# YASKAWA

YASKAWA AC Drive V1000 Option

EtherNet/IP
Technical Manual

Type: SI-EN3D/V

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

Table of Contents

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/V option:

	Yaskawa AC Drive V1000 Option SI-EN3D/V Dual-Port EtherNet/IP Installation Manual (TOEPYAICOM15)
	The Installation Manual contains information required to install the option and set up related drive parameters.
	Yaskawa AC Drive V1000 Option SI-EN3D/V Dual-Port EtherNet/IP Technical Manual (SIEPYAICOM15)
	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.

	V1000 Series AC Drive Quick Start Guide
	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.
	V1000 Series AC Drive Technical Manual
	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.

◆ Terms

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

Drive: Yaskawa V1000 Series AC Drive

Option: Yaskawa AC Drive V1000 SI-EN3D/V 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.*

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.

<table>
<tr><td>

NOTICE
</td></tr>
</table>

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.

■ Option Unit Warning Labels

Warning information is displayed on the option unit as shown in the figure below. Follow all warnings and safety instructions when using the product.
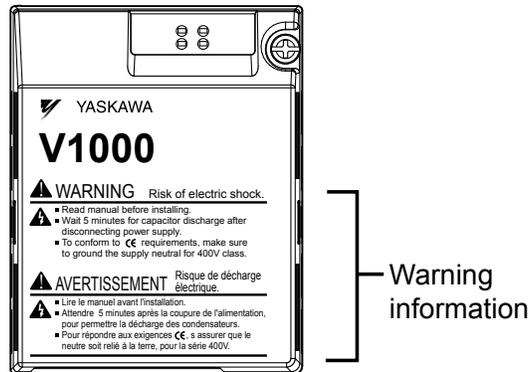
■ Warning Contents

⚠ **WARNING**   Risk of electric shock.

⚠ ■ Read manual before installing.
  ■ Wait 5 minutes for capacitor discharge after
    disconnecting power supply.
  ■ To conform to $C\epsilon$ requirements, make sure
    to ground the supply neutral for 400V class.

⚠ **AVERTISSEMENT**   Risque de décharge électrique.

⚠ ■ Lire le manuel avant l'installation.
  ■ Attendre 5 minutes après la coupure de l'alimentation,
    pour permettre la décharge des condensateurs.
  ■ Pour répondre aux exigences $C\epsilon$, s assurer que le
    neutre soit relié à la terre, pour la série 400V.

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.

EtherNet√IP
conformance tested

◆ 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]
V1000	CIMR-V□□A□□□□	1012 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 Unit	Ground Wire	Warning Labels	Installation Manual
–				MANUAL
Quantity	1	4	1	1
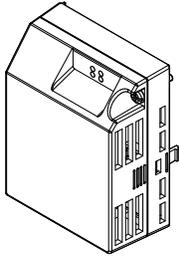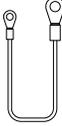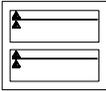
◆ Tools Required for Installation

A Phillips screwdriver (M3, M3.5 to M6 metric or #1, #2 U.S. standard) is required to install the option. Screw sizes vary by drive capacity. Select a screwdriver appropriate for the drive capacity.

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

4 Option Components

◆ SI-EN3D/V Dual-Port EtherNet/IP Option Unit

Option with cover attached · Option with cover removed

A – LED (NS) [2]
B – LED (MS) [2]
C – Option cover
D – EtherNet/IP PCB
E – Attachment screw hole for option cover
F – Nameplate
G – Functional earth cable connection (FE)
H – Mounting tab
I – Ground wire [1]

J – Pass-through hole for ground wire
K – Port 2 LED (10/100) [2]
L – Port 2
M – Port 2 LED (LINK/ACT) [2]
N – Port 1 LED (10/100) [2]
O – Port 1
P – Port 1 LED (LINK/ACT) [2]
Q – EtherNet/IP cable connector
R – Option connector

**Figure 1 Option Unit Components**

<1> A selection of ground wires are packaged loose in the option shipping package. Connect the appropriate ground wire based on drive model during installation.

<2> *Refer to Option LED Display on page 11* for details on the LEDs.

◆ Dimensions

The installed option adds 27 mm (1.06 in.) to the total depth of the drive.

27 mm (1.06 in.)
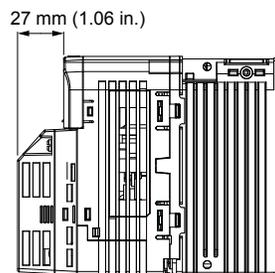
Figure 2 Dimensions

◆ Communication Connector CN1

Communication Connector CN1 is a modular RJ45 female connector and the connection point for a customer-supplied male Ethernet network communication cable.
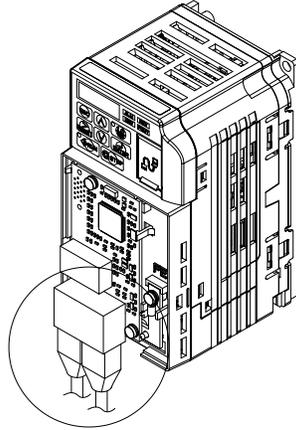
Figure 3 Communication Connector CN1 (RJ45)

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 [1]
	5 (Pair 1)	Not used [1]
	6 (Pair 3)	Receive data (RXD) -
	7 (Pair 4)	Not used [1]
	8 (Pair 4)	Not used [1]
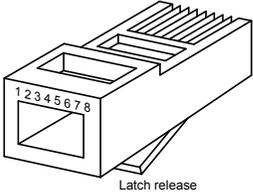
<1> Not used for 10 Mbps and 100 Mbps networks.

◆ 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.
10/100 [1]	Green	OFF	10 Mbps is established	
	Green	ON	100 Mbps is established	–
LINK/ACT [1]	Green	OFF	LINK is not established	
	Green	ON	LINK is established	
	Green	Flashing	LINK is established and there is network activity.	

<1> 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 option unit cover 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 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.
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.

NOTICE
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.

◆ Installing the Option

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 at least five minutes after confirming the DC bus voltage is safe, then loosen the screw that fastens the front cover in place and remove the front cover. This drive front cover will be replaced by the option cover. Cover removal varies depending on drive size.

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.*
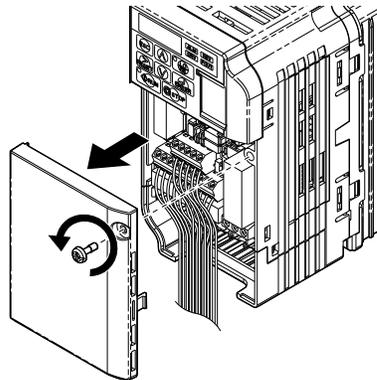
Figure 4 Remove the Front Cover

2. The remaining installation steps differ based on drive model. Find the drive model number on the drive nameplate and refer to the step indicated in *Table 5* based on your model number

Table 5 Installation Steps Based on Drive Model

Enclosure Type	Drive Model	Proceed to Step	Page
IP20/Open-Chassis	CIMR-V□□A□□□□B	3	*13*
IP20/NEMA Type 1 [1]	CIMR-V□□A□□□□F	6	*15*

Installing the option on an IP20/NEMA Type 1 enclosure drive voids NEMA Type 1 protection while maintaining IP20 conformity.

3. For IP20/Open-Chassis models CIMR-V□□A□□□□B, remove the bottom cover of the drive by applying pressure to the tabs on each side of the bottom cover. Pull the bottom cover away from the drive while pushing in on the tabs to release the cover from the drive. Refer to *Figure 5* for details.

Refer to *Figure 6* for drive models BA0006B to BA0018B, 2A0008B to 2A0069B, and 4A0001B to 4A0038B, which require removing the terminal cover prior to removing the bottom cover.
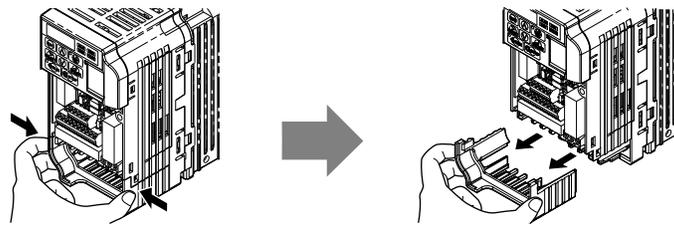
**Figure 5 Remove the Bottom Cover on an IP20/Open-Chassis Drive
(Models BA0001B to BA0003B and 2A0001B to 2A0006B)**


Terminal Cover
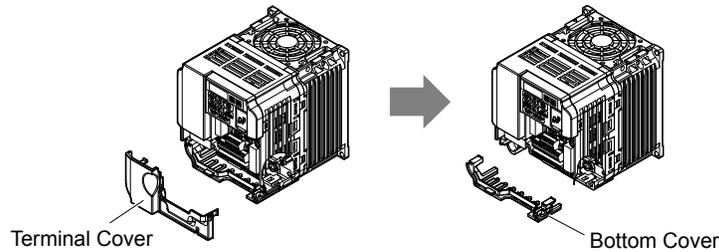
Bottom Cover

**Figure 6 Remove the Terminal Cover and Bottom Cover on an IP20/Open-Chassis Drive
(Models BA0006B to BA0018B; 2A0008B to 2A0069B; 4A0001B to 4A0038B)**

4. On IP20/Open-Chassis models, connect the drive side of the ground wire to the drive ground terminal.

Note: The different ground wires packaged with the option connect the option to different drive models. Select the proper ground wire depending on drive size. Refer to *Table 6* for ground wire selection by drive model.

Option unit connector Screw size: M3

Drive-side connector Screw size: M3.5 to M6

Ground wire

Ground terminal ⏚
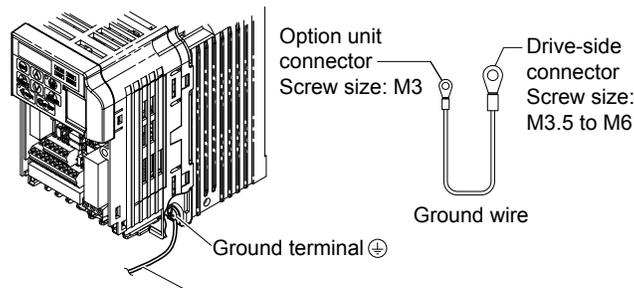
Figure 7 Connect the Ground Wire on an IP20/Open-Chassis Drive

Table 6 Ground Wire Selection

Ground Wire Length (mm/in)	Drive Model		
	Single-Phase 200 V Class	Three-Phase 200 V Class	Three-Phase 400 V Class
150/5.9	BA0001 BA0002 BA0003	2A0001 2A0002 2A0004 2A0006	–
200/7.9	BA0006 BA0010 BA0012 BA0018	2A0010 2A0012 2A0020	4A0001 4A0002 4A0004 4A0005 4A0007 4A0009 4A0011
250/9.8	–	2A0030 2A0040	4A0018 4A0023
400/15.7	–	2A0056 2A0069	4A0031 4A0038

5. For IP20/Open-Chassis models, go to Step 9. on page 36.

6. For IP20/NEMA Type 1 enclosure models CIMR-V□□A□□□□F, loosen the screw on the front of the NEMA Type 1 terminal cover and remove it from the drive. Refer to *Figure 8* for details.

Refer to *Figure 9* for drive models BA0006F to BA0018F, 2A0010F to 2A0069F, and 4A0001F to 4A0038F, which require removing the plastic terminal cover prior to removing the NEMA Type 1 terminal cover.

Note: Installing the option on an IP20/NEMA Type 1 enclosure drive voids NEMA Type 1 protection while maintaining IP20 conformity.
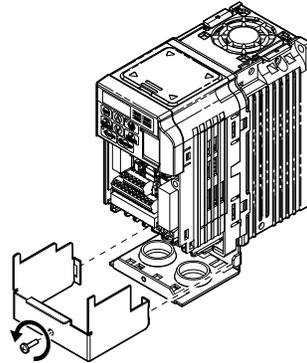
**Figure 8 Remove the NEMA Type 1 Terminal Cover
(Models BA0001F to BA0003F and 2A0001F to 2A0006F)**
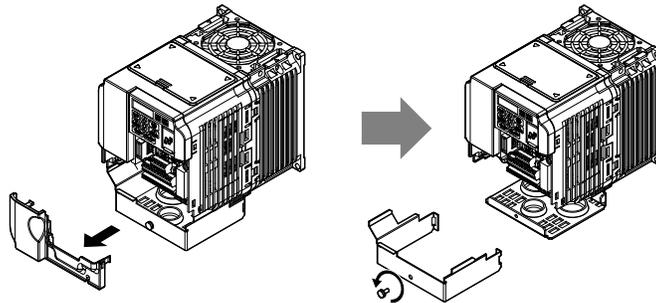
**Figure 9 Remove the Terminal Cover on an IP20/NEMA Type 1 Drive
(Models BA0006F to BA0018F; 2A0008F to 2A0069F; 4A0001F to 4A0038F)**

7. For models BA0001F to BA0003F and 2A0001F to 2A0006F, loosen the screws attaching the NEMA Type 1 conduit bracket to the drive to remove the NEMA Type 1 conduit bracket.
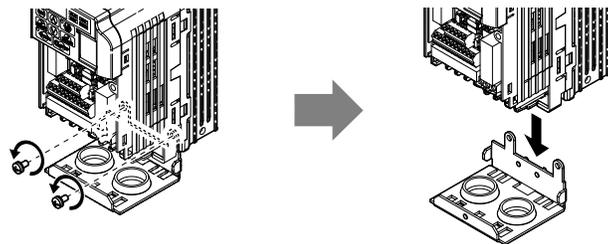
**Figure 10 Remove the NEMA Type 1 Conduit Bracket
(Models BA0001F to BA0003F and 2A0001F to 2A0006F)**

8. On models (BA0001F to BA0003F and 2A0001F to 2A0006F), the screw for the drive ground terminal also acts as one of the screws that attaches the NEMA Type 1 conduit bracket to the drive. Reattach the NEMA Type 1 conduit bracket according to Figure 27 and connect the drive-side of the ground wire to the drive ground terminal.

Note: The different ground wires packaged with the option connect the option to different drive models. Select the proper ground wire depending on drive size. Refer to *Table 6* on page *14* for ground wire selection by drive model.
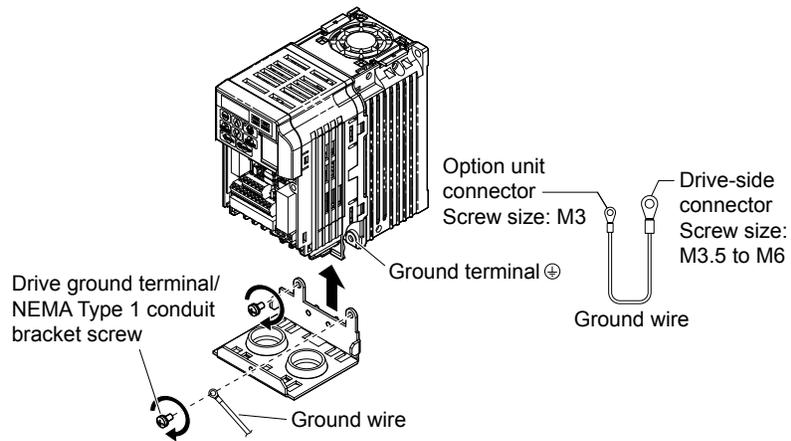
**Figure 11 Reattach the NEMA Type 1 Conduit Bracket and Connect the Ground Wire
(Models BA0001F to BA0003F and 2A0001F to 2A0006F)**

9. Reattach the bottom cover. Keep the ground wire inside of the bottom cover when reattaching.

IP20/Open-Chassis   IP20/NEMA Type 1 Enclosure
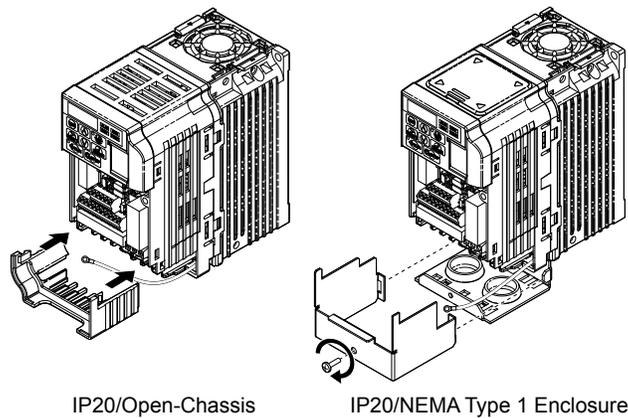
Figure 12 Reattach the Bottom Cover

10. On models BA0006 to BA0018, 2A0008 to 2A0069, and 4A0001 to 4A0038, reattach the terminal cover.

Refer to *Figure 13* and *Figure 14* for drive models BA0006 to BA0018, 2A0008 to 2A0020, and 4A0001 to 4A0011, which require routing the ground wire through the provided notch when reinstalling the terminal cover.
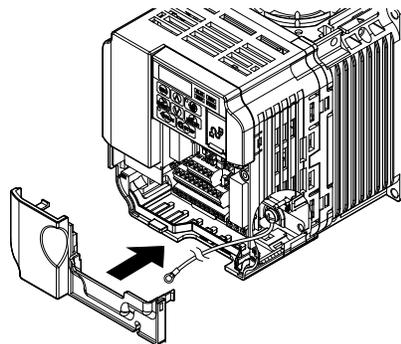
**Figure 13 Reattach the Terminal Cover
(Models BA0006 to BA0018; 2A0008 to 2A0069; 4A0001 to 4A0038)**

Ground wire
routing notch
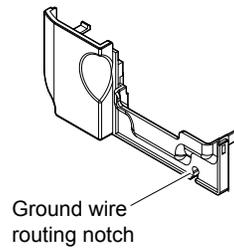
Figure 14 Terminal Cover Ground Wire Notch
(Models BA0006 to BA0018; 2A0008 to 2A0020; 4A0001 to 4A0011)

11. Remove the option cover and pass the ground wire through the inside of the drive bottom cover and into the through-hole for the ground wire at the front of the option.
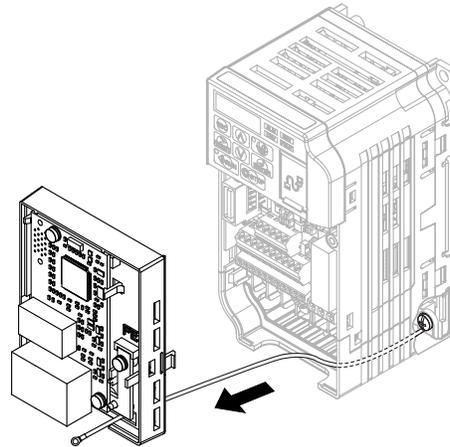
Figure 15 Ground Wire Routing

12. Attach the option to the drive. Properly seat the tabs on the left and right sides of the option to the drive case.

Line up tabs

Line up tabs
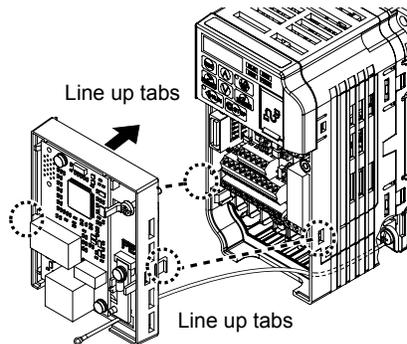
Figure 16 Connect the Option

13. Connect the ground wire at the option ground terminal. Tighten the screw to 0.5 to 0.6 N · m or (4.4 to 5.3 in lbs) using an M3 Phillips screwdriver.
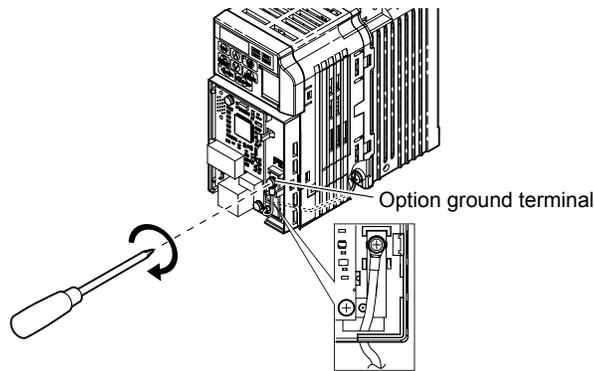
Figure 17 Connect the Ground Wire to the Option

14. 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 18*).

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.
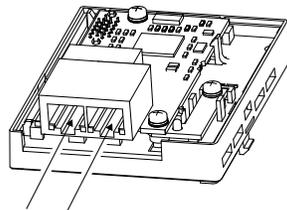
Figure 18 Communication Cable Ports
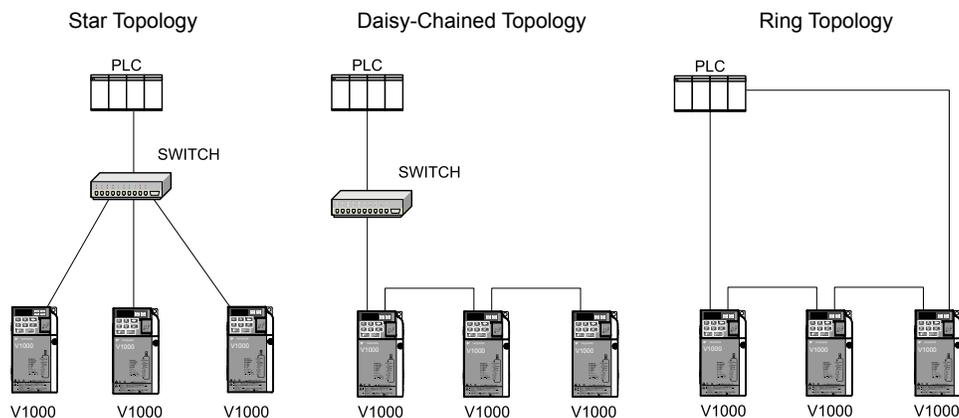
Figure 19 Topology Options
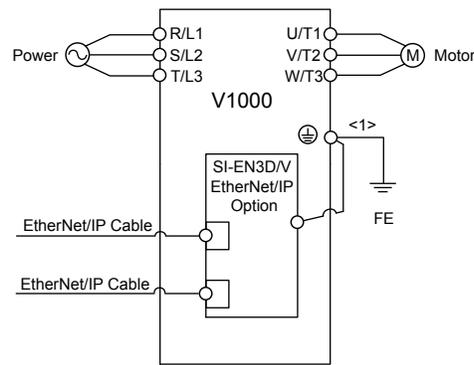
Figure 20 Option Connection Diagram

15. Use the second communication cable port to daisy chain a series of drives where applicable.

16. Attach the option cover by aligning the tabs with the mounting holes, seat the front cover into place, and tighten the screw on the front.
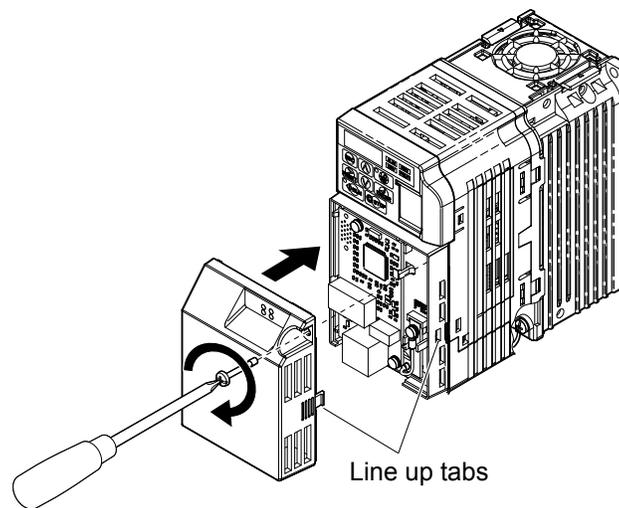
Figure 21 Attach the Option Cover

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.

17. Set drive parameters in *Table 7* 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 7* before starting network communications. After changing parameter settings, cycle power to the drive for the new settings to take effect.

Table 7 Related Parameters

No. (Addr. Hex)	Name	Description	Values
b1-01 (0180) *<1>*	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) *<1>*	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 *<2>*	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 *<2>*	Default: 1 Range: 0 to 3
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: 1 Range: 0, 1
F6-08 (036A) *<3>*	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
F6-14 (03BB)	bUS Error Auto Reset	0: Disabled 1: Enabled	Default: 0 Range: 0, 1
F7-01 (03E5) *<4>*	IP Address 1	Sets the most significant octet of network static IP address.	Default: 192 Range: 0 to 255
F7-02 (03E6) *<4>*	IP Address 2	Sets the second most significant octet of network static IP address.	Default: 168 Range: 0 to 255
F7-03 (03E7) *<4>*	IP Address 3	Sets the third most significant octet of network static IP address.	Default: 1 Range: 0 to 255
F7-04 (03E8) *<4>*	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

No. (Addr. Hex)	Name	Description	Values
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 [5] 1: BOOTP 2: DHCP	Default: 2 Range: 0 to 2
F7-14 (03F2)	Duplex Mode Selection	Selects duplex mode setting. 0: Half duplex forced (both ports) [6] 1: Auto-negotiate duplex mode and communication speed (both ports) 2: Full duplex forced (both ports) [6] 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: [7] Range: 0 to 8 [8]
F7-15 (03F3)	Communication Speed Selection	Sets the communication speed 0: 10 Mbps 10: 10 Mbps 100: 100 Mbps 101: 10 (Port 1)/100 Mbps (port 2) 102: 100 (Port 1)/10 Mbps (port 2)	Default: 10 [9] Range: 10; 100 to 102 [9]
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.

<3> Parameter setting value is not reset to the default value when the drive is initialized.

<4> Cycle power for setting changes to take effect.

<5> 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.

<6>   When F7-14 is set to 0 or 2, parameter F7-15 must be set.

<7>   Default setting differs depending on drive software version. PRG: 1012 to 1015: 0
       PRG: 1016 and later: 1

<8>   Setting range differs depending on drive software version. PRG: 1012 to 1023, Range: 0 to 2
       PRG: 1024 and later, Range: 0 to 8

<9>   Setting values differ depending on drive software version. PRG: 1012 to 1015, Default: 0; Range: 0, 10, 100
       PRG: 1016 to 1023, Default: 10; Range: 10, 100
       PRG: 1024 and later, Default: 10; Range: 10; 100 to 102

Table 8 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 9* are available for polled I/O:

Table 9 Supported Polled I/O Assemblies

Assembly Number (Hex)	Description	Type	Bytes	Page
20 (14)	Basic Speed Control Output	Output	4	*24*
21 (15)	Extended Speed Control Output	Output	4	*24*
22 (16)	Speed and Torque Control Output	Output	6	*25*
23 (17)	Extended Speed and Torque Control Output	Output	6	*25*
70 (46)	Basic Speed Control Input	Input	4	*31*
71 (47)	Extended Speed Control Input	Input	4	*31*
72 (48)	Speed and Torque Control Input	Input	6	*32*
73 (49)	Extended Speed and Torque Control Input	Input	6	*32*
100 (64)	(Vendor Specific Yaskawa Electric (YE) Assy)-MEMOBUS/Modbus Message Output	Output	5	*26*
101 (65)	(Vendor Specific Yaskawa Electric (YE) Assy)-Speed/Torque Control Output	Output	8	*26*
115 (73)	(Vendor Specific Yaskawa Electric (YE) Assy)-Extended Speed/Torque Control Output	Output	40	*27*
116 (74)	(Vendor Specific Yaskawa Electric (YE) Assy)-High Speed/Torque Control Output	Output	44	*28*
150 (96)	(Vendor Specific Yaskawa Electric (YE) Assy)-MEMOBUS/Modbus Message Input	Input	5	*33*
151 (97)	(Vendor Specific Yaskawa Electric (YE) Assy)-Speed/Torque Status Input	Input	8	*34*
155 (9B)	(Vendor Specific Yaskawa Electric (YE) Assy)- Extended Speed/ Torque Status Input	Input	40	*35*
166 (A6)	(Vendor Specific Yaskawa Electric (YE) Assy)-High Speed/Torque Status Input	Input	44	*38*

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.

◆ 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.

◆ Speed and Torque Control Output - 22 (0x16)

Output Instance	Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
22	0	0	–	–	–	–	–	Fault Reset	–	Run Fwd
		1	–							
	1	2	Speed Reference (Low Byte)							
		3	Speed Reference (High Byte)							
	2	4	Torque Reference (Lower Byte), not supported							
		5	Torque Reference (High Byte), not supported							

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 Unit depends on o1-03.
Torque Reference	Not supported

◆ Extended Speed and Torque Control Output - 23 (0x17)

Output Instance	Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
23	0	0	–	NetRef	NetCtrl	–	–	Fault Reset	Run Rev	Run Fwd
		1	–							
	1	2	Speed Reference (Low Byte)							
		3	Speed Reference (High Byte)							
	2	4	Torque Reference (Lower Byte), not supported							
		5	Torque Reference (High Byte), not supported							

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.
Torque Reference	Not supported

◆ MEMOBUS/Modbus Message Output (Vendor Specific Yaskawa Electric (YE) Assy) - 100 (0x64)

Output Instance	Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
100	0	0	Function Code							
		1	Register Number (High Byte)							
	1	2	Register Number (Low Byte)							
		3	Register Data (High Byte)							
	2	4	Register Data (Low Byte)							

Note: This is a paired assembly (100/150).

Name	Description
Function Code	MEMOBUS/Modbus Function Code
Register Number	MEMOBUS/Modbus Register Number
Register Data	MEMOBUS/Modbus Register Data

Table 10 Function Code Decode Table

Function Code	MEMOBUS/Modbus Function
0x00	No Operation
0x03	Read Register
0x10	Write Register

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.

◆ Speed/Torque Control Output (Vendor Specific Yaskawa Electric (YE) Assy) - 101 (0x65)

Output Instance	Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
101	0	0	–	Multi-Function Input 7	Multi-Function Input 6	Multi-Function Input 5	Multi-Function Input 4	Multi-Function Input 3	Run Rev	Run Fwd
		1	Multi-Function Photo-coupler 2	Multi-Function Photo-coupler 1	Multi-Function Digital Output	–	–	–	Fault Reset	External Fault
	1	2	Speed Reference (Low Byte)							
		3	Speed Reference (High Byte)							
	2	4	Torque Reference (Low Byte), not supported							
		5	Torque Reference (High Byte), not supported							
	3	6	Torque Compensation (Low Byte), not supported							
		7	Torque Compensation (High Byte), not supported							

Name	Description
Run Fwd	Forward Run Command 0: Stop 1: Forward Run
Run Rev	Reverse Run Command 0: Stop 1: Reverse Run
Multi-Function Input 3	Terminal S3 Function Input 0: Terminal S3 Function (H1-03) OFF 1: Terminal S3 Function (H1-03) ON
Multi-Function Input 4	Terminal S4 Function Input 0: Terminal S4 Function (H1-04) OFF 1: Terminal S4 Function (H1-04) ON
Multi-Function Input 5	Terminal S5 Function Input 0: Terminal S5 Function (H1-05) OFF 1: Terminal S5 Function (H1-05) ON

Name	Description
Multi-Function Input 6	Terminal S6 Function Input 0: Terminal S6 Function (H1-06) OFF 1: Terminal S6 Function (H1-06) ON
Multi-Function Input 7	Terminal S7 Function Input 0: Terminal S7 Function (H1-07) OFF 1: Terminal S7 Function (H1-07) ON
External Fault	External Fault EF0 0: No External Fault (EF0) 1: External Fault (EF0)
Fault Reset	Fault Reset 0: No Fault Reset 1: Fault Reset
Multi-Function Digital Output	Terminal MA/MB 0: MA/MB OFF 1: MA/MB ON This function is enabled only when H2-01 is set to F.
Multi-Function Photocoupler 1	Terminal P1 0: P1 OFF 1: P1 ON This function is enabled only when H2-02 is set to F.
Multi-Function Photocoupler 2	Terminal P2 0: P2 OFF 1: P2 ON This function is enabled only when H2-03 is set to F.
Speed Reference	Speed Command Sets drive speed reference. Unit depends on o1-03. Unit is not affected by Speed Scale SS.
Torque Reference	Not supported
Torque Compensation	Not supported

◆ Extended Speed/Torque Control Output (Vendor Specific Yaskawa Electric (YE) Assy) - 115 (0x73)

Output Instance	Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
115	0	0	–	Multi-Function Input 7	Multi-Function Input 6	Multi-Function Input 5	Multi-Function Input 4	Multi-Function Input 3	Run Rev	Run Fwd
		1	Multi-Function Photo-coupler 2	Multi-Function Photo-coupler 1	Multi-Function Digital Output	–	–	–	Fault Reset	External Fault
	1	2	Speed Reference (Low Byte)							
		3	Speed Reference (High Byte)							
	2	4	Torque Reference (Low Byte), not supported							
		5	Torque Reference (High Byte), not supported							
	3	6	Torque Compensation (Low Byte), not supported							
		7	Torque Compensation (High Byte), not supported							
	4/5	8-11	Reserved							
	6	12	Analog Output 1 (Low Byte)							
		13	Analog Output 1 (High Byte)							
	7	14	Analog Output 2 (Low Byte)							
		15	Analog Output 2 (High Byte)							
	8	16	Digital Outputs (Low Byte)							
		17	Digital Outputs (High Byte)							
	9-20	18-39	Reserved							

Name	Description
Run Fwd	Forward Run Command 0: Stop 1: Forward Run
Run Rev	Reverse Run Command 0: Stop 1: Reverse Run
Multi-Function Input 3	Terminal S3 Function Input 0: Terminal S3 Function (H1-03) OFF 1: Terminal S3 Function (H1-03) ON
Multi-Function Input 4	Terminal S4 Function Input 0: Terminal S4 Function (H1-04) OFF 1: Terminal S4 Function (H1-04) ON
Multi-Function Input 5	Terminal S5 Function Input 0: Terminal S5 Function (H1-05) OFF 1: Terminal S5 Function (H1-05) ON
Multi-Function Input 6	Terminal S6 Function Input 0: Terminal S6 Function (H1-06) OFF 1: Terminal S6 Function (H1-06) ON
Multi-Function Input 7	Terminal S7 Function Input 0: Terminal S7 Function (H1-07) OFF 1: Terminal S7 Function (H1-07) ON
External Fault	External Fault EF0 0: No External Fault (EF0) 1: External Fault (EF0)
Fault Reset	Fault Reset 0: No Fault Reset 1: Fault Reset
Multi-Function Digital Output	Terminal MA/MB 0: MA/MB OFF 1: MA/MB ON This function is enabled only when H2-01 is set to F.
Multi-Function Photocoupler 1	Terminal P1 0: P1 OFF 1: P1 ON This function is enabled only when H2-02 is set to F.
Multi-Function Photocoupler 2	Terminal P2 0: P2 OFF 1: P2 ON This function is enabled only when H2-03 is set to F.
Speed Reference	Speed Command Sets drive speed reference. Unit depends on o1-03. Unit is not affected by Speed Scale SS.
Torque Reference [0.1%]	Torque Reference [0.1%], not supported
Torque Compensation [0.1%]	Torque Compensation [0.1%], not supported
Analog Output 1	MEMOBUS/Modbus (0x0007)
Analog Output 2	MEMOBUS/Modbus (0x0008)
Digital Outputs	MEMOBUS/Modbus (0x0009)

◆ High Speed/Torque Control Output (Vendor Specific Yaskawa Electric (YE) Assy) - 116 (0x74)

This assembly is dynamic and can be configured as to what parameters are used. The first 20 Bytes (0-19) are fixed and the next 20 Bytes can be configured using parameters F7-23 to F7-32. If an error occurs while trying to write to the dynamic parameters, the appropriate error bit in Assembly 166 will be set. If more information is needed as to the nature of the error, the extended error status can be read explicitly through Class 4, Instance 0xA6, Attribute 0x64. This will return 20 Bytes with each dynamic parameter in Assembly 116 having a Byte dedicated to its extended error status. *Refer to Input Assemblies (Drive Produces) on page 31* for more information.

Output Instance	Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
116	0	0	–	Multi-Function Input 7	Multi-Function Input 6	Multi-Function Input 5	Multi-Function Input 4	Multi-Function Input 3	Run Rev	Run Fwd
		1	Multi-Function Photo-coupler 2	Multi-Function Photo-coupler 1	Multi-Function Digital Output	–	–	–	Fault Reset	External Fault
	1	2	Speed Reference (Low Byte)							
		3	Speed Reference (High Byte)							
	2	4	Torque Reference (Low Byte), not supported							
		5	Torque Reference (High Byte), not supported							
	3	6	Torque Compensation (Low Byte), not supported							
		7	Torque Compensation (High Byte), not supported							
	4	8	Reserved							
		9	–	–	–	–	Multi-Function Input 12	Multi-Function Input 11	Multi-Function Input 10	Multi-Function Input 9
	5	10	–	–	–	–	–	–	NetCtrl	NetRef
		11	–	–	–	–	–	–	–	–
	6	12	Analog Output 1 (Low Byte)							
		13	Analog Output 1 (High Byte)							
116	7	14	Analog Output 2 (Low Byte)							
		15	Analog Output 2 (High Byte)							
	8	16	Digital Outputs (Low Byte)							
		17	Digital Outputs (High Byte)							
	9	18	Reserved							
		19	Reserved							
	10	20-21	Programmable Bytes Defined by F7-23 Default: Not Used							
	11	22-23	Programmable Bytes Defined by F7-24 Default: Not Used							
	12	24-25	Programmable Bytes Defined by F7-25 Default: Not Used							
	13	26-27	Programmable Bytes Defined by F7-26 Default: Not Used							
	14	28-29	Programmable Bytes Defined by F7-27 Default: Not Used							
	15	30-31	Programmable Bytes Defined by F7-28 Default: Not Used							
	16	32-33	Programmable Bytes Defined by F7-29 Default: Not Used							
	17	34-35	Programmable Bytes Defined by F7-30 Default: Not Used							
	18	36-37	Programmable Bytes Defined by F7-31 Default: Not Used							
	19	38-39	Programmable Bytes Defined by F7-32 Default: Not Used							

8 Output Assemblies (Drive Consumes)

Name	Description
Run Fwd	Forward Run Command 0: Stop 1: Forward Run
Run Rev	Reverse Run Command 0: Stop 1: Reverse Run
Multi-Function Input 3	Terminal S3 Function Input 0: Terminal S3 Function (H1-03) OFF 1: Terminal S3 Function (H1-03) ON
Multi-Function Input 4	Terminal S4 Function Input 0: Terminal S4 Function (H1-04) OFF 1: Terminal S4 Function (H1-04) ON
Multi-Function Input 5	Terminal S5 Function Input 0: Terminal S5 Function (H1-05) OFF 1: Terminal S5 Function (H1-05) ON
Multi-Function Input 6	Terminal S6 Function Input 0: Terminal S6 Function (H1-06) OFF 1: Terminal S6 Function (H1-06) ON
Multi-Function Input 7	Terminal S7 Function Input 0: Terminal S7 Function (H1-07) OFF 1: Terminal S7 Function (H1-07) ON
External Fault	External Fault EF0 0: No External Fault (EF0) 1: External Fault (EF0)
Fault Reset	Fault Reset 0: No Fault Reset 1: Fault Reset
Multi-Function Digital Output	Terminal MA/MB 0: MA/MB OFF 1: MA/MB ON This function is enabled only when H2-01 is set to F.
Multi-Function Photocoupler 1	Terminal P1 0: P1 OFF 1: P1 ON This function is enabled only when H2-02 is set to F.
Multi-Function Photocoupler 2	Terminal P2 0: P2 OFF 1: P2 ON This function is enabled only when H2-03 is set to F.
Speed Reference	Speed Command Sets drive speed reference. Unit depends on o1-03. Unit is not affected by Speed Scale SS.
Torque Reference [0.1%]	Torque Reference [0.1%], not supported
Torque Compensation [0.1%]	Torque Compensation [0.1%], not supported
Digital Inputs	MEMOBUS/Modbus (0x49). Monitor parameter U1-10
NetRef	Network sets reference
NetCtrl	Network sets control
Analog Output 1	MEMOBUS/Modbus (0x0007)
Analog Output 2	MEMOBUS/Modbus (0x0008)
Digital Outputs	MEMOBUS/Modbus (0x0009)
Programmable Bytes	Contains the data to be written to the MEMOBUS/Modbus address defined in the given parameter. A value of 0 in the given parameter means it is not used, therefore the value received for this given parameter will not be written to any MEMOBUS/Modbus register. If the PPA is Input Assembly 166, then any errors occurring during a write will be flagged. *Refer to High Speed/Torque Status Input (Vendor Specific Yaskawa Electric (YE) Assy) - 166 (0xA6) on page 38* for details.

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.

◆ 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

Name	Description
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.

◆ Speed and Torque Control Input - 72 (0x48)

Input Instance	Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
72	0	0	–	–	–	–	–	Running 1 (FWD)	–	Faulted
		1	–							
	1	2	Speed Actual (Low Byte)							
		3	Speed Actual (High Byte)							
	2	4	Torque Actual (Low Byte), not supported							
		5	Torque Actual (High Byte), not supported							

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.
Torque Actual	Output Torque, not supported

◆ Extended Speed and Torque Control Input - 73 (0x49)

Input Instance	Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
73	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)							
	2	4	Torque Actual (Low Byte), not supported							
		5	Torque Actual (High Byte), not supported							

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

Name	Description
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.
Torque Actual	Output Torque, not supported

◆ MEMOBUS/Modbus Message Input (Vendor Specific Yaskawa Electric (YE) Assy) - 150 (0x96)

Input Instance	Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
150	0	0	Function Code							
		1	Register Number (High Byte)							
	1	2	Register Number (Low Byte)							
		3	Register Data (High Byte)							
	2	4	Register Data (Low Byte)							

Note: This is a paired assembly (100/150).

Table 11 Reply Mapping – 150

Byte	Write Success	Read Success	Write Failure	Read Failure	Invalid Function Code	Function Code Equals Zero
0	0x10	0x03	0x90	0x83	Function Code Or-ed with 0x80	0
1	Output Assembly Register Number (High Byte)	Output Assembly Register Number (High Byte)	Output Assembly Register Number (High Byte)	Output Assembly Register Number (High Byte)	Output Assembly Register Number (High Byte)	0
2	Output Assembly Register Number (Low Byte)	Output Assembly Register Number (Low Byte)	Output Assembly Register Number (Low Byte)	Output Assembly Register Number (Low Byte)	Output Assembly Register Number (Low Byte)	0
3	0	Read Data (High Byte)	0	0	0	0
4	0	Read Data (Low Byte)	Error Code	Error Code	1	0

Table 12 Error Replies – 150

Error Code	Description
0x01	Invalid Function Code
0x02	Invalid Register Number
0x21	Upper/Lower Limit Error
0x22	Option generated busy event. The MEMOBUS/Modbus requested operation is in the process loop but the drive is not done. Writing "Enter" when drive is running. Attempt to write data that is read only. Attempt to write a parameter when drive is running. During a CPF03 event attempting to write to registers other than A1-00 to A1-05, E1-03, o2-04.
0x23	Attempting to write during a drive undervoltage (Uv) event.

Error Code	Description
0x24	Attempting to write while the drive is storing data.

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.

◆ Speed/Torque Status Input (Vendor Specific Yaskawa Electric (YE) Assy) - 151 (0x97)

Input Instance	Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
151	0	0	Faulted	Alarm	Ready	Speed Agree	Reset	REV Running	ZSP	Running
		1	–	–	Multi-Function Photo-coupler 2	Multi-Function Photo-coupler 1	Multi-Function Digital Output	LOCAL/REMOTE	Uv	oPE
	1	2	Output Frequency (Low Byte)							
		3	Output Frequency (High Byte)							
	2	4	Torque Actual (Low Byte), not supported							
		5	Torque Actual (High Byte), not supported							
	3	6	Current Actual (Low Byte)							
		7	Current Actual (High Byte)							

Name	Description
Running	Running 0: Stop 1: Forward or Reverse Running
ZSP	Zero Speed 0: Running 1: Stop or DC Injection Braking
REV Running	Reverse Running 0: Not Reverse Running 1: Reverse Running
Reset	Reset 0: No Reset 1: Reset
Speed Agree	Speed Agree 0: No Speed Agree 1: Speed Actual at speed reference
Ready	Drive Ready 0: Not Ready 1: Ready
Alarm	Drive Alarm 0: No Drive Alarm 1: Alarm
Faulted	Drive Fault 0: No Drive Fault 1: Fault
OPE	OPE Fault 0: No oPE Fault 1: oPE
UV	Undervoltage 0: No Undervoltage 1: Undervoltage
LOCAL/REMOTE	Status of Run command from Network 0: Run command is not from network 1: Run command is from network
Multi-Function Digital Output	Terminal MA/MB 0: MA/MB OFF 1: MA/MB ON This function is enabled only when H2-01 is set to F.
Multi-Function Photocoupler 1	Terminal P1 0: Terminal P1 OFF 1: Terminal P1 ON

Name	Description
Multi-Function Photocoupler 2	Terminal P2 0: Terminal P2 OFF 1: Terminal P2 ON
Output Frequency	Actual Drive Speed Monitors drive output frequency. Unit depends on o1-03. Unit is not affected by Speed Scale SS.
Torque Actual	Output Torque, not supported
Current Actual	Actual Output Current Monitors drive output current. Unit is 0.01 A. Unit is not affected by Current Scale CS.

◆ **Extended Speed/Torque Status Input (Vendor Specific Yaskawa Electric (YE) Assy) - 155 (0x9B)**

Output Instance	Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
155	0	0	Faulted	Alarm	Ready	Speed Agree	Fault Reset	REV Running	ZSP	Running
		1	–	–	Multi-Function Photo-coupler 2	Multi-Function Photo-coupler 1	Multi-Function Digital Output	LOCAL/ REMOTE	Uv	oPE
	1	2	Motor Speed (Low Byte)							
		3	Motor Speed (High Byte)							
	2	4	Torque Actual (Low Byte), not supported							
		5	Torque Actual (High Byte), not supported							
	3	6	PG Count Value (Low Byte)							
		7	PG Count Value (High Byte)							
	4	8	Frequency Command (Low Byte)							
		9	Frequency Command (High Byte)							
	5	10	Output Frequency (Low Byte)							
		11	Output Frequency (High Byte)							
	6	12	Output Current (Low Byte)							
		13	Output Current (High Byte)							
	7	14	Parameter F7-35 Default: Terminal A2 Input (Low Byte)							
		15	Parameter F7-35 Default: Terminal A2 Input (High Byte)							
	8	16	Main Circuit DC Voltage (Low Byte)							
		17	Main Circuit DC Voltage (High Byte)							
	9	18	Error Code (Low Byte)							
		19	Error Code (High Byte)							

Output Instance	Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
155	10	20 [1]				Parameter F7-33 Default: Alarm Code (Low Byte)				
		21 [1]				Parameter F7-33 Default: Alarm Code (High Byte)				
	11	22 [1]				Parameter F7-34 Default: Output Power (Low Byte)				
		23 [1]				Parameter F7-34 Default: Output Power (High Byte)				
	12	24 [1]				Parameter F7-37 Default: Terminal A3 Input (Low Byte), not supported				
		25 [1]				Parameter F7-37 Default: Terminal A3 Input (High Byte), not supported				
	13	26 [1]				Parameter F7-36 Default: Terminal S1 to S7 Input (Low Byte)				
		27 [1]				Parameter F7-36 Default: Terminal S1 to S7 Input (High Byte)				
	14	28 [1]				Terminal A1 Input (Low Byte)				
		29 [1]				Terminal A1 Input (High Byte)				
	15	30 [1]				Parameter F7-38 Default: PG Counter (Ch2) (Low Byte)				
		31 [1]				Parameter F7-38 Default: PG Counter (Ch2) (High Byte)				
	16-19	32-39				Reserved				

[1] Selectable with F7-33 to F7-42.

Name	Description
Running	Running 0: Stop 1: Forward or Reverse Running
Zero Speed	Zero Speed 0: Running 1: Stop or DC Injection Braking
REV Running	Reverse Running 0: Not Reverse Running 1: Reverse Running
Fault Reset	Fault Reset command from Network 0: Fault Reset command is not from network 1: Fault Reset command is from network
Speed Agree	Speed Agree 0: No Speed Agree 1: Speed Actual at speed reference
Ready	Drive Ready 0: Not Ready 1: Ready
Alarm	Drive Alarm 0: No Drive Alarm 1: Alarm
Faulted	Drive Fault 0: No Drive Fault 1: Fault
oPE	oPE Fault 0: No oPE Fault 1: oPE
Uv	Undervoltage 0: No Undervoltage 1: Undervoltage
LOCAL/REMOTE	Status of Run command from Network 0: Run command is not from network 1: Run command is from network

Name	Description
Multi-Function Digital Output	Terminal MA/MB 0: MA/MB OFF 1: MA/MB ON This function is enabled only when H2-01 is set to F.
Multi-Function Photocoupler 1	Terminal P1 0: Terminal P1 OFF 1: Terminal P1 ON
Multi-Function Photocoupler 2	Terminal P2 0: Terminal P2 OFF 1: Terminal P2 ON
Motor Speed	Monitor parameter U1-05
Torque Reference	Not supported
PG Count Value	Contained MEMOBUS/Modbus Address
Frequency Command	Monitor parameter U1-01
Output Frequency	Actual Drive Speed Monitors drive output frequency. Unit depends on o1-03. Unit is not affected by Speed Scale SS.
Output Current	Actual Output Current Monitors drive output current. Unit is 0.01 A Unit is not affected by Current Scale CS.
Drive Terminal A1 Input	MEMOBUS/Modbus (0x46) Monitor parameter U1-13
Main DC Voltage	Main Circuit DC Voltage Monitor parameter U1-07
Error Code	U2-01 converted using fault code table
F7-33 Alarm Code	Programmable: MEMOBUS/Modbus (0x7F)
F7-35 Terminal A2 Input	Programmable: MEMOBUS/Modbus (0x4F) Monitor parameter U1-14
F7-36 Drive Terminal S1 to S7	Programmable: MEMOBUS/Modbus (0x49) Monitor parameter U1-10
F7-37 Terminal A3 Input	Programmable: MEMOBUS/Modbus (0x50)
F7-38 PG Count Value (CH 2)	Programmable: MEMOBUS/Modbus (0xF1) Serial interface Control Response

◆ High Speed/Torque Status Input (Vendor Specific Yaskawa Electric (YE) Assy) - 166 (0xA6)

If an error occurs while trying to read from the dynamic parameters, the appropriate error bit in Assembly 166 will be set. If more information about the nature of the error is needed, the extended error status can be read explicitly through Class 4, Instance 0xA6, Attribute 0x64. This will return 20 Bytes with each dynamic parameter in Assembly 166 having a Byte dedicated to its extended error status.

Output Instance	Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
166	0	0	Faulted	Alarm	Ready	Speed Agree	Fault Reset	REV Running	ZSP	Running
		1	–	–	Multi-Function Photo-coupler 2	Multi-Function Photo-coupler 1	Multi-Function Digital Output	LOCAL/ REMOTE	Uv	oPE
	1	2	Motor Speed (Low Byte)							
		3	Motor Speed (High Byte)							
	2	4	Torque Actual (Low Byte), not supported							
		5	Torque Actual (High Byte), not supported							
	3	6	PG Count Value (Low Byte)							
		7	PG Count Value (High Byte)							
	4	8	Frequency Command (Low Byte)							
		9	Frequency Command (High Byte)							
	5	10	Output Frequency (Low Byte)							
		11	Output Frequency (High Byte)							
	6	12	Output Current (Low Byte)							
		13	Output Current (High Byte)							
	7	14	Parameter F7-35 Default: Terminal A2 Input (Low Byte)							
		15	Parameter F7-35 Default: Terminal A2 Input (High Byte)							
	8	16	Main Circuit DC Voltage (Low Byte)							
		17	Main Circuit DC Voltage (High Byte)							
	9	18	Error Code (Low Byte)							
		19	Error Code (High Byte)							
	10	20 [1]	Parameter F7-33 Default: Alarm Code (Low Byte)							
		21 [1]	Parameter F7-33 Default: Alarm Code (High Byte)							

Output Instance	Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
166	11	22 *<1>*	Parameter F7-34 Default: Output Power (Low Byte)							
		23 *<1>*	Parameter F7-34 Default: Output Power (High Byte)								
	12	24 *<1>*	Parameter F7-35 Default: Terminal A2 Input (Low Byte)								
		25 *<1>*	Parameter F7-35 Default: Terminal A2 Input (High Byte)								
	13	26 *<1>*	Parameter F7-36 Default: Terminal S1 to S7 Input (Low Byte)								
		27 *<1>*	Parameter F7-36 Default: Terminal S1 to S7 Input (High Byte)								
	14	28 *<1>*	Parameter F7-37 Default: Terminal A3 Input (Low Byte), not supported								
		29 *<1>*	Parameter F7-37 Default: Terminal A3 Input (High Byte), not supported								
	15	30 *<1>*	Parameter F7-38 Default: PG Counter (Ch2) (Low Byte)								
		31 *<1>*	Parameter F7-38 Default: PG Counter (Ch2) (High Byte)								
	16	32 *<1>*	Parameter F7-39 Default: NetRef and NetCtrl (Low Byte)								
			–	–	–	–	–	–	NetCtrl	NetRef
		33 *<1>*	Parameter F7-39 Default: NetRef and NetCtrl								
	17	34 *<1>*	Parameter F7-40 Default: Drive Software Version (Low Byte)								
		35 *<1>*	Parameter F7-40 Default: Drive Software Version (High Byte)								
	18	36 *<1>*	Parameter F7-41 Default: Not Used								
		37 *<1>*	Parameter F7-33 Default: Not Used								
	19	38 *<1>*	Parameter F7-33 Default: Not Used								
		39 *<1>*	Parameter F7-42 Default: Not Used								
	20	40	–	–	–	–	–	–	Assy. 116 F7-32 Error	Assy. 116 F7-31 Error
		41	Assy. 116 F7-30 Error	Assy. 116 F7-29 Error	Assy. 116 F7-28 Error	Assy. 116 F7-27 Error	Assy. 116 F7-26 Error	Assy. 116 F7-25 Error	Assy. 116 F7-24 Error	Assy. 116 F7-23 Error
	21	42	–	–	–	–	–	–	Assy. 166 F7-42 Error	Assy. 166 F7-41 Error
		43	Assy. 166 F7-40 Error	Assy. 166 F7-39 Error	Assy. 166 F7-38 Error	Assy. 166 F7-37 Error	Assy. 166 F7-36 Error	Assy. 166 F7-35 Error	Assy. 166 F7-34 Error	Assy. 166 F7-33 Error

<1> Selectable with F7-33 to F7-42.

Name	Description
Running	Running 0: Stop 1: Forward or Reverse Running
Zero Speed	Zero Speed 0: Running 1: Stop or DC Injection Braking
REV Running	Reverse Running 0: Not Reverse Running 1: Reverse Running

Name	Description
Fault Reset	Fault Reset command from Network 0: Fault Reset command is not from network 1: Fault Reset command is from network
Speed Agree	Speed Agree 0: No Speed Agree 1: Speed Actual at speed reference
Ready	Drive Ready 0: Not Ready 1: Ready
Alarm	Drive Alarm 0: No Drive Alarm 1: Alarm
Faulted	Drive Fault 0: No Drive Fault 1: Fault
oPE	oPE Fault 0: No oPE Fault 1: oPE
Uv	Undervoltage 0: No Undervoltage 1: Undervoltage
LOCAL/REMOTE	Status of Run command from Network 0: Run command is not from network 1: Run command is from network
Multi-Function Digital Output	Terminal MA/MB 0: MA/MB OFF 1: MA/MB ON This function is enabled only when H2-01 is set to F.
Multi-Function Photocoupler 1	Terminal P1 0: Terminal P1 OFF 1: Terminal P1 ON
Multi-Function Photocoupler 2	Terminal P2 0: Terminal P2 OFF 1: Terminal P2 ON
Motor Speed	Monitor parameter U1-05
Torque Reference	Not supported
PG Count Value	Contained MEMOBUS/Modbus Address
Frequency Command	Monitor parameter U1-01
Output Frequency	Actual Drive Speed Monitors drive output frequency. Unit depends on o1-03. Unit is not affected by Speed Scale SS.
Output Current	Actual Output Current Monitors drive output current. Unit is 0.01 A Unit is not affected by Current Scale CS.
Drive Terminal A1 Input	MEMOBUS/Modbus (0x46) Monitor parameter U1-13
Main DC Voltage	Main Circuit DC Voltage Monitor parameter U1-07
Error Code	U2-01 converted using fault code table
F7-33 Alarm Code	Programmable: MEMOBUS/Modbus (0x7F)
F7-35 Terminal A2 Input	Programmable: MEMOBUS/Modbus (0x4F) Monitor parameter U1-14
F7-36 Drive Terminal S1 to S7	Programmable: MEMOBUS/Modbus (0x49) Monitor parameter U1-10
F7-37 Terminal A3 Input	Programmable: MEMOBUS/Modbus (0x50)
F7-38 PG Count Value (CH 2)	Programmable: MEMOBUS/Modbus (0xF1) Serial interface Control Response
F7-39 NetRef (Status)	Status of reference command from Network 0: Reference command is not from network 1: Reference command is from network

Name	Description
F7-40 Drive Software Version	Programmable: MEMOBUS/Modbus (0x4D) Monitor parameter U1-25

Possible extended error codes are listed in *Table 13* and *Table 14*. If an error occurs, extended error code 0x02 (Register number failure) is usually set.

Table 13 Extended Error Codes for Assembly 116/166

Error Code	Description
0x00	No error
0x01	Sub function code failure
0x02	Register number failure
0x21	Limit check error failure
0x22	Write failure
0x23	Write failure at Uv
0x24	Write failure at busy

Table 14 Extended Error Codes in Class 0x04 Instance 0xA6 Attribute 0x64

Dynamic Parameter	Byte Containing Extended Error Code
F7-23	Byte 0
F7-24	Byte 1
F7-25	Byte 2
F7-26	Byte 3
F7-27	Byte 4
F7-28	Byte 5
F7-29	Byte 6
F7-30	Byte 7
F7-31	Byte 8
F7-32	Byte 9
F7-33	Byte 10
F7-34	Byte 11
F7-35	Byte 12
F7-36	Byte 13
F7-37	Byte 14
F7-38	Byte 15
F7-39	Byte 16
F7-40	Byte 17
F7-41	Byte 18
F7-42	Byte 19

10   General Class Objects

◆ Identity Object 1 (Class 0x01)

■ Services Supported

Service Code No. (Hex)	Service Name
01	Get Attribute All
05	Reset
0E	Get Attribute Single

■ Attributes Supported

Instance ID	Attribute	Name	Description	Get	Set	Size	Range	Default
0	1	Object Software Revision	Identity Object software revision	O	–	Word	–	1
1	1	Vendor ID	Manufacturer code. 44 (2C H): Yaskawa Electric	O	–	Word	–	44 (Yaskawa)
1	2	Device Type	Device profile. The profile for this product is an AC drive. 2: AC drive	O	–	Word	–	2 (AC drives)
1	3	Product Code	Product codes determined by the manufacturer.	O	–	Word	–	*<1>*
1	4	Revision	Software revision for the option.	O	–	Word	–	Depends on software
1	5	Status	Shows the communication status for the drive.	O	–	Word	–	0
1	6	Serial Number	Option serial number	O	–	Long	–	Each unit is unique
1	7	Product Name	Product name	O	–	String (14 Bytes)	–	Product-dependent (i.e., CIMR-X)
1	8	State	Operation status of the drive. 3: Drive ready 4: Fault	O	–	Byte	–	3 State of the drive

<1>   Product code is 2 Bytes. The first Byte is the drive type and the second Byte is the model number of the drive.

◆ Assembly Object 4 (Class 0x04)

■ Services Supported

Service Code No. (Hex)	Service Name
0E	Get Attribute Single
10	Set Attribute Single

■ Attributes Supported

Instance ID	Attribute	Name	Description	Get	Set	Size	Range	Default
0	1	Object Software Revision	Show the EtherNet Object software revision.	O	–	Word	–	2
20	3	Data	Same function as the Basic Speed Control (Output Assembly)	O	O	Array 4 Bytes	–	00 00 00 00
21	3	Data	Same function as the Extended Speed Control (Output Assembly)	O	O	Array 4 Bytes	–	00 00 00 00
22	3	Data	Same function as the Speed and Torque Control (Output Assembly)	O	O	Array 6 Bytes	–	00 00 00 00 00 00

Instance ID	Attribute	Name	Description	Get	Set	Size	Range	Default
23	3	Data	Same function as the Extended Speed and Torque Control (Output Assembly)	O	O	Array 6 Bytes	–	00 00 00 00 00 00
70	3	Data	Same function as the Basic Speed Control (Input Assembly)	O	–	Array 4 Bytes	–	00 00 00 00
71	3	Data	Same function as the Extended Speed Control (Input Assembly)	O	–	Array 4 Bytes	–	00 00 00 00
72	3	Data	Same function as the Extended Speed and Torque Control (Input Assembly)	O	–	Array 6 Bytes	–	00 00 00 00 00 00
73	3	Data	Same function as the Speed Control (Input Assembly)	O	–	Array 6 Bytes	–	00 00 00 00 00 00
100	3	Data	Same function as the MEMOBUS/ Modbus Message Command (Output Assembly)	O	O	Array 5 Bytes	–	00 00 00 00 00
101	3	Data	Same function as the Standard Control (Output Assembly)	O	O	Array 8 Bytes	–	00 00 00 00 00 00 00 00
115	3	Data	Same function as the Extended Speed/ Torque Control (Output Assembly)	O	O	Array 40 Bytes	–	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
116	3	Data	Same function as the High Speed/ Torque Control (Output Assembly)	O	O	Array 44 Bytes	–	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
150	3	Data	Same function as the MEMOBUS/ Modbus Message Command (Input Assembly)	O	–	Array 5 Bytes	–	00 00 00 00 00
151	3	Data	Same function as the Standard Status (Input Assembly)	O	–	Array 8 Bytes	–	00 00 00 00 00 00 00 00
155	3	Data	Same function as the Extended Speed/ Torque Status (Input Assembly)	O	–	Array 40 Bytes	–	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
166	3	Data	Same function as the High Speed/ Torque Status (Input Assembly)	O	–	Array 44 Bytes	–	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

◆ Motor Data Object 40 (Class 0x28)

■ Services Supported

Service Code No. (Hex)	Service Name
0E	Get Attribute Single
10	Set Attribute Single

■ Attributes Supported

Instance ID	Attribute	Name	Description	Get	Set	Size	Range	Default
0	1	Object Software Revision	Motor Data Object software revision.	O	–	Word	–	1
1	3	Motor Type	Differs depending on selected motor control mode. When set to OLV/PM (A1-02 = 5), value becomes 3 (PM motor). Else, set the value to 7 (Induction motor).	O	–	Byte	–	. Depends on A1-02, Control Method Selection
1	6	Rated Current [0.1 A]	Motor rated current. Displayed in 0.1 A units. Changes according to the current scale (CS).	O	O	Byte	–	Depends on capacity
1	7	Rated Voltage [1V]	Motor rated voltage. Displayed in 1 V units. Changes according to the voltage scale (VS).	O	O	Byte	–	Depends on capacity

◆ Control Supervisor Object 41 (Class 0x29)

■ Services Supported

Service Code No. (Hex)	Service Name
0E	Get Attribute Single
10	Set Attribute Single
05	Reset

■ Attributes Supported

Instance ID	Attribute	Name	Description	Get	Set	Size	Range	Default
0	1	Object Software Revision	Revision number of the Control Supervisor Object.	O	–	Word	–	1
1	3	Run 1 (Forward Run Command)	Forward Running 0: Stop 1: Forward Running	O	O	Byte	0, 1	0
1	4	Run 2 (Reverse Run Command)	Reverse Running 0: Stop 1: Reverse Running	O	O	Byte	0, 1	0
1	5	NetCtrl (Command)	Run command from Network 0: Depends on b1-02 1: Enables the run command from network	O	O	Byte	0, 1	0
1	6	State	Drive Status 2: Not Ready 3: Ready (Stopped) 4: Enabled (Run command present) 5: Deceleration to Stop 6: Fault Stop 7: Fault	O	–	Byte	–	3
1	7	Running 1 (FWD)	Forward Running 0: Stop 1: Forward Running	O	–	Byte	–	0
1	8	Running 1 (REV)	Reverse Running 0: Stop 1: Reverse Running	O	–	Byte	–	0
1	9	Ready	Drive Ready 0: Not Ready 1: Ready	O	–	Byte	–	1
1	10	Faulted	Drive Fault 0: No Drive Fault 1: Fault	O	–	Byte	–	0

Instance ID	Attribute	Name	Description	Get	Set	Size	Range	Default
1	11	Warning	Warning 0: No Warning 1: Warning	O	–	Byte	–	0
1	12	Fault Reset	Fault Reset 0: No Fault Reset 1: Fault Reset	O	O	Byte	0, 1	0
1	13	Fault Code	Current Fault *Refer to Option Fault Code Conversion Table on page 45* for details.	O	–	Word	–	0000
1	15	Control from Net (Status)	Run Command from the option 0: The Run command is not from the option 1: Enables the Run command from option	O	–	Byte	–	0
1	16	NetFaultMode	Normal 2 (Vendor Specific)	O	–	Byte	–	2
1	17	Force Fault	External Fault 0: No External Fault 1: External Fault (EF0) Triggered by the rising edge of the signal.	O	O	Byte	0, 1	0
1	18	Force Status	External Fault status 0: No External Fault 1: External Fault (EF0) Triggered by the rising edge of the signal.	O	–	Byte	–	0

■ Option Fault Code Conversion Table

Drive Fault Code (Hex) (MEMOBUS/Modbus 0080 Hex)	Option Fault Code (Hex)	Description
2	3220	DC Bus Undervolt (Uv1)
3	5110	CTL PS Undervolt (Uv2)
4	3222	MC Answerback (Uv3)
5	2130	Short Circuit (SC)
6	2120	Ground Fault (GF)
7	2300	Over Current (oC)
8	3210	DC Bus Overvolt (ov)
9	4200	Heatsink Overtemp (oH)
10	4210	Heatsink Max Temp (oH1)
11	2220	Motor Overload (oL1)
12	2200	Drive Overload (oL2)
13	2221	Overtorque Det 1 (oL3)
14	2222	Overtorque Det 2 (oL4)
15	7110	DynBrk Transistor (rr)
16	7112	DynBrk Resistor (rH)
17	9000	External Fault 3 (EF3)
18	9000	External Fault 4 (EF4)
19	9000	External Fault 5 (EF5)
20	9000	External Fault 6 (EF6)
21	9000	External Fault 7 (EF7)
27	3130	Input Phase Loss (PF)
28	3130	Output Phase Loss (LF)
29	5210	Motor Overheat 1 (PTC Input) (oH3)
30	5300	Operator Disconnected (oPr)
31	6320	EEPROM R/W Error (Err)
32	3210	Motor OverHeat 2 (PTC Input) (oH4)

Drive Fault Code (Hex) (MEMOBUS/Modbus 0080 Hex)	Option Fault Code (Hex)	Description
33	7500	MEMBOUS/Modbus Com Fault (CE)
34	7500	EtherNet/IP Communication Error (bUS)
37	8321	Out of Control (CF)
39	9000	External Fault 0 (EF0)
40	8000	PID Feedback Loss (FbL)
41	8000	Undertorque Detection 1 (UL3)
42	8000	Undertorque Detection 2 (UL4)
43	8000	High Slip Braking oL (oL7)
54	8000	Current Imbalance (LF2)
55	8000	Pull-Out Detection (STo)
59	1000	Too Many Speed Search Restarts (SEr)
65	8000	Excessive PID Feedback (FbH)
66	9000	External Fault (input terminal S1) (EF1)
67	9000	External Fault (input terminal S2) (EF2)
38	8000	Mechanical Weakening Detection 1 (oL5)
39	8000	Mechanical Weakening Detection 2 (UL5)
70	5000	Current Offset Fault (CoF)
73	8000	DriveWorksEZ Fault (dwFL)
–	1000	Other faults

◆ AC/DC Drive Object 42 (Class 0x2A)

■ Services Supported

Service Code No. (Hex)	Service Name
0E	Get Attribute Single
10	Set Attribute Single

■ Attributes Supported

Instance ID	Attribute	Name	Description	Get	Set	Size	Range	Default
0	1	Object Software Revision	Revision number of AC/DC drive object	O	–	Word	–	1
1	3	AtReference	Speed Agree 0: – 1: Speed Agree	O	–	Byte	–	0
1	4	NetRef (Command)	Status of reference command from EtherNet/ IP 0: Reference command not from option 1: Reference command from the option	O	O	Byte	–	0
1	6	Drive Mode	Drive control mode. 0: V/f 1: OLV 2: OLV for PM (Read only)	O	O	Byte	0 to 2	0
1	7	Speed Actual	Actual drive speed. Unit is not affected by Speed Scale (SS).	O	–	Word	–	3
1	8	Speed Reference	Frequency Reference. Monitors the drive frequency reference. Unit is not affected by Speed Scale (SS).	O	O	Word	–	0

Instance ID	Attribute	Name	Description	Get	Set	Size	Range	Default
1	9	Current Actual	Actual Output Current. Display is in the following units: BA0001 to BA0018, 2A0001 to 2A0040, 4A0001 to 4A0023: 0.01 A units. 2A0056 to 2A0069, 4A0031 to 4A0038: 0.1 A units. Unit is not affected by Current Scale (CS).	O	–	Word	–	0
1	11	Torque Actual	Not supported	O	–	Word	–	0
1	12	Torque Reference	Not supported	O	–	Word	–	0
1	15	Power Actual (W)	Drive Output Power Unit is affected by Power Scale (PS).	O	–	Word	–	0
1	16	Input Voltage (V)	Drive Input Voltage Unit is affected by Voltage Scale (VS).	O	–	Word	–	Dep. on capacity
1	17	Output Voltage (V)	Drive Output Voltage Unit is affected by Voltage Scale (VS).	O	–	Word	–	0
1	18	Accel Time (ms)	Acceleration Time 1 (C1-01) Units set in parameter C1-10. Unit is affected by Time Scale (TS).	O	O	Word	–	2710H
1	19	Decel Time (ms)	Acceleration Time 1 (C1-02) Units set in parameter C1-10. Unit is affected by Time Scale (TS).	O	O	Word	–	2710H
1	20	Low Speed Limit Percent of Max Speed	Frequency Reference Lower Limit (d2-02)	O	O	Word	0 to 1100	0
1	21	High Speed Limit Percent of Max Speed	Frequency Reference Upper Limit (d2-01)	O	O	Word	0 to 1100	3E8H
1	22	Speed Scale (-15 to 15)	Setting for F7-17, scale of units for speed related data.	O	O	Byte	-15 to 15	0
1	23	Current Scale (-15 to 15)	Setting for F7-18, scale of units for current related data.	O	O	Byte	-15 to 15	0
1	24	Torque Scale (-15 to 15)	Setting for F7-19, scale of units for torque related data.	O	O	Byte	-15 to 15	0
1	26	Power Scale (-15 to 15)	Setting for F7-20, scale of units for power related data.	O	O	Byte	-15 to 15	0
1	27	Voltage Scale (-15 to 15)	Setting for F7-21, scale of units for voltage related data.	O	O	Byte	-15 to 15	0
1	28	Time Scale (-15 to 15)	Setting for F7-22, scale of units for speed related data.	O	O	Byte	-15 to 15	0
1	29	Reference from Net (Status)	Status of Reference Command (1 = Network). 0: As set by the drive parameters 1: Network	O	–	Byte	–	0

◆ DLR Object 71 (Class 0x47)

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. This option is a beacon based ring node implementation.

To set up a DLR network, configure a supervisor on the network prior to connecting and powering on all devices in the ring. Establishing a ring without an active supervisor may cause a loss of communication to devices on the ring.

The supervisor precedence must be configured when setting up the supervisor. Typically, the default beacon rate is 400 ms to allow for faster fault detection and recovery period and should be fast enough for devices to recover on the ring without losing an I/O connection. The precedence value for the supervisor is used when more than one supervisor is present. When two supervisors are on the network, the supervisor with the higher MAC address will become the supervisor and the other will become a backup supervisor.

Yaskawa recommends that all devices in the ring be DLR capable. Add non-DLR devices to the ring through a DLR-capable device, such as a 3-port ETAP.

Ensure that non-DLR devices placed in the ring meet the following requirements:

• Disable MAC address learning
• Do not use multicast filtering
• Preserve VLAN tags.

Make sure that all switches in the ring are DLR-aware. Switches in the ring that are not DLR-aware may cause undesired behavior due to MAC address learning of the supervisor beacon packets being received on two different switch ports.

Be sure to set the RPI only as fast as needed to limit the network traffic. Yaskawa supports RPIs down to 10 ms. However, if a slower level of control is acceptable, a slower RPI setting will reduce network traffic.

Yaskawa also recommends setting up and configuring all devices prior to completing the ring by leaving one cable disconnected. Make the last connection after configuring the nodes and supervisor.

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

■ Services Supported

Service Code No. (Hex)	Service Name
01	Get Attribute All
10	Set Attribute Single

■ Attributes Supported

Instance ID	Attribute	Name	Description	Get	Set	Size	Range	Default
0	1	Object Software Revision	Revision number of the DLR Object	O	–	Word	–	3
1	1	Network Topology	Current network topology mode 0: Linear 1: Ring	O	–	Byte	0, 1	0
1	2	Network Status	Current status of network 0: Normal 1: Ring fault 2: Unexpected loop detected 3: Partial network fault 4: Rapid fault/restore cycle	O	–	Byte	0 to 4	–
1	10	Active Supervisor Address	Struct of: Supervisor IP Address = Long Supervisor MAC Address = Array of bytes	O	–	Struct	–	–
1	12	Capability Flags	Describes DLR capabilities	O	–	Long	–	0x00000002

Note: "Get Attribute All" Service shall report in attribute ascending order.

◆ QoS Object 72 (Class 0x48)

■ Services Supported

Service Code No. (Hex)	Service Name
0E	Get Attribute Single
10	Set Attribute Single

■ Attributes Supported

Instance ID	Attribute	Name	Description	Get	Set	Size	Range	Default
0	1	Object Software Revision	Revision number of the QoS Object	O	–	Word	–	1
1	4	DCSP Urgent	DSCP value for CIP transport class 0/1 Urgent priority messages	O	O	Byte	0 to 63	55
1	5	DSCP Scheduled	DSCP value for CIP transport class 0/1 Scheduled priority messages	O	O	Byte	0 to 63	47
1	6	DSCP High	DSCP value for CIP transport class 0/1 High priority messages	O	O	Byte	0 to 63	43

Instance ID	Attribute	Name	Description	Get	Set	Size	Range	Default
1	7	DSCP Low	DSCP value for CIP transport class 0/1 Low priority messages	O	O	Byte	0 to 63	31
1	8	DSCP Explicit	DSCP value for CIP explicit messages and all other EtherNet/IP encapsulation messages	O	O	Byte	0 to 63	27

◆ TCP/IP Object 245 (Class 0xF5)

■ Services Supported

Service Code No. (Hex)	Service Name
01	Get Attribute All
0E	Get Attribute Single
10	Set Attribute Single

■ Attributes Supported

Instance ID	Attribute	Name	Description	Get	Set	Size	Range	Default
0	1	Object Software Revision	Revision number of the TCP/IP Object	O	–	Word	–	1
1	1	Status	Bits 0-3 = Interface Status 0: Interface has not been configured 1: Interface Configuration is valid, obtained from BOOTP, DHCP, or NVRAM 2: Interface Configuration is valid and obtained from hardware settings 3: Reserved Bit 4 = Multicast Pending Bits 5-31 = Reserved	O	–	DWord	–	–
1	2	Configuration Capability	Bit 0 = BOOTP Client Bit 1 = DNS Client Bit 2 = DHCP Client Bit 3 = DHCP-DNS Update Bit 4 = Configuration Settable Bits 5-31 = Reserved	O	–	DWord	–	–
1	3	Configuration Control	Bits 0-3 = Startup Configuration 0: NVRAM 1: BOOTP 2: DHCP 3: Reserved Bit 4 =DNS Enabled (not supported) Bits 5-31 = Reserved	O	O	DWord	–	–
1	4	Physical Link	Struct of: Path Size: 0 Path: 0	O	–	Struct	–	02H 00H 20H F6H 24H 01H
1	5	Interface Configuration	Struct of: IP Address = Long Subnet Mask = Long Gateway Address = Long Name Server1 = Long Name Server2 = Long Domain Name = STRING	O	O	Struct	–	–
1	6	Host Name	Host Name	O	O	STRING	64 char	Null
1	10	Select ACD	Activates use of ACD 0: Disable ACD 1: Enable ACD	O	O	BOOL	0, 1	1
1	11	Last Conflict Detected	Structure containing information related to the last conflict detected. Struct of: Bit 0: ACD Activity Bits 1-7: Remote MAC Bits 8-36: ARP PDU	O	O	Struct	–	–

Note: "Get Attributes All" Service shall report in attribute ascending order.

◆ Ethernet Link Object 246 (Class 0xF6)

■ Services Supported

Service Code No. (Hex)	Service Name
01	Get Attribute All
0E	Get Attribute Single
10	Set Attribute Single

■ Attributes Supported

Instance ID	Attribute	Name	Description	Get	Set	Size	Range	Default
0	1	Object Software Revision	Revision number of the TCP/IP Object	O	–	Word	–	3
0	2	Max Instance	–	O	–	UINT	–	2
0	3	Number of Instances	–	O	–	UINT	–	2
1	1	Interface Speed	Interface speed currently in use	O	–	UDINT	–	–
1	2	Interface Flags	Bit 0 = Link Status Bit 1 = Duplex (0: Half/1: Full) Bits 2-4 = Negotiation Status 0: In progress 1: Auto-negotiate failed 2: Speed found, duplex not found 3: Successful 4: Not attempted Bit 5 = Manual Setting requires restart Bit 6 = Local hardware fault Bits 7-31 = Reserved	O	–	DWord	–	–
1	3	Physical Address (MAC)	MAC address	O	–	Array of 6 Bytes	–	–
1	6	Interface Control	Struct of: Control Bits: Word Bit 0 = Auto-negotiate Bit 1 = Forced Duplex Mode Bits 2-15 = Reserved Forced Int Speed: Word	–	O	Struct	–	–
1	10	Interface Label	–	O	–	Short String	–	Port 1
2	1	Interface Speed	Interface speed currently in use	O	–	UDINT	–	–
2	2	Interface Flags	Bit 0 = Link Status Bit 1 = Duplex (0: Half/1: Full) Bits 2-4 = Negotiation Status 0: In progress 1: Auto-negotiate failed 2: Speed found, duplex not found 3: Successful 4: Not attempted Bit 5 = Manual Setting requires restart Bit 6 = Local hardware fault Bits 7-31 = Reserved	O	–	DWord	–	–
2	6	Interface Control	Struct of: Control Bits: Word Bit 0 = Auto-negotiate Bit 1 = Forced Duplex Mode Bits 2-15 = Reserved Forced Int Speed: Word	–	O	Struct	–	–
2	10	Interface Label	–	O	–	Short String	–	Port 2

Note: "Get Attributes All" Service shall report in attribute ascending order.

11 Vendor-Specific (Yaskawa) Class Objects

◆ Yaskawa Drive Parameters Object 100 (Class 0x64)

■ Services Supported

Service Code No. (Hex)	Service Name
0E	Get Attribute Single
10	Set Attribute Single

This is a dynamic explicit Class Object. With this Class object any drive parameter with a MEMOBUS/Modbus address greater than 0x00FF can be accessed. The mapping of Class Object instance/attribute to MEMOBUS/Modbus address is as follows.

Given a typical MEMOBUS/Modbus Address of 0xXXYY

The EtherNet/IP Instance value is equal to XX

The EtherNet/IP Attribute value is equal to YY

As an example, to access parameter b5-12 (MEMOBUS/Modbus Address =0x01B0)

Class Object is 100 (0x64) (Always for this Class Object)

Instance = 0x01

Attribute = 0xB0

■ Storing Changed Parameters

Writing a zero to 0x0900 (Enter) stores changed parameters to the non-volatile memory of the drive. Writing a 0 to 0x0910 (Accept) allows the drive to use the changed parameters. Reading Enter Command 0x0900 or Accept Command 0x910 will always return a value of 0x0001.

Performing a RAM-ENTER to Store Register Data

Parameter H5-11 is used to decide whether a RAM-ENTER will be done on the writes to registers in the drive. If H5-11 = 1 (default), the option will issue the RAM-ENTER with the parameter writes. If H5-11 = 0, no RAM-ENTER is issued and an ENTER command must be explicitly sent by the user for the parameter to be activated after a write.

Explicit writes to RAM-ENTER (0x910) and ROM-ENTER (0x900) are handled as special cases. If a user writes a 0 to RAM-ENTER or ROM-ENTER, the command will be executed in the drive. If a user writes a 1 to those registers, the command will not be executed but returns a success to the explicit write on the network. Writing a value other than 0 or 1 will result in an error response of Invalid Attribute Value on the network.

Note: Performing the RAM-ENTER increases the processing time of the writes and increases the response time to explicit writes.

■ Attributes Supported

Instance ID	Attribute	Name	Description	Get	Set	Size	Range	Default
0	1	Object Software Revision	Yaskawa Drive Parameters object software revision	O	–	Word	–	1
1	00	MEMOBUS/ Modbus Register 0x0100	Language selection	O	O	Word	0 to 2	1
1	01	MEMOBUS/ Modbus Register 0x0101	Parameter access level	O	O	Word	0 to 2	2
1	YY	MEMOBUS/ Modbus Registers 0x0100 to 0x01FF	MEMOBUS/Modbus Registers 0x0100 to 0x01FF	O	O	Word	–	–
2	YY	MEMOBUS/ Modbus Registers 0x0200 to 0x02FF	MEMOBUS/Modbus Registers 0x0200 to 0x02FF	O	O	Word	–	–

Instance ID	Attribute	Name	Description	Get	Set	Size	Range	Default
...	...	...	...	...	O	Word	–	–
255	YY	MEMOBUS/ Modbus Registers 0xFF00 to 0xFFFF	MEMOBUS/Modbus Registers 0xFF00 to 0xFFFF	O	O	Word	–	–

Note:
1. Attempting to set a read-only parameter results in an EtherNet/IP error code of 0x0E, Attribute Not Settable.
2. Attempting to access an invalid parameter results in an EtherNet/IP error code of 0x09, Invalid Attribute Value.
3. 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.

◆ Yaskawa Monitor/Control Object 125 (Class 0x7D)

■ Services Supported

Service Code No. (Hex)	Service Name
0E	Get Attribute Single
10	Set Attribute Single

This is a dynamic explicit Class Object. With this Class object any parameter with a MEMOBUS/Modbus address less than 0x0100 can be accessed. This class is similar to the Drive Parameters Object Class 100, Object Class 100 differs slightly from Object Class 125. In Object Class 125 the most significant byte of MEMOBUS/Modbus address is always zero and the Instance ID remains at 1.

Given a typical MEMOBUS/Modbus Address 0f 0x00YY

The EtherNet/IP Instance value is equal to 0x01

The EtherNet/IP Attribute value is equal to YY

As an example, to access Drive Status (MEMOBUS/Modbus Address = 0x002C)

Class Object is 125 (0x7D) (Always for this Class Object)

Instance = 0x01

Attribute = 0x2C

■ Attributes Supported

Instance ID	Attribute	MEMOBUS/ Modbus Address	Description	Get	Set	Size	Range	Default
0	1	–	Object Software Revision	O	–	Word	–	1
1	1	0x0001	Drive Command Bits	O	O	Word	–	0
1	2	0x0002	Frequency Instruction	O	O	Word	–	4
..	..	..	..	O	O	Word	–	–
1	255	0x00FF	Unused	O	O	Word	–	–

Note:
1. Attempting to set a read-only parameter results in an EtherNet/IP error code of 0x0E, Attribute Not Settable.
2. Attempting to access an invalid parameter results in an EtherNet/IP error code of 0x09, Invalid Attribute Value.
3. 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.

12 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 22* 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	*54*
Drive Status Tab	*55*
Network Tab	*55*
Email Alerts Tab	*56*
Parameter Access Tab [1]	*57*
Configuration Tab [1]	*58*
Custom Tab	*59*

<1> 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.

Figure 22 HTML Home Page

◆ Main Tab

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

Figure 23 Main Tab View

◆ Drive Status Tab

The Drive Status tab shows basic I/O information and drive state information.
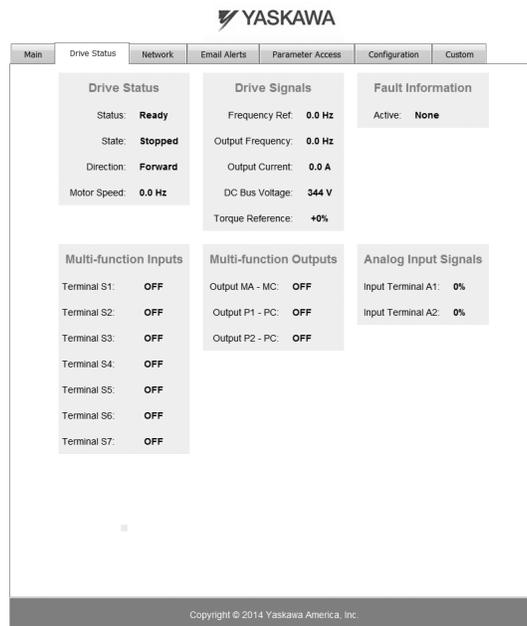
Figure 24 Drive Status Tab View

◆ Network Tab

The Network tab shows the status of the option network traffic and the status of open I/O connections.
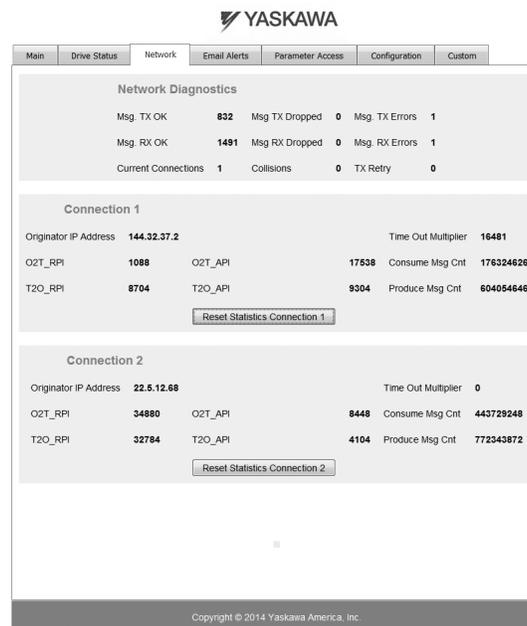
Figure 25 Network Tab View

Table 15 Network Monitor Descriptions

Network Monitor	Explanation
Msg Tx OK	Cumulative number of messages transmitted successfully from the option.
Msg Rx OK	Cumulative number of messages received successfully to the option.

Network Monitor	Explanation
Current Connections	Current number of open connections.
Control Connection Delta Time	The time between the last two writes to the Control register, MEMOBUS/Modbus address 0001H.
Msg Tx Dropped	Cumulative number of messages dropped due to output network buffer being full and unable to hold the new message.
Msg Rx Dropped	Cumulative number of messages dropped due to input network buffer being full and unable to hold the new message.
Collisions	Cumulative number of collisions (half duplex only) reported by the MAC/PHY (Media Access Control/Physical Connection).
Msg Tx Errors	Cumulative number of transmit underruns and transmit stops reported by the MAC/PHY.
Msg Rx Errors	Cumulative number of receive overruns, receive stops, and receive error frames reported by the MAC/PHY.
Tx Retry	Cumulative number of transmits in which the 1st attempt was delayed due to busy medium reported by the MAC/PHY.

◆ Email Alerts Tab

The Email Alerts tab allows the user to configure four Email Fault/Alarm conditions. When the condition is true, one email will be sent to the provided email address. Another email will not be sent until the condition becomes false and then true again. A 30-second timer prevents emails from being sent when conditions reoccur immediately after being removed. The timer helps limit the amount of emails sent regarding the same intermittent condition and helps to reduce network traffic by reducing emails about reoccurring errors.

Figure 26 Email Alerts Tab View

■ Conditional Email Set-up

1. Define the condition that will trigger the email by selecting a monitor parameter, a comparator, and a value. Set up comparator values for the range of values to check in the chosen condition. If choosing only one condition and no OR or AND are needed, set the "OR/AND" drop-down selection to "NotUsed".

2. Enter the email address where the alert will be sent.

3. Enter the message that will appear in the email contents.

4. Enter the email subject.

5. Click the "Email Active" check box to enable the alert.

Clicking "Save to device" will save the entered information into the option memory.

Clicking "Cancel and reload" will cancel any pending edits and display the most recently saved settings from the option board.

◆ Parameter Access Tab

The Parameter Access tab allows the user to read and write parameters from the drive. Write access is restricted until a valid password is entered.


Figure 27 Parameter Access Tab View

The MEMOBUS/Modbus address for the drive parameter being accessed must be entered in hexadecimal. The number must begin with "0x" to signify hexadecimal. Clicking "Read" will load and display the current value of the given MEMOBUS/Modbus Address.

Clicking "Set" will save the given value to the given MEMOBUS/Modbus address.

After a "Read" or "Set" command is given, Status will display "Waiting" while the action is being carried out, then "Complete" is displayed when finished.

◆ Configuration Tab

The Configuration tab sets web page behavior parameters. Access is restricted unless a valid password is entered.

Figure 28 Configuration Tab View

■ Security Login

Enter a valid password and click "Log in". The button text will change to "Log out" and the status will change to "Logged in".

> **Note:** The default security password is "yaskawa".

This password can be changed in the "Change Password" section of the tab. Entering a valid password allows access to the settings in the Configuration tab, Email Alerts tab, and the Parameter Access tab.

■ Change Password

To change the password, enter the new password in the "New Password:" and "Confirm Password:" text boxes then click "Change password". The Status display will change to "Idle" then "Changing Password" then "Password Changed". If the passwords in the two text boxes do not match, the Status will display "Passwords don't match".

■ Option Card

The values displayed in the various tabs are refreshed at the rate defined in the "Applet Refresh Rate (ms)" text box. Enter values in the range of 1000 ms to 65.535 seconds.

Parameter Security can be enabled or disabled by clicking one of the radio buttons. When "Disabled" is selected, no password is necessary and all functions in the web pages will be available. When "Enabled" is selected, a valid password must be entered to edit email settings and to write parameters.

■ Email Settings

The "Email Server IP" text box must contain the IP address of the email server. The subnet address is configured in drive parameters F7-05 through F7-08. The configured email alerts will use the server at this address when sending emails.

Enter the email server port in the "Email Port" text box.

The value in the "From Email Address" text box identifies the origin of the email alerts to the recipient.

Click "Submit Email Parameters" to save the email settings to the option.

Click "Save Configuration Parameters to Flash" to save the entered values from this tab into non-volatile memory. These values will then be remembered after cycling power.

■ General Settings

Click "Save Options Card Parameters" to save the Applet Refresh Rate and the Parameter Security settings to the option.

◆ Custom Tab

The Custom tab displays a selection of quick setting parameters.
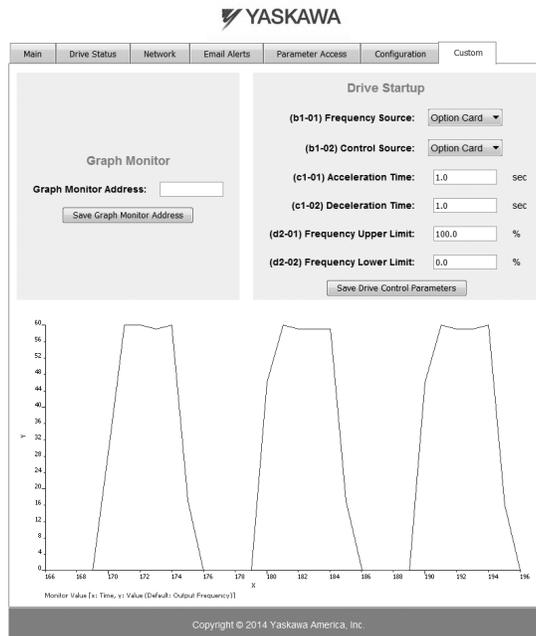
Figure 29 Custom Tab View

13 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
bUS	bUS	Option Communication Error
		• 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		• Check that power is supplied to the PLC
		• Check that PLC is not in program mode
Communication cable is not connected properly		• Check for faulty wiring
		• Correct any wiring problems
A data error occurred due to noise		• 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.

Digital Operator Display		Fault Name
EF0	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.		• 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	oFA00	Option Card Connection Error at Option Port CN5-A
		The option card is incompatible with the drive.
Cause		**Possible Solution**

Digital Operator Display		Fault Name
oFA01	oFA01	Option Card Fault
		Option not properly connected
Cause		**Possible Solution**
The option card connection is faulty		• 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.

Digital Operator Display		Fault Name
$oFAO3$	oFA03	Option Card Fault (port A)
		Option card self-diagnostic error
$oFAO4$	oFA04	Option Card Fault (port A)
		An error occurred attempting to write to the option card memory.
$oFA30$ to $oFA43$	oFA30 to oFA43	Option Card Fault (port A)
		Communication ID error
Cause		**Possible Solution**
Option card or hardware is damaged.		Replace the option card. Contact Yaskawa for consultation.

■ 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.		• 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.		• 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.	

■ 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 16 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.
15	Too much data	The data size is incorrect.	Correct the data size.

Error Code (Hex)	Description	Cause	Possible Solution
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 17*.

Table 17 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.
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.

14   Specifications

Table 18 Option Specifications

Item	Specification
Model	SI-EN3D/V
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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Revision History

The revision dates and the numbers of the revised manuals appear on the bottom of the back cover.

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