

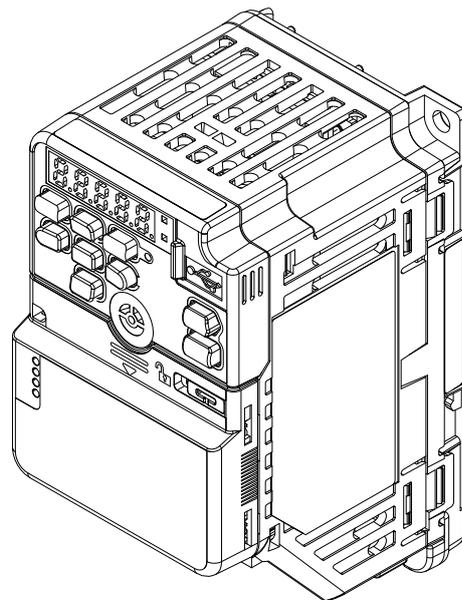
YASKAWA AC Drive GA501

## EtherNet/IP

## Technical Manual

Model CIPR-GA51xxxxxxxxx

To correctly use the product, read this manual thoroughly and keep it for easy reference, inspection, and maintenance.  
Make sure that the end user receives this manual.



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# Table of Contents

1. Preface and Safety . . . . .	7
Applicable Documentation . . . . .	7
Glossary . . . . .	7
Registered Trademarks . . . . .	7
Supplemental Safety Information . . . . .	8
Section Safety . . . . .	8
2. Overview . . . . .	8
3. Component Names . . . . .	9
PCB . . . . .	9
Communication Connector . . . . .	9
Communication LED States . . . . .	10
Power-Up Diagnostics . . . . .	10
4. Installation . . . . .	11
Section Safety . . . . .	11
Settings for DIP Switch S1 . . . . .	11
Communication Cable Specifications . . . . .	12
Communication Topology Specifications . . . . .	12
EDS File . . . . .	12
5. Related Drive Parameters . . . . .	13
Operation at PLC Forward Close Command . . . . .	17
6. EtherNet/IP Configuring Messaging . . . . .	17
Polled Configuration . . . . .	17
7. Output Assemblies (Consumers) . . . . .	18
EtherNet/IP Basic Speed Control Output - 20 (0x14) . . . . .	18
EtherNet/IP Extended Speed Control Output - 21 (0x15) . . . . .	18
EtherNet/IP Speed and Torque Control Output - 22 (0x16) . . . . .	19
EtherNet/IP Extended Speed and Torque Control Output - 23 (0x17) . . . . .	19
MEMOBUS/Modbus Message Output (Vendor Specific Yaskawa Electric (YE) Assy) - 100 (0x64) . . . . .	20
(Vendor Specific Yaskawa Electric (YE) Assy) Speed/Torque Control Output - 101 (0x65) . . . . .	21
(Vendor Specific Yaskawa Electric (YE) Assy) Extended Speed/Torque Control Output - 115 (0x73) . . . . .	22
(Vendor Specific Yaskawa Electric (YE) Assy)-High Speed/Torque Control Output - 116 (0x74) . . . . .	23

(Vendor Specific Yaskawa Electric (YE) Assy) 8 Byte Dynamic Output - 117 (0x75) . . . .	25
(Vendor Specific Yaskawa Electric (YE) Assy) 12 Byte Dynamic Output - 118 (0x76) . . .	26
(Vendor Specific Yaskawa Electric (YE) Assy) 18 Byte Dynamic Output - 119 (0x77) . . .	27
(Vendor Specific Yaskawa Electric (YE) Assy) 24 Byte Dynamic Output - 120 (0x78) . . . . .	28
<b>8. Input Assemblies (Producers) . . . . .</b>	<b>29</b>
EtherNet/IP Basic Speed Control Input - 70 (0x46) . . . . .	29
EtherNet/IP Extended Speed Control Input - 71 (0x47) . . . . .	30
EtherNet/IP Speed and Torque Control Input - 72 (0x48) . . . . .	31
EtherNet/IP Extended Speed and Torque Control Input - 73 (0x49) . . . . .	31
(Vendor Specific Yaskawa Electric (YE) Assy) MEMOBUS/Modbus Message Input - 150 (0x96) . . . . .	32
(Vendor Specific Yaskawa Electric (YE) Assy) Speed/Torque Status Input - 151 (0x97) . . . . .	33
(Vendor Specific Yaskawa Electric (YE) Assy) Extended Speed/Torque Status Input - 155 (0x9B) . . . . .	34
(Vendor Specific Yaskawa Electric (YE) Assy) High Speed/Torque Status Input - 166 (0xA6) . . . . .	36
(Vendor Specific Yaskawa Electric (YE) Assy) 8-Byte Dynamic Input - 167 (0xA7) . . . . .	39
(Vendor Specific Yaskawa Electric (YE) Assy) 12-Byte Dynamic Input - 168 (0xA8) . . . . .	40
(Vendor Specific Yaskawa Electric (YE) Assy) 18-Byte Dynamic Input - 169 (0xA9) . . . . .	42
(Vendor Specific Yaskawa Electric (YE) Assy) 24-Byte Dynamic Input - 170 (0xAA) . . . . .	43
<b>9. General Class Objects . . . . .</b>	<b>44</b>
Identity Object - 1 (Class 0x01) . . . . .	44
Services Supported . . . . .	44
Attributes Supported . . . . .	44
Assembly Object - 4 (Class 0x04) . . . . .	45
Services Supported . . . . .	45
Attributes Supported . . . . .	45
Motor Data Object - 40 (Class 0x28) . . . . .	46
Services Supported . . . . .	46
Attributes Supported . . . . .	46
Control Supervisor Object - 41 (Class 0x29) . . . . .	47
Services Supported . . . . .	47
Attributes Supported . . . . .	47
EtherNet/IP Fault Code Conversion Table . . . . .	48
AC/DC Drive Object - 42 (Class 0x2A) . . . . .	49
Services Supported . . . . .	49
Attributes Supported . . . . .	49
DLR Object 71 (Class 0x47) . . . . .	51
Services Supported . . . . .	51
Attributes Supported . . . . .	51
QoS Object 72 (Class 0x48) . . . . .	52
Services Supported . . . . .	52
Attributes Supported . . . . .	52
Base Energy Object 78 (Class 0x4E) . . . . .	52
Services Supported . . . . .	52
Attributes Supported . . . . .	52
Electrical Energy Object 79 (Class 0x4F) . . . . .	53
Services Supported . . . . .	53

Attributes Supported .....	53
RSTP Bridge Object - 84 (Class 0x54) .....	53
Services Supported .....	53
Attributes Supported .....	53
RSTP Port Object 85 (Class 0x55) .....	54
Services Supported .....	54
Attributes Supported .....	54
TCP/IP Object 245 (Class 0xF5) .....	56
Services Supported .....	56
Attributes Supported .....	56
Ethernet Link Object 246 (Class 0xF6) .....	57
Services Supported .....	57
Attributes Supported .....	57
LLDP Management Object - 265 (Class 0x109) .....	59
Services Supported .....	59
Attributes Supported .....	60
LLDP Data Table Object - 266 (Class 0x10A) .....	60
Services Supported .....	60
Attributes Supported .....	60
<b>10. Vendor-Specific (Yaskawa) Class Objects .....</b>	<b>62</b>
Yaskawa Drive Parameters Object - 100 (Class 0x64) .....	62
Services Supported .....	62
Storing Changed Parameters .....	62
Attributes Supported .....	63
Yaskawa Monitor/Control Object - 125 (Class 0x7D) .....	63
Services Supported .....	63
Attributes Supported .....	63
<b>11. Web Interface .....</b>	<b>64</b>
Home Page .....	64
EtherNet/IP Page .....	65
Network Page .....	66
Ring Page .....	67
RSTP .....	67
Port Information .....	68
Chart Page .....	69
Email Alerts Page .....	69
Procedure: Conditional Email Set-up .....	70
Parameter Access Page .....	70
Settings Page .....	71
Security Login .....	71
Webpage Password .....	71
Webpage Settings .....	72
Email Settings .....	72
<b>12. Rapid Spanning Tree Protocol (RSTP) .....</b>	<b>72</b>
Convergence Time .....	72
Topology .....	72
Enabling RSTP .....	72
RSTP Monitor U6-96 .....	73
<b>13. Troubleshooting .....</b>	<b>73</b>

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Drive-Side Error Codes .....	73
Fault .....	74
bUS Fault Tolerance .....	74
bUS Fault Auto-Restart .....	74
bUS Fault Delay .....	74
Explicit Message Communications Errors .....	75
EtherNet/IP Error Codes .....	75
Fault Monitors <i>U6-98</i> and <i>U6-99</i> .....	75
Communication Error .....	76
Self RAM Check .....	76
14. Specifications .....	76
Specifications .....	76
Revision History .....	77

# 1 Preface and Safety

YASKAWA Electric supplies component parts for use in a wide variety of industrial applications. The selection and application of YASKAWA products remain the responsibility of the equipment designer or end user.

YASKAWA accepts no responsibility for the way its products are incorporated into the final system design. Under no circumstances should any YASKAWA product be incorporated into any product or design as the exclusive or sole safety control. Without exception, all controls should be designed to detect faults dynamically and fail safely under all circumstances. All products designed to incorporate a component part manufactured by YASKAWA must be supplied to the end user with appropriate warnings and instructions as to the safe use and operation of that part. Any warnings provided by YASKAWA must be promptly provided to the end user. YASKAWA offers an express warranty only as to the quality of its products in conforming to standards and specifications published in the manual. **NO OTHER WARRANTY, EXPRESS OR IMPLIED, IS OFFERED.** YASKAWA assumes no liability for any personal injury, property damage, losses, or claims arising from misapplication of its products.

## ◆ Applicable Documentation

Document	Description
YASKAWA AC Drive GA501 EtherNet/IP Technical Manual Manual No.: SIEP C710617 4S (This book)	The Technical Manual contains detailed information about the EtherNet/IP protocol. For questions, contact Yaskawa or a Yaskawa representative.
YASKAWA AC Drive GA501 Manuals	Drive manuals contain basic installation and wiring information in addition to detailed parameter setting, fault diagnostic, and maintenance information. The manuals also include important information about parameter settings and tuning the drive. The drive product Quick Setup Procedures/Quick Start Guides are packaged with the drive. The most recent versions of these documents are available for download on these documentation websites; U.S.: <a href="https://www.yaskawa.com/ga501manuals">https://www.yaskawa.com/ga501manuals</a> , Europe: <a href="https://www.yaskawa.eu.com/manuals/ga501">https://www.yaskawa.eu.com/manuals/ga501</a> , China: <a href="https://yaskawa.com.cn/manual/ga501g5e.aspx?from=NTdfNF80">https://yaskawa.com.cn/manual/ga501g5e.aspx?from=NTdfNF80</a> , Asia: <a href="https://dlc.e-mechatronics.com/dqr/qr/ga501en_AT.html">https://dlc.e-mechatronics.com/dqr/qr/ga501en_AT.html</a> . Refer to the back cover of these documents for other locations. For questions, contact Yaskawa or a Yaskawa representative.

## ◆ Glossary

Terms	Definition
Keypad	<ul style="list-style-type: none"> <li>• HOA Operator</li> <li>• LCD Operator</li> <li>• LED Operator</li> <li>• HOA Keypad</li> <li>• LCD Keypad</li> <li>• LED Keypad</li> </ul>
Hex. (Example: 900 (Hex.))	Identifies a unit for hexadecimal number format.

## ◆ Registered Trademarks

- Modbus TCP/IP is a trademark of Modbus-IDA.
- EtherNet/IP is a registered trademark of Open DeviceNet Vendor Association, Inc. (ODVA).
- EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.
- PROFINET is a registered trademark of PROFIBUS Nutzerorganisation e.V. (PNO).
- BACnet is a trademark of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).
- MECHATROLINK-4 is a trademark of the MECHATROLINK Members Association (MMA).
- Ethernet is a registered trademark of FUJIFILM Business Innovation Corp.
- Trademarks are the property of their respective owners.

## ◆ Supplemental Safety Information

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

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

**⚠ DANGER** *This signal word identifies a hazard that will cause serious injury or death if you do not prevent it.*

**⚠ WARNING** *This signal word identifies a hazard that can cause death or serious injuries if you do not prevent it.*

**⚠ CAUTION** *This signal word identifies a hazard that can cause minor or moderate injuries if you do not prevent it.*

**NOTICE** *This signal word identifies a property damage message that is not related to personal injury.*

## ■ Section Safety

### General Precautions

- The diagrams in this section may include options and drives without covers or safety shields to illustrate details. Be sure to reinstall covers or shields before operating any devices. The option should be used according to the instructions described in this manual.
- The diagrams in this manual are provided as examples only and may not pertain to all products covered by this manual.
- The products and specifications described in this manual or the content and presentation of the manual may be changed without notice to improve the product and/or the manual.
- Contact Yaskawa or a Yaskawa representative and provide the manual number shown on the front cover to order new copies of the manual.

**⚠ DANGER** *Do not ignore the safety messages in this manual. If you ignore the safety messages in this manual, it will cause serious injury or death. The manufacturer is not responsible for injuries or damage to equipment.*

**⚠ WARNING** *Electrical Shock Hazard. Do not modify the drive circuitry. Failure to obey can cause serious injury or death, or cause damage to the drive and will void warranty. Yaskawa is not responsible for modifications of the product made by the user.*

**NOTICE** *Damage to Equipment. Do not use steam or other disinfectants to fumigate wood for packaging the drive. Use alternative methods, for example heat treatment, before you package the components. Gas from wood packaging fumigated with halogen disinfectants, for example fluorine, chlorine, bromine, iodine or DOP gas (phthalic acid ester), can cause damage to the drive.*

## 2 Overview

This drive provides a communications connection between the drive and an EtherNet/IP network.

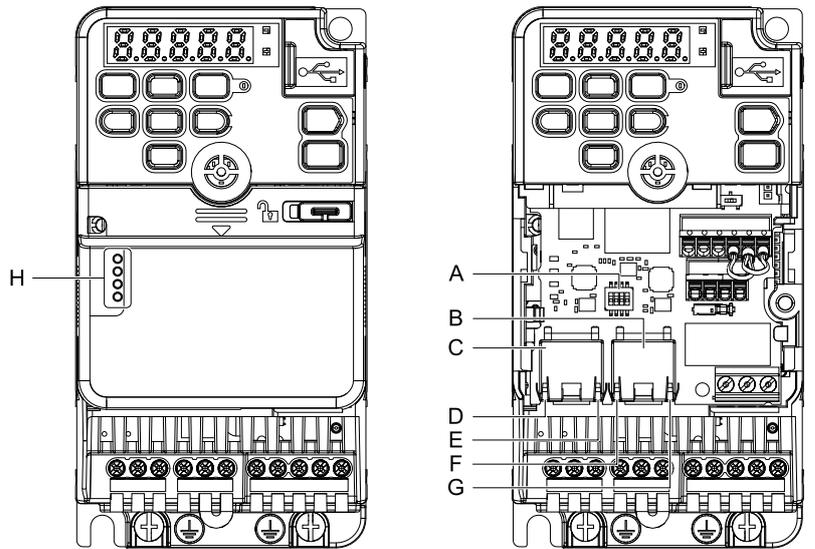
The controller can do these functions:

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

EtherNet/IP is a communications link to connect industrial devices (for example smart motor controllers, operator interfaces, and variable frequency drives) and control devices (for example, programmable controllers and computers) to a network. EtherNet/IP is a simple networking solution. EtherNet/IP decreases the cost and time to wire and install factory automation devices, and it gives the drive to interchange like components from other vendors. EtherNet/IP is an open network standard.

## 3 Component Names

### ◆ PCB



- A - DIP switch S1
- B - Ethernet connector CN1B (Port 2) (RJ45)
- C - Ethernet connector CN1A (Port 1) (RJ45)
- D - Port 1 LED (LINK/ACT) \*1
- E - Port 1 LED (10/100) \*1
- F - Port 2 LED (LINK/ACT) \*1
- G - Port 2 LED (10/100) \*1
- H - Communication status LEDs \*1

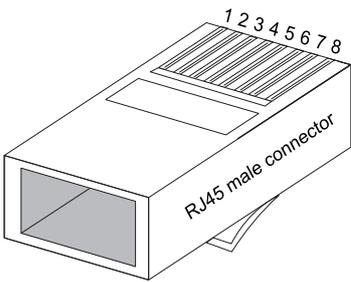
Figure 3.1 PCB Components

\*1 Refer to [Communication LED States on page 10](#) for more information about the LEDs.

### ◆ Communication Connector

Ports CN1A (Port 1) and CN1B (Port 2) are connection points for male 8-way Ethernet modular RJ45 connectors on customer-supplied communication cables.

Table 3.1 Male 8-way Ethernet Modular Connector (Customer-Supplied)

Male 8-way Ethernet 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
	5 (Pair 1)	Not used
	6 (Pair 3)	Receive data (RXD) -
	7 (Pair 4)	Not used
	8 (Pair 4)	Not used

### ◆ Communication LED States

Use LED label B when you use EtherNet/IP.



A - For EtherCAT

B - For Modbus TCP/IP, EtherNet/IP,  
PROFINET, BACnet/IP,  
MECHATROLINK-4

Figure 3.2 Communication LED Labels

Wait 2 seconds minimum for the power-up diagnostic process to complete before you verify the LED states. Table 3.2 shows the operating status of the LEDs after the power-up diagnostic LED sequence is complete.

Table 3.2 Communication LED States

LED Name	Indication		Operating State	Description
	Color	Status		
MS (Module Status)	-	OFF	Power supply off	There is no power to the drive.
	Green	ON	Operating	The communication network is operating normally.
	Green	Flashing	Initializing	The communication network is configuring an IP address.
	Red	ON	Fatal error occurred	The drive detected a fatal (unrecoverable) error.
	Red	Flashing	Non-fatal error occurred	The drive detected an <i>EFO</i> [Ethernet External Fault], duplicate IP address, or bad IP address configuration.
NS (Network Status)	-	OFF	Power supply OFF or Offline	-
	Green	ON	Online communications established	The drive is online and has established connections.
	Green	Flashing	Online with IP address	The drive is configured with an active link but does not have any control connections.
	Red	ON	Communications error (fatal)	The drive detected a duplicate IP address or has a bad IP address configuration.
	Red	Flashing	Comm error	Control connection timeout, disconnection from controller during run, or loss of all physical links to device.
10/100	-	OFF	10 Mbps is established	
	Green	ON	100 Mbps is established	
LINK/ACT	-	OFF	Link is not established	
	Green	ON	Link is established	
	Green	Flashing	Link is established and there is network activity	

### ■ Power-Up Diagnostics

An LED test is performed each time the drive is powered up. The initial boot sequence can take several seconds. After the LEDs complete the diagnostic LED sequence, the drive is successfully initialized. The LEDs then assume operational conditions as shown in Table 3.3.

Table 3.3 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	-

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

## 4 Installation

### ◆ Section Safety

**⚠ DANGER** *Electrical Shock Hazard. Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, measure for dangerous voltages to make sure that the drive is safe. If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.*

**⚠ WARNING** *Electrical Shock Hazard. Do not operate the drive when covers are missing. Replace covers and shields before you operate the drive. Use the drive only as specified by the instructions. Some figures in this section include drives without covers or safety shields to more clearly show the inside of the drive. If covers or safety shields are missing from the drive, it can cause serious injury or death.*

**⚠ WARNING** *Electrical Shock Hazard. Only let approved personnel install, wire, maintain, examine, replace parts, and repair the drive. If personnel are not approved, it can cause serious injury or death.*

**⚠ WARNING** *Electrical Shock Hazard. Do not remove covers or touch circuit boards while the drive is energized. If you touch the internal components of an energized drive, it can cause serious injury or death.*

**⚠ WARNING** *Electrical Shock Hazard. Do not use damaged wires, put too much force on the wiring, or cause damage to the wire insulation. Damaged wires can cause serious injury or death.*

**⚠ WARNING** *Fire Hazard. Tighten all terminal screws to the correct tightening torque. Connections that are too loose or too tight can cause incorrect operation and damage to the drive. Incorrect connections can also cause death or serious injury from fire.*

**NOTICE** *Damage to Equipment. When you touch the product, make sure that you observe correct electrostatic discharge (ESD) procedures. If you do not follow procedures, it can cause ESD damage to the drive circuitry.*

**NOTICE** *Damage to Equipment. Do not de-energize the drive while the drive is outputting voltage. Incorrect equipment sequencing can cause damage to the drive.*

**NOTICE** *Do not operate a drive or connected equipment that has damaged or missing parts. You can cause damage to the drive and connected equipment.*

**NOTICE** *Use Yaskawa connection cables or recommended cables only. Incorrect cables can cause the drive to function incorrectly.*

**NOTICE** *Damage to Equipment. Correctly connect the connectors. Incorrect connections can cause malfunction or damage to the equipment.*

**NOTICE** *Damage to Equipment. Make sure that all connections are correct after you install the drive and connecting peripheral devices. Incorrect connections can cause damage to the product.*

### ◆ Settings for DIP Switch S1

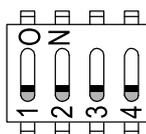
Use DIP switch S1 on the PCB to select the communication protocol.

Use non-conductive tweezers or a tool with a tip width of approximately 0.5 mm (0.02 in) to set DIP switch S1.

Figure 4.1 shows the default settings for DIP switch S1.

**Note:**

Remove the front cover to set DIP switch S1.



**Figure 4.1 Default Settings for DIP Switch S1**

When you use EtherNet/IP, set DIP switch S1 as shown in Figure 4.2.

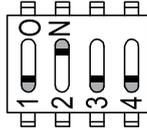


Figure 4.2 Settings for DIP Switch S1

### ◆ Communication Cable Specifications

Yaskawa recommends using shielded Cat5e cable. The Yaskawa warranty does not cover other cable types.

**Note:**

The maximum Ethernet cable length is 100 m (328 ft).

### ■ Communication Topology Specifications

When you use EtherNet/IP, drives can be connected to network in a star, ring, or line topology.

- **Star Topology**  
Use either one of the communication connectors CN1A (Port 1) or CN1B (Port 2).
- **Daisy-Chained Topology**  
Use the communication connectors CN1A (Port 1) and CN1B (Port 2) at the same time. A switch is not necessary for this connection.
- **Ring Topology**  
Use both communication connectors CN1A (Port 1) and CN1B (Port 2) to create a ring. Ring topologies will use the DLR or RSTP protocol. Device Level Ring (DLR) is enabled by default.

**Note:**

For Ring Topology connections, enable the DLR or RSTP function. (The default setting is DLR enabled.) To enable the RSTP function, refer to [Rapid Spanning Tree Protocol \(RSTP\) on page 72](#).

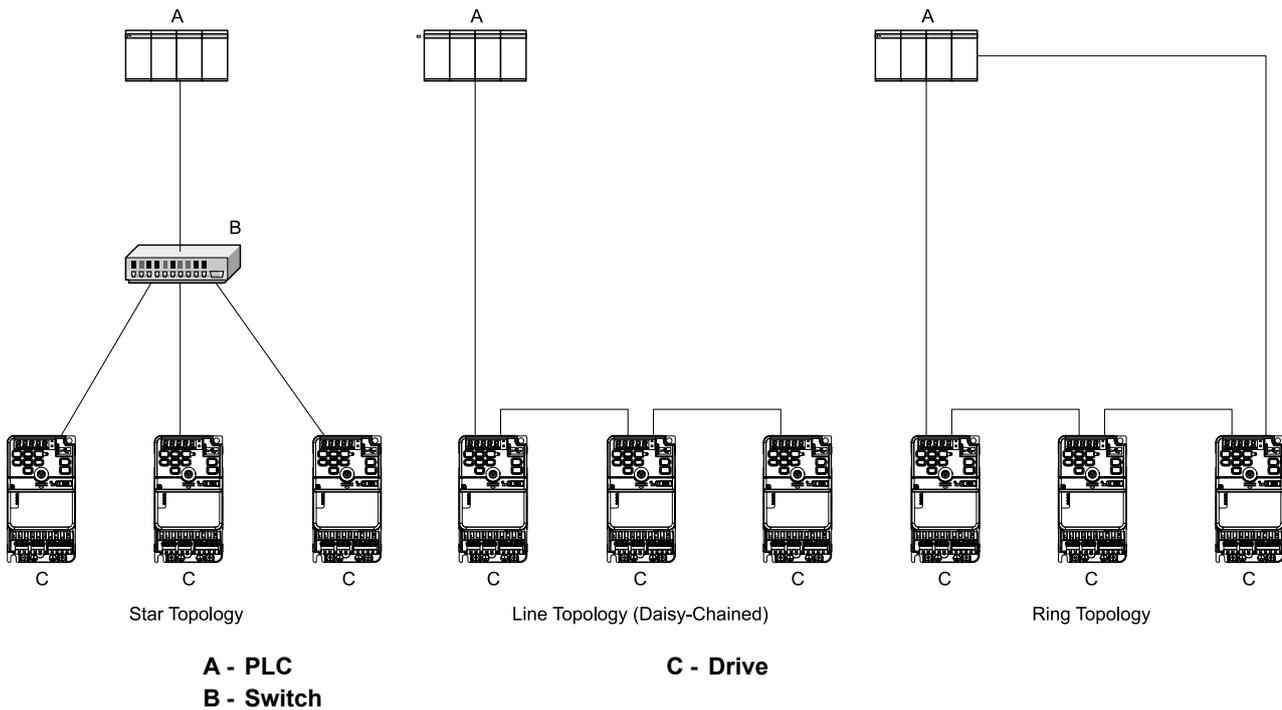


Figure 4.3 Communication Cable Wiring

### ◆ EDS File

For easy network implementation of drives, please obtain the EDS file from the Yaskawa website.

**Note:**

Download the compatible EDS file for this product. You can also obtain the EDS file from the built-in web page on the drive (EtherNet/IP Page). Refer to [EtherNet/IP Page on page 65](#) for more information.

## 5 Related Drive Parameters

These parameters set the drive for operation with EtherNet/IP. Make sure that the parameter settings in this table are correct before you start network communications.

**Note:**

- Hex.: MEMOBUS addresses that you can use to change parameters over network communication are represented in hexadecimal numbers.
- Expert: The parameter is available in Expert Mode only. When  $A1-01 = 3$  [*Access Level Selection = Expert Level*], Expert Mode parameters can be displayed on and set with the keypad.

No. (Hex.)	Name	Description	Default (Range)
b1-01 (0180)	Frequency Reference Selection 1	Selects the input method for frequency reference. 0 : Keypad 1 : Analog Input 2 : USB 3 : Ethernet <b>Note:</b> Set $b1-01 = 3$ to use Ethernet to control the frequency reference of the drive.	3 (0 - 3)
b1-02 (0181)	Run Command Selection 1	Sets the input method for the Run command. 0 : Keypad 1 : Digital Input 2 : USB 3 : Ethernet <b>Note:</b> Set $b1-02 = 3$ to start and stop the drive with Ethernet.	3 (0 - 3)
F6-01 (03A2)	Communication Error Selection	Selects drive response when the drive detects a <i>bUS [Ethernet Communication Error]</i> error during communications. 0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use C1-09) 3 : Alarm Only 4 : Alarm (Run at $d1-04$ ) 5 : Alarm - Ramp Stop <b>Note:</b> • When you set this parameter to 3 or 4, the drive will continue operation after it detects a fault. Separately prepare safety protection equipment and systems, for example fast-stop switches. • Changes to this parameter take effect immediately. It is not necessary to cycle power on the drive.	1 (0 - 5)
F6-02 (03A3)	Comm External Fault (EF0) Detect	Selects the conditions at which <i>EF0 [Ethernet External Fault]</i> is detected. 0 : Always Detected 1 : Detected during RUN Only	0 (0, 1)
F6-03 (03A4)	Comm External Fault (EF0) Select	Selects the operation of the drive when <i>EF0 [Ethernet External Fault]</i> is detected. 0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use C1-09) 3 : Alarm Only <b>Note:</b> When you set this parameter to 3, the drive will continue operation after it detects a fault. Separately prepare safety protection equipment and systems, for example fast stop switches.	1 (0 - 3)
F6-06 (03A7)	Torque Limit by Comm. Ethernet	Selects whether to enable or disable the torque reference and torque limit received from Ethernet. 0 : Disabled 1 : Enabled <b>Note:</b> • Parameter is available when $A1-02 = 2, 6, 8$ [ <i>Control Method Selection = Open Loop Vector, PM Advanced Open Loop Vector, EZ Vector Control</i> ]. The drive reads this value as the Torque Limit. • If the PLC does not supply a torque reference or torque limit when $F6-06 = 1$ [ <i>Torque Limit by Comm. Ethernet = Enabled</i> ], the motor cannot rotate.	0 (0, 1)
F6-07 (03A8)	Multi-Step Ref @ NetRef/ ComRef	0 : Disable Multi-Step References 1 : Enable Multi-Step References	1 (0, 1)
F6-08 (036A)	Comm Parameter Reset @Initialize	Selects whether communication-related parameters $F6-xx$ and $F7-xx$ are set back to original default values when you use parameter $A1-03$ [ <i>Initialize Parameters</i> ] to initialize the drive. 0 : No Reset - Parameters Retained 1 : Reset - Back to Factory Default <b>Note:</b> When you set $F6-08$ to 1 and you then use $A1-03$ to initialize the drive, the drive will not change this setting value.	0 (0, 1)
F6-14 (03BB)	Bus Error Auto Reset	Enables and disables the automatic reset of a <i>bUS [Ethernet Communication Error]</i> fault. 0 : Disabled	0 (0, 1)

## 5 Related Drive Parameters

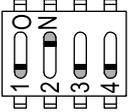
No. (Hex.)	Name	Description	Default (Range)
		1 : Enabled <b>Note:</b> Changes to this parameter take effect immediately. It is not necessary to cycle power on the drive.	
F6-15 (0B5B)	Ethernet Parameters Reload	Sets when the drive will activate the F6-xx/F7-xx Ethernet-related parameters that you changed. Use this parameter as an alternative to cycling power to the drive to active parameters. 0 : Reload at Next Power Cycle 1 : Reload Now 2 : Cancel Reload Request <b>Note:</b> • F6-15 is reset to 0 after setting 1 or 2. • Changes to this parameter take effect immediately. It is not necessary to cycle power on the drive.	0 (0 - 2)
F6-54 (03C5)	Net Idle Fault Detection	Sets the drive operation when communication is in Idle Mode. 0 : Enabled 1 : Disabled, No Fault Detection 2 : Vendor Specific 3 : RUN Forward 4 : RUN Reverse <b>Note:</b> • Change the parameter then cycle power on the drive. • When you set F6-54 = 2, use F6-01 to select drive operation to stop or continue.	0 (0 - 4)
F7-01 (03E5)	IP Address 1	Sets the static/fixed IP address. Sets the most significant octet. <b>Note:</b> • This parameter is only effective when F7-13 = 0 [Address Mode at Startup = Static]. • All IP Addresses must be unique. • You must cycle power to the drive or set F6-15 = 1 [Ethernet Parameters Reload = Reload Now] for the changes to take effect.	192 (0 - 255)
F7-02 (03E6)	IP Address 2	Sets the static/fixed IP address. Sets the second most significant octet. <b>Note:</b> • This parameter is only effective when F7-13 = 0 [Address Mode at Startup = Static]. • All IP Addresses must be unique. • You must cycle power to the drive or set F6-15 = 1 [Ethernet Parameters Reload = Reload Now] for the changes to take effect.	168 (0 - 255)
F7-03 (03E7)	IP Address 3	Sets the static/fixed IP address. Sets the third most significant octet. <b>Note:</b> • This parameter is only effective when F7-13 = 0 [Address Mode at Startup = Static]. • All IP Addresses must be unique. • You must cycle power to the drive or set F6-15 = 1 [Ethernet Parameters Reload = Reload Now] for the changes to take effect.	1 (0 - 255)
F7-04 (03E8)	IP Address 4	Sets the static/fixed IP address. Sets the fourth most significant octet. <b>Note:</b> • This parameter is only effective when F7-13 = 0 [Address Mode at Startup = Static]. • All IP Addresses must be unique. • You must cycle power to the drive or set F6-15 = 1 [Ethernet Parameters Reload = Reload Now] for the changes to take effect.	20 (0 - 255)
F7-05 (03E9)	Subnet Mask 1	Sets the static/fixed Subnet Mask. Sets the most significant octet. <b>Note:</b> • This parameter is only effective when F7-13 = 0 [Address Mode at Startup = Static]. • All IP Addresses must be unique. • You must cycle power to the drive or set F6-15 = 1 [Ethernet Parameters Reload = Reload Now] for the changes to take effect.	255 (0 - 255)
F7-06 (03EA)	Subnet Mask 2	Sets the static/fixed Subnet Mask. Sets the second most significant octet. <b>Note:</b> • This parameter is only effective when F7-13 = 0 [Address Mode at Startup = Static]. • All IP Addresses must be unique. • You must cycle power to the drive or set F6-15 = 1 [Ethernet Parameters Reload = Reload Now] for the changes to take effect.	255 (0 - 255)
F7-07 (03EB)	Subnet Mask 3	Sets the static/fixed Subnet Mask. Sets the third most significant octet. <b>Note:</b> • This parameter is only effective when F7-13 = 0 [Address Mode at Startup = Static]. • All IP Addresses must be unique. • You must cycle power to the drive or set F6-15 = 1 [Ethernet Parameters Reload = Reload Now] for the changes to take effect.	255 (0 - 255)
F7-08 (03EC)	Subnet Mask 4	Sets the static/fixed Subnet Mask. Parameter F7-08 sets the fourth most significant octet. <b>Note:</b> • This parameter is only effective when F7-13 = 0 [Address Mode at Startup = Static]. • All IP Addresses must be unique. • You must cycle power to the drive or set F6-15 = 1 [Ethernet Parameters Reload = Reload Now] for the changes to take effect.	0 (0 - 255)
F7-09 (03ED)	Gateway Address 1	Sets the static/fixed Gateway address. Sets the most significant octet.	192 (0 - 255)

No. (Hex.)	Name	Description	Default (Range)
		<b>Note:</b> <ul style="list-style-type: none"> <li>This parameter is only effective when <math>F7-13 = 0</math> [Address Mode at Startup = Static].</li> <li>All IP Addresses must be unique.</li> <li>You must cycle power to the drive or set <math>F6-15 = 1</math> [Ethernet Parameters Reload = Reload Now] for the changes to take effect.</li> </ul>	
F7-10 (03EE)	Gateway Address 2	Sets the static/fixed Gateway address. Sets the second most significant octet. <b>Note:</b> <ul style="list-style-type: none"> <li>This parameter is only effective when <math>F7-13 = 0</math> [Address Mode at Startup = Static].</li> <li>All IP Addresses must be unique.</li> <li>You must cycle power to the drive or set <math>F6-15 = 1</math> [Ethernet Parameters Reload = Reload Now] for the changes to take effect.</li> </ul>	168 (0 - 255)
F7-11 (03EF)	Gateway Address 3	Sets the static/fixed Gateway address. Sets the third most significant octet. <b>Note:</b> <ul style="list-style-type: none"> <li>This parameter is only effective when <math>F7-13 = 0</math> [Address Mode at Startup = Static].</li> <li>All IP Addresses must be unique.</li> <li>You must cycle power to the drive or set <math>F6-15 = 1</math> [Ethernet Parameters Reload = Reload Now] for the changes to take effect.</li> </ul>	1 (0 - 255)
F7-12 (03F0)	Gateway Address 4	Sets the static/fixed Gateway address. Parameter F7-12 sets the fourth most significant octet. <b>Note:</b> <ul style="list-style-type: none"> <li>This parameter is only effective when <math>F7-13 = 0</math> [Address Mode at Startup = Static].</li> <li>All IP Addresses must be unique.</li> <li>You must cycle power to the drive or set <math>F6-15 = 1</math> [Ethernet Parameters Reload = Reload Now] for the changes to take effect.</li> </ul>	1 (0 - 255)
F7-13 (03F1)	Address Startup Mode	Selects how the IP address is set. 0 : Static (Use F7-01 to F7-12 to set.) 1 : BOOTP (Use network address.) 2 : DHCP (Use network address.) <b>Note:</b> You must cycle power to the drive or set $F6-15 = 1$ [Ethernet Parameters Reload = Reload Now] for the changes to take effect.	2 (0 - 2)
F7-14 (03F2)	Duplex Mode Selection	Sets duplex mode settings (Port 1 (CN1A)/Port 2 (CN1B)). 0 : Half/Half (Half Duplex/Half Duplex) 1 : Auto/Auto (Auto Negotiation/Auto Negotiation) 2 : Full/Full (Full Duplex/Full Duplex) 3 : Half/Auto (Half Duplex/Auto Negotiation) 4 : Half/Full (Half Duplex/Full Duplex) 5 : Auto/Half (Auto Negotiation/Half Duplex) 6 : Auto/Full (Auto Negotiation/Full Duplex) 7 : Full/Half (Full Duplex/Half Duplex) 8 : Full/Auto (Full Duplex/Auto Negotiation) <b>Note:</b> You must cycle power to the drive or set $F6-15 = 1$ [Ethernet Parameters Reload = Reload Now] for the changes to take effect.	1 (0 - 8)
F7-15 (03F3)	Communication Speed Selection	Sets the communications speed (Port 1 (CN1A)/Port 2 (CN1B)). 10 : 10/10 Mbps (10 Mbps/10 Mbps) 100 : 100/100 Mbps (100 Mbps/100 Mbps) 101 : 10/100 Mbps (10 Mbps/100 Mbps) 102 : 100/10 Mbps (100 Mbps/10 Mbps) <b>Note:</b> <ul style="list-style-type: none"> <li><math>F7-15</math> is only effective when the port is set to half or full duplex in <math>F7-14</math> [Duplex Mode Selection].</li> <li>You must cycle power to the drive or set <math>F6-15 = 1</math> [Ethernet Parameters Reload = Reload Now] for the changes to take effect.</li> </ul>	10 (10 - 102)
F7-16 (03F4)	Timeout Value	Sets the detection time for a communications timeout. <b>Note:</b> <ul style="list-style-type: none"> <li>Set this parameter to 0.0 to disable the connection timeout function.</li> <li>Changes to this parameter take effect immediately. It is not necessary to cycle power on the drive.</li> </ul>	0.0 s (0.0 s - 30.0 s)
F7-17 (03F5)	EtherNet/IP Speed Scaling Factor	Sets the scaling factor for the speed monitor in EtherNet/IP Class ID 2A (Hex.) Object. <b>Note:</b> Changes to this parameter take effect immediately. It is not necessary to cycle power on the drive.	0 (-15 - 15)
F7-18 (03F6)	EtherNet/IP Current Scale Factor	Sets the scaling factor for the output current monitor in EtherNet/IP Class ID 2A (Hex.) Object. <b>Note:</b> Changes to this parameter take effect immediately. It is not necessary to cycle power on the drive.	0 (-15 - 15)
F7-19 (03F7)	EtherNet/IP Torque Scale Factor	Sets the scaling factor for the torque monitor in EtherNet/IP Class ID 2A (Hex.) Object. <b>Note:</b> Changes to this parameter take effect immediately. It is not necessary to cycle power on the drive.	0 (-15 - 15)

## 5 Related Drive Parameters

No. (Hex.)	Name	Description	Default (Range)
F7-20 (03F8)	EtherNet/IP Power Scaling Factor	Sets the scaling factor for the power monitor in EtherNet/IP Class ID 2A (Hex.) Object. <b>Note:</b> Changes to this parameter take effect immediately. It is not necessary to cycle power on the drive.	0 (-15 - 15)
F7-21 (03F9)	EtherNet/IP Voltage Scale Factor	Sets the scaling factor for the voltage monitor in EtherNet/IP Class ID 2A (Hex.) Object. <b>Note:</b> Changes to this parameter take effect immediately. It is not necessary to cycle power on the drive.	0 (-15 - 15)
F7-22 (03FA)	EtherNet/IP Time Scaling	Sets the scaling factor for the time monitor in EtherNet/IP Class ID 2A (Hex.) Object. <b>Note:</b> Changes to this parameter take effect immediately. It is not necessary to cycle power on the drive.	0 (-15 - 15)
F7-23 - F7-27 (03FB - 03FF) F7-28 - F7-32 (0370 - 0374)	Dynamic Out Parameters 1 to 10 for Ethernet	Parameters used in Output Assemblies 116, 117, 118, 119, 120. Each parameter contains a MEMOBUS/Modbus address. The value received for the Output Assembly will be written to this corresponding MEMOBUS/Modbus address. A MEMOBUS/Modbus address value of 0 means that the value received for the Output Assembly will not be written to any MEMOBUS/Modbus register.	0 (-)
F7-33 - F7-42 (0375 to 037E)	Dynamic In Parameters 1 to 10 for Ethernet	Parameters used in Input Assemblies 166, 167, 168, 169, 170. Each parameter contains a MEMOBUS/Modbus address. The value sent for the Input Assembly will be read from this corresponding MEMOBUS/Modbus address. A MEMOBUS/Modbus address value of 0 means that the value sent for the Input Assembly is not defined by the user, therefore the EtherNet/IP default register value will be returned. Refer to <i>Input Assemblies (Producers) on page 29</i> for definitions of the default MEMOBUS/Modbus registers.	0 (-)
F7-43 (1BCE)	PLC Cnxn Close Behavior@Run	Sets the operation when the Forward Close command (PLC communication disconnection command) is received from the network during run. Refer to <i>Operation at PLC Forward Close Command on page 17</i> for more information. 0 : Continue 1 : Clear RUN Command 2 : bUS [Ethernet Communication Error] Fault (set by F6-01 [Communication Error Selection])	0 (0 - 2)

**Table 5.1 EtherNet/IP Monitor**

No.	Name	Description	Range
U4-75	Ethernet Protocol	Shows the setting of DIP switch S1. <ul style="list-style-type: none"> <li>72 (Setting to use EtherNet/IP (1: OFF, 2: ON, 3: OFF, 4: OFF))</li> </ul>  <ul style="list-style-type: none"> <li>00 to 71, 73 to FF (Setting to use other than EtherNet/IP)</li> </ul> <b>Note:</b> EtherNet/IP will not operate with these setting values.	00 - FF (Hex.)
U4-76 - U4-78	MAC Address 1	Shows the Main MAC Address. <ul style="list-style-type: none"> <li>U4-76: First octet, Second octet</li> <li>U4-77: Third octet, Fourth octet</li> <li>U4-78: Fifth octet, Sixth octet</li> </ul>	0000 - FFFF (Hex.)
U4-79 - U4-81 Expert	MAC Address 2	Shows the second MAC Address. <ul style="list-style-type: none"> <li>U4-79: First octet, Second octet</li> <li>U4-80: Third octet, Fourth octet</li> <li>U4-81: Fifth octet, Sixth octet</li> </ul>	0000 - FFFF (Hex.)
U4-82 - U4-84 Expert	MAC Address 3	Shows the third MAC Address. <ul style="list-style-type: none"> <li>U4-82: First octet, Second octet</li> <li>U4-83: Third octet, Fourth octet</li> <li>U4-84: Fifth octet, Sixth octet</li> </ul>	0000 - FFFF (Hex.)
U6-80 - U6-83	Ethernet IP Address 1 - 4	Shows the currently available local IP Address. <ul style="list-style-type: none"> <li>U6-80: First octet</li> <li>U6-81: Second octet</li> <li>U6-82: Third octet</li> <li>U6-83: Fourth octet</li> </ul>	0 - 255
U6-84 - U6-87	Ethernet Subnet 1 - 4	Shows the currently available subnet mask. <ul style="list-style-type: none"> <li>U6-84: First octet</li> <li>U6-85: Second octet</li> <li>U6-86: Third octet</li> <li>U6-87: Fourth octet</li> </ul>	0 - 255
U6-88 - U6-91	Ethernet Gateway 1 - 4	Shows the currently available gateway address. <ul style="list-style-type: none"> <li>U6-88: First octet</li> <li>U6-89: Second octet</li> <li>U6-90: Third octet</li> </ul>	0 - 255

No.	Name	Description	Range
		• U6-91: Fourth octet	
U6-92	Ethernet Speed	Shows CN1A Port 1 link speed currently available.	10: 10 Mbps 100: 100 Mbps
U6-93	Online Duplex	Shows CN1A Port 1 duplex setting currently available.	0: Half/Half 1: Full/Full
U6-94	Ethernet SPARE 1	Shows CN1B Port 2 link speed currently available.	10: 10 Mbps 100: 100 Mbps
U6-95	Ethernet SPARE 2	Shows CN1B Port 2 duplex setting currently available.	0: Half/Half 1: Full/Full
U6-96	Ethernet SPARE 3	Shows RSTP Role and State of Port1 and Port2. Refer to <a href="#">Rapid Spanning Tree Protocol (RSTP) on page 72</a> for more information.	0000 - 9292
U6-97	Ethernet SPARE 4	Shows EtherNet/IP software version.	-
U6-98	Ethernet First Fault	Shows first EtherNet/IP fault.	-
U6-99	Ethernet Current Fault	Shows current EtherNet/IP fault.	-

## ◆ Operation at PLC Forward Close Command

Use *F7-43 [PLC Cnxn Close Behavior@Run]* to set the operation when the Forward Close command is received from the network during run.

- Set value 0: Continue (Default)  
This is the factory-set operation. When the Forward Close command is received during run, the operation continues at the current frequency reference.
- Set value 1: Clear RUN Command  
When the Forward Close command is received during run, turns off the Run command to the drive. To resume operation, send the Forward Open command from the PLC and input the Run command.
- Set value 2: *bUS [Ethernet Communication Error]* Fault (set by *F6-01 [Communication Error Selection]*)  
When the Forward Close command is received during run, a *bUS [Ethernet Communication Error]* occurs. If *bUS [Ethernet Communication Error]* occurs, the drive stops or continues the operation of the motor according to *F6-01 [Communication Error Selection]*. *F7-16 [Timeout Value]* and *F6-14 [Bus Error Auto Reset]* operate in the same way as the normal *bUS [Ethernet Communication Error]*.

## 6 EtherNet/IP Configuring Messaging

This section provides information on methods used to control the drive on an EtherNet/IP network.

### ◆ Polled Configuration

The assemblies in [Table 6.1](#) are available for polled I/O:

**Table 6.1 Supported Polled I/O Assemblies**

Assembly Number (Hex.)	Description	Type	Bytes	Ref.
20 (14)	EtherNet/IP Basic Speed Control Output	Output	4	<a href="#">18</a>
21 (15)	EtherNet/IP Extended Speed Control Output	Output	4	<a href="#">18</a>
22 (16)	EtherNet/IP Speed and Torque Control Output	Output	6	<a href="#">19</a>
23 (17)	EtherNet/IP Extended Speed and Torque Control Output	Output	6	<a href="#">19</a>
70 (46)	EtherNet/IP Basic Speed Control Input	Input	4	<a href="#">29</a>
71 (47)	EtherNet/IP Extended Speed Control Input	Input	4	<a href="#">30</a>
72 (48)	EtherNet/IP Speed and Torque Control Input	Input	6	<a href="#">31</a>
73 (49)	EtherNet/IP Extended Speed and Torque Control Input	Input	6	<a href="#">31</a>
100 (64)	(Vendor Specific Yaskawa Electric (YE) Assy) MEMOBUS Message Output	Output	5	<a href="#">20</a>
101 (65)	(Vendor Specific Yaskawa Electric (YE) Assy) Speed/Torque Control Output	Output	8	<a href="#">21</a>
115 (73)	(Vendor Specific Yaskawa Electric (YE) Assy) Extended Speed/Torque Control Output	Output	40	<a href="#">22</a>
116 (74)	(Vendor Specific Yaskawa Electric (YE) Assy) High Speed/Torque Control Output	Output	44	<a href="#">23</a>

## 7 Output Assemblies (Consumers)

Assembly Number (Hex.)	Description	Type	Bytes	Ref.
117 (75)	(Vendor Specific Yaskawa Electric (YE) Assy) 8-Byte Dynamic Output	Output	8	25
118 (76)	(Vendor Specific Yaskawa Electric (YE) Assy) 12-Byte Dynamic Output	Output	12	26
119 (77)	(Vendor Specific Yaskawa Electric (YE) Assy) 18-Byte Dynamic Output	Output	18	27
120 (78)	(Vendor Specific Yaskawa Electric (YE) Assy) 24-Byte Dynamic Output	Output	24	28
150 (96)	(Vendor Specific Yaskawa Electric (YE) Assy) MEMOBUS Message Input	Input	5	32
151 (97)	(Vendor Specific Yaskawa Electric (YE) Assy) Speed/Torque Status Input	Input	8	33
155 (9B)	(Vendor Specific Yaskawa Electric (YE) Assy) Extended Speed/Torque Status Input	Input	40	34
166 (A6)	(Vendor Specific Yaskawa Electric (YE) Assy) High Speed/Torque Status Input	Input	44	36
167 (A7)	(Vendor Specific Yaskawa Electric (YE) Assy) 8-Byte Dynamic Input	Input	8	39
168 (A8)	(Vendor Specific Yaskawa Electric (YE) Assy) 12-Byte Dynamic Input	Input	12	40
169 (A9)	(Vendor Specific Yaskawa Electric (YE) Assy) 18-Byte Dynamic Input	Input	18	42
170 (AA)	(Vendor Specific Yaskawa Electric (YE) Assy) 24-Byte Dynamic Input	Input	24	43

## 7 Output Assemblies (Consumers)

### 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 the drive.

### ◆ EtherNet/IP 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: - 1: Fault Reset
Speed Reference	Speed Command Sets drive speed reference. Speed reference data: Frequency reference/ $2^{SS}$ (SS: Speed scale) Setting range: 0 - FFFF (Hex.) For example, when setting a reference of 4096 with a speed scale of 2: Speed reference data = $4096/2^2 = 1024 = 400$ (Hex.) Unit depends on o1-03.

### ◆ EtherNet/IP 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: - 1: 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 <sup>SS</sup> (SS: Speed scale) Setting range: 0 - FFFF (Hex.) For example, when setting a reference of 4096 with a speed scale of 2: Speed reference data = 4096/2 <sup>2</sup> = 1024 = 400 (Hex.) Unit depends on o1-03.

### ◆ EtherNet/IP 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 Limit (Low Byte)								
		5	Torque Limit (High Byte)								

Name	Description
Run Fwd	Forward Run Command 0: Stop 1: Forward Run
Fault Reset	Fault Reset 0: - 1: Fault Reset
Speed Reference	Speed Command Sets drive speed reference. Speed reference data: Frequency reference/2 <sup>SS</sup> (SS: Speed scale) Setting range: 0 - FFFF (Hex.) For example, when setting a reference of 4096 with a speed scale of 2: Speed reference data = 4096/2 <sup>2</sup> = 1024 = 400 (Hex.) Unit depends on o1-03.
Torque Limit	Torque Limit Sets the Torque Limit. Sets in units of 0.1%. The Torque Limit is disabled when F6-06 = 0.

### ◆ EtherNet/IP 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 Limit (Low Byte)								

## 7 Output Assemblies (Consumers)

Output Instance	Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
		5	Torque Limit (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: - 1: Fault Reset
NetCtrl	Run command is from network 0: Depends on b1-02 1: Run command is from network
NetRef	Speed reference is from network 0: Depends on b1-01 1: Speed reference is from network
Speed Reference	Sets drive speed reference. Speed reference data: Frequency reference x 2 <sup>SS</sup> (SS: Speed scale) Setting range: 0 - FFFF (Hex.) For example, when setting a reference of 4096 with a speed scale of 2: Speed reference data = 4096/2 <sup>2</sup> = 1024 = 400 (Hex.) Unit depends on o1-03.
Torque Limit	Sets the Torque Limit. Sets in units of 0.1%. The Torque Limit is disabled when F6-06 = 0.

### ◆ 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 7.1 Function Code Decode Table**

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

**Note:**

Refer to the drive manuals for a list of monitor data using the MEMOBUS/Modbus message area.

## ◆ (Vendor Specific Yaskawa Electric (YE) Assy) Speed/Torque Control Output - 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 Digital Output 3	Multi-Function Digital Output 2	Multi-Function Digital Output 1	-	-	-	Fault Reset	External Fault	
	1	2	Speed Reference (Low Byte)								
		3	Speed Reference (High Byte)								
	2	4	Torque Limit (Low Byte)								
		5	Torque Limit (High Byte)								
	3	6	Torque Compensation (Low Byte)								
		7	Torque Compensation (High Byte)								

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	Ethernet DI3 Function Input 0: Ethernet DI3 [H1-03] OFF 1: Ethernet DI3 [H1-03] ON
Multi-Function Input 4	Ethernet DI4 Function Input 0: Ethernet DI4 [H1-04] OFF 1: Ethernet DI4 [H1-04] ON
Multi-Function Input 5	Ethernet DI5 Function Input 0: Ethernet DI5 [H1-05] OFF 1: Ethernet DI5 [H1-05] ON
Multi-Function Input 6	Ethernet DI6 Function Input 0: Ethernet DI6 [H1-06] OFF 1: Ethernet DI6 [H1-06] ON
Multi-Function Input 7	Ethernet DI7 Function Input 0: Ethernet DI7 [H1-07] OFF 1: Ethernet DI7 [H1-07] ON
External Fault	External Fault EF0 0: - 1: External Fault [EF0]
Fault Reset	Fault Reset 0: - 1: Fault Reset
Multi-Function Digital Output 1	Terminal MA-MB-MC 0: MA-MB-MC OFF 1: MA-MB-MC ON This function is enabled only when H2-01 is set to F.
Multi-Function Digital Output 2	Ethernet DO1 0: Ethernet DO1 OFF 1: Ethernet DO1 ON This function is enabled only when H2-02 is set to F.
Multi-Function Digital Output 3	Ethernet DO2 0: Ethernet DO2 OFF 1: Ethernet DO2 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.

## 7 Output Assemblies (Consumers)

Name	Description
Torque Limit	Torque Limit Sets the Torque Limit. Sets in units of 0.1%. The Torque Limit is disabled when F6-06 = 0.
Torque Compensation	Torque Compensation Sets the amount of Torque Compensation Sets in units of 0.1%.

### ◆ (Vendor Specific Yaskawa Electric (YE) Assy) Extended Speed/Torque Control Output - 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 Digital Output 3	Multi-Function Digital Output 2	Multi-Function Digital Output 1	-	-	-	Fault Reset	External Fault	
	1	2	Speed Reference (Low Byte)								
		3	Speed Reference (High Byte)								
	2	4	Torque Limit (Low Byte)								
		5	Torque Limit (High Byte)								
	3	6	Torque Compensation (Low Byte)								
		7	Torque Compensation (High Byte)								
	4 - 7	8 - 15	Reserved								
	8	16	Digital Outputs (Low Byte)								
		17	Digital Outputs (High Byte)								
	9 - 19	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	Ethernet DI3 Function Input 0: Ethernet DI3 [H1-03] OFF 1: Ethernet DI3 [H1-03] ON
Multi-Function Input 4	Ethernet DI4 Function Input 0: Ethernet DI4 [H1-04] OFF 1: Ethernet DI4 [H1-04] ON
Multi-Function Input 5	Ethernet DI5 Function Input 0: Ethernet DI5 [H1-05] OFF 1: Ethernet DI5 [H1-05] ON
Multi-Function Input 6	Ethernet DI6 Function Input 0: Ethernet DI6 [H1-06] OFF 1: Ethernet DI6 [H1-06] ON
Multi-Function Input 7	Ethernet DI7 Function Input 0: Ethernet DI7 [H1-07] OFF 1: Ethernet DI7 [H1-07] ON
External Fault	External Fault EF0 0: - 1: External Fault [EF0]
Fault Reset	Fault Reset 0: - 1: Fault Reset
Multi-Function Digital Output 1	Terminal MA-MB-MC 0: MA-MB-MC OFF 1: MA-MB-MC ON

Name	Description
	This function is enabled only when H2-01 is set to F.
Multi-Function Digital Output 2	Ethernet DO1 0: Ethernet DO1 OFF 1: Ethernet DO1 ON This function is enabled only when H2-02 is set to F.
Multi-Function Digital Output 3	Ethernet DO2 0: Ethernet DO2 OFF 1: Ethernet DO2 ON This function is enabled only when H2-03 is set to F.
Speed Reference	Speed Command Sets drive speed reference. Unit is determined by o1-03. Unit is not affected by Speed Scale SS.
Torque Limit	Torque Limit Sets the Torque Limit. Sets in units of 0.1%. The Torque Limit is disabled when F6-06 = 0.
Torque Compensation	Torque Compensation Sets the amount of Torque Compensation Sets in units of 0.1%.
Digital Outputs	MEMOBUS/Modbus (0x0009) <b>Note:</b> These values are ORed with values in byte 1.

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

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.

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 Digital Output 3	Multi-Function Digital Output 2	Multi-Function Digital Output 1	-	-	-	Fault Reset	External Fault	
	1	2	Speed Reference (Low Byte)								
		3	Speed Reference (High Byte)								
	2	4	Torque Limit (Low Byte)								
		5	Torque Limit (High Byte)								
	3	6	Torque Compensation (Low Byte)								
		7	Torque Compensation (High Byte)								
	4	8	Reserved								
		9	-	-	-	-	-	-	-	-	-
	5	10	-	-	-	-	-	-	-	NetCtrl	NetRef
		11	-	-	-	-	-	-	-	-	-
	6 - 7	12 - 15	Reserved								
	8	16	Digital Outputs (Low Byte)								
		17	Digital Outputs (High Byte)								
	9	18	Reserved								
		19	Reserved								
	10	20 - 21	Dynamic Output 1 [F7-23], Default: Not Used								
	11	22 - 23	Dynamic Output 2 [F7-24], Default: Not Used								
	12	24 - 25	Dynamic Output 3 [F7-25], Default: Not Used								

## 7 Output Assemblies (Consumers)

Output Instance	Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	13	26 - 27	Dynamic Output 4 [F7-26], Default: Not Used							
	14	28 - 29	Dynamic Output 5 [F7-27], Default: Not Used							
	15	30 - 31	Dynamic Output 6 [F7-28], Default: Not Used							
	16	32 - 33	Dynamic Output 7 [F7-29], Default: Not Used							
	17	34 - 35	Dynamic Output 8 [F7-30], Default: Not Used							
	18	36 - 37	Dynamic Output 9 [F7-31], Default: Not Used							
	19	38 - 39	Dynamic Output 10 [F7-32], Default: Not Used							
	20 - 21	40 - 43	Not Used							

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	Ethernet DI3 Function Input 0: Ethernet DI3 [H1-03] OFF 1: Ethernet DI3 [H1-03] ON
Multi-Function Input 4	Ethernet DI4 Function Input 0: Ethernet DI4 [H1-04] OFF 1: Ethernet DI4 [H1-04] ON
Multi-Function Input 5	Ethernet DI5 Function Input 0: Ethernet DI5 [H1-05] OFF 1: Ethernet DI5 [H1-05] ON
Multi-Function Input 6	Ethernet DI6 Function Input 0: Ethernet DI6 [H1-06] OFF 1: Ethernet DI6 [H1-06] ON
Multi-Function Input 7	Ethernet DI7 Function Input 0: Ethernet DI7 [H1-07] OFF 1: Ethernet DI7 [H1-07] ON
External Fault	External Fault EF0 0: - 1: External Fault [EF0]
Fault Reset	Fault Reset 0: - 1: Fault Reset
Multi-Function Digital Output 1	Terminal MA-MB-MC 0: MA-MB-MC OFF 1: MA-MB-MC ON This function is enabled only when H2-01 is set to F.
Multi-Function Digital Output 2	Ethernet DO1 0: Ethernet DO1 OFF 1: Ethernet DO1 ON This function is enabled only when H2-02 is set to F.
Multi-Function Digital Output 3	Ethernet DO2 0: Ethernet DO2 OFF 1: Ethernet DO2 ON This function is enabled only when H2-03 is set to F.
Speed Reference	Speed Command Sets drive speed reference. Unit is determined by o1-03. Unit is not affected by Speed Scale SS.
Torque Limit	Torque Limit Sets the Torque Limit. Sets in units of 0.1%. The Torque Limit is disabled when F6-06 = 0.
Torque Compensation	Torque Compensation Sets the amount of Torque Compensation Sets in units of 0.1%.
NetRef	Network sets reference

Name	Description
NetCtrl	Network sets control
Digital Outputs	MEMOBUS/Modbus (0x0009) <b>Note:</b> These values are ORed with values in byte 1.
Dynamic Outputs	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 <i>(Vendor Specific Yaskawa Electric (YE) Assy) High Speed/Torque Status Input - 166 (0xA6) on page 36</i> for more information.

### ◆ (Vendor Specific Yaskawa Electric (YE) Assy) 8 Byte Dynamic Output - 117 (0x75)

Output Instance	Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
117	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 Digital Output 3	Multi-Function Digital Output 2	Multi-Function Digital Output 1	-	-	-	Fault Reset	External Fault	
	1	2	Speed Reference (Low Byte)								
		3	Speed Reference (High Byte)								
	2	4 - 5	Dynamic Output 1 [F7-23], Default: Not Used								
	3	6 - 7	Dynamic Output 2 [F7-24], Default: Not Used								

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	Ethernet DI3 Function Input 0: Ethernet DI3 [H1-03] OFF 1: Ethernet DI3 [H1-03] ON
Multi-Function Input 4	Ethernet DI4 Function Input 0: Ethernet DI4 [H1-04] OFF 1: Ethernet DI4 [H1-04] ON
Multi-Function Input 5	Ethernet DI5 Function Input 0: Ethernet DI5 [H1-05] OFF 1: Ethernet DI5 [H1-05] ON
Multi-Function Input 6	Ethernet DI6 Function Input 0: Ethernet DI6 [H1-06] OFF 1: Ethernet DI6 [H1-06] ON
Multi-Function Input 7	Ethernet DI7 Function Input 0: Ethernet DI7 [H1-07] OFF 1: Ethernet DI7 [H1-07] ON
External Fault	External Fault EF0 0: - 1: External Fault [EF0]
Fault Reset	Fault Reset 0: - 1: Fault Reset
Multi-Function Digital Output 1	Terminal MA-MB-MC 0: MA-MB-MC OFF 1: MA-MB-MC ON This function is enabled only when H2-01 is set to F.
Multi-Function Digital Output 2	Ethernet DO1 0: Ethernet DO1 OFF 1: Ethernet DO1 ON This function is enabled only when H2-02 is set to F.
Multi-Function Digital Output 3	Ethernet DO2

## 7 Output Assemblies (Consumers)

Name	Description
	0: Ethernet DO2 OFF 1: Ethernet DO2 ON This function is enabled only when H2-03 is set to F.
Speed Reference	Speed Command Sets drive speed reference. Unit is determined by o1-03. Unit is not affected by Speed Scale SS.
Dynamic Outputs	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 <a href="#">(Vendor Specific Yaskawa Electric (YE) Assy) High Speed/Torque Status Input - 166 (0xA6) on page 36</a> for more information.

### ◆ (Vendor Specific Yaskawa Electric (YE) Assy) 12 Byte Dynamic Output - 118 (0x76)

Output Instance	Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
118	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 Digital Output 3	Multi-Function Digital Output 2	Multi-Function Digital Output 1	-	-	-	Fault Reset	External Fault	
	1	2	Speed Reference (Low Byte)								
		3	Speed Reference (High Byte)								
	2	4 - 5	Dynamic Output 1 [F7-23], Default: Not Used								
	3	6 - 7	Dynamic Output 2 [F7-24], Default: Not Used								
	4	8 - 9	Dynamic Output 3 [F7-25], Default: Not Used								
	5	10 - 11	Dynamic Output 4 [F7-26], Default: Not Used								

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	Ethernet DI3 Function Input 0: Ethernet DI3 [H1-03] OFF 1: Ethernet DI3 [H1-03] ON
Multi-Function Input 4	Ethernet DI4 Function Input 0: Ethernet DI4 [H1-04] OFF 1: Ethernet DI4 [H1-04] ON
Multi-Function Input 5	Ethernet DI5 Function Input 0: Ethernet DI5 [H1-05] OFF 1: Ethernet DI5 [H1-05] ON
Multi-Function Input 6	Ethernet DI6 Function Input 0: Ethernet DI6 [H1-06] OFF 1: Ethernet DI6 [H1-06] ON
Multi-Function Input 7	Ethernet DI7 Function Input 0: Ethernet DI7 [H1-07] OFF 1: Ethernet DI7 [H1-07] ON
External Fault	External Fault EF0 0: - 1: External Fault [EF0]
Fault Reset	Fault Reset 0: - 1: Fault Reset
Multi-Function Digital Output 1	Terminal MA-MB-MC 0: MA-MB-MC OFF 1: MA-MB-MC ON This function is enabled only when H2-01 is set to F.

Name	Description
Multi-Function Digital Output 2	Ethernet DO1 0: Ethernet DO1 OFF 1: Ethernet DO1 ON This function is enabled only when H2-02 is set to F.
Multi-Function Digital Output 3	Ethernet DO2 0: Ethernet DO2 OFF 1: Ethernet DO2 ON This function is enabled only when H2-03 is set to F.
Speed Reference	Speed Command Sets drive speed reference. Unit is determined by o1-03. Unit is not affected by Speed Scale SS.
Dynamic Outputs	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 <i>(Vendor Specific Yaskawa Electric (YE) Assy) High Speed/Torque Status Input - 166 (0xA6) on page 36</i> for more information.

### ◆ (Vendor Specific Yaskawa Electric (YE) Assy) 18 Byte Dynamic Output - 119 (0x77)

Output Instance	Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
119	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 Digital Output 3	Multi-Function Digital Output 2	Multi-Function Digital Output 1	-	-	-	Fault Reset	External Fault	
	1	2	Speed Reference (Low Byte)								
		3	Speed Reference (High Byte)								
	2	4 - 5	Dynamic Output 1 [F7-23], Default: Not Used								
	3	6 - 7	Dynamic Output 2 [F7-24], Default: Not Used								
	4	8 - 9	Dynamic Output 3 [F7-25], Default: Not Used								
	5	10 - 11	Dynamic Output 4 [F7-26], Default: Not Used								
	6	12 - 13	Dynamic Output 5 [F7-27], Default: Not Used								
	7	14 - 15	Dynamic Output 6 [F7-28], Default: Not Used								
8	16 - 17	Dynamic Output 7 [F7-29], Default: Not Used									

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	Ethernet DI3 Function Input 0: Ethernet DI3 [H1-03] OFF 1: Ethernet DI3 [H1-03] ON
Multi-Function Input 4	Ethernet DI4 Function Input 0: Ethernet DI4 [H1-04] OFF 1: Ethernet DI4 [H1-04] ON
Multi-Function Input 5	Ethernet DI5 Function Input 0: Ethernet DI5 [H1-05] OFF 1: Ethernet DI5 [H1-05] ON
Multi-Function Input 6	Ethernet DI6 Function Input 0: Ethernet DI6 [H1-06] OFF 1: Ethernet DI6 [H1-06] ON
Multi-Function Input 7	Ethernet DI7 Function Input 0: Ethernet DI7 [H1-07] OFF 1: Ethernet DI7 [H1-07] ON

## 7 Output Assemblies (Consumers)

Name	Description
External Fault	External Fault EF0 0: - 1: External Fault [EF0]
Fault Reset	Fault Reset 0: - 1: Fault Reset
Multi-Function Digital Output 1	Terminal MA-MB-MC 0: MA-MB-MC OFF 1: MA-MB-MC ON This function is enabled only when H2-01 is set to F.
Multi-Function Digital Output 2	Ethernet DO1 0: Ethernet DO1 OFF 1: Ethernet DO1 ON This function is enabled only when H2-02 is set to F.
Multi-Function Digital Output 3	Ethernet DO2 0: Ethernet DO2 OFF 1: Ethernet DO2 ON This function is enabled only when H2-03 is set to F.
Speed Reference	Speed Command Sets drive speed reference. Unit is determined by o1-03. Unit is not affected by Speed Scale SS.
Dynamic Outputs	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 <i>(Vendor Specific Yaskawa Electric (YE) Assy) High Speed/Torque Status Input - 166 (0xA6) on page 36</i> for more information.

### ◆ (Vendor Specific Yaskawa Electric (YE) Assy) 24 Byte Dynamic Output - 120 (0x78)

Output Instance	Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
120	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 Digital Output 3	Multi-Function Digital Output 2	Multi-Function Digital Output 1	-	-	-	Fault Reset	External Fault	
	1	2	Speed Reference (Low Byte)								
		3	Speed Reference (High Byte)								
	2	4 - 5	Dynamic Output 1 [F7-23], Default: Not Used								
	3	6 - 7	Dynamic Output 2 [F7-24], Default: Not Used								
	4	8 - 9	Dynamic Output 3 [F7-25], Default: Not Used								
	5	10 - 11	Dynamic Output 4 [F7-26], Default: Not Used								
	6	12 - 13	Dynamic Output 5 [F7-27], Default: Not Used								
	7	14 - 15	Dynamic Output 6 [F7-28], Default: Not Used								
	8	16 - 17	Dynamic Output 7 [F7-29], Default: Not Used								
	9	18 - 19	Dynamic Output 8 [F7-30], Default: Not Used								
10	20 - 21	Dynamic Output 9 [F7-31], Default: Not Used									
11	22 - 23	Dynamic Output 10 [F7-32], Default: Not Used									

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	Ethernet DI3 Function Input 0: Ethernet DI3 [H1-03] OFF

Name	Description
	1: Ethernet DI3 [H1-03] ON
Multi-Function Input 4	Ethernet DI4 Function Input 0: Ethernet DI4 [H1-04] OFF 1: Ethernet DI4 [H1-04] ON
Multi-Function Input 5	Ethernet DI5 Function Input 0: Ethernet DI5 [H1-05] OFF 1: Ethernet DI5 [H1-05] ON
Multi-Function Input 6	Ethernet DI6 Function Input 0: Ethernet DI6 [H1-06] OFF 1: Ethernet DI6 [H1-06] ON
Multi-Function Input 7	Ethernet DI7 Function Input 0: Ethernet DI7 [H1-07] OFF 1: Ethernet DI7 [H1-07] ON
External Fault	External Fault EF0 0: - 1: External Fault [EF0]
Fault Reset	Fault Reset 0: - 1: Fault Reset
Multi-Function Digital Output 1	Terminal MA-MB-MC 0: MA-MB-MC OFF 1: MA-MB-MC ON This function is enabled only when H2-01 is set to F.
Multi-Function Digital Output 2	Ethernet DO1 0: Ethernet DO1 OFF 1: Ethernet DO1 ON This function is enabled only when H2-02 is set to F.
Multi-Function Digital Output 3	Ethernet DO2 0: Ethernet DO2 OFF 1: Ethernet DO2 ON This function is enabled only when H2-03 is set to F.
Speed Reference	Speed Command Sets drive speed reference. Unit is determined by o1-03. Unit is not affected by Speed Scale SS.
Dynamic Outputs	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 <i>(Vendor Specific Yaskawa Electric (YE) Assy) High Speed/Torque Status Input - 166 (0x46) on page 36</i> for more information.

## 8 Input Assemblies (Producers)

### 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 the drive.

### ◆ EtherNet/IP 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)								

## 8 Input Assemblies (Producers)

Name	Description
Faulted	Faulted 0: No Fault 1: Fault
Running 1 (FWD)	Forward Running 0: Stop or Reverse Running 1: Forward Running
Speed Actual	Actual Drive Speed Monitors motor speed. Speed actual data: Motor speed x 2 <sup>SS</sup> (SS: Speed scale) Range: 0 - FFFF (Hex.) For example, when <i>U1-05 [Motor Speed]</i> of 1024 with a speed scale of 2: Speed actual data = 1024 x 2 <sup>2</sup> = 4096 = 1000 (Hex.) Unit depends on o1-03. <b>Note:</b> Monitors the value calculated using <i>U1-02 [Open frequency]</i> when <i>A1-02 = 0, 5, 6 [V/f Control, PM Open Loop Vector, PM Advanced Open Loop Vector]</i> .

### ◆ EtherNet/IP 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	Speed Agree	NetRef	NetCtrl	Ready	Running 2 (REV)	Running 1 (FWD)	Alarm	Faulted	
		1	State								
	1	2	Speed Actual (Low Byte)								
		3	Speed Actual (High Byte)								

Name	Description
Faulted	Faulted 0: No Fault 1: Fault
Alarm	Alarm 0: No Alarm 1: Alarm
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	Ready 0: Not Ready 1: Ready
NetCtrl	Run command is from network 0: Run command is not from network 1: Run command is from network
NetRef	Speed reference is from network 0: Speed reference is not from network 1: Speed reference is from network
Speed Agree	Speed Agree 0: - 1: Speed actual at speed reference
State	Contains the value from the Control Supervisor (Class 0x29) Instance 1 Attribute 6.
Speed Actual	Actual Drive Speed Monitors motor speed. Speed actual data: Motor speed x 2 <sup>SS</sup> (SS: Speed scale) Range: 0 - FFFF (Hex.) For example, when <i>U1-05 [Motor Speed]</i> of 1024 with a speed scale of 2: Speed actual data = 1024 x 2 <sup>2</sup> = 4096 = 0x1000 Unit depends on o1-03. <b>Note:</b> Monitors the value calculated using <i>U1-02 [Open frequency]</i> when <i>A1-02 = 0, 5, 6 [V/f Control, PM Open Loop Vector, PM Advanced Open Loop Vector]</i> .

### ◆ EtherNet/IP 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)								
		5	Torque Actual (High Byte)								

Name	Description
Faulted	Faulted 0: No Fault 1: Fault
Running 1 (FWD)	Forward Running 0: Stop or Reverse Running 1: Forward Running
Speed Actual	Actual Drive Speed Monitors motor speed. Speed actual data: Motor speed x 2 <sup>SS</sup> (SS: Speed scale) Range: 0 - FFFF (Hex.) For example, when U1-05 [Motor Speed] of 1024 with a speed scale of 2: Speed actual data = 1024 x 2 <sup>2</sup> = 4096 = 1000 (Hex.) Unit depends on o1-03. <b>Note:</b> Monitors the value calculated using U1-02 [Open frequency] when A1-02 = 0, 5, 6 [V/f Control, PM Open Loop Vector, PM Advanced Open Loop Vector].
Torque Actual	Output Torque Shows the Torque Reference. Value displays in 0.1% units.

### ◆ EtherNet/IP 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	Speed Agree	NetRef	NetCtrl	Ready	Running 2 (REV)	Running 1 (FWD)	Alarm	Faulted	
		1	State								
	1	2	Speed Actual (Low Byte)								
		3	Speed Actual (High Byte)								
	2	4	Torque Actual (Low Byte)								
		5	Torque Actual (High Byte)								

Name	Description
Faulted	Faulted 0: No Fault 1: Fault
Alarm	Alarm 0: No Alarm 1: Alarm
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	Ready 0: Not Ready 1: Ready
NetCtrl	Run command is from network

## 8 Input Assemblies (Producers)

Name	Description
	0: Run command is not from network 1: Run command is from network
NetRef	Speed reference is from network 0: Speed reference is not from network 1: Speed reference is from network
Speed Agree	Speed Agree 0: - 1: Speed actual at speed reference
State	Contains the value from the Control Supervisor (Class 0x29) Instance 1 Attribute 6.
Speed Actual	Actual Drive Speed Monitors motor speed. Speed actual data: Motor speed x 2 <sup>SS</sup> (SS: Speed scale) Range: 0 - FFFF (Hex.) For example, when U1-05 [Motor Speed] of 1024 with a speed scale of 2: Speed actual data = 1024 x 2 <sup>2</sup> = 4096 = 1000 (Hex.) Unit depends on o1-03. <b>Note:</b> Monitors the value calculated using U1-02 [Open frequency] when A1-02 = 0, 5, 6 [V/f Control, PM Open Loop Vector, PM Advanced Open Loop Vector].
Torque Actual	Output Torque Shows the Torque Reference. Value displays in 0.1% units.

### ◆ (Vendor Specific Yaskawa Electric (YE) Assy) MEMOBUS/Modbus Message Input - 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 8.1 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)	0				
2	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 8.2 Error Replies - 150**

Error Code	Description
0x01	Invalid Function Code
0x02	Invalid Register Number
0x21	Upper/Lower Limit Error
0x22	Write Mode Error Network generated busy event. The MEMOBUS/Modbus requested operation is in the process loop but the drive is not done yet. 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.

Error Code	Description
0x23	Writing Error during Undervoltage Attempting to write during a drive Uv [undervoltage] event.
0x24	Writing Error during Parameter Processing Attempting to write while the drive is storing data.

**Note:**

Refer to the drive manuals for a list of monitor data using the MEMOBUS/Modbus message area.

### ◆ (Vendor Specific Yaskawa Electric (YE) Assy) Speed/Torque Status Input - 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	ZSV	-	Multi-Function Digital Output 3	Multi-Function Digital Output 2	Multi-Function Digital Output 1	LOCAL/REMOTE	Uv	oPE	
	1	2	Motor Speed (Low Byte)								
		3	Motor Speed (High Byte)								
	2	4	Torque Actual (Low Byte)								
		5	Torque Actual (High Byte)								
	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: - 1: Reset
Speed Agree	Speed Agree 0: - 1: Speed actual at speed reference
Ready	Ready 0: Not Ready 1: Ready
Alarm	Alarm 0: No Alarm 1: Alarm
Faulted	Faulted 0: No Fault 1: Fault
oPE	oPE 0: - 1: oPExx
Uv	Undervoltage 0: - 1: Undervoltage
LOCAL/REMOTE	Run command is from network 0: Run command is not from network 1: Run command is from network
Multi-Function Digital Output 1	Terminal MA-MB-MC 0: MA-MB-MC OFF

## 8 Input Assemblies (Producers)

Name	Description
	I: MA-MB-MC ON
Multi-Function Digital Output 2	Ethernet DO1 0: Ethernet DO1 OFF 1: Ethernet DO1 ON
Multi-Function Digital Output 3	Ethernet DO2 0: Ethernet DO2 OFF 1: Ethernet DO2 ON
ZSV	Zero Servo Completed 0: - 1: Zero Servo Completed
Motor Speed	Motor Speed Monitors <i>U1-05 [Motor Speed]</i> . Unit depends on o1-03. Unit is not affected by Speed Scale SS. <b>Note:</b> Monitors the value calculated using <i>U1-02 [Open frequency]</i> when <i>A1-02 = 0, 5, 6 [V/f Control, PM Open Loop Vector, PM Advanced Open Loop Vector]</i> .
Torque Actual	Output Torque Shows the Torque Reference. Value displays in 0.1% units.
Current Actual	Actual Output Current Monitors drive output current. Unit: 0.1 A Unit is not affected by Current Scale CS.

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

Input 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	ZSV	-	Multi-Function Digital Output 3	Multi-Function Digital Output 2	Multi-Function Digital Output 1	LOCAL/REMOTE	Uv	oPE	
	1	2	Motor Speed (Low Byte)								
		3	Motor Speed (High Byte)								
	2	4	Torque Actual (Low Byte)								
		5	Torque Actual (High Byte)								
	3	6	Reserved								
		7	Reserved								
	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	Reserved								
		15	Reserved								
	8	16	Main Circuit DC Voltage (Low Byte)								
		17	Main Circuit DC Voltage (High Byte)								
	9	18	Error Alarm Signal 1 (Low Byte)								
		19	Error Alarm Signal 1 (High Byte)								
	10	20	Error Alarm Signal 2 (Low Byte)								
		21	Error Alarm Signal 2 (High Byte)								
11	22	Error Alarm Signal 3 (Low Byte)									

Input Instance	Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
		23	Error Alarm Signal 3 (High Byte)							
	12	24	Reserved							
		25	Reserved							
	13	26	Terminal S1, S2, Ethernet DI3 to DI7 Input (Low Byte)							
		27	Terminal S1, S2, Ethernet DI3 to DI7 Input (High Byte)							
	14	28	Terminal A1 Input (Low Byte)							
		29	Terminal A1 Input (High Byte)							
	15	30	Reserved							
		31	Reserved							
	16 - 19	32 - 39	Reserved							

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
Fault Reset	Fault Reset 0: - 1: Fault Reset
Speed Agree	Speed Agree 0: - 1: Speed actual at speed reference
Ready	Ready 0: Not Ready 1: Ready
Alarm	Alarm 0: No Alarm 1: Alarm
Faulted	Faulted 0: No Fault 1: Fault
oPE	oPE 0: - 1: oPExx
Uv	Undervoltage 0: - 1: Undervoltage
LOCAL/REMOTE	Run command is from network 0: Run command is not from network 1: Run command is from network
Multi-Function Digital Output 1	Terminal MA-MB-MC 0: MA-MB-MC OFF 1: MA-MB-MC ON
Multi-Function Digital Output 2	Ethernet DO1 0: Ethernet DO1 OFF 1: Ethernet DO1 ON
Multi-Function Digital Output 3	Ethernet DO2 0: Ethernet DO2 OFF 1: Ethernet DO2 ON
ZSV	Zero Servo Completed 0: - 1: Zero Servo Completed
Motor Speed	Monitor parameter U1-05

## 8 Input Assemblies (Producers)

Name	Description
	<b>Note:</b> Monitors the value calculated using U1-02 [Open frequency] when A1-02 = 0, 5, 6 [V/f Control, PM Open Loop Vector, PM Advanced Open Loop Vector].
Torque Actual	Output Torque Shows the torque reference. Value displays in 0.1% units.
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: 0.1 A Unit is not affected by Current Scale CS.
Main Circuit DC Voltage	Main Circuit DC Voltage Monitor parameter U1-07
Error Alarm Signal 1	Error Alarm Signal 1 MEMOBUS/Modbus (0xC8)
Error Alarm Signal 2	Error Alarm Signal 2 MEMOBUS/Modbus (0xC9)
Error Alarm Signal 3	Error Alarm Signal 3 MEMOBUS/Modbus (0xCA)
Terminal S1, S2, Ethernet DI3 to DI7 Input	MEMOBUS/Modbus (0x49) Monitor parameter U1-10
Terminal A1 Input	MEMOBUS/Modbus (0x46) Monitor parameter U1-13

### ◆ (Vendor Specific Yaskawa Electric (YE) Assy) High Speed/Torque Status Input - 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.

Input 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	ZSV	-	Multi-Function Digital Output 3	Multi-Function Digital Output 2	Multi-Function Digital Output 1	LOCAL/REMOTE	Uv	oPE	
	1	2	Motor Speed (Low Byte)								
		3	Motor Speed (High Byte)								
	2	4	Torque Actual (Low Byte)								
		5	Torque Actual (High Byte)								
	3	6	Reserved								
		7	Reserved								
	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	Terminal A1 Input (Low Byte)								
		15	Terminal A1 Input (High Byte)								
	8	16	Main Circuit DC Voltage (Low Byte)								

Input Instance	Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
		17	Main Circuit DC Voltage (High Byte)								
	9	18	Error Code (Low Byte)								
		19	Error Code (High Byte)								
	10 *1	20 *1	Parameter [F7-33], Default: Alarm Code (Low Byte)								
		21 *1	Parameter [F7-33], Default: Alarm Code (High Byte)								
	11 *1	22 *1	Parameter [F7-34], Default: Output Power (Low Byte)								
		23 *1	Parameter [F7-34], Default: Output Power (High Byte)								
	12 *1	24 *1	Parameter [F7-35] (Low Byte), Default: Not Used								
		25 *1	Parameter [F7-35] (High Byte), Default: Not Used								
	13 *1	26 *1	Parameter [F7-36], Default: Terminal S1, S2, Ethernet DI3 to DI7 Input (Low Byte)								
		27 *1	Parameter [F7-36], Default: Terminal S1, S2, Ethernet DI3 to DI7 Input (High Byte)								
	14 *1	28 *1	Parameter [F7-37] (Low Byte), Default: Not Used								
		29 *1	Parameter [F7-37] (High Byte), Default: Not Used								
	15 *1	30 *1	Parameter [F7-38] (Low Byte), Default: Not Used								
		31 *1	Parameter [F7-38] (High Byte), Default: Not Used								
	16 *1	32 *1	Parameter [F7-39], Default: NetRef and NetCtrl (Low Byte)								
			-	-	-	-	-	-	-	NetCtrl	NetRef
		33 *1	Parameter [F7-39], Default: NetRef and NetCtrl (High Byte)								
	17 *1	34 *1	Parameter [F7-40], Default: Drive Software Version (Low Byte)								
		35 *1	Parameter [F7-40], Default: Drive Software Version (High Byte)								
18 *1	36 *1	Parameter [F7-41] (Low Byte), Default: Not Used									
	37 *1	Parameter F7-41 (High Byte), Default: Not Used									
19 *1	38 *1	Parameter [F7-42] (Low Byte), Default: Not Used									
	39 *1	Parameter F7-42 (High Byte), 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
ZSP	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 0: - 1: Fault Reset
Speed Agree	Speed Agree 0: - 1: Speed actual at speed reference
Ready	Ready 0: Not Ready 1: Ready
Alarm	Alarm

## 8 Input Assemblies (Producers)

Name	Description
	0: No Alarm 1: Alarm
Faulted	Faulted 0: No Fault 1: Fault
oPE	oPE 0: - 1: oPExx
Uv	Undervoltage 0: - 1: Undervoltage
LOCAL/REMOTE	Run command is from network 0: Run command is not from network 1: Run command is from network
Multi-Function Digital Output 1	Terminal MA-MB-MC 0: MA-MB-MC OFF 1: MA-MB-MC ON
Multi-Function Digital Output 2	Ethernet DO1 0: Ethernet DO1 OFF 1: Ethernet DO1 ON
Multi-Function Digital Output 3	Ethernet DO2 0: Ethernet DO2 OFF 1: Ethernet DO2 ON
ZSV	Zero Servo Completed 0: - 1: Zero Servo Completed
Motor Speed	Monitor parameter U1-05 <b>Note:</b> Monitors the value calculated using U1-02 [Open frequency] when A1-02 = 0, 5, 6 [V/f Control, PM Open Loop Vector, PM Advanced Open Loop Vector].
Torque Actual	Output Torque Shows the Torque Reference. Value displays in 0.1% units.
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: 0.1 A Unit is not affected by Current Scale CS.
Terminal A1 Input	MEMOBUS/Modbus (0x46) Monitor parameter U1-13
Main Circuit 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)
F7-34 Output Power	Programmable: MEMOBUS/Modbus (0x47) Monitor parameter U1-08
F7-35 Not Used	Programmable
F7-36 Terminal S1, S2, Ethernet DI3 to DI7 Input	Programmable: MEMOBUS/Modbus (0x49) Monitor parameter U1-10
F7-37 Not Used	Programmable
F7-38 Not Used	Programmable
F7-39 NetRef (Status)	Speed reference is from network 0: Speed reference is not from network 1: Speed reference is from network
F7-40 Drive Software Version	Programmable: MEMOBUS/Modbus (0x4D) Monitor parameter U1-25

Possible extended error codes are listed in [Table 8.3](#) and [Table 8.4](#). If an error occurs, extended error code 0x02 (Register number failure) is usually set.

**Table 8.3 Extended Error Codes for Assembly 116/166**

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

**Table 8.4 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

### ◆ (Vendor Specific Yaskawa Electric (YE) Assy) 8-Byte Dynamic Input - 167 (0xA7)

Input Instance	Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
167	0	0	Faulted	Alarm	Ready	Speed Agree	Fault Reset	REV Running	ZSP	Running	
		1	ZSV	-	Multi-Function Digital Output 3	Multi-Function Digital Output 2	Multi-Function Digital Output 1	LOCAL/REMOTE	Uv	oPE	
	1	2	Motor Speed (Low Byte)								
		3	Motor Speed (High Byte)								
	2	4 - 5	Dynamic Input 1 [F7-33], Default: Alarm Code								
	3	6 - 7	Dynamic Input 2 [F7-34], Default: Output Power [U1-08]								

## 8 Input Assemblies (Producers)

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
Fault Reset	Fault Reset 0: - 1: Fault Reset
Speed Agree	Speed Agree 0: - 1: Speed actual at speed reference
Ready	Ready 0: Not Ready 1: Ready
Alarm	Alarm 0: No Alarm 1: Alarm
Faulted	Faulted 0: No Fault 1: Fault
oPE	oPE 0: - 1: oPExx
Uv	Undervoltage 0: - 1: Undervoltage
LOCAL/REMOTE	Run command is from network 0: Run command is not from network 1: Run command is from network
Multi-Function Digital Output 1	Terminal MA-MB-MC 0: MA-MB-MC OFF 1: MA-MB-MC ON
Multi-Function Digital Output 2	Ethernet DO1 0: Ethernet DO1 OFF 1: Ethernet DO1 ON
Multi-Function Digital Output 3	Ethernet DO2 0: Ethernet DO2 OFF 1: Ethernet DO2 ON
Motor Speed	Motor Speed Monitors U1-05 [Motor Speed]. Unit depends on o1-03. Unit is not affected by Speed Scale SS. <b>Note:</b> Monitors the value calculated using U1-02 [Open frequency] when A1-02 = 0, 5, 6 [V/f Control, PM Open Loop Vector, PM Advanced Open Loop Vector].
Dynamic Inputs	Contains the data to be read from the MEMOBUS/Modbus address defined in the given parameter. A value of 0 in the given parameter means it will return the default data as defined in the table above.

### ◆ (Vendor Specific Yaskawa Electric (YE) Assy) 12-Byte Dynamic Input - 168 (0xA8)

Input Instance	Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
168	0	0	Faulted	Alarm	Ready	Speed Agree	Fault Reset	REV Running	ZSP	Running
		1	ZSV	-	Multi-Function Digital Output 3	Multi-Function Digital Output 2	Multi-Function Digital Output 1	LOCAL/REMOTE	Uv	oPE
	1	2	Motor Speed (Low Byte)							

Input Instance	Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
		3	Motor Speed (High Byte)							
	2	4 - 5	Dynamic Input 1 [F7-33], Default: Alarm Code							
	3	6 - 7	Dynamic Input 2 [F7-34], Default: Output Power [U1-08]							
	4	8 - 9	Dynamic Input 3 [F7-35], Default: Not Used							
	5	10 - 11	Dynamic Input 4 [F7-36], Default: Digital Input							

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
Fault Reset	Fault Reset 0: - 1: Fault Reset
Speed Agree	Speed Agree 0: - 1: Speed actual at speed reference
Ready	Ready 0: Not Ready 1: Ready
Alarm	Alarm 0: No Alarm 1: Alarm
Faulted	Faulted 0: No Fault 1: Fault
oPE	oPE 0: - 1: oPExx
Uv	Undervoltage 0: - 1: Undervoltage
LOCAL/REMOTE	Run command is from network 0: Run command is not from network 1: Run command is from network
Multi-Function Digital Output 1	Terminal MA-MB-MC 0: MA-MB-MC OFF 1: MA-MB-MC ON
Multi-Function Digital Output 2	Ethernet DO1 0: Ethernet DO1 OFF 1: Ethernet DO1 ON
Multi-Function Digital Output 3	Ethernet DO2 0: Ethernet DO2 OFF 1: Ethernet DO2 ON
Motor Speed	Motor Speed Monitors U1-05 [Motor Speed]. Unit depends on o1-03. Unit is not affected by Speed Scale SS. <b>Note:</b> Monitors the value calculated using U1-02 [Open frequency] when A1-02 = 0, 5, 6 [V/f Control, PM Open Loop Vector, PM Advanced Open Loop Vector].
Dynamic Inputs	Contains the data to be read from the MEMOBUS/Modbus address defined in the given parameter. A value of 0 in the given parameter means it will return the default data as defined in the table above.

## ◆ (Vendor Specific Yaskawa Electric (YE) Assy) 18-Byte Dynamic Input - 169 (0xA9)

Input Instance	Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
169	0	0	Faulted	Alarm	Ready	Speed Agree	Fault Reset	REV Running	ZSP	Running	
		1	ZSV	-	Multi-Function Digital Output 3	Multi-Function Digital Output 2	Multi-Function Digital Output 1	LOCAL/REMOTE	Uv	oPE	
	1	2	Motor Speed (Low Byte)								
		3	Motor Speed (High Byte)								
	2	4 - 5	Dynamic Input 1 [F7-33], Default: Fault Code								
	3	6 - 7	Dynamic Input 2 [F7-34], Default: Output Power [U1-08]								
	4	8 - 9	Dynamic Input 3 [F7-35], Default: Not Used								
	5	10 - 11	Dynamic Input 4 [F7-36], Default: Digital Input								
	6	12 - 13	Dynamic Input 5 [F7-37], Default: Not Used								
	7	14 - 15	Dynamic Input 6 [F7-38], Default: Not Used								
	8	16 - 17	Dynamic Input 7 [F7-39], Default: Net Ref and Net Ctrl								

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
Fault Reset	Fault Reset 0: - 1: Fault Reset
Speed Agree	Speed Agree 0: - 1: Speed actual at speed reference
Ready	Ready 0: Not Ready 1: Ready
Alarm	Alarm 0: No Alarm 1: Alarm
Faulted	Faulted 0: No Fault 1: Fault
oPE	oPE 0: - 1: oPExx
Uv	Undervoltage 0: - 1: Undervoltage
LOCAL/REMOTE	Run command is from network 0: Run command is not from network 1: Run command is from network
Multi-Function Digital Output 1	Terminal MA-MB-MC 0: MA-MB-MC OFF 1: MA-MB-MC ON
Multi-Function Digital Output 2	Ethernet DO1 0: Ethernet DO1 OFF 1: Ethernet DO1 ON
Multi-Function Digital Output 3	Ethernet DO2

Name	Description
	0: Ethernet DO2 OFF 1: Ethernet DO2 ON
Motor Speed	Motor Speed Monitors U1-05 [Motor Speed]. Unit depends on o1-03. Unit is not affected by Speed Scale SS. <b>Note:</b> Monitors the value calculated using U1-02 [Open frequency] when A1-02 = 0, 5, 6 [V/f Control, PM Open Loop Vector, PM Advanced Open Loop Vector].
Dynamic Inputs	Contains the data to be read from the MEMOBUS/Modbus address defined in the given parameter. A value of 0 in the given parameter means it will return the default data as defined in the table above.

### ◆ (Vendor Specific Yaskawa Electric (YE) Assy) 24-Byte Dynamic Input - 170 (0xAA)

Input Instance	Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
170	0	0	Faulted	Alarm	Ready	Speed Agree	Fault Reset	REV Running	ZSP	Running	
		1	ZSV	-	Multi-Function Digital Output 3	Multi-Function Digital Output 2	Multi-Function Digital Output 1	LOCAL/REMOTE	Uv	oPE	
	1	2	Motor Speed (Low Byte)								
		3	Motor Speed (High Byte)								
	2	4 - 5	Dynamic Input 1 [F7-33], Default: Fault Code								
	3	6 - 7	Dynamic Input 2 [F7-34], Default: Output Power [U1-08]								
	4	8 - 9	Dynamic Input 3 [F7-35], Default: Not Used								
	5	10 - 11	Dynamic Input 4 [F7-36], Default: Digital Input								
	6	12 - 13	Dynamic Input 5 [F7-37], Default: Not Used								
	7	14 - 15	Dynamic Input 6 [F7-38], Default: Not Used								
	8	16 - 17	Dynamic Input 7 [F7-39], Default: Net Ref and Net Ctrl								
	9	18 - 19	Dynamic Input 8 [F7-40], Default: Drive Software Version								
10	20 - 21	Dynamic Input 9 [F7-41], Default: Not Used									
11	22 - 23	Dynamic Input 10 [F7-42], Default: Not Used									

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
Fault Reset	Fault Reset 0: - 1: Fault Reset
Speed Agree	Speed Agree 0: - 1: Speed actual at speed reference
Ready	Ready 0: Not Ready 1: Ready
Alarm	Alarm 0: No Alarm 1: Alarm
Faulted	Faulted 0: No Fault 1: Fault

## 9 General Class Objects

Name	Description
oPE	oPE 0: - 1: oPExx
Uv	Undervoltage 0: - 1: Undervoltage
LOCAL/REMOTE	Run command is from network 0: Run command is not from network 1: Run command is from network
Multi-Function Digital Output 1	Terminal MA-MB-MC 0: MA-MB-MC OFF 1: MA-MB-MC ON
Multi-Function Digital Output 2	Ethernet DO1 0: Ethernet DO1 OFF 1: Ethernet DO1 ON
Multi-Function Digital Output 3	Ethernet DO2 0: Ethernet DO2 OFF 1: Ethernet DO2 ON
Motor Speed	Motor Speed Monitors U1-05 [Motor Speed]. Unit depends on o1-03. Unit is not affected by Speed Scale SS. <b>Note:</b> Monitors the value calculated using U1-02 [Open frequency] when A1-02 = 0, 5, 6 [V/f Control, PM Open Loop Vector, PM Advanced Open Loop Vector].
Dynamic Inputs	Contains the data to be read from the MEMOBUS/Modbus address defined in the given parameter. A value of 0 in the given parameter means it will return the default data as defined in the table above.

## 9 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	✓	-	Word	-	1
1	1	Vendor ID	Manufacturer code. 44 (2C (Hex.)): Yaskawa Electric	✓	-	Word	-	44
1	2	Device Type	Device profile. The profile for this product is an AC drive. 2: AC drive	✓	-	Word	-	2
1	3	Product Code	Product codes determined by the manufacturer.	✓	-	Word	-	5DFF (Hex.)
1	4	Revision	Software revision	✓	-	Word	-	Depends on software
1	5	Status	Shows the communication status for the drive.	✓	-	Word	-	0
1	6	Serial number	Serial number	✓	-	Long	-	Each unit is unique
1	7	Product Name	Product Name	✓	-	String	-	GA501
1	8	State	Operation status of the drive. 3: Drive ready 4: Fault	✓	-	Byte	-	3



## 9 General Class Objects

Instance ID	Attribute	Name	Description	Get	Set	Size	Range	Default
167	3	Data	Same function as the 8 Byte Dynamic Input (Input Assembly)	✓	-	Array 8 Bytes	-	00 00 00 00 00 00 00
168	3	Data	Same function as the 12 Byte Dynamic Input (Input Assembly)	✓	-	Array 12 Bytes	-	00 00 00 00 00 00 00 00 00
169	3	Data	Same function as the 18 Byte Dynamic Input (Input Assembly)	✓	-	Array 18 Bytes	-	00 00 00 00 00 00 00 00 00 00 00 00 00 00
170	3	Data	Same function as the 24 Byte Dynamic Input (Input Assembly)	✓	-	Array 24 Bytes	-	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)

**Note:**

This object is only available for Motor 1. It is not available for Motor 2.

### ■ 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.	✓	-	Word	-	1
1	3	Motor Type	Type of motor used. 3: PM motor 7: IM motor The setting value of this parameter is different for different A1-02 [Control Method Selection] setting. When A1-02 = 5, 6 [PM Open Loop Vector, PM Advanced Open Loop Vector], value becomes 3 [PM Motor]. When A1-02 = 0, 2 [V/f Control, Open Loop Vector], value becomes 7 [IM Motor].	✓	-	Byte	-	Depends on A1-02 [Control Method Selection].
1	6	Rated Current [0.1 A]	The setting value of this attribute depends on A1-02 [Control Method Selection]. • When A1-02 = 0, 2 [V/f Control, Open Loop Vector], the value is E2-01 [Motor Rated Current (FLA)] setting. • When A1-02 = 5, 6 [PM Open Loop Vector, PM Advanced Open Loop Vector], the value is E5-03 [PM Motor Rated Current (FLA)] setting. • When A1-02 = 8 [EZ Vector Control], the value is E9-06 [Motor Rated Current (FLA)] setting. The set value depends on Current Scale (CS).	✓	✓	Byte	-	Depends on capacity
1	7	Rated Voltage [1V]	The setting value of this attribute depends on A1-02 [Control Method Selection]. • When A1-02 = 0, 2, 5, 6 [V/f Control, Open Loop Vector, PM Advanced Open Loop Vector, PM Closed Loop Vector], the value is E1-05 [Maximum Output Voltage] setting. • When A1-02 = 8 [EZ Vector Control], the value is E9-05 [Motor Rated Voltage] setting. The set value depends on Voltage Scale (VS).	✓	✓	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.	✓	-	Word	-	1
1	3	Run command 1 (FWD)	Forward Run Command 0: Stop 1: Forward Run	✓	✓	Byte	0, 1	0
1	4	Run command 2 (REV)	Reverse Run Command 0: Stop 1: Reverse Run	✓	✓	Byte	0, 1	0
1	5	NetCtrl (Command)	Run command is from network 0: Depends on b1-02 1: Run command is from network	✓	✓	Byte	0, 1	0
1	6	State	State 1: During Startup 2: Not Ready 3: Ready (Stopped) 4: Enabled (Run command present) 5: Deceleration to Stop 6: Fault Stop 7: Fault	✓	-	Byte	-	3
1	7	Running 1 (FWD)	Forward Running 0: Stop or Reverse Running 1: Forward Running	✓	-	Byte	-	0
1	8	Running 2 (REV)	Reverse Running 0: Stop or Forward Running 1: Reverse Running	✓	-	Byte	-	0
1	9	Ready	Ready 0: Not Ready 1: Ready	✓	-	Byte	-	1
1	10	Faulted	Faulted 0: No Fault 1: Fault	✓	-	Byte	-	0
1	11	Alarm	Alarm 0: No Alarm 1: Alarm	✓	-	Byte	-	0
1	12	Fault Reset	Fault Reset 0: - 1: Fault Reset	✓	✓	Byte	0, 1	0
1	13	Fault Code	EtherNet/IP Current Fault Refer to <a href="#">EtherNet/IP Fault Code Conversion Table on page 48</a> for more information.	✓	-	Word	-	0000
1	15	NetCtrl (Status)	Run command is from network 0: Run command is not from network 1: Run command is from network	✓	-	Byte	-	0
1	17	Force Fault	External Fault 0: - 1: External Fault [EF0] Triggered by the rising edge of the signal.	✓	✓	Byte	0, 1	0

## 9 General Class Objects

Instance ID	Attribute	Name	Description	Get	Set	Size	Range	Default
1	18	Force Reset	External Fault status 0: - 1: External Fault [EF0] Triggered by the rising edge of the signal.	✓	-	Byte	-	0
1	20	Net Idle Mode	Operation mode selection when communication is in Idle Mode. 0: Stop 1: Ignore 2: Stop if F6-01 is set to fault mode. 3: Forward Run 4: Reverse Run	✓	✓	-	0 - 4	

### ■ EtherNet/IP Fault Code Conversion Table

Drive Fault Code (Dec.) (MEMOBUS/Modbus 0080 (Hex.))	EtherNet/IP Fault Code (Hex.)	Description
0	0000	No Fault
2	3220	Uv1 [DC Bus Undervoltage]
3	5110	Uv2 [Control Power Undervoltage]
4	3222	Uv3 [Soft Charge Answerback Fault]
6	2120	GF [Ground Fault]
7	2300	oC [Overcurrent]
8	3210	ov [Overvoltage]
9	4200	oH [Heatsink Overheat]
10	4210	oH1 [Heatsink Overheat]
11	2220	oL1 [Motor Overload]
12	2200	oL2 [Drive Overload]
13	2221	oL3 [Overtorque Detection 1]
14	2222	oL4 [Overtorque Detection 2]
15	7110	rr [Dynamic Braking Transistor Fault]
16	7112	rH [Braking Resistor Overheat]
17	9000	EF3 [External Fault (Ethernet DI3)]
18	9000	EF4 [External Fault (Ethernet DI4)]
19	9000	EF5 [External Fault (Ethernet DI5)]
20	9000	EF6 [External Fault (Ethernet DI6)]
21	9000	EF7 [External Fault (Ethernet DI7)]
24	7310	oS [Overspeed]
25	7310	dEv [Speed Deviation]
26	7301	PGo [Encoder (PG) Feedback Loss]
27	3130	PF [Input Phase Loss]
28	3130	LF [Output Phase Loss]
29	5210	oH3 [Motor Overheat (PTC Input)]
30	5300	oPr [Keypad Connection Fault]
31	6320	Err [EEPROM Write Error]
32	0	oH4 [Motor Overheat Fault (PTC Input)]
33	7500	CE [Modbus Communication Error]
34	7500	bUS [Ethernet Communication Error]
37	8321	CF [Control Fault]
38	8313	SvE [Zero Servo Fault]
39	9000	EF0 [Ethernet External Fault]

Drive Fault Code (Dec.) (MEMOBUS/Modbus 0080 (Hex.))	EtherNet/IP Fault Code (Hex.)	Description
40	8000	FbL [PID Feedback Loss]
41	8000	UL3 [Undertorque Detection 1]
42	8000	UL4 [Undertorque Detection 2]
43	8000	oL7 [High Slip Braking Overload]
50	8000	dv1 [Z Pulse Fault]
51	8000	dv2 [Z Pulse Noise Fault Detection]
52	8000	dv3 [Inversion Detection]
53	8000	dv4 [Inversion Prevention Detection]
54	8000	LF2 [Output Current Imbalance]
55	8000	STPo [Pull-Out Detection]
56	7000	PGoH [Encoder (PG) Hardware Fault]
59	1000	SEr [Speed Search Retries Exceeded]
65	8000	FbH [Excessive PID Feedback]
66	9000	EF1 [External Fault (Terminal S1)]
67	9000	EF2 [External Fault (Terminal S2)]
68	8000	oL5 [Mechanical Weakening Detection 1]
69	8000	UL5 [Mechanical Weakening Detection 2]
70	5000	CoF [Current Offset Fault]
73	8000	dWFL [DriveWorksEZ Fault]
77	5000	voF [Output Voltage Detection Fault]
78	7000	rF [Braking Resistor Fault]
79	7000	boL [Braking Transistor Overload Fault]
-	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	✓	-	Word	-	1
1	3	Speed Agree	Speed Agree 0: - 1: Speed actual at speed reference	✓	-	Byte	-	0
1	4	NetRef (Command)	Speed reference is from network 0: Speed reference is not from network 1: Speed reference is from network	✓	✓	Byte	-	0
1	6	Drive Mode	Drive Control Mode 1: V/f 1: OLV 1: OLV for PM 1: Advanced OLV for PM 1: EZOLV <b>Note:</b> A1-02 = 0 [Control Method Selection = V/f] when 1 is written to this attribute.	✓	✓	Byte	0 - 3	0

## 9 General Class Objects

Instance ID	Attribute	Name	Description	Get	Set	Size	Range	Default
1	7	Speed Actual	Actual Drive Speed Unit depends on o1-03.	✓	-	Word	-	3
1	8	Speed Reference	Speed Reference Unit depends on o1-03.	✓	✓	Word	-	0
1	9	Current Actual	Actual Output Current Monitors drive output current. Units are in 0.1 A.	✓	-	Word	-	0
1	11	Torque Actual	Drive Output Torque Unit is affected by Torque Scale (TS)	✓	-	Word	-	0
1	12	Torque Limit	Torque Limit Sets the Torque Limit. Unit is affected by Torque Scale (TS). The Torque Limit is disabled when F6-06 = 0.	✓	✓	Word	-	0
1	15	Power Actual [W]	Drive Output Power Unit is affected by Power Scale (PS).	✓	-	Word	-	0
1	16	Input Voltage [V]	Drive Input Voltage [E1-01] Unit is affected by Voltage Scale (VS).	✓	-	Word	-	Depends on capacity
1	17	Output Voltage [V]	Drive Output Voltage Unit is affected by Voltage Scale (VS).	✓	-	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).	✓	✓	Word	-	2710 (Hex.)
1	19	Decel Time [ms]	Acceleration Time 1 [C1-02] Units set in parameter C1-10. Unit is affected by Time Scale (TS).	✓	✓	Word	-	2710 (Hex.)
1	20	Low Speed Limit Percent of Max Speed	Frequency Reference Lower Limit [d2-02]	✓	✓	Word	0 - 1100	0
1	21	High Speed Limit Percent of Max Speed	Frequency Reference Upper Limit [d2-01]	✓	✓	Word	0 - 1100	3E8 (Hex.)
1	22	Speed Scale (-15 - +15)	Scale of Units for Speed Related Data Sets or verifies F7-17 [EtherNet/IP Speed Scaling Factor].	✓	✓	Byte	-15 - +15	0
1	23	Current Scale (-15 - +15)	Scale of Units for Current Related Data Sets or verifies F7-18 [EtherNet/IP Current Scale Factor].	✓	✓	Byte	-15 - +15	0
1	24	Torque Scale (-15 - +15)	Scale of Units for Torque Related Data Sets or verifies F7-19 [EtherNet/IP Torque Scale Factor].	✓	✓	Byte	-15 - +15	0
1	26	Power Scale (-15 - +15)	Scale of Units for Power Related Data Sets or verifies F7-20 [EtherNet/IP Power Scaling Factor].	✓	✓	Byte	-15 - +15	0
1	27	Voltage Scale (-15 - +15)	Scale of Units for Voltage Related Data Sets or verifies F7-21 [EtherNet/IP Voltage Scale Factor].	✓	✓	Byte	-15 - +15	0
1	28	Time Scale (-15 - +15)	Scale of Units for Time Related Data Sets or verifies F7-22 [EtherNet/IP Time Scaling].	✓	✓	Byte	-15 - +15	0
1	29	NetRef (Status)	Speed reference is from network 0: Speed reference is not from network 1: Speed reference is from network	✓	-	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. DLR 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  $\mu$ s, which should be set to an interval that allows for a shorter fault detection and recovery period without losing an I/O connection to the devices. When there are multiple supervisors in the same network, the supervisor with the higher supervisor priority becomes the supervisor. If the priorities are the same, the device with the larger MAC address becomes the supervisor and the other becomes the backup supervisor.

Yaskawa recommends that all devices in the ring be DLR capable. If non-DLR devices are connected in a ring, add 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. This product 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.

## ■ 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	DLR Object software revision.	✓	-	Word	-	3
1	1	Network Topology	Current network topology 0: Linear 1: Ring	✓	-	Byte	0, 1	0
1	2	Network Status	Current status of network 0: No fault 1: Ring fault 2: Unexpected loop detected 3: Partial network fault 4: Rapid fault/restore cycle	✓	-	Byte	0 - 4	-
1	10	Supervisor IP Address	Supervisor IP address, Supervisor MAC address	✓	-	Struct	-	-
1	12	Capability Flags	Describes DLR capabilities	✓	-	Long	-	0x00000002

### Note:

“Get Attributes 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	QoS Object software revision.	✓	-	Word	-	1
1	4	DSCP Urgent	DSCP value for CIP transport class 0/1 Urgent priority messages	✓	✓	Byte	0 - 63	55
1	5	DSCP Scheduled	DSCP value for CIP transport class 0/1 Scheduled priority messages	✓	✓	Byte	0 - 63	47
1	6	DSCP High	DSCP value for CIP transport class 0/1 High priority messages	✓	✓	Byte	0 - 63	43
1	7	DSCP Low	DSCP value for CIP transport class 0/1 Low priority messages	✓	✓	Byte	0 - 63	31
1	8	DSCP Explicit	DSCP value for CIP explicit messages and all other EtherNet/IP encapsulation messages	✓	✓	Byte	0 - 63	27

## ◆ Base Energy Object 78 (Class 0x4E)

### ■ 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	Base Energy Software Revision	Base Energy Object software revision	✓	-	Word	-	2
1	1	Energy/Resource Type	Type of energy managed	✓	-	Word	-	Always 1 (Electrical)
1	2	Base Energy Object Capabilities	Energy Capabilities of this device	✓	-	Word	-	Always 0 (Measured)
1	3	Energy Accuracy	Specifies the accuracy of power and energy metering results.	✓	-	Word	-	Always 1000 (10%)
1	7	Consumed Energy Odometer	Consumed energy read from U4-10 [kWh, Lower 4 Digits] and U4-11 [kWh, Upper 5 Digits] in units of kWh.	✓	-	ODOMETER Array of 5 words	0 - 999,999,999.999	-
1	8	Generated Energy Odometer	Always returns 0	✓	-	ODOMETER Array of 5 words	0 - 999,999,999.999	-
1	9	Net Energy Odometer	The difference between Consumed energy and Generated energy in units of kWh.	✓	-	SIGNED ODOMETER Array of 5 signed Words	-999,999,999.999 - 999,999,999.999	-
1	10	Energy Transfer Rate	Output Power read from monitor U1-08 [Output Power] in units of 1kW. In IEEE 754 REAL format.	✓	-	REAL	Depends on capacity	-
1	12	Energy Type Specific Object Path	EPATH to Electrical Energy Object	✓	-	STRUCT of UINT Size Padded EPATH	-	Always 02 20 4F 24 01

## ◆ Electrical Energy Object 79 (Class 0x4F)

### ■ 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	Electrical Energy Software Revision	Electrical Energy Object software revision	✓	-	Word	-	2
1	1	Consumed Energy Odometer	Consumed energy read from U4-10 [kWh, Lower 4 Digits] and U4-11 [kWh, Upper 5 Digits] in units of kWh.	✓	-	ODOMETER Array of 5 words	0 - 999,999,999,999.999	-
1	2	Generated Energy Odometer	Always returns 0	✓	-	ODOMETER Array of 5 words	0 - 999,999,999,999.999	-
1	3	Net Energy Odometer	The difference between Consumed energy and Generated energy in units of kWh.	✓	-	SIGNED ODOMETER Array of 5 signed Words	-999,999,999,999.999 - 999,999,999,999.999	-
1	41	Energy Type Specific Object Path	EPATH to Base Energy Object	✓	-	STRUCT of UINT Size Padded EPATH	-	Always 02 20 4E 24 01

## ◆ RSTP Bridge Object - 84 (Class 0x54)

### ■ 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	RSTP Bridge Object software revision.	✓	-	Word	-	1
1	1	Bridge Object Identification	Shows the model name of the drive used.	✓	-	STRING	-	-
1	2	Bridge Identifier Priority	Shows the root bridge priority.	✓	-	UINT	0 - 61440	-
1	3	Transmit Hold Count	Limits the transmission rate.	✓	-	UINT	1 - 10	10
1	4	Number of RSTP Ports	Shows the number of ports for this bridge.	✓	-	UINT	2	2
1	5	List of RSTP Port Object References	Shows the list of the number of instances of the RSTP Bridge object, associated with the RSTP Port object.	✓	-	Array of UINT	-	-
1	6	Force Protocol Version	STP or RSTP	✓	-	UINT	0 = STP 2 = RSTP	2
1	7	Bridge Max Age	Shows the maximum duration of information sent by the bridge, when root bridging.	✓	-	UINT	6 - 40	20
1	8	Bridge Hello Time	Shows the interval for sending Configuration Message by the designated port.	✓	-	UINT	1 - 2	2
1	9	Bridge Forward Delay	Shows the delay that the STP bridge transit the route and designated port to the forwarding.	✓	-	UINT	4 - 30	15
1	12	Designated Root	Shows the root bridge identifier of the spanning tree. This value is	✓	-	Array of USINT	-	-

## 9 General Class Objects

Instance ID	Attribute	Name	Description	Get	Set	Size	Range	Default
			used as the route identifier parameter for BPDU sent by this node.					
1	13	Root Cost	Shows the path cost from this bridge to the route.	✓	-	UINT	1 - 200,000,000	-
1	14	Root Port	Shows the port identifier that provides the lowest path cost from this bridge to the root bridge.	✓	-	UINT	0x8000 - 0x80001	-
1	15	Max Age	Shows the maximum period of time that STP information learned by a port from the network will be discarded. This is the actual value currently used by this bridge.	✓	-	UINT	6 - 40	-
1	16	Hello Time	Shows the interval at which this node sends BPDU, if this node is the root of STP or is transitioning to the root. This is the actual value currently used by the bridge.	✓	-	UINT	1 - 2	-
1	17	Forward Delay	When transitioning to forwarding state, this time controls the speed at which the port changes spanning state. This is the value currently used by the bridge. In contrast, BridgeForwardDelay is the time at which this bridge and all other bridges become active if this bridge becomes root.	✓	-	UINT	4 - 30	-

**Note:**

“Get Attributes All” Service shall report in attribute ascending order.

### ◆ RSTP Port Object 85 (Class 0x55)

#### ■ 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	RSTP Port Object software revision.	✓	-	Word	-	1
0	2	Max Instance	Shows number of Instances.	✓	-	UINT	-	2
0	3	Number of Instances	Shows number of Instances.	✓	-	UINT	-	2
1	1	Bridge Object Instance	Shows the number of instances of the RSTP Bridge object, associated with the RSTP Port object.	✓	-	UINT	1	1
1	2	Ethernet Link Instance Number	Shows the number of instances of the Ethernet Link object, associated with the RSTP Port object.	✓	-	UINT	1 - 2	-
1	3	Reference Bridge Identifier	Shows the identifier of the bridge, associated with the port.	✓	-	Array of 8 USINTs	-	-
1	4	Port MAC Address	Shows the MAC address of the Port instance, with attribute 2.	✓	-	Array of 6 USINTs	-	-
1	5	RSTP Port Enable	Shows port enable or disable status.	✓	✓	BOOL	0 - 1	1
1	6	Port Identifier Priority	Shows the management component of the Port identifier, called Port Priority.	✓	-	UDINT	-	-
1	7	Oper Edge Port	The value of BOOL. Shows the value of the operEdgePort parameter, determined by the operation of the Bridge Detection state machine.	✓	-	BOOL	0 - 1	1
1	8	Port State	Shows the current Port status, defined by STP.	✓	-	UINT	1 - 6	1 = Disabled 2 = Blocking

Instance ID	Attribute	Name	Description	Get	Set	Size	Range	Default
								3 = Listening 4 = Learning 5 = Forwarding 6 = Broken
1	9	mcheck	The value of BOOL. The administrator configures the Port Protocol Migration state machine to send RST BPDU during migration.	✓	-	BOOL	0 - 1	0
1	10	Port Path Cost	Shows the administratively assigned value for the port's Contribution to the path cost to the Spanning Tree Root.	✓	-	UDINT	0 - 200,000,000	200000
1	11	Port Admin Edge Port	Shows the managed value of edge port parameters. If the value is True, it becomes an edge port. If the value is False, it is not an edge port.	✓	✓	BOOL	0 - 1	0
1	13	Oper PointToPoint MAC	Shows the status of point-to-point operation of the LAN segment connected to this port.	✓	-	UINT	0 - 1	0
1	14	Port Role	Sets the role of port.	✓	-	UINT	0 - 6	0 = Unknown 1 = Alt Backup 2 = Root 3 = Designated 4 = Alternate 5 = Backup 6 = Disabled
1	15	Designated Root Bridge Identifier	Shows the bridge identifier that is recorded as the root in the Configuration BPDU sent by the designated bridge on the segment to which the port is connected.	✓	-	Array of 8 USINTs	-	-
1	16	Designated Root Path Cost	Shows the path cost of the designated port on the segment connected to this port. This value is compared to the root path cost of the received BPDU.	✓	-	UDINT	1 - 200,000,000	-
1	17	Designated Bridge Identifier	Shows the bridge identifier that considers this port to be the designated bridge for the segment.	✓	-	Array of 8 USINTs	-	-
1	18	Designated Port	Shows the port identifier of the designated bridge for this port's segment.	✓	-	UINT	0x8000 - 0x80001	-
2	1	Bridge Object Instance	Shows the number of instances of the RSTP Bridge object, associated with the RSTP Port object.	✓	-	UINT	1	1
2	2	Ethernet Link Instance Number	Shows the number of instances of the Ethernet Link object, associated with the RSTP Port object.	✓	-	UINT	1 - 2	-
2	3	Reference Bridge Identifier	Shows the identifier of the bridge, associated with the port.	✓	-	Array of 8 USINTs	-	-
2	4	Port MAC Address	Shows the MAC address of the Port instance, with attribute 2.	✓	-	Array of 6 USINTs	-	-
2	5	RSTP Port Enable	Shows port enable or disable status.	✓	✓	BOOL	0 - 1	1
2	6	Port Identifier Priority	Shows the management component of the Port identifier, called Port Priority.	✓	-	UDINT	-	-
2	7	Oper Edge Port	The value of BOOL. Shows the value of the operEdgePort parameter, determined by the operation of the Bridge Detection state machine.	✓	-	BOOL	0 - 1	1
2	8	Port State	Shows the current Port status, defined by STP.	✓	-	UINT	1 - 6	1 = Disabled 2 = Blocking 3 = Listening 4 = Learning 5 = Forwarding 6 = Broken
2	9	mcheck	The value of BOOL. The administrator configures the Port Protocol Migration state machine to send RST BPDU during migration.	✓	-	BOOL	0 - 1	0

## 9 General Class Objects

Instance ID	Attribute	Name	Description	Get	Set	Size	Range	Default
2	10	Port Path Cost	Shows the administratively assigned value for the port's Contribution to the path cost to the Spanning Tree Root.	✓	-	UDINT	0 - 200,000,000	200000
2	11	Port Admin Edge Port	Shows the managed value of edge port parameters. If the value is True, it becomes an edge port. If the value is False, it is not an edge port.	✓	✓	BOOL	0 - 1	0
2	13	Oper PointToPoint MAC	Shows the status of point-to-point operation of the LAN segment connected to this port.	✓	-	UINT	0 - 1	0
2	14	Port Role	Sets the role of port.	✓	-	UINT	0 - 6	0 = Unknown 1 = Alt Backup 2 = Root 3 = Designated 4 = Alternate 5 = Backup 6 = Disabled
2	15	Designated Root Bridge Identifier	Shows the bridge identifier that is recorded as the root in the Configuration BPDU sent by the designated bridge on the segment to which the port is connected.	✓	-	Array of 8 USINTs	-	-
2	16	Designated Root Path Cost	Shows the path cost of the designated port on the segment connected to this port. This value is compared to the root path cost of the received BPDU.	✓	-	UDINT	1 - 200,000,000	-
2	17	Designated Bridge Identifier	Shows the bridge identifier that considers this port to be the designated bridge for the segment.	✓	-	Array of 8 USINTs	-	-
2	18	Designated Port	Shows the port identifier of the designated bridge for this port's segment.	✓	-	UINT	0x8000 - 0x80001	-

**Note:**

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

### ◆ 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	✓	-	Word	-	4
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	✓	-	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	✓	-	DWord	-	-

Instance ID	Attribute	Name	Description	Get	Set	Size	Range	Default
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	✓	✓	DWord	-	-
1	4	Physical Link	Struct of: Path Size: First 2 bytes Path: Remaining bytes	✓	-	Struct	-	02 00 20 F6 24 01
1	5	Interface Configuration	Struct of: IP Address: Long Subnet Mask: Long Gateway Address: Long Name Server1: Long Name Server2: Long Domain Name: STRING	✓	✓	Struct	-	-
1	6	Host Name	Host Name	✓	✓	String	64 Characters	Null
1	10	SelectACD	Enables and disables ACD. 0: Disabled 1: Enabled	✓	✓	BOOL	0, 1	1
1	11	Last Conflict Detected	AcdActivity	✓	✓	USINT	0, 1, 2, 3	0
			RemoteMAC	✓	✓	Array of 6 bytes	00 00 00 00 00 00 FF FF FF FF FF FF	00 00 00 00 00 00
			ArpPdu	✓	✓	Array of 28 bytes	-	00 00 00 00 00 00 00 00 00
1	13	Encapsulation Inactivity Timeout	Number of seconds of inactivity before TCP connection is closed.	✓	✓	UINT	1 s - 3600 s	120 s

**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 Ethernet Link Object	✓	-	Word	-	3
0	2	Max Instance	Number of Instances	✓	-	UINT	-	2
0	3	Number of Instances	Number of Instances	✓	-	UINT	-	2
1	1	Interface Speed	Interface speed currently in use	✓	-	UDINT	-	-
1	2	Interface Flags	Bit 0 = Link Status Bit 1 = Duplex (0: half duplex, 1: full duplex) Bits 2-4 = Negotiation Status 0: In progress 1: Auto-negotiate failed 2: Speed found, duplex not found Mode not detected 3: Successful	✓	-	DWord	-	-

## 9 General Class Objects

Instance ID	Attribute	Name	Description	Get	Set	Size	Range	Default
			4: Not attempted Bit 5 = Manual Setting requires restart Bit 6 = Local hardware fault Bits 7-31 = Reserved					
1	3	Physical Address (MAC)	MAC address	✓	-	Array of 6 Bytes	-	-
1	4	Interface Counters (Port 1)	In Octets	✓	-	UDINT	0 - 4294967295	0
			In Ucast Packets	✓	-	UDINT	0 - 4294967295	0
			In NUcast Packets	✓	-	UDINT	0 - 4294967295	0
			In Discards	✓	-	UDINT	0 - 4294967295	0
			In Errors	✓	-	UDINT	0 - 4294967295	0
			In Unknown Protos	✓	-	UDINT	0 - 4294967295	0
			Out Octets	✓	-	UDINT	0 - 4294967295	0
			Out Ucast Packets	✓	-	UDINT	0 - 4294967295	0
			Out NUcast Packets	✓	-	UDINT	0 - 4294967295	0
			Out Discards	✓	-	UDINT	0 - 4294967295	0
			Out Errors	✓	-	UDINT	0 - 4294967295	0
1	5	Media Counters (Port 1)	Alignment Errors	✓	-	UDINT	0 - 4294967295	0
			FCS Errors	✓	-	UDINT	0 - 4294967295	0
			Single Collisions	✓	-	UDINT	0 - 4294967295	0
			Multiple Collisions	✓	-	UDINT	0 - 4294967295	0
			SQE Test Errors	✓	-	UDINT	0 - 4294967295	0
			Deferred Trans-missions	✓	-	UDINT	0 - 4294967295	0
			Late Collisions	✓	-	UDINT	0 - 4294967295	0
			Excessive Collisions	✓	-	UDINT	0 - 4294967295	0
			MAC Transmit Errors	✓	-	UDINT	0 - 4294967295	0
			Carrier Sense Errors	✓	-	UDINT	0 - 4294967295	0
			Frame Too Large	✓	-	UDINT	0 - 4294967295	0
			MAC Receive Errors	✓	-	UDINT	0 - 4294967295	0
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	✓	✓	Struct	-	-
1	10	Interface Label (Port 1)	Human readable identification	✓	-	STRING	-	Port 1
1	11	Interface Capability (Port 1)	Capability bits	✓	-	DWORD	-	000F (Hex.)
			Array of Struct of Speed/Duplex Interface Speed Interface Duplex Mode	✓	-	Array of Struct of UINT USINT	-	-
2	1	Interface Speed	Interface speed currently in use	✓	-	UDINT	-	-
2	2	Interface Flags	Bit 0 = Link Status Bit 1 = Duplex (0: half duplex, 1: full duplex) Bits 2-4 = Negotiation Status 0: In progress 1: Auto-negotiate failed 2: Speed found, duplex not found Mode not detected 3: Successful 4: Not attempted Bit 5 = Manual Setting requires restart Bit 6 = Local hardware fault Bits 7-31 = Reserved	✓	-	DWord	-	-

Instance ID	Attribute	Name	Description	Get	Set	Size	Range	Default
2	3	Physical Address (MAC)	MAC address	✓	-	Array of 6 Bytes	-	-
2	4	Interface Counters (Port 2)	In Octets	✓	-	UDINT	0 - 4294967295	0
			In Ucast Packets	✓	-	UDINT	0 - 4294967295	0
			In NUcast Packets	✓	-	UDINT	0 - 4294967295	0
			In Discards	✓	-	UDINT	0 - 4294967295	0
			In Errors	✓	-	UDINT	0 - 4294967295	0
			In Unknown Protos	✓	-	UDINT	0 - 4294967295	0
			Out Octets	✓	-	UDINT	0 - 4294967295	0
			Out Ucast Packets	✓	-	UDINT	0 - 4294967295	0
			Out NUcast Packets	✓	-	UDINT	0 - 4294967295	0
			Out Discards	✓	-	UDINT	0 - 4294967295	0
			Out Errors	✓	-	UDINT	0 - 4294967295	0
2	5	Media Counters (Port 2)	Alignment Errors	✓	-	UDINT	0 - 4294967295	0
			FCS Errors	✓	-	UDINT	0 - 4294967295	0
			Single Collisions	✓	-	UDINT	0 - 4294967295	0
			Multiple Collisions	✓	-	UDINT	0 - 4294967295	0
			SQE Test Errors	✓	-	UDINT	0 - 4294967295	0
			Deferred Trans-missions	✓	-	UDINT	0 - 4294967295	0
			Late Collisions	✓	-	UDINT	0 - 4294967295	0
			Excessive Collisions	✓	-	UDINT	0 - 4294967295	0
			MAC Transmit Errors	✓	-	UDINT	0 - 4294967295	0
			Carrier Sense Errors	✓	-	UDINT	0 - 4294967295	0
			Frame Too Large	✓	-	UDINT	0 - 4294967295	0
MAC Receive Errors	✓	-	UDINT	0 - 4294967295	0			
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	-	✓	Struct	-	-
2	10	Interface Label (Port 2)	Human readable identification	✓	-	STRING	-	Port 2
2	11	Interface Capability (Port 2)	Capability bits	✓	-	DWORD	-	000F (Hex.)
			Array of Struct of Speed/Duplex Interface Speed Interface Duplex Mode	✓	-	Array of Struct of UINT USINT	-	-

**Note:**

“Get Attributes All” Service shall report in attribute ascending order.

## ◆ LLDP Management Object - 265 (Class 0x109)

LLDP Management object contains the LLDP protocol management information.

### ■ 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	LLDP Management Object software revision.	✓	-	WORD	-	1
1	1	LLDP Enable	-	✓	✓	STRUCT of	-	-
		LLDP Enable Array Length	Shows the number of elements in the array.			UINT	3	3
		LLDP Enable Array	Enables generation and reception of LLDP packets, globally or per port.			Array of BOOL	Bit No. 0: Enabled Globally 1 - N: Enabled per Port 0: LLDP Disabled 1: LLDP Enabled (Default)	0x07
1	2	msgTxInterval	Shows the interval in seconds at which LLDP frames are sent.	✓	✓	UINT	0 - 4: Reserved 5 - 32768: Transmission Interval 32769 - 65535: Reserved	30
1	3	msgTxHold	Shows the multiplier of msgTxInterval to determine the TLV value sent to adjacent devices.	✓	✓	USINT	0: Reserved 1 - 100: Message Transmission Multiplier for LLDP Frames 101-255: Reserved	4
1	4	LLDP DataStore	Shows how to search the LLDP database.	✓	-	WORD	Bit No. 0: LLDP Data Table Object 1: SNMP 2: NETCONF YANG 3: RESTCONF YANG 4 - 15: Reserved	0
1	5	Last Change	Shows the number of seconds since the last change to the entry in LLDP database.	✓	-	UDINT	The number of seconds since last change	-

◆ LLDP Data Table Object - 266 (Class 0x10A)

LLDP Data Table Object shows a record of all currently active adjacent LLDP implementation devices, according to the receive state machine of the LLDP protocol.

■ 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	LLDP Data Table Object software revision.	✓	-	Word	-	1
0	2	Max Instance	Shows the maximum number of instances of objects currently created at this class level of device.	✓	-	UINT	The maximum number of instances of objects created at this class layer level	-
0	3	Number of Instances	Shows the maximum number of instances of objects currently created at this class level of device.	✓	-	UINT	The number of instances of objects created at this class layer level	-

Instance ID */1	Attribute	Name	Description	Get	Set	Size	Range	Default
1	1	Ethernet Link Instance Number	Shows the local number of instances of the Ethernet Link object that matches the physical port on which the LLDP frame generating this instance was received.	✓	-	UINT	0: Unknown 1 - 65535: The number of the Ethernet Link object	-
1	2	MAC Address	Shows the adjacent MAC address received from the CIP MAC address, Chassis ID, or Port ID.	✓	-	ETH_MAC_ADDR	Adjacent MAC address value	-
1	3	Interface Label	Shows the adjacent interface label received from the CIP interface label, Chassis ID, or Port ID TLV.	✓	-	SHORT_STRING	Maximum 64 characters	-
1	4	Time to Live	Shows the number of seconds the information is considered valid.	✓	-	UINT	0: Reserved 1 - 65535: Period (Seconds)	-
1	5	System Capabilities TLV	The System Capability field contains a Capability bitmap that defines the main functions of the adjacent system.	✓	-	STRUCT of	-	-
		System Capabilities	Shows the capabilities supported by adjacent devices based on the currently implemented software.			WORD	Bit 0: Other 1: Repeater 2: Bridge 3: Access Point 4: Router 5: Telephone 6: DOCSIS Cable Device 7: End Station 8: C-VLAN component 9: S-VLAN component 10: Two-port MAC Relay Component 11 - 15: Reserved by IEEE	-
1	6	IPv4 Management Address	Shows the IPv4 management address of the adjacent device.	✓	-	STRUCT of	-	-
		Management Address Count	Shows the number of management addresses implemented.			USINT	0 - 255: The number of the management address TLV, received from this adjacent device	-
		Management Address	Shows the management address of the adjacent device.			Array of UDINT	IPv4 address	-
1	7	CIP Identification	Shows the CIP identification TLV of the adjacent device, if present.	✓	-	STRUCT of	Sets by the CIP identification TLV (TLV type = 127, subtype = 01), if present. In other cases, it will be 0.	-
		Vendor ID				UINT		
		Device Type				UINT		
		Product Code				UINT		
		Major Revision				BYTE		
		Minor Revision				USINT		
		CIP Serial Number				UDINT		
1	8	Additional Ethernet Capabilities	Shows the TLV for Ethernet Preemption Support from the adjacent device.	✓	-	STRUCT of	-	-
		Preemption Support	Link partners determine if they support preemption on their links.			BOOL	0: Not Supported 1: Supported	-
		Preemption Status	Link partners can determine if the preemption on a link is enabled.			BOOL	0: Disabled 1: Enabled	-
		Preemption Active	Link partners can determine if the preemption on a link passes embedded validation.			BOOL	0: Disabled 1: Enabled	-

## 10 Vendor-Specific (Yaskawa) Class Objects

Instance ID */	Attribute	Name	Description	Get	Set	Size	Range	Default
		Additional Fragment Size	Shows the number of octets that must be sent the frame before preemption occurs.			USINT	0: 64 Octets 1: 128 Octets 2: 192 Octets 3: 256 Octets 4 - 255: Reserved	-
1	9	Last Change	Shows the number of seconds since the last change to this instance's attributes.	✓	-	UDINT	The number of seconds since last change	-

\*1 Instance number corresponds to the entry in the table for all of the LLDP entries.

**Note:**

“Get Attributes All” Service shall report in attribute ascending order.

## 10 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

Yaskawa Drive Parameters object is related to the parameters or monitor of Yaskawa drives. Not compatible with EtherNet/IP compatible drives from a different company. With this Class object any drive parameter or monitor 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 0 to 0x0900 (ROM-ENTER) stores changed parameters to the non-volatile memory of the drive.

Writing a 0 to 0x0910 (RAM-ENTER) allows the drive to use the changed parameters. Reading ROM-ENTER Command 0x0900 or RAM-ENTER 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 RAM-ENTER will be issued 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	✓	-	Word	-	1
1	00	MEMOBUS/Modbus Register 0x0100	Language selection	✓	✓	Word	0 - 12	1
1	01	MEMOBUS/Modbus Register 0x0101	Parameter access level	✓	✓	Word	0 - 2	2
1	YY	MEMOBUS/Modbus Registers 0x0100 - 0x01FF	MEMOBUS/Modbus Registers 0x0100 - 0x01FF	✓	✓	Word	-	-
2	YY	MEMOBUS/Modbus Registers 0x0200 - 0x02FF	MEMOBUS/Modbus Registers 0x0200 - 0x02FF	✓	✓	Word	-	-
..	..	..	..	-	✓	Word	-	-
255	YY	MEMOBUS/Modbus Registers 0xFF00 - 0xFFFF	MEMOBUS/Modbus Registers 0xFF00 - 0xFFFF	✓	✓	Word	-	-

### Note:

- Refer to [Explicit Message Communications Errors on page 75](#) for error codes.
- Refer to the drive manuals 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

Yaskawa Monitor/Control object is related to the parameters or monitors of Yaskawa drives. Not compatible with the EtherNet/IP compatible drives from another company. With this Class object any parameter or monitor with a MEMOBUS/Modbus address less than 0x0100 can be accessed. In this class, the most significant byte of MEMOBUS/Modbus address is always zero and the Instance ID remains at 1. Other than that, it is the same as Yaskawa Drive Parameters object 100 (Class 0x64).

Given a typical MEMOBUS/Modbus Address of 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	Name	Description	Get	Set	Size	Range	Default
0	1	Object Software Revision	Shows Yaskawa Monitor/Control Object Software Revision.	✓	-	Word	-	1
1	1	0x0001	Drive Command Bits	✓	✓	Word	-	0
1	2	0x0002	Frequency Instruction	✓	✓	Word	-	4
..	..	..	..	✓	✓	Word	-	-
1	255	0x00FF	Reserved	✓	✓	Word	-	-

### Note:

- Refer to [Explicit Message Communications Errors on page 75](#) for error codes.
- Refer to the drive manuals for a list of monitor data using the MEMOBUS/Modbus message area.

# 11 Web Interface

The drive contains a series of web pages that let you use a standard web browser to view status and diagnostic information.

You can access the web page through a self-contained web server at port 80. Type the IP address of the drive into a web browser to access the Home page.

Example: <http://192.168.1.20>

If you do not know the IP address, use monitors *U6-80 to U6-83* [Ethernet IP Address 1 to Ethernet IP Address 4] on the keypad to read the IP address of the drive. Refer to [Table 5.1](#) for more information.

## ◆ Home Page

The Home page shows the status of the drive and the I/O. It also shows identifying information about the drive.

The screenshot displays the Yaskawa web interface for a CIPR-GA51U2006 EtherNet/IP / GA501 drive. The page is titled 'YASKAWA' and includes a navigation menu with options like Home, EtherNet/IP, Network, Ring, Chart, Email Alerts, Parameter Access, Settings, and Logout. The main content area shows the drive's status as 'Running - Forward' with several control buttons: RUN (green), ZERO SPD, REV, RESET, AT SPD (green), READY (green), ALARM, and FAULT. Below this, there are three sections: 'Drive Monitors' showing Frequency Reference (40.00 Hz), Output Frequency (40.00 Hz), Output Current (0.1 A), DC Bus Voltage (291 VDC), and Torque Reference (0.0 %); 'Digital Inputs' with seven indicators (S1-S7, S3-S7 are virtual); and 'Digital Outputs' with MA-MB-MC. An 'Analog Inputs' section shows A1 at 0.0%. At the bottom, there are two tables: 'Drive' (Model: GA501, Full Model: CIPR-GA51U2006, Version: 2010, Serial Number: 0123456789ABCDE) and 'Ethernet' (Version: VST908211, Protocol: EtherNet/IP-Ver3004, CIP Serial Number: 72351839). The footer contains copyright information and an update time of 1 second.

**Figure 11.1 Home Page View**

When a fault or minor fault occurs in the drive, the details of the fault or minor fault are displayed on the Home page.

CIPR-GA51U2006  
EtherNet/IP / GA501

Home EtherNet/IP Network Ring Chart Email Alerts Parameter Access Settings Logout

Status Extended Status

### Drive Status

**FAULT - External Fault (Terminal S1) (EF1)**

RUN ZERO SPD REV RESET AT SPD READY ALARM **FAULT**

Drive Monitors		Digital Inputs		Digital Outputs	
Frequency Reference	0.00 Hz	<input checked="" type="checkbox"/>	S1	<input checked="" type="checkbox"/>	MA-MB-MC
Output Frequency	0.00 Hz	<input type="checkbox"/>	S2		
Output Current	0.0 A	<input type="checkbox"/>	S3 (virtual)		
DC Bus Voltage	291 VDC	<input type="checkbox"/>	S4 (virtual)		
Torque Reference	0.0 %	<input type="checkbox"/>	S5 (virtual)		
		<input type="checkbox"/>	S6 (virtual)		
		<input type="checkbox"/>	S7 (virtual)		

Analog Inputs	
A1	0.0 %

Drive		Ethernet	
Model	GA501	Version	VST908211
Full Model	CIPR-GA51U2006	Protocol	EtherNet/IP-Ver3004
Version	2010	CIP Serial Number	72351839
Serial Number	0123456789ABCDE		

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If a fault or minor fault occurs in the drive and only the fault or minor fault code is displayed on the Home page, refer to the drive manuals for details on the fault or minor fault.

CIPR-GA51U2006  
EtherNet/IP / GA501

Home EtherNet/IP Network Ring Chart Email Alerts Parameter Access Settings Logout

Status Extended Status

### Drive Status

**FAULT - Code 71H**

RUN ZERO SPD REV RESET AT SPD READY ALARM **FAULT**

Drive Monitors		Digital Inputs		Digital Outputs	
Frequency Reference	0.00 Hz	<input type="checkbox"/>	S1	<input checked="" type="checkbox"/>	MA-MB-MC
Output Frequency	0.00 Hz	<input type="checkbox"/>	S2		
Output Current	0.0 A	<input type="checkbox"/>	S3 (virtual)		
DC Bus Voltage	291 VDC	<input type="checkbox"/>	S4 (virtual)		
Torque Reference	0.0 %	<input type="checkbox"/>	S5 (virtual)		
		<input type="checkbox"/>	S6 (virtual)		
		<input type="checkbox"/>	S7 (virtual)		

Analog Inputs	
A1	0.0 %

Drive		Ethernet	
Model	GA501	Version	VST908211
Full Model	CIPR-GA51U2006	Protocol	EtherNet/IP-Ver3004
Version	2010	CIP Serial Number	72351839
Serial Number	0123456789ABCDE		

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## ◆ EtherNet/IP Page

The EtherNet/IP page shows basic information about the protocol. A maximum of two simultaneous connections can be enabled. The assemblies and connection types used are displayed.

The "Forward Close Behavior" field on this page shows the contents set by F7-43 [PLC Cnxn Close Behavior@Run].

Refer to *Operation at PLC Forward Close Command on page 17* for details on F7-43.

Download the EDS file used by the software to configure the PLC from the bottom of the page.

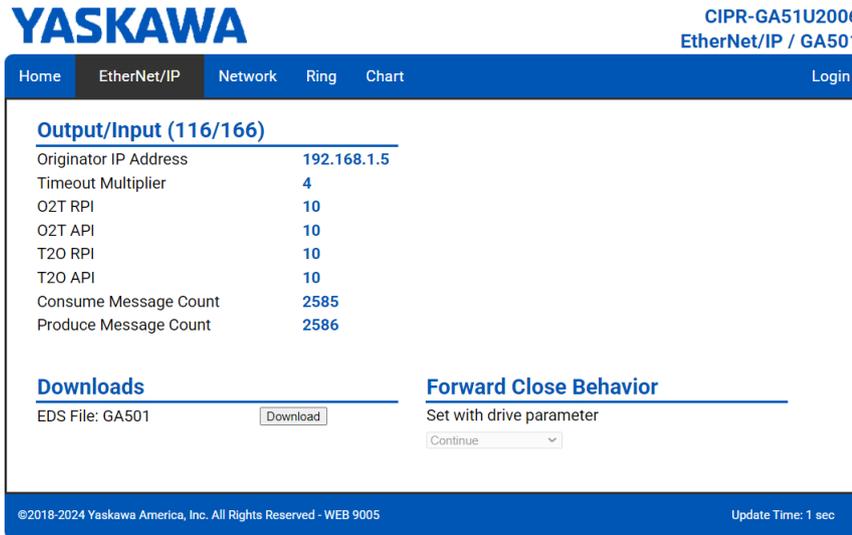


Figure 11.2 EtherNet/IP Page View

### ◆ Network Page

The Network page shows the status of the drive network traffic and the status of open I/O connections.

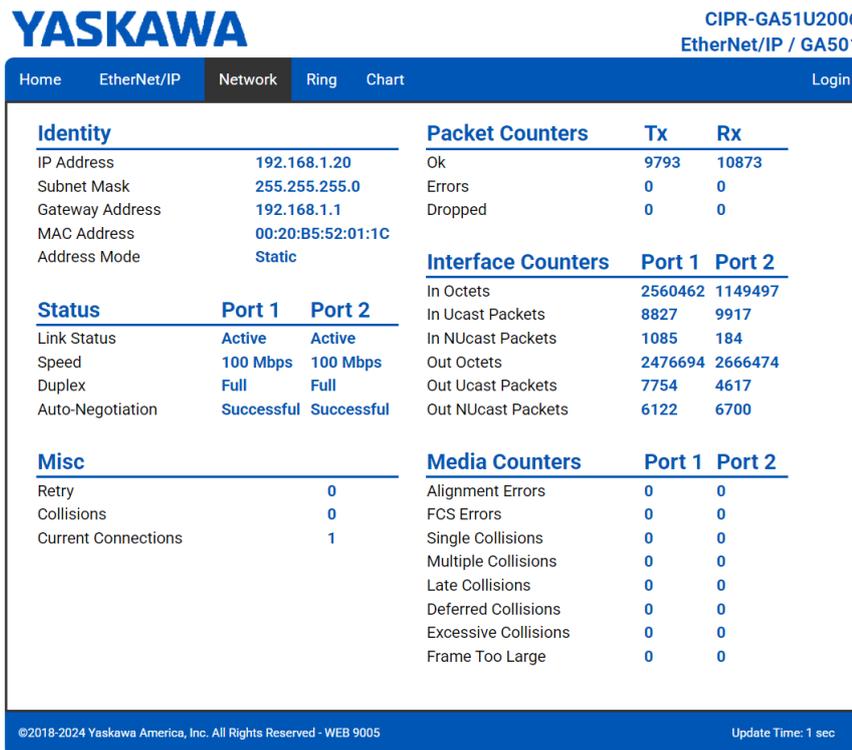


Figure 11.3 Network Page View

Table 11.1 Network Monitor Descriptions

Name	Description
Address Mode	Either static IP address or DHCP.
Alignment Errors	Cumulative number of errors for uneven packets lengths.
Auto-Negotiation	If auto-negotiation is enabled, this will show the status of the negotiation.
Collisions	Cumulative number of collisions (half duplex only) reported by the MAC/PHY (Media Access Control/Physical Layer).
Current Connections	Current number of open connections.
Deferred Collisions	Cumulative number of deferred collisions.

Name	Description
Duplex	Display either Full or Half.
Excessive Collisions	Cumulative number of excessive collisions.
FCS Errors	Cumulative number of frame check sequence errors.
Frame Too Large	Cumulative number of frames that exceed the maximum frame size.
Gateway Address	The Gateway IP Address.
In NUCast Packets	Cumulative number of non-unicast packets received.
In Octets	Cumulative number of incoming octets.
In Ucast Packets	Cumulative number of unicast packets received.
IP Address	IP Address.
Late Collisions	Cumulative number of late collisions.
Link Status	Active if the cable is plugged in, or inactive if no cable.
MAC Address	MAC Address.
Msg Rx Dropped	Cumulative number of messages dropped due to input network buffer being full and unable to hold the new message.
Msg Rx Errors	Cumulative number of receive errors reported by the MAC/PHY (Media Access Control/Physical Layer).
Msg Rx OK	Cumulative number of messages received successfully.
Msg Tx Dropped	Cumulative number of messages dropped due to output network buffer being full and unable to hold the new message.
Msg Tx Errors	Cumulative number of transmit errors reported by the MAC/PHY (Media Access Control/Physical Layer).
Msg Tx OK	Cumulative number of messages transmit successfully.
Multiple Collisions	Cumulative number of multiple collisions.
Out NUCast Packets	Cumulative number of non-unicast packets sent.
Out Octets	Cumulative number of outgoing octets.
Out Ucast Packets	Cumulative number of unicast packets sent.
Single Collisions	Cumulative number of single collisions.
Speed	Connection speed, either 10 Mbps or 100 Mbps.
Subnet Mask	Subnet Mask.
Tx Retry	Cumulative number of retransmits due to busy medium reported by the MAC/PHY (Media Access Control/Physical Layer).

**Note:**

Cumulative counters are reset when the power supply is cycled.

## ◆ Ring Page

The Ring page shows the status of the DLR or RSTP network. DLR or RSTP can be enabled from this page. To change the Ring Protocol, you will need to be logged into the page first.

**YASKAWA** CIPR-GA51U2006  
EtherNet/IP / GA501

Home EtherNet/IP Network **Ring** Chart Login

**DLR**

Ring Protocol	DLR
Network Topology	Ring
Network Status	Normal
Supervisor IP Address	192.168.1.30
Supervisor MAC Address	00:1D:9C:BE:A6:D7

Save Changes

**Port Information**

Beacon Interval (µs)	400
Beacon Timeout (µs)	2000
Precedence	25
VLAN ID	10

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Figure 11.4 Ring Page View

## ■ RSTP

### Ring Protocol

After setting the setting value to [ENABLED], click [Save Changes] to enable RSTP.

## Priority

The RSTP Priority controls which bridge in the network becomes the root bridge. A lower value in the [Priority] field indicates a higher priority. The [Priority] field ranges from 0 to 61440 in increments of 4096. The default value is 61440. Refer to [Table 11.2](#) for information on [Priority] field setting.

**Table 11.2 Priority Values**

0	16384	32678	49152
4096	20480	36864	53248
8192	24576	40960	57344
12288	28672	45056	61440

To change the priority in [Priority] field, select the desired priority from the list [Table 11.2](#) and click [Save Changes].

## Root Bridge

This field displays the MAC address of the root bridge on the network.

## Hello Time (secs)

This field displays and indicates how often the bridge packets will be sent out. This value is set by the root bridge.

## Forward Delay (secs)

The Forward Delay is displayed in seconds. This value is set by the root bridge.

## Max Age (secs)

The Max Age is displayed in seconds. This value is set by the root bridge and indicates how long a message can be passed along before being discarded.

## ■ Port Information

### Role

The [Role] field shows how the port is being used. Refer to [Table 11.3](#) for the seven settings in the [Role] field.

**Table 11.3 Port Role Values**

Port Role	Description
Unknown	An unknown error has occurred within RSTP.
Root	This port leads to the root bridge.
Designated	This port leads away from the root bridge.
Alternate	This port is an alternate path to the root bridge.
Backup	This port is an alternate path away from the root bridge.
Disabled	This port does not have an active link.
RSTP is disabled.	RSTP is disabled.

### State

The [State] field indicates if the port is accepting and sending messages. The four possible values for [State] field and the features of each state are shown in [Table 11.4](#).

**Table 11.4 State Values**

State	Accept Packets	Forward Packets	Learn MAC Addresses
Discarding	NO	NO	NO
Learning	NO	NO	YES
Forwarding	YES	YES	YES
Disabled	RSTP is disabled.		

### Version

In the [Version] field, when an STP-only node is detected on the network, this port operates in STP mode and displays [STP]. [RSTP] will be displayed in all other cases. RSTP supports normal RSTP mode or STP mode.

### Port BPDU Rx Count

The [Port BPDU Rx Count] field shows the number of BPDU packets received on that port. In general, root ports receive far more BPDU packets than designated ports.

## ◆ Chart Page

The Chart page can be used to monitor one signal from a predefined list.

- Frequency Reference
- Output Frequency
- Output Current
- Motor Speed
- Torque Reference
- DC Bus Voltage
- Terminal Analog Input 1

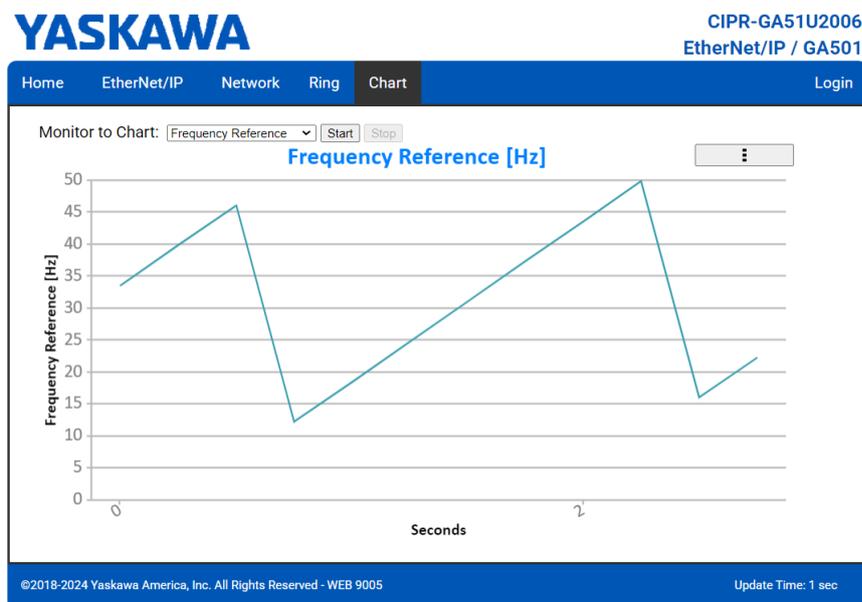


Figure 11.5 Chart Page View

## ◆ Email Alerts Page

The Email Alerts page 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.

Click [Save Email Settings] when you save the entered information.

**YASKAWA** CIPR-GA51U2006  
EtherNet/IP / GA501

Home EtherNet/IP Network Ring Chart **Email Alerts** Parameter Access Settings Logout

**Conditional Email 1**

Enable

Condition Frequency Reference < > 0 --- < > 0

Address ToAddress1@ToDomain1 Subject Subject1

Message Text1

**Conditional Email 2**

Enable

Condition Frequency Reference < > 0 --- < > 0

Address ToAddress2@ToDomain2 Subject Subject2

Message Text2

**Conditional Email 3**

Enable

Condition Frequency Reference < > 0 --- < > 0

Address ToAddress3@ToDomain3 Subject Subject3

Message Text3

**Conditional Email 4**

Enable

Condition Frequency Reference < > 0 --- < > 0

Address ToAddress4@ToDomain4 Subject Subject4

Message Text4

Save Email Settings

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Figure 11.6 Email Alerts Page View

## ■ Procedure: Conditional Email Set-up

1. Click the “Enable” check box to enable the alert.
2. Define the condition that will trigger the email by selecting a monitor parameter, a comparator, and a value.  
Set the conditions to send alerts from the “Condition” drop-down selection. If choosing only one condition and no OR or AND are needed, set the “OR/AND” drop-down selection to “—”.
3. Enter the email address where the alert will be sent.
4. Enter the message that will appear in the email contents.
5. Enter the email subject.

## ◆ Parameter Access Page

The Parameter Access page lets you read and write parameters, monitors and other MEMOBUS/Modbus registers from the drive.

**Figure 11.7 Parameter Access Page View**

The MEMOBUS/Modbus address for the drive parameter being accessed must be entered in 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 [Read Successful] or [Write Successful] is displayed when finished.

## ◆ Settings Page

The Settings page sets web page behavior parameters. Access is restricted unless a valid password is entered. The default password is yaskawa.

**Figure 11.8 Settings Page View**

## ■ Security Login

Click “Login” and enter a valid password. 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 Settings page.

Entering a valid password allows access to the settings in the Settings page, Email Alerts page, and the Parameter Access page.

## ■ Webpage Password

To change the password, enter the new password in the “New Password:” and “Confirm Password:” text boxes. Click “Save password”.

■ **Webpage Settings**

The values displayed in the various tabs are refreshed at the rate defined in the “Data Update Time” select box. The Data Update Time can be set to 250 ms, 500 ms, 1 second, 2 seconds, or 5 seconds.

■ **Email Settings**

The “Email Server IP Address” 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 Server Port” text box.

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

To save the entered information, click “Save Email Settings”.

**12 Rapid Spanning Tree Protocol (RSTP)**

Rapid Spanning Tree Protocol (RSTP) is a mechanism that allows an Ethernet network to be configured as a ring or other topology that may have more than one pathway to each node. The RSTP protocol automatically determines the most efficient pathway to each node and disables any redundant pathways.

If one path fails, RSTP activates another pathway to keep the network traffic flowing. If the failed path is restored, RSTP disables any redundant paths without disrupting network traffic.

◆ **Convergence Time**

Convergence is the process that RSTP performs to identify the root node and which pathways to disable. Convergence occurs on power up and when the network changes (for example path failures and restorations).

Take special care when using parameter *F7-16 [Timeout Value]*, Communication Timeout Loss, and be sure to give RSTP enough time for convergence. When *F7-16* is set too short, convergence will not be able to complete before it expires. The complexity of the network and the number of drives on the network will both factor into the value of the timeout.

◆ **Topology**

EtherNet/IP is ideal for use in ring topologies. With RSTP enabled, a ring topology provides redundancy to the network. RSTP determines the fastest paths to each node on the network and virtually splits the ring by disabling one port on one node to prevent data from being transmitted endlessly around the ring. If a path on the ring fails, RSTP re-enables the disabled port and reconnects the split. All nodes on the network remain accessible without any interruptions.

◆ **Enabling RSTP**

RSTP is enabled from the webpage on the drive.

1. Use the keypad to read the IP address values from monitors *U6-80*, *U6-81*, *U6-82*, and *U6-83*. The IP address is necessary to access the webpage. Refer to [Table 12.1](#) for example values of the monitors for an IP address of 192.168.1.20.

**Table 12.1 Example IP Address Monitor Values**

Monitor	Value
U6-80	192
U6-81	168
U6-82	1
U6-83	20

2. Enter the IP address to address bar of your web browser (Ex. <http://192.168.1.20>) and press the Enter key. The Home page will be loaded. Refer to [Home Page on page 64](#) for more information about the Home page.

3. Click [Ring] tab on top of the webpage.  
The Ring page is displayed with the current selected Ring Protocol set to either [DLR] or [RSTP]. If Ring Protocol is set to [DLR], change Ring Protocol to [RSTP] and click [Save Changes].

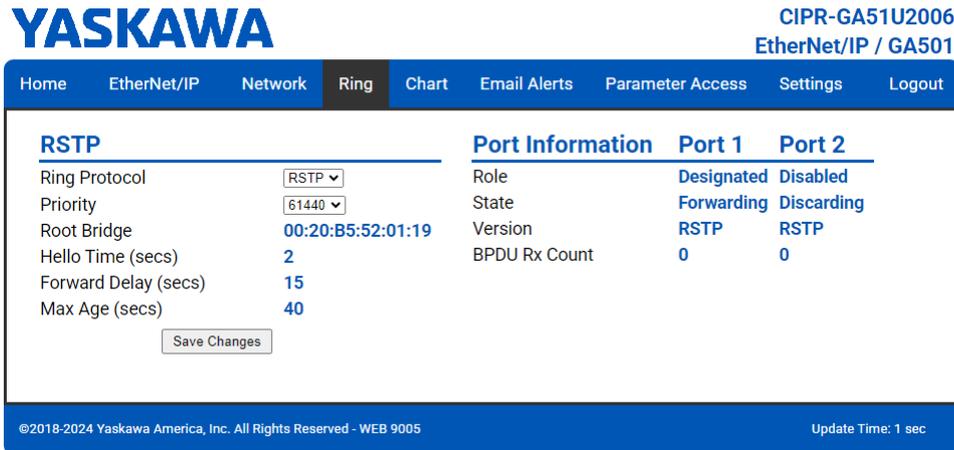


Figure 12.1 Ring Page View (When Logged in)

### ◆ RSTP Monitor U6-96

Monitor *U6-96* is dedicated to RSTP. Shows the role and state for each port.

The displayed value has four digits. The first two digits belong to port 1 and the last two digits belong to port 2. The first and third digits represent port role while the second and fourth digits represent port state.

The possible port role and state values are shown in [Figure 12.2](#).

3 2 2 2

Port 1 Role		Port 1 State		Port 2 Role		Port 2 State	
0	Unknown	0	Discarding	0	Unknown	0	Discarding
2	Root	1	Learning	2	Root	1	Learning
3	Designated	2	Forwarding	3	Designated	2	Forwarding
4	Alternate			4	Alternate		
5	Backup			5	Backup		
6	Disabled			6	Disabled		
9	RSTP Disabled			9	RSTP Disabled		

Figure 12.2 U6-96 Monitor Values

Refer to [Table 11.3](#) for descriptions of the port role values.

Refer to [Table 11.4](#) for descriptions of the port state values.

Below are a few examples:

- 9292 = RSTP is disabled and both ports are forwarding.
- 3222 = Port 1 is forwarding and is the designated port. Port 2 is forwarding and is the root port.
- 2232 = Port 1 is forwarding and is the root port. Port 2 is forwarding and is the designated port.
- 3232 = Both ports are forwarding and are designated ports. This occurs when the drive is the root bridge.
- 4022 = Port 1 is discarding and is the alternate port. Port 2 is forwarding and is the root port.
- 2260 = Port 1 is forwarding and is the root port. Port 2 is discarding and is the disabled port.

## 13 Troubleshooting

### ◆ Drive-Side Error Codes

Drive-side error codes appear on the drive keypad. [Fault on page 74](#) lists causes of the errors and possible corrective actions. Refer to the drive manuals for additional error codes that may appear on the drive keypad.

## ■ Fault

A *bUS* [Ethernet Communication Error] and *EF0* [Ethernet External Fault] can appear as a fault. When a fault occurs, the keypad ALM LED stays lit. When an alarm occurs, the ALM LED flashes.

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

- Is the communication line connected correctly to the drive?
- Is the PLC program working? Is the controller/PLC CPU stopped?
- Did a momentary power loss interrupt communications?

Code	Name	Causes	Possible Solutions
bUS	Ethernet Communication Error	The drive did not receive a signal from the controller.	<ul style="list-style-type: none"> <li>• Check for wiring errors.</li> <li>• Correct the wiring.</li> </ul>
		The communications cable wiring is incorrect.	
		An existing short circuit or communications disconnection	Check disconnected cables and short circuits and repair as needed
		A data error occurred due to electric interference	<ul style="list-style-type: none"> <li>• Prevent noise in the control circuit, main circuit, and ground wiring.</li> <li>• If you identify a magnetic contactor as a source of noise, install a surge absorber to the contactor coil.</li> <li>• Use only recommended cables or other shielded line. Ground the shield on the controller side or the drive input power side.</li> <li>• Separate all communication wiring from drive power lines. Install an EMC noise filter to the drive power supply input.</li> <li>• Decrease the effects of electrical interference from the controller.</li> </ul>
		Connection Time-out	Check if the CPU of the controller stopped.
		Duplicate IP Address found on network	Change to a different IP address. If $F7-13 = 0$ [Address Mode at Startup = Static], change parameters $F7-01$ to $F7-04$ [IP Address 1 to 4].
		IP Configuration Error	IP Address Setting/Gateway Setting If $F7-13 = 0$ [Address Mode at Startup = Static], change the settings of $F7-01$ to $F7-12$ [IP Address 1 to 4, Subnet Mask 1 to 4, Gateway Address 1 to 4] to align with the network part of IP address and the gateway address, then cycle power. If $F7-13 = 1$ or $2$ [Address Startup Mode = BOOTP (Use network address.) or DHCP (Use network address.)], check the configuration of your BOOTP or DHCP server.
PLC closed connection while the drive has an active Run command.	Parameter $F7-43$ [PLC Cnxn Close Behavior@Run] controls the drive response. Change $F7-43$ or make sure that the PLC removes Run before it removes the connection.		
EF0	Ethernet External Fault	The drive received an external fault from the controller.	<ol style="list-style-type: none"> <li>1. Find the device that caused the external fault and remove the caus.</li> <li>2. Clear the external fault input from the controller.</li> </ol>
		A programming error occurred on the controller side.	Examine the operation of the controller program.
oFA00	Ethernet HW Error	Invalid DIP switch S1 setting	Check if the DIP switch S1 setting is correct for the communication protocol you are using.
PSE	Protocol Set Error	Invalid DIP switch S1 setting	Check if the DIP switch S1 setting is correct for the communication protocol you are using.

## ◆ bUS Fault Tolerance

### ■ bUS Fault Auto-Restart

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

Setting  $F6-14 = 1$  [Enabled] AND  $F6-01 \neq 3$  [Fault] will cause the following operation:

1. The *bUS* fault occurs after the  $F7-16$  [Timeout Value] delay and the Run command is removed from the drive.
2. The drive detects that the *bUS* fault occurred in the EtherNet/IP network.
3. When the condition is removed, a fault reset is commanded and the control of the drive is returned to the EtherNet/IP network.

### ■ bUS Fault Delay

The setting value of  $F7-16$  is the length of time from when the network detects a fault until the *bUS* fault is detected on the drive. The status LEDs on the drive are not affected by the delay time set in  $F7-16$ ; the LEDs will indicate the *bUS* condition immediately.

## ◆ Explicit Message Communications Errors

When there is a problem with a request message sent from the client in explicit communications, the drive will return one of the error codes shown in [Table 13.1](#).

**Table 13.1 Communications Errors and Solutions**

Error Code (Hex.)	Description	Cause	Possible Solutions
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 parameter that cannot be changed while the drive is running.	Stop the drive.
0E	Attribute not settable	Attempted to change a read-only attribute.	Correct the service code or attribute setting.
13	Not enough data	The data size is incorrect.	Correct the data size.
14	Attribute not supported	Attempted to execute a service not defined for the attribute.	Correct the service code or attribute setting.
15	Too much data	The data size is incorrect.	Correct the data size.
16	Object does not exist	An unsupported object was specified.	Correct the class or instance setting.
1F	Vendor-specific error	<ul style="list-style-type: none"> <li>Attempted to change a drive parameter that cannot be changed while the drive is running.</li> <li>Attempted to change a drive parameter to a value outside the setting range.</li> </ul>	<ul style="list-style-type: none"> <li>Stop the drive.</li> <li>Specify a value within the setting range.</li> </ul>
20	Invalid parameter	Attempted to change to a data value outside the setting range.	Specify a data value within the setting range.

## ◆ EtherNet/IP Error Codes

### ■ Fault Monitors U6-98 and U6-99

If any faults occur with EtherNet/IP, you can check error/warning conditions via drive monitors on the drive keypad as shown in [Table 13.2](#).

**Table 13.2 Fault Monitor Descriptions**

Status	Fault Declared	Status Value (U6-98/U6-99)	Description
No Faults	-	0	No Faults
Fatal error occurred	<i>EF0</i>	3	Network sent a message to force this node to the fault state.
Communications timeout (non-fatal)	<i>bUS</i>	1101	The node timer (Requested Packet Interval) timed out.
Duplicate IP Address	<i>bUS</i>	1102	This node and at least one other node have the same IP Address.
Default MAC Address	-	1103	Programmed MAC Address is not at factory default setting. <b>Note:</b> Return the drive to Yaskawa or your nearest sales representative and request the setting change.
Network Link Down	<i>bUS</i>	1104	Neither of the two network Ethernet ports has a link. This will only happen when a link is established, then lost.
Bad IP Configuration	<i>bUS</i>	1106	<i>F7-13 = 0</i> [Address Mode at Startup = Static] and the network part of the settings of <i>F7-01</i> to <i>F7-12</i> [IP Address 1 to 4, Subnet Mask 1 to 4, Gateway Address 1 to 4] are not aligned. If <i>F7-13 = 1</i> or <i>2</i> [Address Startup Mode = BOOTP (Use network address.) or DHCP (Use network address.)], your BOOTP or DHCP server is not configured correctly. Set the parameters to the correct values and cycle power on the drive.
Web Interface Setting Error	-	1110	Failure to read the web interface setting.
Forward Close Fault	<i>bUS</i>	1111	The PLC closed the IO connection while there was an active run to the drive.

Two drive monitors, *U6-98* [Ethernet First Fault] and *U6-99* [Ethernet Current Fault] 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 network 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, *U6-98* retains the original fault value and *U6-99* stores the new fault status value.

### ◆ Communication Error

If there are no problems with the drive, but you cannot communicate with other devices, try the possible solution below.

Status	Possible Solutions
The LINK/ACT LED will not illuminate.	Set F7-14 = 1 [Duplex Mode Selection = Auto/Auto (Auto Negotiation/Auto Negotiation)].

### ◆ Self RAM Check

Use these procedures to do a self RAM check for all areas including unused areas.

**Note:**

- The self RAM check completes in approximately 1.5 minutes.
- When you start the self RAM check, the drive will detect oFA00 [Ethernet HW Error].

1. Set DIP switch S1 as shown in Figure 13.1.

**Note:**

Use non-conductive tweezers or a tool with a tip width of approximately 0.5 mm (0.02 in) to set DIP switch S1.

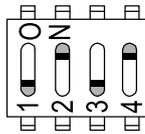


Figure 13.1 DIP Switch S1 Settings for the Self RAM Check

2. Apply power to the drive.  
This will start the self RAM check.
3. Look at the LEDs to see the status of the self RAM check.  
Refer to Table 13.3 for more information.

Table 13.3 LED States during Self RAM Check

Self RAM Check Status	LED States	
	MS	NS
Checking	Lit in green	OFF
Successful termination	Lit in green	Lit in green
Abnormal termination	Lit in red	Lit in red

## 14 Specifications

### ◆ Specifications

Table 14.1 EtherNet/IP Specifications

Items	Specifications
Supported Messages	<ul style="list-style-type: none"> <li>• Explicit: Explicit Class 3, Unconnected</li> <li>• I/O: Class 1, Listen Only, Input Only</li> </ul>
I/O Assembly Instance	<ul style="list-style-type: none"> <li>• Input: 12 types (4 - 44 Bytes)</li> <li>• Output: 12 types (4 - 44 Bytes)</li> </ul>
Minimum RPI	10 ms
EtherNet/IP Specification	Conformance Level CT 20: Passed
EtherNet/IP Profile	AC Drive
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	<ul style="list-style-type: none"> <li>• Explicit: 6</li> <li>• I/O: 2</li> </ul>
Duplex Mode	Half-forced, Auto-negotiate, Full-forced
Address Startup Mode	Static, BOOTP, DHCP

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## Revision History

Date of Publication	Revision Number	Section	Revised Content
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# YASKAWA AC Drive GA501

# EtherNet/IP

# Technical Manual

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# YASKAWA

YASKAWA ELECTRIC  
CORPORATION

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

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