Select a screwdriver appropriate for the drive capacity.
- Diagonal cutting pliers. (required for some drive models)
- A small file or medium grit sandpaper. (required for some drive models)

Note: Tools required to prepare the option cables for wiring are not listed in this manual.

4 Option Components

◆ SI-EN3D Dual-Port EtherNet/IP Option

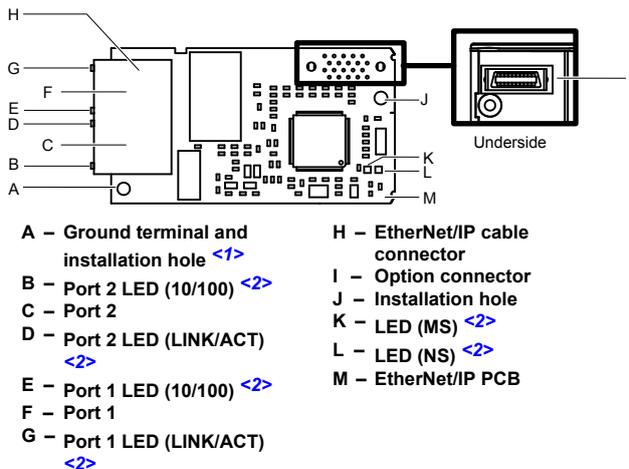


Figure 1 Option Components

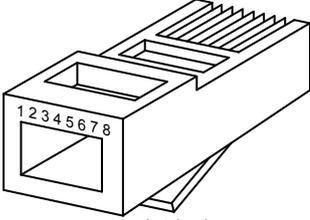
- <1> The ground wire is packaged loose in the option shipping package. Connect this ground wire during installation.
- <2> [Refer to Option LED Display on page 12](#) for details on the LEDs.

◆ Communication Connector CN1

The communication connector on the option is a modular RJ45 female connector designated CN1.

CN1 is the connection point for a customer-supplied male Ethernet network communication cable.

Table 2 Male, 8-Way Ethernet Modular Connector (Customer-Supplied)

| Male Ethernet 8-Way Modular Connector | Pin | Description |
|---|------------|-----------------------|
|  | 1 (Pair 2) | Transmit data (TXD) + |
| | 2 (Pair 2) | Transmit data (TXD) - |
| | 3 (Pair 3) | Receive data (RXD) + |
| | 4 (Pair 1) | Not used <I> |
| | 5 (Pair 1) | Not used <I> |
| | 6 (Pair 3) | Receive data (RXD) - |
| | 7 (Pair 4) | Not used <I> |
| | 8 (Pair 4) | Not used <I> |

<I> Not used for 10 Mbps and 100 Mbps networks.

◆ Option LED Display

The option has four LEDs.

Bi-color Status LEDs:

- Module status (MS) red/green
- Network status (NS) red/green

Ethernet LEDs:

- Network speed - 10/100 (MS) green
- Link status and network activity - LINK/ACT (NS) red/green

The operational states of the option LEDs after completion of the power-up diagnostic LED sequence are described in [Table 3](#). Wait at least 2 seconds for the power-up diagnostic process to complete before verifying LED states.

Table 3 Option LED States

| Name | Display | | Operating Status | Remarks |
|------|-----------|----------|-----------------------------------|---|
| | Color | Status | | |
| MS | – | OFF | Power supply OFF | Power is not being supplied to the drive. |
| | Green | ON | Normal operation | The option is operating normally and initialization is complete. |
| | Green | Flashing | Standby/Initializing | The option is in process of configuring or waiting for configuration information. |
| | Red | Flashing | Non-fatal error occurred | The option has detected a recoverable minor fault such as incomplete configuration. |
| | Red | ON | Fatal error occurred | The option has detected an unrecoverable major fault. |
| | Green/Red | Flashing | Option self-test | The option is in self-test mode. |
| NS | – | OFF | Power supply OFF | – |
| | Green | ON | Online communications established | The option is online and has established connections. |
| | Green | Flashing | Not connected | The option is online without an established connection. |
| | Red | Flashing | Minor fault | A minor recoverable fault has occurred. |
| | Red | ON | Major fault | The option detected a duplicate IP address. |
| | Green/Red | Flashing | Option self-test | The option is in self-test mode. |

| Name | Display | | Operating Status | Remarks |
|--------------|---------|----------|--|---------|
| | Color | Status | | |
| 10/100 </> | Green | OFF | 10 Mbps is established | |
| | Green | ON | 100 Mbps is established | |
| LINK/ACT </> | Green | OFF | LINK is not established | |
| | Green | ON | LINK is established | |
| | Green | Flashing | LINK is established and there is network activity. | |
| | | | | |

</> Remove the cover to check the status of the LED. Be careful not to touch the main circuit terminals or the control board in the drive.

■ Power-Up Diagnostics

An LED test is performed each time the drive is powered up. The initial boot sequence may take several seconds. After the LEDs have completed the diagnostic LED sequence, the option is successfully initialized. The LEDs then assume operational conditions as 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 | OFF | – |
| 4 | Green | Green | 250 |
| 5 | Green | Red | 250 |
| 6 | Green | OFF | – |

5 Installation Procedure

◆ Section Safety

DANGER

Electrical Shock Hazard

Do not connect or disconnect wiring while the power is on.

Failure to comply will result in death or serious injury.

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.

WARNING

Electrical Shock Hazard

Do not remove the front covers of the drive while the power is on.

Failure to comply could result in death or serious injury.

The diagrams in this section may include options and drives without covers or safety shields to show details. Be sure to reinstall covers or shields before operating any devices. The option should be used according to the instructions described in this manual.

Do not allow unqualified personnel to use equipment.

Failure to comply could result in death or serious injury.

Maintenance, inspection, and replacement of parts must be performed only by authorized personnel familiar with installation, adjustment, and maintenance of this product.

Do not touch circuit boards while the power is on.

Failure to comply could result in death or serious injury.

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

Failure to comply could result in death or serious injury.

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

Failure to comply could result in death or serious injury.

WARNING

Fire Hazard

Tighten all terminal screws to the specified tightening torque.

Loose electrical connections could result in death or serious injury by fire due to overheating of electrical connections.

NOTICE

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

Failure to comply may result in ESD damage to the drive circuitry.

Never shut the power off while the drive is outputting voltage.

Failure to comply may cause the application to operate incorrectly or damage the drive.

Do not operate damaged equipment.

Failure to comply may cause further damage to the equipment.

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

Do not use unshielded cable 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.

Failure to comply may prevent proper operation and possibly damage equipment.

Check wiring to ensure that all connections are correct after installing the option and connecting any other devices.

Failure to comply could result in damage to the option.

◆ Prior to Installing 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 drive Quick Start Guide for information on wiring and connecting the drive.

Figure 2 shows an exploded view of the drive with the option and related components for reference.

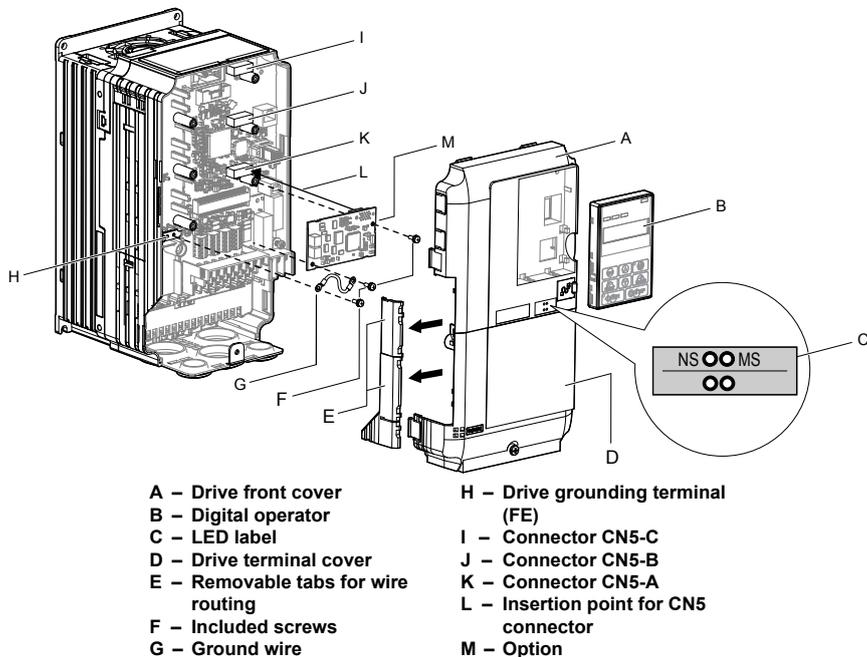


Figure 2 Drive Components with Option

◆ Installing the Option

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

DANGER! 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 digital operator (B) and front covers (A, D). Front cover removal varies by model.

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.

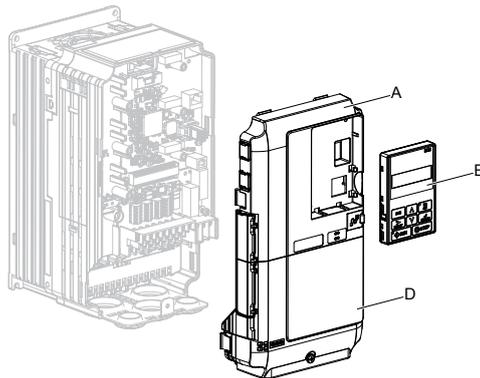


Figure 3 Remove the Front Covers and Digital Operator

2. With the front covers and digital operator removed, apply the LED label (C) in the appropriate position on the drive top front cover (A).

5 Installation Procedure

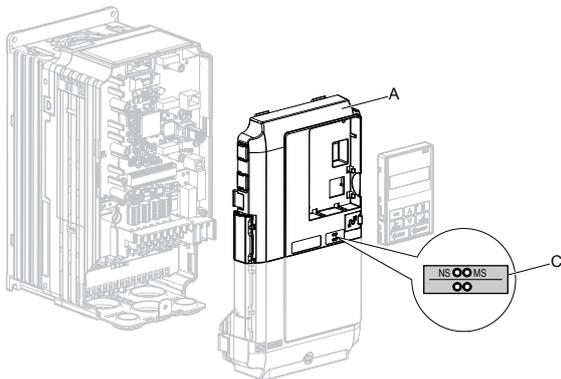


Figure 4 Apply the LED Label

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

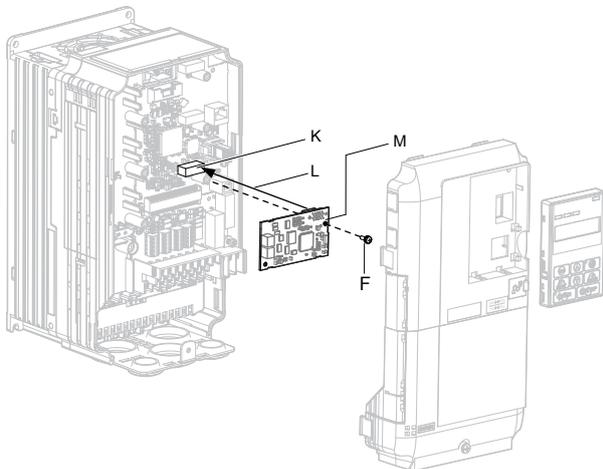


Figure 5 Insert the Option

4. Connect 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) and tighten both screws to 0.5 to 0.6 N·m (4.4 to 5.3 in lbs).

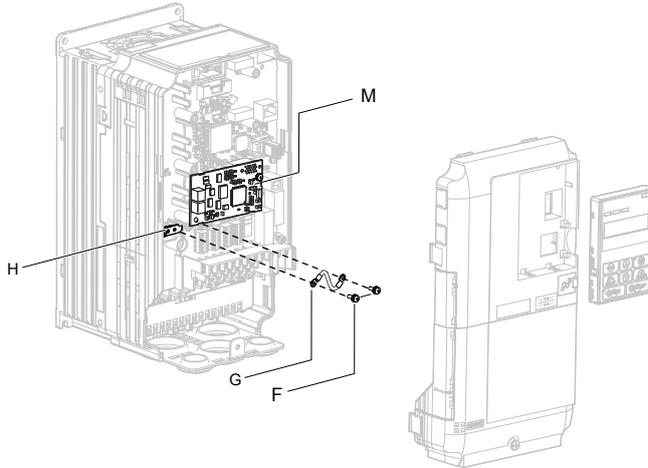


Figure 6 Connect the Ground Wire

Note: There are two screw holes on the drive for use as ground terminals. When connecting three options, two ground wires will need to share the same drive ground terminal.

5. Route the option wiring.

Depending on the drive model, some drives may require routing the wiring through the side of the front cover to the outside to provide adequate space for the wiring. Refer to the Peripheral Devices & Options section of the drive Quick Start Guide or Technical Manual for more information on wire routing of specific models.

Route the wiring through the side of the front cover to the outside. In these cases, using diagonal cutting pliers, cut out the perforated openings on the left side of the drive front cover as shown in [Figure 7-A](#). Use a file or sandpaper to make the sharp edges along the cutout smoother to prevent any damage to the wires. Route the wiring inside the enclosure as shown in [Figure 7-B](#) for drives that do not require routing through the front cover.

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

5 Installation Procedure

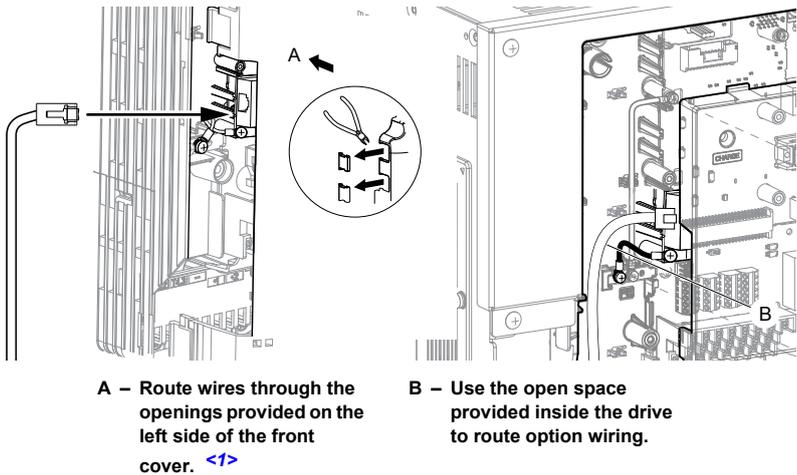


Figure 7 Wire Routing Examples

<1> The drive will not meet NEMA Type 1 requirements if wiring is exposed outside the enclosure.

6. Connect the Ethernet communication cable to the option modular connector (CN1) port 1.

To connect the option to a network, firmly connect RJ45 8-pin shielded twisted pair Cat5e cable(s) into the modular connector ports (see [Figure 7](#)).

IGMP Snooping

Switches implementing IGMP Snooping are strongly recommended. When IGMP Snooping is used, devices will only receive the multicast packets in which they are interested.

Communication Cable Specifications

Only use cable recommended for EtherNet/Industrial Protocol (EtherNet/IP™). Using a cable not specifically recommended may cause the option or drive to malfunction. Refer to the ODVA website for more information on network cabling (<http://www.odva.org>).

The dual RJ45 network ports on the option board act as a switch to allow for flexibility in cabling topology. For example, a traditional star network topology may be employed by using a single port on the option board. Alternatively, a daisy-chained approach may be employed by using both RJ45 ports. The daisy-chained approach reduces the requirements of central switch ports. A ring topology is also possible.

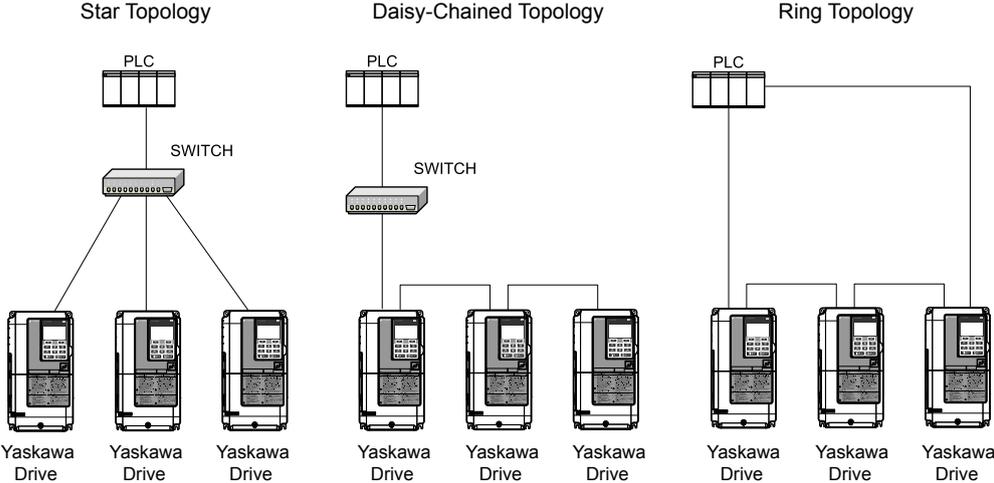


Figure 8 Topology Options

5 Installation Procedure

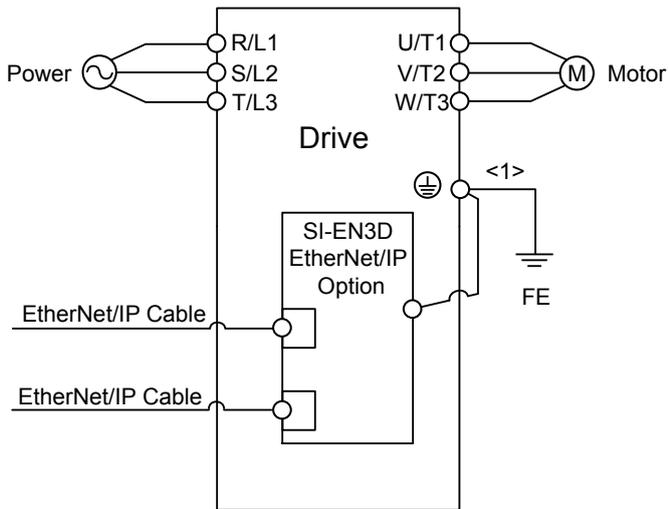


Figure 9 Option Connection Diagram

7. Use the second communication cable port to daisy chain a series of drives where applicable.
8. Replace and secure the front covers of the drive (A, D) and replace the digital operator (B).

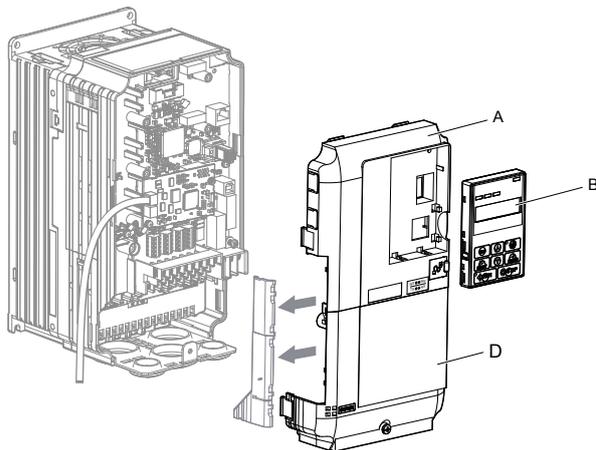


Figure 10 Replace the Front Covers and Digital Operator

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.

9. Set drive parameters in [Table 5](#) for proper option performance.

◆ EDS Files

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

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

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

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

Other areas: Contact a Yaskawa representative.

Note: Download the option EDS file. The option will not function as a slave in the network without the appropriate EDS file.

6 Related Drive Parameters

The following parameters are used to set up the drive for operation with the option. Parameter setting instructions can be found in the drive manual.

Confirm proper setting of the parameters in [Table 5](#) before starting network communications. After changing parameter settings, cycle power to the drive for the new settings to take effect.

Table 5 Related Parameters

| No. (Addr. Hex) | Name | Description | Values |
|------------------------|--|--|-----------------------------|
| b1-01 (0180) </> | Frequency Reference Selection 1 | 0: Digital operator 1: Analog input terminals 2: MEMOBUS/Modbus communications 3: Option PCB 4: Pulse input (terminal RP) | Default: 1 Range: 0 to 4 |
| b1-02 (0181) </> | Run Command Selection 1 | 0: Digital operator 1: Digital input terminals 2: MEMOBUS/Modbus communications 3: Option PCB | Default: 1 Range: 0 to 3 |
| F6-01 (03A2) | Communications Error Operation Selection | 0: Ramp to stop. Decelerate to stop using the deceleration time in C1-02. 1: Coast to stop 2: Fast Stop. Decelerate to stop using the deceleration time in C1-09. 3: Alarm only </> | Default: 1 Range: 0 to 3 |
| F6-02 (03A3) | External Fault from Comm. Option Detection Selection | 1: Detection during run only | Default: 0 Range: 0, 1 |
| F6-03 (03A4) | External Fault from Comm. Option Operation Selection | 0: Ramp to stop. Decelerate to stop using the deceleration time in C1-02. 1: Coast to stop 2: Fast Stop. Decelerate to stop using the deceleration time in C1-09. 3: Alarm only </> | Default: 1 Range: 0 to 3 |
| F6-06 (03A7) </> | Torque Reference/Torque Limit Selection from Comm. Option | 0: Disabled. Torque reference/limit from option board disabled. 1: Enabled. Torque reference/limit from option board enabled. </> | Default: 0 Range: 0, 1 |
| F6-07 (03A8) | Multi-Step Speed Enable/Disable Selection when NefRef/ComRef is Selected | 0: Multi-step reference disabled (same as F7) 1: Multi-step reference enabled (same as V7) | Default: 0 Range: 0, 1 |
| F6-08 (036A) </> | Reset Communication Parameters | 0: Communication-related parameters (F6-□□/F7-□□) are not reset when the drive is initialized using A1-03. 1: Reset all communication-related parameters (F6-□□/F7-□□) when the drive is initialized using A1-03. | Default: 0 Range: 0, 1 |

6 Related Drive Parameters

| No. (Addr. Hex) | Name | Description | Values |
|---------------------|-------------------------|---|---------------------------------|
| F6-14 (03BB) | bUS Error Auto Reset | 0: Disabled 1: Enabled | Default: 0 Range: 0, 1 |
| F7-01 (03E5) <6> | IP Address 1 | Sets the most significant octet of network static IP address. | Default: 192 Range: 0 to 255 |
| F7-02 (03E6) <6> | IP Address 2 | Sets the second most significant octet of network static IP address. | Default: 168 Range: 0 to 255 |
| F7-03 (03E7) <6> | IP Address 3 | Sets the third most significant octet of network static IP address. | Default: 1 Range: 0 to 255 |
| F7-04 (03E8) <6> | IP Address 4 | Sets the fourth most significant octet of network static IP address. | Default: 20 Range: 0 to 255 |
| F7-05 (03E9) | Subnet Mask 1 | Sets the most significant octet of network static Subnet Mask. | Default: 255 Range: 0 to 255 |
| F7-06 (03EA) | Subnet Mask 2 | Sets the second most significant octet of network static Subnet Mask. | Default: 255 Range: 0 to 255 |
| F7-07 (03EB) | Subnet Mask 3 | Sets the third most significant octet of network static Subnet Mask. | Default: 255 Range: 0 to 255 |
| F7-08 (03EC) | Subnet Mask 4 | Sets the fourth most significant octet of network static Subnet Mask. | Default: 0 Range: 0 to 255 |
| F7-09 (03ED) | Gateway Address 1 | Sets the most significant octet of network Gateway address. | Default: 192 Range: 0 to 255 |
| F7-10 (03EE) | Gateway Address 2 | Sets the second most significant octet of network Gateway address. | Default: 168 Range: 0 to 255 |
| F7-11 (03EF) | Gateway Address 3 | Sets the third most significant octet of network Gateway address. | Default: 1 Range: 0 to 255 |
| F7-12 (03E0) | Gateway Address 4 | Sets the fourth most significant octet of network Gateway address. | Default: 1 Range: 0 to 255 |
| F7-13 (03F1) | Address Mode at Startup | Select the option address setting method 0: Static <7> 1: BOOTP 2: DHCP | Default: 2 Range: 0 to 2 |
| F7-14 (03F2) | Duplex Mode Selection | Selects duplex mode setting. 0: Half duplex forced <8> 1: Auto-negotiate duplex mode and communication speed 2: Full duplex forced <8> 3: Half (port 1)/Auto (port 2) 4: Half (Port 1)/Full (port 2) 5: Auto (port 1)/Half (port 2) 6: Auto (port 1)/Full (port 2) 7: Full (port 1)/Half (port 2) 8: Full (port 1)/Auto (port 2) | Default: 1 Range: 0 to 8 <9> |

6 Related Drive Parameters

| No. (Addr. Hex) | Name | Description | Values |
|-------------------------------|------------------------------------|--|---|
| F7-15 (03F3) | Communication Speed Selection | Sets the communication speed 10: 10 Mbps 100: 100 Mbps 101: 10 (Port 1)/100 Mbps (port 2) 102: 100 (Port 1)/10 Mbps (port 2) | Default: 10 Range: 10; 100 to 102 <10> |
| F7-16 (03F4) | Communication Loss Timeout | Sets the timeout value for communication loss detection in tenths of a second. A value of 0 disables the connection timeout. Example: An entered value of 100 represents 10.0 seconds. | Default: 0.0 Min.: 0.0 Max.: 30.0 |
| F7-17 (03F5) | EtherNet/IP Speed Scaling Factor | Sets the scaling factor for the speed monitor in EtherNet/IP Class ID 2AH Object. | Default: 0 Min.: -15 Max.: 15 |
| F7-18 (03F6) | EtherNet/IP Current Scaling Factor | Sets the scaling factor for the output current monitor in EtherNet/IP Class ID 2AH Object. | Default: 0 Min.: -15 Max.: 15 |
| F7-19 (03F7) | EtherNet/IP Torque Scaling Factor | Sets the scaling factor for the torque monitor in EtherNet/IP Class ID 2AH Object. | Default: 0 Min.: -15 Max.: 15 |
| F7-20 (03F8) | EtherNet/IP Power Scaling Factor | Sets the scaling factor for the power monitor in EtherNet/IP Class ID 2AH Object. | Default: 0 Min.: -15 Max.: 15 |
| F7-21 (03F9) | EtherNet/IP Voltage Scaling Factor | Sets the scaling factor for the voltage monitor in EtherNet/IP Class ID 2AH Object. | Default: 0 Min.: -15 Max.: 15 |
| F7-22 (03FA) | EtherNet/IP Time Scaling | Sets the scaling factor for the time monitor in EtherNet/IP Class ID 2AH Object. | Default: 0 Min.: -15 Max.: 15 |
| F7-23 to F7-32 (03FB to 0374) | Dynamic Output Assembly Parameters | Parameters used in Output Assembly 116. Each parameter contains a MEMOBUS/Modbus address. The value received for Output Assembly 116 will be written to this corresponding MEMOBUS/Modbus address. A MEMOBUS/Modbus address value of 0 means that the value received for Output Assembly 116 will not be written to any MEMOBUS/Modbus register. | Default: 0 |
| F7-33 to F7-42 (0375 to 037E) | Dynamic Input Assembly Parameters | Parameters used in Input Assembly 166. Each parameter contains a MEMOBUS/Modbus address. The value sent for Input Assembly 166 will be read from this corresponding MEMOBUS/Modbus address. A MEMOBUS/Modbus address value of 0 means that the value sent for Input Assembly 166 is not defined by the user, therefore the option default register value will be returned. | Default: 0 |

- <1> To start and stop the drive with the EtherNet/IP 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 drive 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> When set to 3, the drive will continue to operate when a fault is detected. Take safety measures, such as installing an emergency stop switch.

6 Related Drive Parameters

- <3> Enabled in CLV, AOLV/PM, and CLV/PM control modes (A1-02 = 3, 6, or 7). When enabled, d5-01 determines whether the value is read as the Torque Limit value (d5-01 = 0) or read as the Torque Reference value (d5-01 = 1). In CLV/PM, this value is read as the Torque Limit.
- <4> The setting specifies that the Torque Reference or Torque Limit is to be provided via network communications (F6-06 = 1). The motor may rotate if no torque reference or Torque Limit is supplied from the PLC.
- <5> Parameter setting value is not reset to the default value when the drive is initialized.
- <6> Cycle power for setting changes to take effect.
- <7> When F7-13 is set to 0, parameters F7-01 to F7-12 must be set, and all IP Addresses (as defined with parameters F7-01 to F7-04) must be unique.
- <8> When F7-14 is set to 0 or 2, parameter F7-15 must be set.
- <9> Setting range differs depending on drive software version. PRG: 1020 and earlier, Range: 0 to 2
PRG: 1021 and later, Range: 0 to 8
- <10> Setting range differs depending on drive software version. PRG: 1020 and earlier, Range: 10, 100
PRG: 1021 and later, Range: 10; 100 to 102

Table 6 Option Monitors

| No. | Name | Description | Value Range |
|----------------------|-------------------|---|------------------------------|
| U6-80 to U6-83 | Online IP Address | IP Address currently available; U6-80 is the most significant octet | 0 to 255 |
| U6-84 to U6-87 | Online Subnet | Subnet currently available; U6-84 is the most significant octet | 0 to 255 |
| U6-88 to U6-91 | Online Gateway | Gateway currently available; U6-88 is the most significant octet | 0 to 255 |
| U6-92 | Online Speed | Link Speed | 10: 10 Mbps 100: 100 Mbps |
| U6-93 | Online Duplex | Duplex Setting | 0: Half, 1: Full |
| U6-94 | Port 2 Duplex | Port 2 Duplex Setting | 0: Half, 1: Full |
| U6-95 | Port 2 Speed | Port 2 Link Speed | 10: 10 Mbps 100: 100 Mbps |
| U6-98 | First Fault | First Option Fault | – |
| U6-99 | Current Fault | Current Option Fault | – |

7 Configuring Messaging

This section provides information on methods used to control the drive with the option installed.

◆ Drive Polled Configuration

The assemblies in [Table 7](#) are available for polled I/O:

Table 7 Supported Polled I/O Assemblies

| Assembly Number (Hex) | Description | Type | Bytes | Page |
|-----------------------|---|--------|-------|--------------------|
| 20 (14) | Basic Speed Control Output | Output | 4 | 29 |
| 21 (15) | Extended Speed Control Output | Output | 4 | 30 |
| 22 (16) | Speed and Torque Control Output | Output | 6 | – |
| 23 (17) | Extended Speed and Torque Control Output | Output | 6 | – |
| 70 (46) | Basic Speed Control Input | Input | 4 | 31 |
| 71 (47) | Extended Speed Control Input | Input | 4 | 32 |
| 72 (48) | Speed and Torque Control Input | Input | 6 | – |
| 73 (49) | Extended Speed and Torque Control Input | Input | 6 | – |
| 100 (64) | (Vendor Specific Yaskawa Electric (YE) Assy)-MEMOBUS/Modbus Message Output | Output | 5 | – |
| 101 (65) | (Vendor Specific Yaskawa Electric (YE) Assy)-Speed/Torque Control Output | Output | 8 | – |
| 115 (73) | (Vendor Specific Yaskawa Electric (YE) Assy)-Extended Speed/Torque Control Output | Output | 40 | – |
| 116 (74) | (Vendor Specific Yaskawa Electric (YE) Assy)-High Speed/Torque Control Output | Output | 44 | – |
| 150 (96) | (Vendor Specific Yaskawa Electric (YE) Assy)-MEMOBUS/Modbus Message Input | Input | 5 | – |
| 151 (97) | (Vendor Specific Yaskawa Electric (YE) Assy)-Speed/Torque Status Input | Input | 8 | – |
| 155 (9B) | (Vendor Specific Yaskawa Electric (YE) Assy)- Extended Speed/ Torque Status Input | Input | 40 | – |
| 166 (A6) | (Vendor Specific Yaskawa Electric (YE) Assy)-High Speed/Torque Status Input | Input | 44 | – |

8 Output Assemblies (Drive Consumes)

Note: The convention in this manual is from the PLC perspective. As such, an assembly is called an “Output Assembly” when outputted from the PLC and received by this node. This section details “Output Assemblies” that are “Consumed” by this drive.

◆ Basic Speed Control Output - 20 (0x14)

| Output Instance | Word | Byte | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 | |
|-----------------|------|------|-----------------------------|-------|-------|-------|-------|-------------|-------|---------|--|
| 20 | 0 | 0 | – | – | – | – | – | Fault Reset | – | Run Fwd | |
| | | 1 | – | | | | | | | | |
| | 1 | 2 | Speed Reference (Low Byte) | | | | | | | | |
| | | 3 | Speed Reference (High Byte) | | | | | | | | |

| Name | Description |
|-----------------|--|
| Run Fwd | Forward Run Command 0: Stop 1: Forward Run |
| Fault Reset | Fault Reset (0 to 1 transition: Fault Reset) |
| Speed Reference | Speed Command Sets drive speed reference. Speed reference data: Frequency reference/2 ^{SS} (SS: Speed scale) Setting range: 0 to 0xFFFF Example: setting a reference of 4096 with a speed scale of 2: Speed reference data = 4096/2 ² = 1024 = 0x0400 Hex or 10.24 Hz Unit depends on o1-03. |

8 Output Assemblies (Drive Consumes)

◆ Extended Speed Control Output - 21 (0x15)

| Output Instance | Word | Byte | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 | |
|-----------------|------|------|-----------------------------|--------|---------|-------|-------|-------------|---------|---------|--|
| 21 | 0 | 0 | – | NetRef | NetCtrl | – | – | Fault Reset | Run Rev | Run Fwd | |
| | | 1 | – | | | | | | | | |
| | 1 | 2 | Speed Reference (Low Byte) | | | | | | | | |
| | | 3 | Speed Reference (High Byte) | | | | | | | | |

| Name | Description |
|-----------------|---|
| Run Fwd | Forward Run Command 0: Stop 1: Forward Run |
| Run Rev | Reverse Run Command 0: Stop 1: Reverse Run |
| Fault Reset | Fault Reset (0 to 1 transition: Fault Reset) |
| NetCtrl | Run command from Network 0: Depends on b1-02 1: Enables the run command from network |
| NetRef | Speed reference from Network 0: Depends on b1-01 1: Enables the speed reference from network |
| Speed Reference | Speed Command Sets drive speed reference. Speed reference data: Frequency reference/ 2^{SS} (SS: Speed scale) Setting range: 0 to 0xFFFF Example: setting a reference of 4096 with a speed scale of 2: Speed reference data = $4096/2^2 = 1024 = 0x0400$ Hex Unit depends on o1-03. |

9 Input Assemblies (Drive Produces)

Note: The convention in this manual is from the PLC perspective. An “Input Assembly” is outputted from this node and read by the PLC. This section details “Input Assemblies” that are “Produced” by this drive.

◆ Basic Speed Control Input - 70 (0x46)

| Input Instance | Word | Byte | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 | |
|----------------|------|------|--------------------------|-------|-------|-------|-------|-----------------|-------|---------|--|
| 70 | 0 | 0 | – | – | – | – | – | Running 1 (FWD) | – | Faulted | |
| | | 1 | – | | | | | | | | |
| | 1 | 2 | Speed Actual (Low Byte) | | | | | | | | |
| | | 3 | Speed Actual (High Byte) | | | | | | | | |

| Name | Description |
|-----------------|---|
| Faulted | Faulted 0: No Faults Occurred 1: Fault Occurred |
| Running 1 (FWD) | Forward Running 0: Stop or Reverse Running 1: Forward Running |
| Speed Actual | Actual Drive Speed Monitors drive output frequency. Speed actual data: Output frequency x 2 ^{SS} (SS: Speed scale) Setting range: 0 to 0xFFFF For example, when output frequency of 1024 with a speed scale of 2: Speed actual data = 1024 x 2 ² = 4096 = 0x1000 Unit depends on o1-03. |

9 Input Assemblies (Drive Produces)

◆ Extended Speed Control Input - 71 (0x47)

| Input Instance | Word | Byte | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 | |
|----------------|------|------|--------------------------|--------------|---------------|-------|-----------------|-----------------|---------|---------|--|
| 71 | 0 | 0 | At Speed | Ref from Net | Ctrl from Net | Ready | Running 2 (REV) | Running 1 (FWD) | Warning | Faulted | |
| | | 1 | Drive State | | | | | | | | |
| | 1 | 2 | Speed Actual (Low Byte) | | | | | | | | |
| | | 3 | Speed Actual (High Byte) | | | | | | | | |

| Name | Description |
|-----------------|---|
| Faulted | Faulted 0: No Faults Occurred 1: Fault Occurred |
| Warning | Warning 0: No Warning Occurred 1: Warning Occurred |
| Running 1 (FWD) | Forward Running 0: Stop or Reverse Running 1: Forward Running |
| Running 2 (REV) | Reverse Running 0: Stop or Forward Running 1: Reverse Running |
| Ready | Drive Ready 0: Not Ready 1: Ready |
| Ctrl from Net | Status of Run command from Network 0: Run command is not from network 1: Run command is from network |
| Ref from Net | Status of Speed reference from Network 0: Speed reference is not from network 1: Speed reference is from network |
| At Speed | Speed Agree 0: No Speed Agree 1: Speed actual at speed reference |
| Drive State | Contains the value from the Control Supervisor (Class 0x29) Instance 1 Attribute 6. |
| Speed Actual | Actual Drive Speed Monitors drive output frequency. Speed actual data: Output frequency x 2 ^{SS} (SS: Speed scale) Setting range: 0 to 0xFFFF For example, when output frequency of 1024 with a speed scale of 2: Speed actual data = 1024 x 2 ² = 4096 = 0x1000 Unit depends on o1-03. |

10 Device Level Ring (DLR) General Class Object

Device Level Ring (DLR) is a layer 2 protocol allowing for redundancy in EtherNet/IP based ring topology networks. DLR allows devices to be placed in a ring to reduce the need for switch hardware and cabling and allow for the detection and recovery of faults in the ring.

Refer to the option Technical Manual for more information on DLR.

Note: DLR is supported in option software versions VST800341 and later.

11 Web Interface

The option contains a series of web pages that allow for viewing of status and diagnostic information through a standard web browser.

The web page is accessed through a self-contained web server at port 80. Access the home page by typing the IP address of the option in a web browser. Example: "http://192.168.1.20"

The IP address of the option can be read using monitors U6-80 to U6-83 on the digital operator if it is unknown. *Refer to Option Monitors on page 27* for details.

The home page is an HTML-based page providing basic drive and option data and a link to an enhanced web page requiring a Java© enabled web browser.

Enhanced Web Page Notes:

- The Enhanced Web Pages use a series of Java© applets.
- PCs must have Java SE 6 Update 14 or later installed to view the enhanced web pages.
- The Java© applets require an internet connection to check the revocation status.
- When no internet connection is available, disable the revocation check by changing a Java setting in the PC: All Programs / Java / Configure Java / Advanced Tab. Set "Perform certificate checks on" to "Do not check".

| Enhanced Web Page Tab | Page |
|--------------------------|---|
| Main Tab | 36 |
| Drive Status Tab | 37 |
| Network Tab | Refer to the option Technical Manual for details on this tab. |
| Email Alerts Tab | Refer to the option Technical Manual for details on this tab. |
| Parameter Access Tab </> | Refer to the option Technical Manual for details on this tab. |
| Configuration Tab </> | Refer to the option Technical Manual for details on this tab. |
| Custom Tab | 38 |

</> Accessible after entering a valid password.

◆ HTML Home Page

The HTML home page provides basic drive and option data and a link to an enhanced web page.



Refresh the page to update values.

| Device Information | Network Status |
|--------------------------------------|--------------------------|
| Protocol EtherNet/IP | Msg Tx OK 247 |
| IP Address 192.168.1.20 | Msg Rx Ok 453 |
| MAC ID 00.20.B5.88.27.E8 | Msg Tx Dropped 0 |
| Serial Number 121001384 | Msg Rx Dropped 0 |
| Product Name SI-EN3D | Msg Tx Errors 1 |
| Option Firmware Version VST800340 | Msg Rx Errors 1 |
| Drive Model CIMR-AU2A0004 | Current Connections 0 |
| Drive Firmware Version 1015 | Collisions 0 |
| Profinet Station Name N/A | Tx Retry 0 |

[Launch Enhanced Website](#)

To run the "Enhanced Website" Java @ must be enabled in your browser. If a connection to the Internet is not available, a change in the Java configuration is required: set "All Programs / Java / Configure Java / Advanced Tab / Perform certificate checks on" to "Do not check"

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Figure 11 HTML Home Page

◆ Main Tab

The Main tab shows basic option information such as IP address, MAC address, and firmware version.

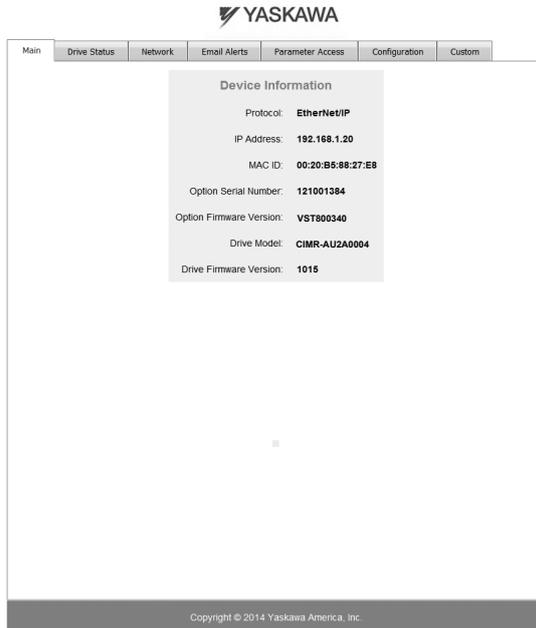


Figure 12 Main Tab View

◆ Drive Status Tab

The Drive Status tab shows basic I/O information and drive state information.

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| Main | Drive Status | Network | Email Alerts | Parameter Access | Configuration | Custom | | | | | | |
|---|--|--|--------------|------------------|---------------|--------|--|--|--|---|---|--|
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; padding: 5px;"> <p style="text-align: center;">Drive Status</p> <p>Status: Ready</p> <p>State: Stopped</p> <p>Direction: Forward</p> <p>Motor Speed: 0.0 Hz</p> </td> <td style="width: 33%; padding: 5px;"> <p style="text-align: center;">Drive Signals</p> <p>Frequency Ref: 0.0 Hz</p> <p>Output Frequency: 0.0 Hz</p> <p>Output Current: 0.0 A</p> <p>DC Bus Voltage: 342 V</p> <p>Torque Reference: +0%</p> </td> <td style="width: 33%; padding: 5px;"> <p style="text-align: center;">Fault Information</p> <p>Active: None</p> </td> </tr> <tr> <td style="padding: 5px;"> <p style="text-align: center;">Multi-function Inputs</p> <p>Terminal S1: OFF</p> <p>Terminal S2: OFF</p> <p>Terminal S3: OFF</p> <p>Terminal S4: OFF</p> <p>Terminal S5: OFF</p> <p>Terminal S6: OFF</p> <p>Terminal S7: OFF</p> <p>Terminal S8: OFF</p> </td> <td style="padding: 5px;"> <p style="text-align: center;">Multi-function Outputs</p> <p>Output M1 - M2: OFF</p> <p>Output M3 - M4: ON</p> <p>Output M5 - M6: OFF</p> </td> <td style="padding: 5px;"> <p style="text-align: center;">Analog Input Signals</p> <p>Input Terminal A1: 0%</p> <p>Input Terminal A2: 0%</p> <p>Input Terminal A3: 0%</p> </td> </tr> </table> | | | | | | | <p style="text-align: center;">Drive Status</p> <p>Status: Ready</p> <p>State: Stopped</p> <p>Direction: Forward</p> <p>Motor Speed: 0.0 Hz</p> | <p style="text-align: center;">Drive Signals</p> <p>Frequency Ref: 0.0 Hz</p> <p>Output Frequency: 0.0 Hz</p> <p>Output Current: 0.0 A</p> <p>DC Bus Voltage: 342 V</p> <p>Torque Reference: +0%</p> | <p style="text-align: center;">Fault Information</p> <p>Active: None</p> | <p style="text-align: center;">Multi-function Inputs</p> <p>Terminal S1: OFF</p> <p>Terminal S2: OFF</p> <p>Terminal S3: OFF</p> <p>Terminal S4: OFF</p> <p>Terminal S5: OFF</p> <p>Terminal S6: OFF</p> <p>Terminal S7: OFF</p> <p>Terminal S8: OFF</p> | <p style="text-align: center;">Multi-function Outputs</p> <p>Output M1 - M2: OFF</p> <p>Output M3 - M4: ON</p> <p>Output M5 - M6: OFF</p> | <p style="text-align: center;">Analog Input Signals</p> <p>Input Terminal A1: 0%</p> <p>Input Terminal A2: 0%</p> <p>Input Terminal A3: 0%</p> |
| <p style="text-align: center;">Drive Status</p> <p>Status: Ready</p> <p>State: Stopped</p> <p>Direction: Forward</p> <p>Motor Speed: 0.0 Hz</p> | <p style="text-align: center;">Drive Signals</p> <p>Frequency Ref: 0.0 Hz</p> <p>Output Frequency: 0.0 Hz</p> <p>Output Current: 0.0 A</p> <p>DC Bus Voltage: 342 V</p> <p>Torque Reference: +0%</p> | <p style="text-align: center;">Fault Information</p> <p>Active: None</p> | | | | | | | | | | |
| <p style="text-align: center;">Multi-function Inputs</p> <p>Terminal S1: OFF</p> <p>Terminal S2: OFF</p> <p>Terminal S3: OFF</p> <p>Terminal S4: OFF</p> <p>Terminal S5: OFF</p> <p>Terminal S6: OFF</p> <p>Terminal S7: OFF</p> <p>Terminal S8: OFF</p> | <p style="text-align: center;">Multi-function Outputs</p> <p>Output M1 - M2: OFF</p> <p>Output M3 - M4: ON</p> <p>Output M5 - M6: OFF</p> | <p style="text-align: center;">Analog Input Signals</p> <p>Input Terminal A1: 0%</p> <p>Input Terminal A2: 0%</p> <p>Input Terminal A3: 0%</p> | | | | | | | | | | |
| <small>Copyright © 2014 Yaskawa America, Inc.</small> | | | | | | | | | | | | |

Figure 13 Drive Status Tab View

◆ Custom Tab

The Custom tab displays a selection of quick setting parameters.

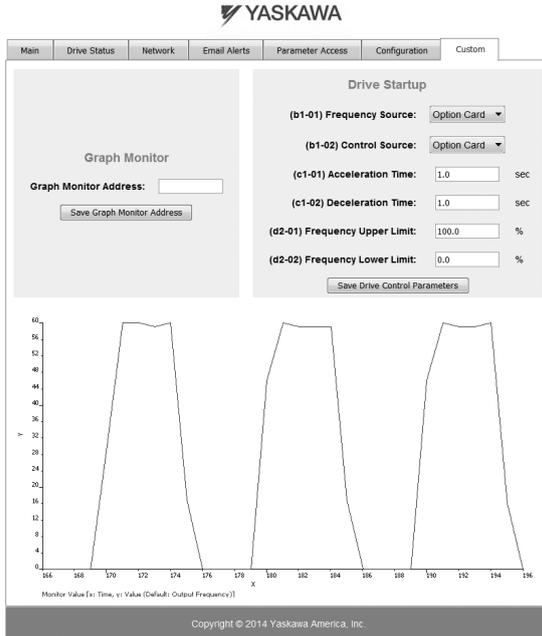


Figure 14 Custom Tab View

12 Troubleshooting

◆ Drive-Side Error Codes

Drive-side error codes appear on the drive digital operator. Causes of the errors and corrective actions are listed below. Refer to the drive manual for additional error codes that may appear on the drive digital operator.

■ Faults

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

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

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

| Digital Operator Display | | Fault Name |
|---|-----|---|
| <i>bUS</i> | bUS | Option Communication Error |
| | | <ul style="list-style-type: none"> • The connection was lost after establishing initial communication. • Only detected when the Run command or frequency reference is assigned to the option (b1-01 = 3 or b1-02 = 3). |
| Cause | | Possible Solution |
| Master controller (PLC) has stopped communicating | | <ul style="list-style-type: none"> • Check that power is supplied to the PLC • Check that PLC is not in program mode |
| Communication cable is not connected properly | | <ul style="list-style-type: none"> • Check for faulty wiring • Correct any wiring problems |
| A data error occurred due to noise | | <ul style="list-style-type: none"> • Check the various options available to minimize the effects of noise • 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 • Make sure the cable used meets requirements • Make sure the option ground wire is connected between option FE terminal and the drive ground terminal connected to earth ground |
| Option is damaged | | If there are no problems with the wiring and the error continues to occur, replace the option. |

12 Troubleshooting

| Digital Operator Display | | Fault Name |
|---|-----|--|
| | EF0 | Option Card External Fault The alarm function for an external device has been triggered. |
| Cause | | Possible Solutions |
| An external fault was received from the PLC and F6-03 is set to a value other than 3. | | <ul style="list-style-type: none"> Remove the cause of the external fault. Remove the external fault input from the PLC. |
| Problem with the PLC program | | Check the PLC program and correct problems. |

| Digital Operator Display | | Fault Name |
|--------------------------|-------|---|
| | oFA00 | Option Card Connection Error at Option Port CN5-A Option compatibility error |
| Cause | | Possible Solution |

| Digital Operator Display | | Fault Name |
|--|-------|---|
| | oFA01 | Option Card Fault at Option Port CN5-A Option not properly connected |
| Cause | | Possible Solution |
| The option card connection to port CN5-A is faulty | | <ul style="list-style-type: none"> Turn off the power and reconnect the option card. Check if the option card is properly plugged into the option port. Make sure the card is fixed properly. If the option is not a communication option card, try to use the card in a different option port. If the option card works properly in a different option port, CN5-A is damaged, and the drive requires replacement. If the error persists (oFb01 or oFC01 occur), replace the option card. |

| Digital Operator Display | | Fault Name |
|------------------------------------|----------------|--|
| | oFA03 to oFA06 | Option Card Error Occurred at Option Port CN5-A |
| | oFA10, oFA11 | |
| | oFA12 to oFA17 | Option Card Connection Error (CN5-A) |
| | oFA30 to oFA43 | Communication Option Card Connection Error (CN5-A) |
| Cause | | Possible Solution |
| Option card or hardware is damaged | | <ul style="list-style-type: none"> Cycle power to the drive. If the problem continues, replace the control board or the entire drive. Contact Yaskawa or a Yaskawa representative for instructions on replacing the control board. |

| Digital Operator Display | | Fault Name |
|--|-------|--|
| oFb00 | oFb00 | Option Card Fault at Option Port CN5-B |
| | | Option compatibility error |
| Cause | | Possible Solution |
| The option card installed into port CN5-B is incompatible with the drive | | Confirm that the drive supports the option card to be installed. Refer to Option Compatibility on page 45 for details. Contact Yaskawa for assistance. |
| A communication option card has been installed in option port CN5-B | | Communication option cards are only supported by option port CN5-A. It is not possible to install more than one communication option. |

| Digital Operator Display | | Fault Name |
|---|-------|---|
| oFb02 | oFb02 | Option Card Fault at Option Port CN5-B |
| | | Same type of option card is currently connected |
| Cause | | Possible Solution |
| An option card of the same type is already installed in option port CN5-A | | Except for PG options, only one of each option card type can only be installed simultaneously. Make sure only one type of option card is connected. Refer to Option Compatibility on page 45 for details. Contact Yaskawa for assistance. |
| An input option card is already installed in option port CN5-A | | Install a communication option, a digital input option, or an analog input option. More than one of the same type of card cannot be installed simultaneously. |

| Digital Operator Display | | Fault Name |
|--|-------|--|
| oFC00 | oFC00 | Option Card Connection Error at Option Port CN5-C |
| | | Option compatibility error |
| Cause | | Possible Solution |
| The option card installed into port CN5-C is incompatible with the drive | | Confirm that the drive supports the option card to be installed. Refer to Option Compatibility on page 45 for details. Contact Yaskawa for assistance. |
| A communication option card has been installed in option port CN5-C | | Communication option cards are only supported by option port CN5-A. It is not possible to install more than one communication option. |

| Digital Operator Display | | Fault Name |
|---|-------|---|
| oFC02 | oFC02 | Option Card Fault at Option Port CN5-C |
| | | Same type of option card is currently connected |
| Cause | | Possible Solution |
| An option card of the same type is already installed in option port CN5-A or CN5-B. | | Except for PG options, only one of each option card type can only be installed simultaneously. Make sure only one type of option card is connected. |
| An input option card is already installed in option port CN5-A or CN5-B. | | Install a communication option, a digital input option, or an analog input option. More than one of the same type of card cannot be installed simultaneously. |

Minor Faults and Alarms

| Digital Operator Display | | Minor Fault Name | |
|--|------|--|--------------------------|
| CALL | CALL | Serial Communication Transmission Error | |
| | | Communication has not yet been established. | |
| Cause | | Possible Solutions | Minor Fault (H2-□□ = 10) |
| Communications wiring is faulty, there is a short circuit, the wiring is incorrect, or the connections are poor. | | <ul style="list-style-type: none"> • Check for wiring errors. • Correct the wiring. • Check for disconnected cables and short circuits. Repair as needed. | YES |
| Programming error on the master side. | | Check communications at start-up and correct programming errors. | |
| Communications circuitry is damaged. | | <ul style="list-style-type: none"> • Perform a self-diagnostics check. • If the problem continues, replace the control board or the entire drive. Contact Yaskawa for instructions on replacing the control board. | |
| Termination resistor setting is incorrect. | | Install a termination resistor at both ends of a communication line. Set the internal termination resistor switch correctly on slave drives. Place DIP switch S1 to the ON position. | |

bUS Fault Tolerance

bUS Fault Auto-Restart

Parameter F6-14, bUS Fault Auto Reset Select, will appear when the option is installed.

Setting F6-14 = 0 (Disabled) or F6-01 = 3 or greater (Alarm only) will not affect standard default drive behavior.

Setting F6-14 = 1 (Enabled) AND F6-01 ≠ 3 (Fault) will cause the following operation: The bUS fault occurs after the F7-16 delay and the Run command is removed from the drive. Then the option throws a bUS fault to the drive. When the condition is removed, the option commands a fault reset and returns control of the drive to the EtherNet/IP network.

Note: The option will only read parameter F6-01 and F6-14 from the drive during power-up.

bUS Fault Delay

Parameter F7-16, Communications Loss Detection Time Delay, will appear when the option is installed.

The setting value of F7-16 is the length of time that the option will delay sending the bUS fault to the drive.

The status LEDs on the option are not affected by the delay time set in F7-16; the LEDs will indicate the bUS condition immediately.

Note: The option will only read parameter F7-16 from the drive during power-up.

■ Explicit Message Communications Errors

When there is a problem with a request message sent from the master in explicit communications, the drive will return one of the following error codes.

Table 8 Communications Errors and Solutions

| Error Code (Hex) | Description | Cause | Possible Solution |
|------------------|-------------------------|---|--|
| 08 | Service not supported | The service code is incorrect. | Correct the service code. |
| 09 | Invalid attribute value | The attribute is incorrect. | Correct the attribute. |
| 0C | Object state conflict | Attempted to change a drive constant that cannot be changed while the drive is running. | Stop the drive. |
| 0E | Attribute not settable | Attempted to change a read-only attribute. | Correct the service code or attribute setting. |
| 13 | Not enough data | The data size is incorrect. | Correct the data size. |
| 14 | Attribute not supported | Attempted to execute a service not defined for the attribute. | Correct the service code or attribute setting. |
| 15 | Too much data | The data size is incorrect. | Correct the data size. |
| 16 | Object does not exist | An unsupported object was specified. | Correct the class or instance setting. |
| 1F | Vendor-specific error | Attempted to change a drive constant that cannot be changed while the drive is running. Attempted to change a drive constant to a value outside the setting range. | Stop the drive. Specify a value within the setting range. |
| 20 | Invalid parameter | Attempted to change to a data value outside the setting range. | Specify a data value within the setting range. |

Note: Refer to the MEMOBUS/Modbus Data Table in the MEMOBUS/Modbus Communications chapter of the drive manual for a list of monitor data using the MEMOBUS/Modbus message area.

◆ Option Error Codes

■ Option Fault Monitors U6-98 and U6-99

The option can declare error/warning conditions via drive monitor parameters on the drive digital operator as shown in [Table 9](#).

Table 9 Option Fault Monitor Descriptions

| Fault Condition | Fault Declared | Status Value (U6-98/U6-99) | Description |
|-------------------|----------------|----------------------------|---|
| No Fault | n/a | 0 | No faults |
| Force Fault | EF0 | 3 | Network sent a message to force this node to the fault state. |
| Network Link Down | BUS ERROR | 1100 | No network link to option. |

12 Troubleshooting

| Fault Condition | Fault Declared | Status Value (U6-98/U6-99) | Description |
|------------------------|-----------------------|-----------------------------------|---|
| Connection Timeout | BUS ERROR | 1101 | The node timer (Requested Packet Interval) timed out. |
| Duplicate IP Address | BUS ERROR | 1102 | This node and at least one other node have the same IP Address. |
| Default MAC Address | None | 1103 | Factory default MAC Address programmed into the option. Return for reprogramming. |

Two drive monitor parameters, U6-98 and U6-99 assist the user in network troubleshooting.

- U6-98 displays the first declared fault since the last power cycle. U6-98 is only cleared upon drive power-up.
- U6-99 displays the present option status. U6-99 is cleared upon a network-issued fault reset and upon power-up.

If another fault occurs while the original fault is still active, parameter U6-98 retains the original fault value and U6-99 stores the new fault status value.

◆ Option Compatibility

A limited number of options may be simultaneously connected to the drive depending on the type of option.

Table 10 below lists the number of options that can be connected to the drive and the drive ports for connecting those options.

Table 10 Option Installation

| Option | Port/Connector | Number of Options Possible |
|--|----------------|----------------------------|
| PG-B3, PG-X3 | CN5-C | 2 </> |
| PG-F3 </> </>, PG-RT3 </> </> | CN5-C | 1 |
| AO-A3, DO-A3 | CN5-A, B, C | 1 |
| SI-B3 </>, SI-C3, SI-EN3 </>, SI-EN3D, SI-EM3 </>, SI-EP3 </>, SI-ES3 </>, SI-ET3 </>, SI-N3, SI-P3, SI-S3, SI-T3, SI-W3 </>, AI-A3 </>, DI-A3 </> | CN5-A | 1 |

- <1> When connecting two PG option cards, use both CN5-B and CN5-C. When connecting only one PG option card, use the CN5-C connector.
- <2> Not available for the application with Motor 2 Selection.
- <3> Not available with models 4A0930 and 4A1200.
- <4> When using AI-A3 and DI-A3 as monitors, the card can be connected to any of CN5-A, CN5-B or CN5-C. The input status of AI-A3 can then be viewed using U1-21, U1-22, and U1-23, and the input status of DI-A3 can then be viewed using U1-17.

13 Specifications

Table 11 Option Specifications

| Item | Specification |
|-----------------------|---|
| Model | SI-EN3D |
| Supported Messages | Explicit: Explicit Class 3, Unconnected I/O: Class 1, Listen Only, Input Only |
| I/O Assembly Instance | Input: 8 types (4 to 44 Bytes) Output: 8 types (4 to 44 Bytes) |
| SI-EN3D Specification | Composite Test Revision: CT11 Passed |
| SI-EN3D Profile | AC Drive |
| Connector Type | RJ45 8-pin Straight Connector STP Cat5e cable |
| Physical Layer Type | Isolated Physical Layer TCP Protocol Transformer Isolated |
| IP Address Setting | Programmable from drive keypad or network |
| Communication Speed | Programmable from drive keypad or network: 10/100 Mbps, auto-negotiate |
| Number of Connections | I/O: 2 Explicit: 6 |
| Duplex Mode | Half-forced, Auto-negotiate, Full-forced |
| Address Startup Mode | Static, BOOTP, DHCP |
| 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 | Indoor (free of corrosive gas, airborne particles, etc.) |
| Altitude | 1000 m (3280 ft.) or lower |

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YASKAWA AC Drive 1000-Series Option EtherNet/IP Installation Manual

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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.

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