YASKAWA

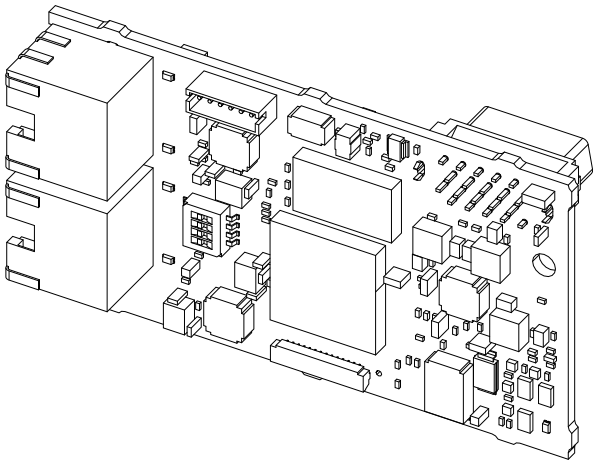
YASKAWA AC Drive Option

BACnet/IP

Technical Manual

Model JOHB-SMP3

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.



MANUAL NO. SIEP C730600 0MB

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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
JOHB-SMP3 Multi-Protocol Ethernet Quick Installation Procedure Manual No.: TOBP C730600 0H	Read this manual first. The manual provides information about wiring, settings, functions, and troubleshooting. The manual is packaged together with the product.
YASKAWA AC Drive Option BACnet/IP Technical Manual Manual No.: SIEP C730600 0M (This book)	The technical manual contains detailed information about the option. Access the following sites to obtain the technical manual: U.S.: https://www.yaskawa.com Europe: https://www.yaskawa.eu.com Japan: https://www.e-mechatronics.com Other areas: Check the back cover of these manuals. For questions, contact Yaskawa or a Yaskawa representative.
YASKAWA AC Drive Manuals	Refer to the drive manual to connect with the option. 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 Quick Start Guides are packaged with the drive. The most recent versions of these manuals are available for download on our documentation websites: U.S.: https://www.yaskawa.com Europe: https://www.yaskawa.eu.com Japan: https://www.e-mechatronics.com Other areas: Check the back cover of these manuals. For questions, contact Yaskawa or a Yaskawa representative.

◆ Glossary

Term	Definition
Option	YASKAWA AC Drive Option JOHB-SMP3 with DIP switches set for BACnet/IP
Keypad	• HOA Operator • LCD Operator • LED Operator • HOA Keypad • LCD Keypad • LED Keypad
Hex. (Example: 900 (Hex.))	Identifies a unit for hexadecimal number format.

◆ Registered Trademarks

- BACnet is a trademark of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).
- QR Code is a registered trademark of DENSO WAVE INCORPORATED.
- 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 option. The option must be installed according to this manual and local codes.

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

⚠ DANGER *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 hazardous situation, which, if not avoided, can cause minor or moderate injury.*

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 or option circuitry. Failure to obey can cause serious injury or death, or cause damage to the drive or option 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 option provides a communications connection between the drive and a BACnet/IP network. The option connects the drive to a BACnet/IP network and facilitates the exchange of data.

BACnet/IP is a communications link to connect building automation devices (for example smart motor controllers, operator interfaces, and variable frequency drives) and control devices (for example, Building Automation Systems and computers) to a network. BACnet/IP is a simple networking solution. BACnet/IP decreases the cost and time to wire and install building automation devices, and it gives the option to interchange like components from other vendors.

BACnet/IP is an open network standard.

Install the option on a drive to perform the following functions from a BACnet/IP controller:

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

◆ Compatible Products

You can use the option with these products:

Table 2.1 Compatible Products

Product Series	Model(s)	Drive Software Version *1
Z1000U	CIMR-ZxxUxxxx	≥ 6117
	CIMR-ZxxExxxx	
	CIMR-ZxxPxxxx	
	CIMR-ZxxWxxxx	
GA500 *2	CIPR-GA50xxxxx	≥ 1019
GA700 *2	CIPR-GA70xxxxx	≥ 1038

Product Series	Model(s)	Drive Software Version *1
GA800 *2	CIPR-GA80xxxxx	≥ 9018
HV600	CIPR-HV60xxxxx	≥ 1016
FP605	CIPR-FP65xxxxx	≥ 1012
HV600 Bypass	H6Bxxxxx	≥ 0446
FP605 Bypass *2	F6Bxxxxx	≥ 0560

*1 Refer to “PRG” on the drive nameplate for the software version number.
*2 These drives are compatible with option software versions PRG:7001 and later. Refer to *U6-97 [OPT SPARE 4]*to check the option software version.

Note:
• For Yaskawa customers in the North or South America regions:
If your product is not listed in Table 2.1, refer to the web page below to confirm this manual is correct for your product. The web page provides a list of option manuals by product, and a direct link to download a PDF of the manual.
Scan QR code or refer to:
https://www.yaskawa.com/optionlookup

3 Receiving

After you receive the option package:

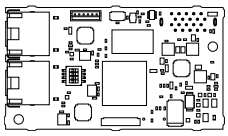
- Make sure that there is no damage to the option and no parts are missing.
The Yaskawa warranty does not include damage from shipping. If there is damage to the option or other parts, contact the shipping company immediately.

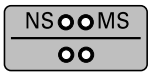
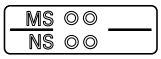
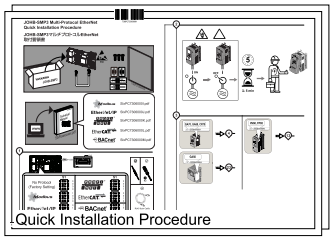
NOTICE *Damage to Equipment. Do not use damaged parts to connect the drive and the option. Failure to comply could damage the drive and option.*

- Make sure that the model number on the option nameplate and the model number on the purchase order are the same. Refer to Figure 4.1 for more information.
- Contact the distributor where you purchased the option or contact Yaskawa or a Yaskawa representative about any problems with the option.

◆ Option Package Contents

Table 3.1 Contents of Package

Option Contents		Quantity
Option		1
Ground Wire *1		1
Screws (M3)		3 *2

Option Contents			Quantity
LED Labels *3	Z1000U		1
	GA500, GA700, GA800		1
	HV600, FP605 *4		1
Quick Installation Procedure			1

*1 GA500, GA700, and GA800 drives do not use the ground wire.
*2 Only two screws are necessary to install the option on GA700, GA800, HV600, and FP605 drives.
*3 LED labels are located on this label sheet. HV600 Bypass and FP605 Bypass do not use an LED label.

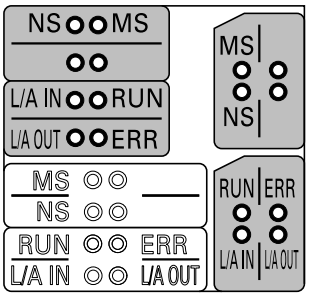


Figure 3.1 LED Label Sheet

*4 The LED label has transparent background and white letters. Please make sure that you use the correct label for HV600 or FP605.

◆ Installation Tools

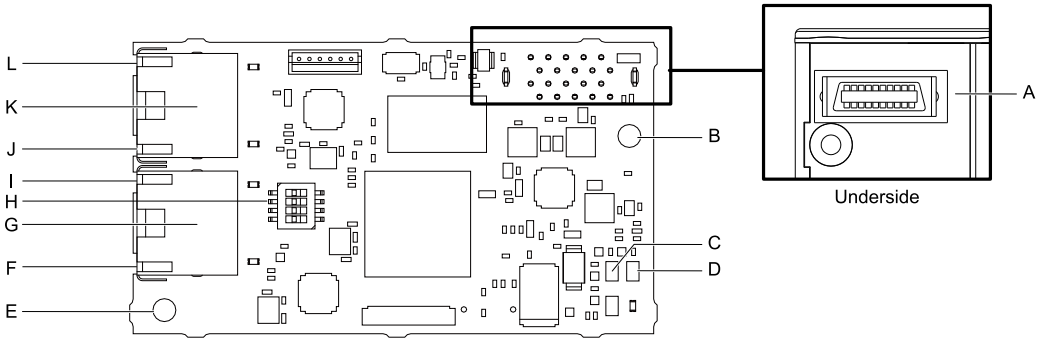
You can use these tools to install the option to the drive:

- A Phillips screwdriver or slotted screwdriver (M3 *1)
- Non-conductive tweezers or a tool with a tip width of approximately 0.5 mm (0.02 in) to set DIP switch S1.
- A pair of diagonal cutting pliers.
- A small file or medium-grit sandpaper.

*1 Phillips screw sizes are different for different drive capacities. Prepare different screwdrivers for different screw sizes.

4 Option Components

◆ Option Components



A - Connector (CN5)
B - Installation hole
C - LED (NS) *1
D - LED (MS) *1
E - Ground terminal (FE) and installation hole *2
F - Port 2 LED (10/100) *1
G - Option modular connector CN1B (Port 2) (RJ45)
H - DIP switch S1
I - Port 2 LED (LINK/ACT) *1
J - Port 1 LED (10/100) *1
K - Option modular connector CN1A (Port 1) (RJ45)
L - Port 1 LED (LINK/ACT) *1

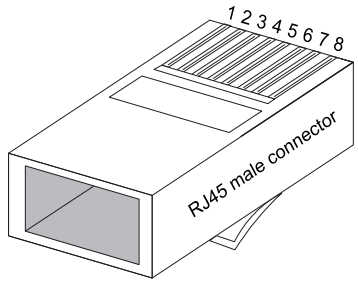
Figure 4.1 Option PCB Components

*1 Refer to Table 4.2 for more information about the LEDs.
*2 Connect the included ground wire during installation.

◆ Communication Connector

Option connections CN1A (Port 1) and CN1B (Port 2) are connection points for customer-supplied BACnet/IP network communication cables. These ports accept customer-supplied male 8-way ethernet modular RJ45 connectors.

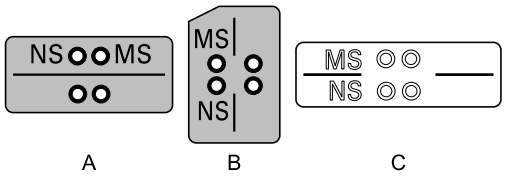
Table 4.1 Male 8-way Ethernet Modular Connector (Customer-Supplied)

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

◆ Option LED States

The option has four LEDs:

- Bi-color Status LEDs:
  - Module status (MS) red/green
  - Network status (NS) red/green
- Ethernet Port LEDs (2 each):
  - Network speed-10/100 green
  - Link status and network activity-Link/Act green



A - Z1000U
B - GA500, GA700, GA800
C - HV600, FP605 *1

Figure 4.2 Option LED Labels

*1 LED label has transparent background and white letters. Please make sure that you use the correct label for HV600 or FP605.

Wait 2 seconds minimum for the power-up diagnostic process to complete before you verify the LED states. The Table 4.2 shows the operating status of the option LEDs after the power-up diagnostic LED sequence is complete. Refer to Table 4.3 for more information about the LEDs.

Table 4.2 Option LED States

LED Name	Indication		Operating State	Description
	Color	Display		
MS	-	OFF	Power supply off	There is no power to the drive.
	Green	ON	Option operating	The option is operating normally.
	Green	Flashing	Option initializing	The option is configuring an IP address.
	Red	ON	Fatal error occurred	The option detected a fatal (unrecoverable) error.
	Red	Flashing	Non-fatal error occurred	The option detected a non-fatal (recoverable) error.
NS	-	OFF	Power supply OFF or no BACnet/IP traffic	The option has not received a BACnet/IP message or command for 2 seconds or longer.
	Green	ON	BACnet/IP message(s) received	The option received at least one BACnet/IP message in the last 2 seconds.
	Green	Flashing	BACnet/IP command(s) received	The option received at least one Frequency Reference or Run/Stop BACnet/IP command in the last 2 seconds. This also includes gateway drive commands.
	Red	ON	Communications error (fatal)	The option detected a duplicate IP address or has a bad IP address configuration.
10/100 *1	Green	OFF	10 Mbps is established	-
	Green	ON	100 Mbps is established	
LINK/ACT *1	-	OFF	Link is not established	
	Green	ON	Link is established	
	Green	Flashing	Link is established and there is network activity	

*1 To verify LED states, you must remove the drive front cover. Do not touch the drive main circuit terminal or circuit boards when you remove the drive front cover.

■ 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 option is successfully initialized. The LEDs then assume operational conditions as shown in Table 4.3.

Table 4.3 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	-
4	Green	Green	250
5	Green	Red	250
6	Green	OFF	-

5 Installation Procedure

◆ 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 option, 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 or option 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 option.*

◆ Settings for DIP Switch S1

Use the DIP switch S1 on the option 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 5.1 shows the default settings for DIP switch S1.

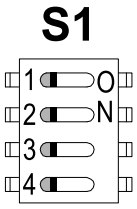


Figure 5.1 Default Settings for DIP Switch S1

When you use BACnet/IP, set DIP switch S1 as shown in Figure 5.2.

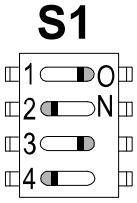


Figure 5.2 BACnet/IP Settings for DIP Switch S1

Note:
If you set the DIP switch for a different protocol, it will erase all user-entered data from the JOHB-SMP3, including the Device Object Name.

◆ Procedures to Install and Wire the Option

Procedures to install and wire the option are different for different drive models.
Refer to Table 5.1 to check the procedures to install and wire the option on a drive.

Table 5.1 Procedures to Install and Wire Options on a Drive

Product Series	Procedures to Install and Wire Options on a Drive	Reference
Z1000U	Procedure A	13
GA500	*1	20
GA700	Procedure B	15
GA800	Procedure B	15
HV600	Procedure C	17
FP605	Procedure C	17
HV600 Bypass	Procedure D	19
FP605 Bypass	Procedure D	19

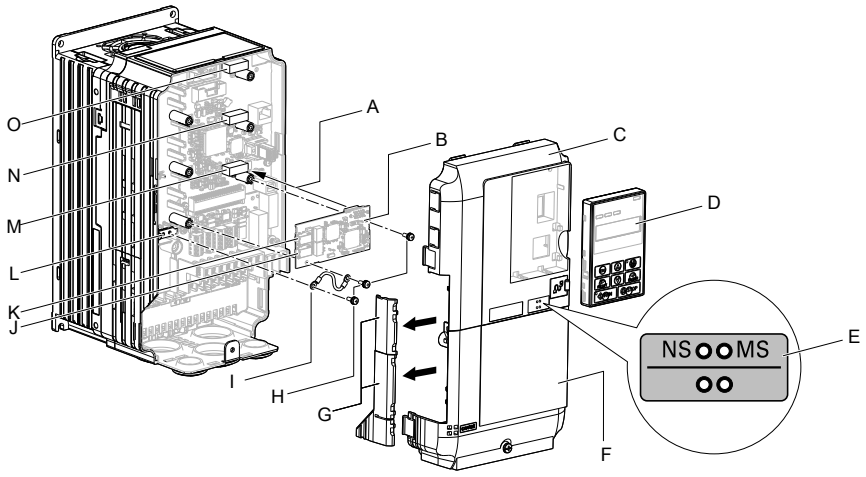
*1 To install the option on GA500 drives, use the option mounting kit (JOHB-GA50) and manual.

■ Procedure A

This section shows the procedure to install and wire the option on a Z1000U drive.

Prepare the Drive for the Option

Correctly wire the drive as specified by the manual packaged with the drive. Make sure that the drive functions correctly. Refer to the drive manuals for more information.



A - Insertion point for CN5 connector
B - Option
C - Drive front cover
D - Keypad
E - LED label
F - Drive terminal cover
G - Removable tabs for wire routing
H - Included screws
I - Ground wire
J - Option modular connector CN1B (Port 2) (RJ45)
K - Option modular connector CN1A (Port 1) (RJ45)
L - Drive grounding terminal (FE)
M - Connector CN5-A
N - Connector CN5-B (Not available for communication option installation.)
O - Connector CN5-C (Not available for communication option installation.)

Figure 5.3 Drive Components with Option

Install the Option

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.*

NOTICE *Damage to Equipment. When you touch the option, 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.*

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

1. Shut off power to the drive and wait for the time specified on the drive warning label at a minimum.

   Make sure that the charge indicator LED is unlit, then remove the keypad and front cover. Refer to the drive manuals for more information.
2. Remove the keypad (D), front cover (C), and terminal cover (F).
3. Put the LED label (E) in the correct position on the drive front cover (C).
4. Install the option (B) into the CN5-A connector (M) on the drive and use the included screws (H) to put it in place.
5. Use one of the remaining included screws (H) to connect one end of the ground wire (I) to the ground terminal (L). Use the last remaining included screw (H) to connect the other end of the ground wire (I) to the remaining ground terminal and installation hole on the option (B).

   Tighten the screws to a correct tightening torque:

   - 0.5 N·m to 0.6 N·m (4.4 lbf·in to 5.3 lbf·in)

Note:
The drive has only two ground terminal screw holes. When you connect three options, two options will share one ground terminal.

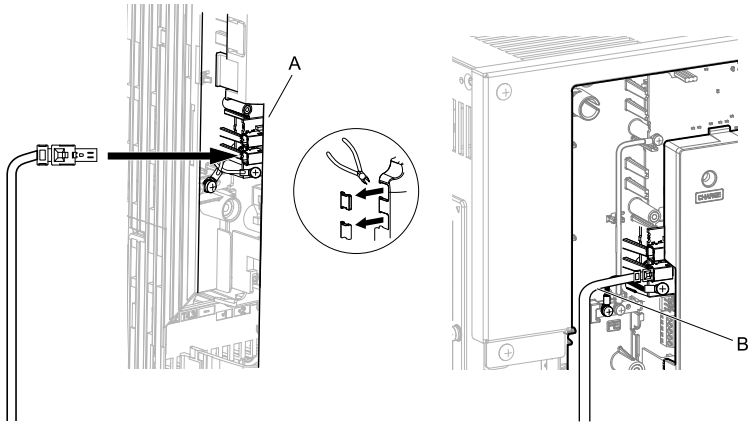
6. Route the option wiring.

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

   - You can route the option wiring through openings on the front cover of some models. Remove the perforated tabs on the left side of the front cover as shown in Figure 5.4-A to create the necessary openings on these models. To prevent damage to the cable from the cut end, treat the cut surface with sandpaper.
   - Route the option wiring inside the enclosure as shown in Figure 5.4-B.

   Refer to the drive manuals for more information.

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



A - Route wires through the openings provided on the left side of the front cover. *1*

B - Use the open space provided inside the drive to route option wiring.

Figure 5.4 Wire Routing Examples

*1 If there is wiring outside the enclosure, the drive will not meet Enclosed wall-mounted type (IP20/UL Type 1) requirements.

7. Firmly connect the Ethernet communication cables to CN1B (Port 2) (J), and/or CN1A (Port 1) (K).

   Isolate communication cables from main circuit wiring and other electrical and power lines. Make sure that you firmly connect the cable end. Refer to *Communication Cable Specifications on page 21* for more information.

8. Reattach the front cover (C), terminal cover (F), and keypad (D).

   Refer to the drive manuals for more information.

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

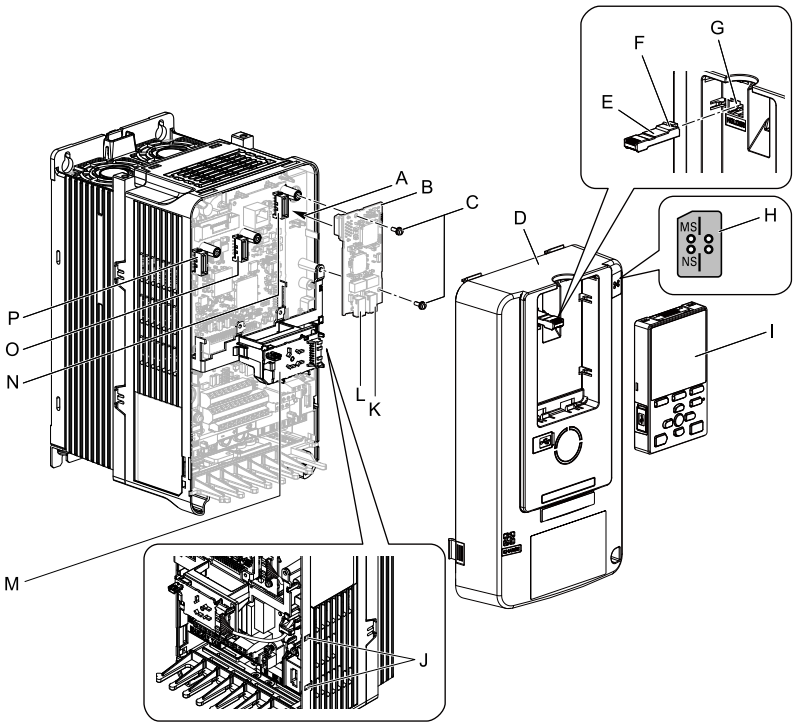
9. Set drive parameters in *Related Drive Parameters on page 22* for correct option performance.

■ Procedure B

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

Prepare the Drive for the Option

Correctly wire the drive as specified by the manual packaged with the drive. Make sure that the drive functions correctly. Refer to the drive manuals for more information.



A - Insertion point for CN5 connector
B - Option
C - Included screws
D - Drive front cover
E - Keypad connector
F - Keypad connector tab
G - Holder
H - LED label
I - Keypad
J - LED Status Ring board temporary placement holes
K - Option modular connector CN1B (Port 2) (RJ45)
L - Option modular connector CN1A (Port 1) (RJ45)
M - LED Status Ring board
N - Connector CN5-A
O - Connector CN5-B (Not available for communication option installation.)
P - Connector CN5-C (Not available for communication option installation.)

Figure 5.5 Drive Components with Option

Install the Option

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.*

NOTICE *Damage to Equipment. When you touch the option, 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.*

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

1. Put the LED label (H) in the correct position on the drive front cover (D).
2. Shut off power to the drive and wait for the time specified on the drive warning label at a minimum.
   Make sure that the charge indicator LED is unlit, then remove the keypad and front cover. Refer to the drive manuals for more information.
3. Remove the keypad (I) and front cover (D).

Note:
Remove the keypad, then move the keypad connector (E) to the holder (G) on the drive, then remove the front cover.

4. Carefully remove the LED Status Ring board (M) and put it in the temporary placement holes (J) on the right side of the drive.
   Refer to the drive manuals for more information.

   NOTICE *Do not remove the LED Status Ring board cable connector. If you disconnect the LED Status Ring board, it can cause incorrect operation and damage to the drive.*

5. Install the option (B) into the CN5-A connector (N) on the drive and use the included screws (C) to put it in place.

   Tighten the screws to a correct tightening torque:

   • 0.5 N·m to 0.6 N·m (4.4 lbf·in to 5.3 lbf·in)

Note:

1. A ground wire is not necessary. Do not use the ground wire.
2. Only two screws are necessary to install the option on a GA700, GA800, and CR700 drive.

6. Firmly connect the Ethernet communication cables to CN1B (Port 2) (K), and/or CN1A (Port 1) (L).

   Isolate communication cables from main circuit wiring and other electrical and power lines. Make sure that you firmly connect the cable end. Refer to *Communication Cable Specifications on page 21* for more information.

Note:

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

7. Reattach the LED Status Ring board (M), front cover (D), and keypad (I).

   Refer to the drive manuals for more information.

   NOTICE *Do not pinch cables between the front cover or the LED Status Ring board and the drive. Failure to comply could cause erroneous operation.*

Note:

• Replace the keypad connector (E), then install the keypad.

• Put the keypad connector tab (F) into the holder when you install the keypad connector to the holder.

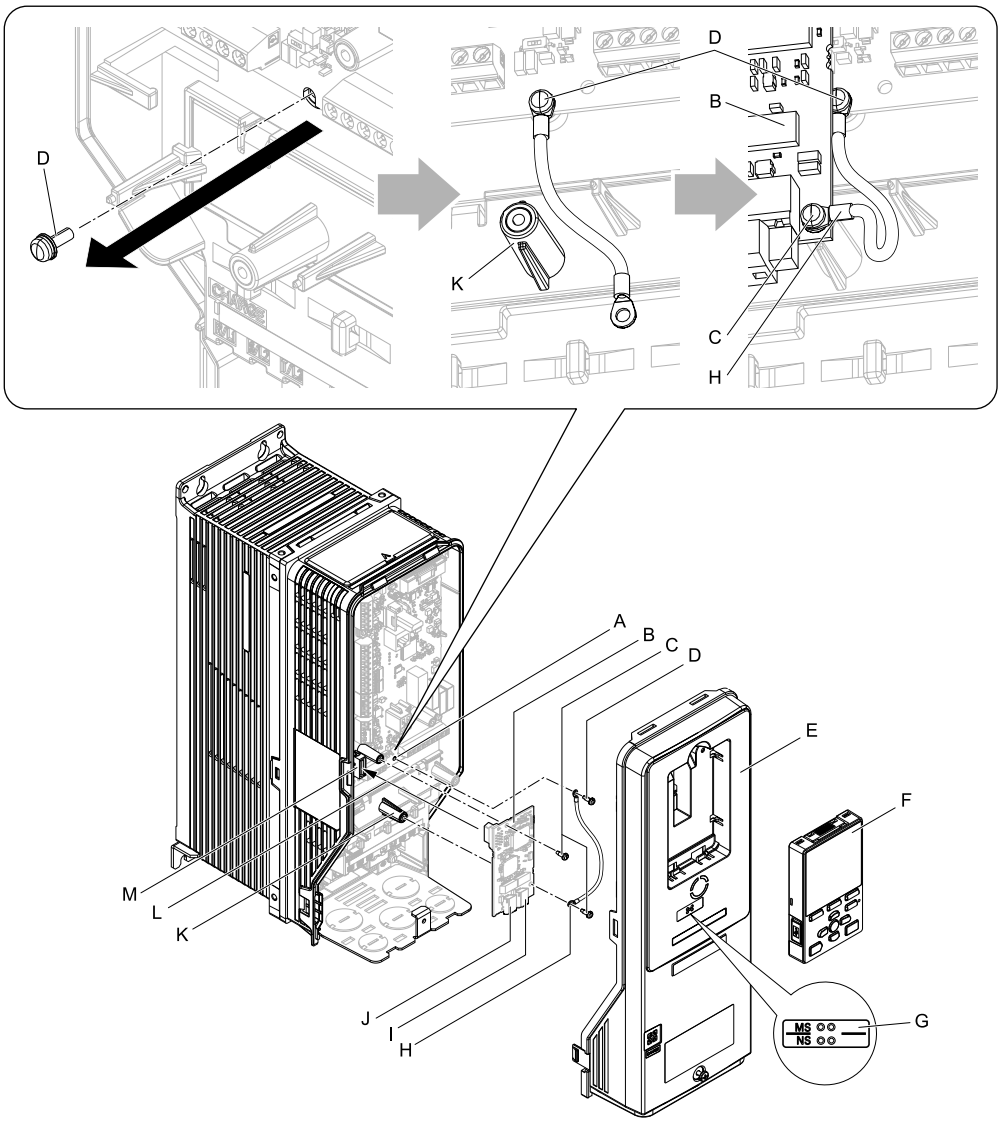
8. Set drive parameters in *Related Drive Parameters on page 22* for correct option performance.

■ Procedure C

This section shows the procedure to install and wire the option on an HV600 or FP605 drive.

Prepare the Drive for the Option

Correctly wire the drive as specified by the manual packaged with the drive. Make sure that the drive functions correctly. Refer to the drive manuals for more information.



A - Drive grounding terminal (FE)
B - Option
C - Included screws
D - Ground screw
E - Drive front cover
F - Keypad
G - LED label
H - Ground wire
I - Option modular connector CN1B (Port 2) (RJ45)
J - Option modular connector CN1A (Port 1) (RJ45)
K - Stud
L - Insertion point for CN5 connector
M - Connector CN5

Figure 5.6 Drive Components with Option

Install the Option

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.*

NOTICE *Damage to Equipment. When you touch the option, 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.*

1. Shut off power to the drive and wait for the time specified on the drive warning label at a minimum.
   Make sure that the charge indicator LED is unlit, then remove the keypad and front cover. Refer to the drive manuals for more information.
2. Remove the keypad (F) and front cover (E).
3. Put the LED label (G) in the correct position on the drive front cover (E).

4. Remove the screw (D) installed in the drive grounding terminal (A).
5. Use the screw (C) installed in the FE ground terminal of the drive (A) to connect one end of the included ground wire (H) to the ground terminal on the drive.
   Route ground wire on the right side of the stud (K).
   Tighten the screw to a correct tightening torque:
   - 0.5 N·m to 0.6 N·m (4.4 lbf·in to 5.3 lbf·in)
6. Install the option (B) into the CN5 connector (M) (HV600: CN5, FP605: CN5-A) on the drive and use one of the included screws (C) to put it in place.
   Tighten the screw to a correct tightening torque:
   - 0.5 N·m to 0.6 N·m (4.4 lbf·in to 5.3 lbf·in)

Note:
Only two screws are necessary to install the option on HV600 and FP605 drives.

7. Use one of the remaining included screws (C) to connect the ground wire (H) to the ground terminal and installation hole on the option (B).
   Refer to Figure 5.6 for instruction about crimp terminal orientation and wire routing.
   Tighten the screw to a correct tightening torque:
   - 0.5 N·m to 0.6 N·m (4.4 lbf·in to 5.3 lbf·in)
8. Firmly connect the Ethernet communication cables to CN1B (Port 2) (I), and/or CN1A (Port 1) (J).
   Isolate communication cables from main circuit wiring and other electrical and power lines. Make sure that you firmly connect the cable end. Refer to *Communication Cable Specifications on page 21* for more information.
9. Reattach the drive front cover (E) and the keypad (F).
   Refer to the drive manuals for more information.

   NOTICE *Do not pinch cables between the front covers and the drive. Failure to comply could cause erroneous operation.*
10. Set drive parameters in *Related Drive Parameters on page 22* for correct option performance.

■ Procedure D

This section shows the procedure to install and wire the option on an HV600 Bypass or FP605 Bypass.

Install the Option

⚠ 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.*

NOTICE *Damage to Equipment. When you touch the option, 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.*

1. Remove the bypass cover.
2. Put the option into port CN5 on the bypass PCB.

3. Use the two screws included in the option kit to fasten the option card to the metal standoffs on the bypass PCB. Use a short-shaft, magnetic screwdriver for narrow enclosure models H6BPxxxx or CIPR-F6BPxxxx. Tighten each screw to 0.5 to 0.6 N•m (4.4 to 5.3 in lbs).

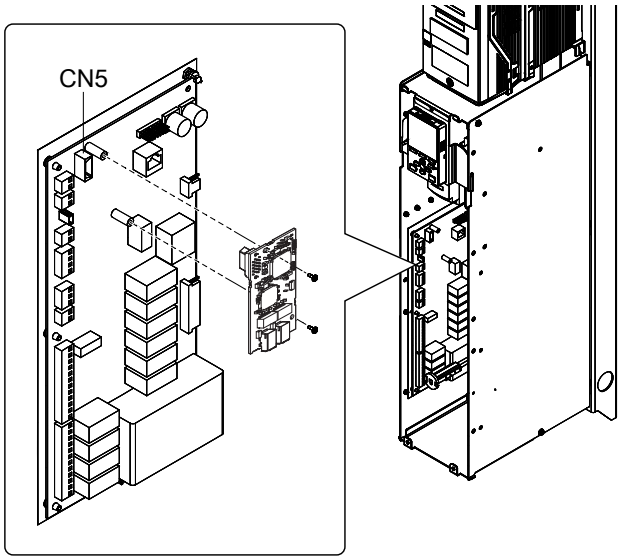


Figure 5.7 Insert Option into Bypass PCB CN5 Connector Port

4. Firmly insert the end of the customer-supplied network cable into the CN1 connection port on the option board. When you have a dual-port option, connect two network cables to the two network ports in CN1 for flexibility in cabling topology.

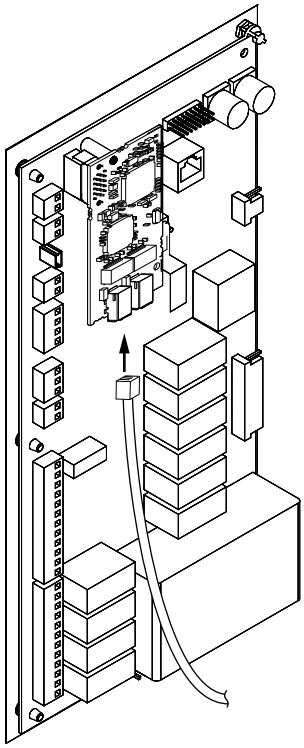


Figure 5.8 Connect Network Cable to Option

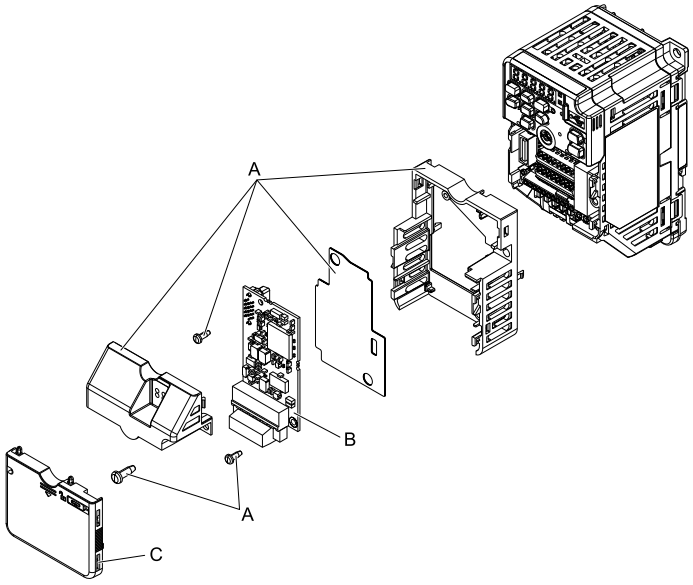
NOTICE *Separate the communication wiring from the input power wiring and the motor wiring. Electrical interference can cause communication data errors.*

5. Make sure that you did not pinch cables between the front cover and the bypass enclosure, then replace and secure the front cover.
6. Set drive parameters in *Related Drive Parameters on page 22* for correct option performance.

◆ Option Card Mounting Kit for GA500

An option card mounting kit is necessary to install the option on a GA500 drive. The option card mounting kit model is: JOHB-GA50. This kit is sold separately.

Refer to the option card mounting kit manual for more information about installation.



A - Option card mounting kit components (sold separately)
B - Option
C - Drive front cover

図 5.9 Option Card Mounting Kit (JOHB-GA50)

◆ Communication Cable Specifications

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

■ Option Connection Diagram

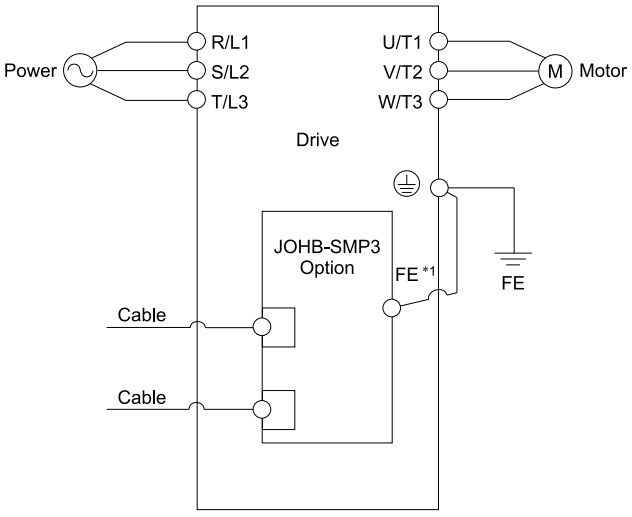


Figure 5.10 Option Connection Diagram

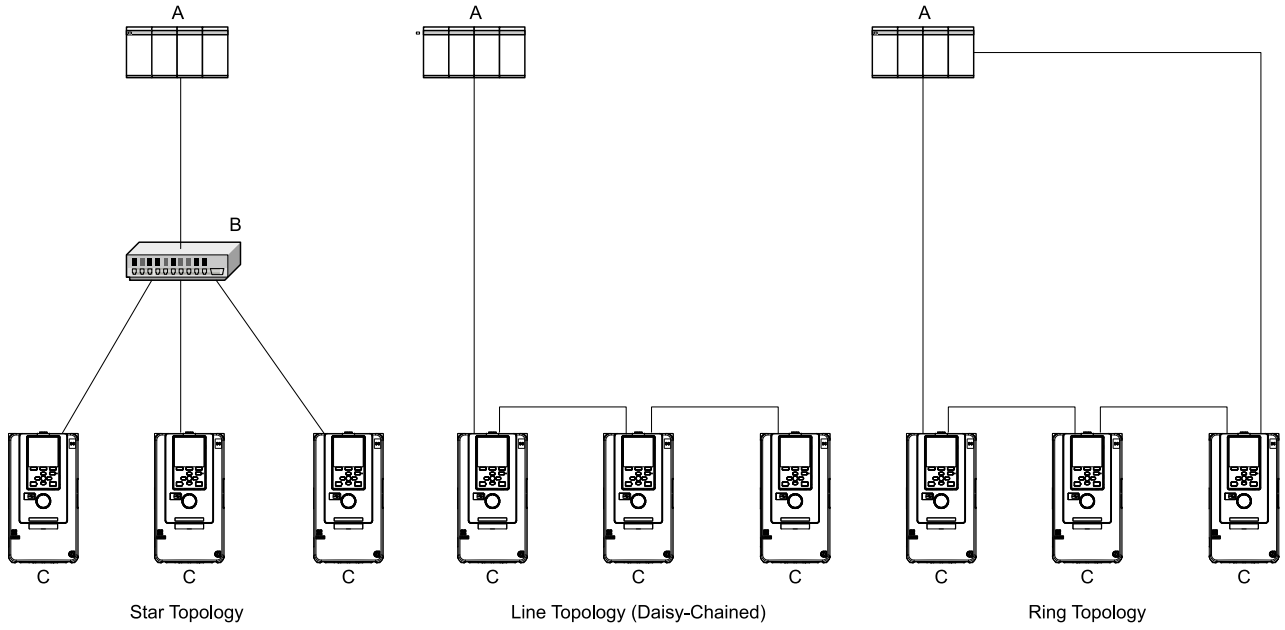
*1 Connect the specified ground wire.

■ Communication Topology Specifications

Drives equipped with the JOHB-SMP3 option can be connected to network in either star or line topology.

- Star Topology
  Use either one of the communication connectors CN1A (Port 1) or CN1B (Port 2).
- Line Topology (Daisy-Chained)
  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 RSTP protocol.

Note:
- Ring Topology is compatible with option software versions PRG: 7001 and later. For Ring Topology connections, enable the RSTP function with reference to *Rapid Spanning Tree Protocol (RSTP) on page 47*. (The default setting is enabled.) Refer to *U6-97 [OPT SPARE 4]* to check the option software version. To use PRG: 7000 option in a ring topology, prepare a separate device that supports STP and RSTP in the same network.
- If you use an option with software version PRG: 7000 and the link speed of Port 1 is different than the link speed of Port 2, it will trigger a *PA1 [PLC Alarm 1]* and the drive will not send data between the ports. To prevent this alarm, set *F7-14 = 1 [Duplex Mode Selection = Auto/Auto (Auto Negotiation/Auto Negotiation)]* and set the two connected ports to the same link speed, and make sure that *F7-15 ≠ 101 or 102 [Communication Speed Selection ≠ 10/100 Mbps (10 Mbps/100 Mbps) or 100/10 Mbps (100 Mbps/10 Mbps)]*. PRG: 7001 and later can send data between the ports, when the link speeds between the ports are different. Therefore, it will not trigger a *PA1 [PLC Alarm 1]*. Refer to *U6-97 [OPT SPARE 4]* to check the option software version.



A - Building Automation Controller
B - Switch
C - Drive

Figure 5.11 Communication Cable Wiring

6 Related Drive Parameters

These parameters set the drive for operation with the option. 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: Some monitors are available in Expert Mode only. When *A1-01 = 3 [Access Level Selection = Expert Level]*, Expert Mode monitors can be displayed on 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 : Memobus/Modbus Communications 3 : Option PCB 4 : Pulse Train Input **Note:** Set *b1-01 = 3* to use the controller to control the frequency reference of the drive.	1 (0 - 4)
b1-02 (0181)	Run Command Selection 1	Sets the input method for the Run command. 0 : Keypad 1 : Digital Input 2 : Memobus/Modbus Communications 3 : Option PCB 7 : AUTO Command + Term Run 8 : AUTO Command + Serial Run 9 : AUTO Command + Option Run	1 (0 - 9)

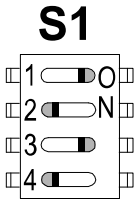
No. (Hex.)	Name	Description	Default (Range)
		Note: • Set *b1-02 = 3 or 9* to start and stop the drive with the controller using serial communications. • The setting range and selections are different for different drives. Refer to the instruction manual of your specific drive for more information.	
F6-01 (03A2)	Communication Error Selection	Selects drive response when the drive detects a *bUS [Option Communication Error]* error during communications with the option. 0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use *C1-09*) 3 : Alarm Only 4 : Alarm (Run at *d1-04*) 5 : Alarm - Ramp Stop **Note:** • 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. • Refer to the drive manual to know if settings *4* and *5* are available. • The setting range for Z1000U drive is different for different software versions. Refer to the Peripheral Devices & Options section of the drive instruction manual for more information. • 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 *EF0 [Option Card External Fault]* 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 *EF0 [Option Card External Fault]* is detected. 0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use C1-09) 3 : Alarm Only **Note:** 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)
F6-07 (03A8)	Multi-Step Ref @ NetRef/ ComRef	Sets the function that enables and disables the multi-step speed reference when the frequency reference source is NetRef or ComRef (communication option or MEMOBUS/Modbus communications). 0 : Disable Multi-Step References 1 : Enable Multi-Step References	0 (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 [Initialize Parameters]* to initialize the drive. 0 : No Reset - Parameters Retained 1 : Reset - Back to Factory Default **Note:** 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	Sets the automatic reset function for *bUS [Option Communication Error]*. 0 : Disabled 1 : Enabled **Note:** Changes to this parameter take effect immediately. It is not necessary to cycle power on the drive.	0 (0, 1)
F6-15 (0B5B)	Comm. Option Parameters Reload	Sets when the drive will activate the *F6-xx/F7-xx* communications-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 **Note:** • *F6-15* is reset to *0* after setting *1* or *2*. • This parameter is not available in Z1000U drive. • Changes to this parameter take effect immediately. It is not necessary to cycle power on the drive.	0 (0 - 2)
F6-16 (0B8A)	Gateway Mode	Sets the gateway mode operation and the number of connected slave drives.. 0 : Disabled 1 : Enabled: 1 Slave Drive 2 : Enabled: 2 Slave Drives 3 : Enabled: 3 Slave Drives 4 : Enabled: 4 Slave Drives **Note:** This parameter is not available in Z1000U drive.	0 (0 - 4)
F6-48 (02FE)	BACnet Device Object Identifier 0	Sets the Instance Identifier of the BACnet Device Object, where the *F6-48* value is the least significant word.	1 (0 - FFFF (Hex.))

No. (Hex.)	Name	Description	Default (Range)
		Note: This parameter and *F6-49* set the Instance Identifier of the BACnet Device Object. Example 1: Set the Device Object Instance Identifier to *1234*. 1234 decimal is equal to 4D2 (Hex.). Set *F6-48 = 4D2 (Hex.)* and *F6-49 = 0 (Hex.)*. Example 2: Set the Device Object Instance Identifier to *1234567*. 1234567 decimal is equal to 12D687 (Hex.). Set *F6-48 = D687 (Hex.)* and *F6-49 = 12 (Hex.)*.	
F6-49 (02FF)	BACnet Device Object Identifier 1	Sets the Instance Identifier of the BACnet Device Object, where the *F6-49* value is the most significant word. **Note:** This parameter and *F6-48* set the Instance Identifier of the BACnet Device Object. Example 1: Set the Device Object Instance Identifier to *1234*. 1234 decimal is equal to 4D2 (Hex.). Set *F6-48 = 4D2 (Hex.)* and *F6-49 = 0 (Hex.)*. Example 2: Set the Device Object Instance Identifier to *1234567*. 1234567 decimal is equal to 12D687 (Hex.). Set *F6-48 = D687 (Hex.)* and *F6-49 = 12 (Hex.)*.	0 (0 - 3F (Hex.))
F7-01 (03E5)	IP Address 1	Sets the static/fixed IP address. Sets the most significant octet. **Note:** • 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 for the changes to take effect. For non-Z1000U drives, setting *F6-15 = 1 [Comm. Option Parameters Reload = Reload Now]* enables communication OPT parameter changes without turning on the power again.	192 (0 - 255)
F7-02 (03E6)	IP Address 2	Sets the static/fixed IP address. Sets the second most significant octet. **Note:** • 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 for the changes to take effect. For non-Z1000U drives, setting *F6-15 = 1 [Comm. Option Parameters Reload = Reload Now]* enables communication OPT parameter changes without turning on the power again.	168 (0 - 255)
F7-03 (03E7)	IP Address 3	Sets the static/fixed IP address. Sets the third most significant octet. **Note:** • 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 for the changes to take effect. For non-Z1000U drives, setting *F6-15 = 1 [Comm. Option Parameters Reload = Reload Now]* enables communication OPT parameter changes without turning on the power again.	1 (0 - 255)
F7-04 (03E8)	IP Address 4	Sets the static/fixed IP address. Sets the fourth most significant octet. **Note:** • 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 for the changes to take effect. For non-Z1000U drives, setting *F6-15 = 1 [Comm. Option Parameters Reload = Reload Now]* enables communication OPT parameter changes without turning on the power again.	20 (0 - 255)
F7-05 (03E9)	Subnet Mask 1	Sets the static/fixed Subnet Mask. Sets the most significant octet. **Note:** • 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 for the changes to take effect. For non-Z1000U drives, setting *F6-15 = 1 [Comm. Option Parameters Reload = Reload Now]* enables communication OPT parameter changes without turning on the power again.	255 (0 - 255)
F7-06 (03EA)	Subnet Mask 2	Sets the static/fixed Subnet Mask. Sets the second most significant octet. **Note:** • 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 for the changes to take effect. For non-Z1000U drives, setting *F6-15 = 1 [Comm. Option Parameters Reload = Reload Now]* enables communication OPT parameter changes without turning on the power again.	255 (0 - 255)
F7-07 (03EB)	Subnet Mask 3	Sets the static/fixed Subnet Mask. Sets the third most significant octet. **Note:** • 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 for the changes to take effect. For non-Z1000U drives, setting *F6-15 = 1 [Comm. Option Parameters Reload = Reload Now]* enables communication OPT parameter changes without turning on the power again.	255 (0 - 255)
F7-08 (03EC)	Subnet Mask 4	Sets the static/fixed Subnet Mask. Sets the fourth most significant octet. **Note:** • 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 for the changes to take effect. For non-Z1000U drives, setting *F6-15 = 1 [Comm. Option Parameters Reload = Reload Now]* enables communication OPT parameter changes without turning on the power again.	0 (0 - 255)
F7-09 (03ED)	Gateway Address 1	Sets the static/fixed Gateway address. Sets the most significant octet. **Note:** • This parameter is only effective when *F7-13 = 0 [Address Mode at Startup = Static]*. • All IP Addresses must be unique.	192 (0 - 255)

No. (Hex.)	Name	Description	Default (Range)
		• You must cycle power to the drive for the changes to take effect. For non-Z1000U drives, setting *F6-15 = 1 [Comm. Option Parameters Reload = Reload Now]* enables communication OPT parameter changes without turning on the power again.	
F7-10 (03EE)	Gateway Address 2	Sets the static/fixed Gateway address. Sets the second most significant octet. **Note:** • 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 for the changes to take effect. For non-Z1000U drives, setting *F6-15 = 1 [Comm. Option Parameters Reload = Reload Now]* enables communication OPT parameter changes without turning on the power again.	168 (0 - 255)
F7-11 (03EF)	Gateway Address 3	Sets the static/fixed Gateway address. Sets the third most significant octet. **Note:** • 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 for the changes to take effect. For non-Z1000U drives, setting *F6-15 = 1 [Comm. Option Parameters Reload = Reload Now]* enables communication OPT parameter changes without turning on the power again.	1 (0 - 255)
F7-12 (03F0)	Gateway Address 4	Sets the static/fixed Gateway address. Sets the fourth most significant octet. **Note:** • 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 for the changes to take effect. For non-Z1000U drives, setting *F6-15 = 1 [Comm. Option Parameters Reload = Reload Now]* enables communication OPT parameter changes without turning on the power again.	1 (0 - 255)
F7-13 (03F1)	Address Startup Mode	Selects how the option address is set. 0 : Static 1 : [Not Used/No Function] BOOTP 2 : DHCP **Note:** • You must cycle power to the drive for the changes to take effect. For non-Z1000U drives, setting *F6-15 = 1 [Comm. Option Parameters Reload = Reload Now]* enables communication OPT parameter changes without turning on the power again. • The host controller will assign the IP addresses when *F7-13 = 1 or 2*.	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) **Note:** You must cycle power to the drive for the changes to take effect. For non-Z1000U drives, setting *F6-15 = 1 [Comm. Option Parameters Reload = Reload Now]* enables communication OPT parameter changes without turning on the power again.	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 : [Not Used/No function] 10/100 Mbps (10 Mbps/100 Mbps) 102 : [Not Used/No function] 100/10 Mbps (100 Mbps/10 Mbps) **Note:** • *F7-15* is only effective when the port is set to half or full duplex in *F7-14 [Duplex Mode Selection]*. • You must cycle power to the drive for the changes to take effect. For non-Z1000U drives, setting *F6-15 = 1 [Comm. Option Parameters Reload = Reload Now]* enables communication OPT parameter changes without turning on the power again.	10 (10 - 102)
F7-50 (1BC1)	BACnet/IP Port	Sets the UDP port on which the drive will receive incoming BACnet messages.	47808 (1024 - 65535)
F7-51 (1BE9)	BBMD Foreign Register Addr 1	Sets the first octet of the IP Address of the BACnet Broadcast Management Device (BBMD) to which the drive will register as a foreign device.	0 (0 - 255)
F7-52 (1BEA)	BBMD Foreign Register Addr 2	Sets the second octet of the IP Address of the BACnet Broadcast Management Device (BBMD) to which the drive will register as a foreign device.	0 (0 - 255)
F7-53 (1BEB)	BBMD Foreign Register Addr 3	Sets the third octet of the IP Address of the BACnet Broadcast Management Device (BBMD) to which the drive will register as a foreign device.	0 (0 - 255)
F7-54 (1BEC)	BBMD Foreign Register Addr 4	Sets the fourth octet of the IP Address of the BACnet Broadcast Management Device (BBMD) to which the drive will register as a foreign device.	0 (0 - 255)
F7-55 (1BED)	BBMD Foreign Port #	Sets the UDP port of the BBMD device to which the drive will register.	47808 (1024 - 65535)

No. (Hex.)	Name	Description	Default (Range)
F7-56 (1BEE)	BBMD Foreign Register Time	Sets the time interval in which the drive will repeat BBMD foreign registration.	3600 s (0 - 65535 s)
F7-57 (1BEF)	BACnet/IP BUS Timeout Value	Sets the length of time that the drive will wait after it receives a Run command or frequency reference command before it detects a *bUS* fault.	3600 s (0 - 65535 s)
H5-11 (043C)	Communications ENTER Function Selection (Function common to communication option)	Sets when an Enter command is necessary to use MEMOBUS/Modbus communications to change parameter values. 0 : Parameter changes are activated when ENTER command is written 1 : Parameter changes are activated immediately. No ENTER command is necessary.	0 (0, 1)
o1-03 (0502)	Frequency Display Unit Selection	Sets the display units for the frequency reference and output frequency. Changes to this parameter take effect immediately. It is not necessary to cycle power on the drive. 0 : 0.01 Hz units 1 : 0.01% units 2 : min^{-1} (r/min) units 3 : User Units (o1-09 -o1-11)	0 (0 - 3)

Table 6.1 Option Monitor

No.	Name	Description	Range
U4-75	Communication OPT Protocol	Shows the setting of DIP switch S1. • 75 = Switches 1 and 3 ON, all other OFF (correct for BACnet/IP)  • 00 to 74, 76 to FF = Other switch positions that are incorrect for BACnet/IP **Note:** BACnet/IP will not operate with these setting values. **Note:** • Not all drive software versions will display this monitor. Contact Yaskawa or your nearest sales representative for more information. • This monitor is not available in Z1000U drives.	00 - FF (Hex.)
U4-76 - U4-78	MAC Address 1	Shows the Main MAC Address. • *U4-76*: First octet, Second octet • *U4-77*: Third octet, Fourth octet • *U4-78*: Fifth octet, Sixth octet **Note:** • Not all drive software versions will display this monitor. Contact Yaskawa or your nearest sales representative for more information. • This monitor is not available in Z1000U drives.	0000 - FFFF (Hex.)
U4-79 - U4-81 Expert	MAC Address 2	Shows the second MAC Address. • *U4-79*: First octet, Second octet • *U4-80*: Third octet, Fourth octet • *U4-81*: Fifth octet, Sixth octet **Note:** • Not all drive software versions will display this monitor. Contact Yaskawa or your nearest sales representative for more information. • This monitor is not available in Z1000U drives.	0000 - FFFF (Hex.)
U4-82 - U4-84 Expert	MAC Address 3	Shows the third MAC Address. • *U4-82*: First octet, Second octet • *U4-83*: Third octet, Fourth octet • *U4-84*: Fifth octet, Sixth octet **Note:** • Not all drive software versions will display this monitor. Contact Yaskawa or your nearest sales representative for more information. • This monitor is not available in Z1000U drives.	0000 - FFFF (Hex.)
U6-80 - U6-83	Option IP Address 1 - 4	Shows the currently available local IP Address. • *U6-80*: First octet • *U6-81*: Second octet • *U6-82*: Third octet • *U6-83*: Fourth octet	0 - 255
U6-84 - U6-87	Online Subnet 1 - 4	Shows the currently available subnet mask. • *U6-84*: First octet • *U6-85*: Second octet • *U6-86*: Third octet • *U6-87*: Fourth octet	0 - 255
U6-88 - U6-91	Online Gateway 1 - 4	Shows the currently available gateway address.	0 - 255

No.	Name	Description	Range
		• *U6-88*: First octet • *U6-89*: Second octet • *U6-90*: Third octet • *U6-91*: Fourth octet	
U6-92	Online Speed	Shows CN1A Port 1 link speed.	10: 10 Mbps 100: 100 Mbps
U6-93	Online Duplex	Shows CN1A Port 1 duplex setting.	0: Half/Half 1: Full/Full
U6-94	OPT SPARE 1	Shows CN1B Port 2 link speed.	10: 10 Mbps 100: 100 Mbps
U6-95	OPT SPARE 2	Shows CN1B Port 2 duplex setting.	0: Half/Half 1: Full/Full
U6-96	OPT SPARE 3	RSTP Role and State. Refer to 22 for more information. **Note:** This monitor is compatible with option software versions PRG: 7001 and later. Refer to *U6-97 [OPT SPARE 4]* to check the option software version.	0000 - 9292
U6-97	OPT SPARE 4	Shows the BACnet/IP-specific software version. (when DIP switches are set for BACnet/IP) Shows overall JOHB-SMP3 software version (when DIP switches are all OFF)	-
U6-98	First Fault	Shows first option fault.	-
U6-99	Current Fault	Shows current option fault.	-

7 BACnet/IP Objects Supported

◆ BACnet Interoperability Building Blocks (BIBBs)

A BACnet interoperability building block is a collection of one or more services. Table 7.1 shows the list of BIBBs that are supported by the JOHB-SMP3.

Table 7.1 BACnet Interoperability Building Blocks Supported

Item	Category	Description
DS-RP-B	Data Sharing	Read Property – B (Client)
DS-WP-B	Data Sharing	Write Property – B (Client)
DS-RPM-B	Data Sharing	Read Property Multiple – B (Client)
DS-WPM-B	Data Sharing	Write Property Multiple – B (Client)
DS-COV-B	Data Sharing	Change Of Value – B (Client)
DS-COVP-B	Data Sharing	Change Of Value Property – B (Client)
DM-DDB-B	Device Management	Dynamic Device Binding – B (Client)
DM-DOB-B	Device Management	Dynamic Object Binding – B (Client)
DM-DCC-B	Device Management	Device Communication Control – B (Client)
DM-RD-B	Device Management	Reinitialize Device – B (Client)
DM-TS-B	Device Management	Time Synchronization – B (Client)
DM-UTC-B	Device Management	UTC Time Synchronization – B (Client)

◆ PV Access

The Present Value (PV) of BACnet objects can always be read. Some PVs can also be written or commanded. A commandable PV is almost the same as the writable PV, but the value is actually written into a priority array. The value that has the highest priority in the array will be used by the drive.

Table 7.2 Present Value Access Types and Descriptions

PV Access	Name	Description
C	Commandable	Value written to a priority array. The highest priority value in the array is then written to the drive.
R	Readable	Value is read-only.
W	Writable	Value written to the drive

◆ Supported Properties of Objects

Table 7.3 Object Properties

Property	Object Type						
	Device	Analog Input (AI)	Analog Output (AO)	Analog Value (AV)	Binary Input (BI)	Binary Output (BO)	Binary Value (BV)
Active_COV_Subscriptions	Yes	-	-	-	-	-	-
Active_Text	-	-	-	-	Yes	Yes	Yes
APDU_Timeout	Yes	-	-	-	-	-	-
COV_Increment *1	-	Yes	-	Yes	-	-	-
Current_Command_Priority	-	-	Yes	Yes	-	Yes	Yes
Database_Revision	Yes	-	-	-	-	-	-
Daylight_Savings_Status	Yes	-	-	-	-	-	-
Device_Address_Binding	Yes	-	-	-	-	-	-
Event_State	-	Yes	Yes	Yes	Yes	Yes	Yes
Firmware_Revision	Yes	-	-	-	-	-	-
Inactive_Text	-	-	-	-	Yes	Yes	Yes
Local Date	Yes	-	-	-	-	-	-
Local Time	Yes	-	-	-	-	-	-
Location	Yes	-	-	-	-	-	-
Max_APDU_Length_Accepted	Yes	-	-	-	-	-	-
Model_Name	Yes	-	-	-	-	-	-
Number_Of_APDU_Retries	Yes	-	-	-	-	-	-
Object_Identifier	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Object_List	Yes	-	-	-	-	-	-
Object_Name	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Object_Type	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Out_Of_Service	-	Yes	Yes	Yes	Yes	Yes	Yes
Polarity	-	-	-	-	Yes	Yes	-
Present_Value	-	Yes	Yes	Yes	Yes	Yes	Yes
Priority_Array	-	-	Yes *2	Yes *2	-	Yes	Yes *2
Property_List	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Protocol_Object_Types_Supported	Yes	-	-	-	-	-	-
Protocol_Revision	Yes	-	-	-	-	-	-
Protocol_Services_Supported	Yes	-	-	-	-	-	-
Protocol_Version	Yes	-	-	-	-	-	-
Reliability	-	-	-	-	-	-	-
Relinquish_Default	-	-	Yes *2	Yes *2	-	Yes	Yes *2
Segmentation_Supported	-	-	-	-	-	-	-
Status_Flags	-	Yes	Yes	Yes	Yes	Yes	Yes
System_Status	Yes	-	-	-	-	-	-
Units	-	Yes	Yes	Yes	-	-	-
UTC_Offset	Yes	-	-	-	-	-	-
Vendor_Identifier	Yes	-	-	-	-	-	-
Vendor_Name	Yes	-	-	-	-	-	-

*1 COV function is only available on objects that are not commandable and not writable.
*2 For Commandable Object Instances only.

◆ Analog Input Objects

Object ID	Object Name *(Network Display, if Different)*	Modbus Register (Hex.)	Range	Unit	PV Access
AI1	Drive Analog Input 1 Level *(Drv Anlg In 1 Level)*	004E	0 - 100.0	%	R
AI2	Drive Analog Input 2 Level *(Drv Anlg In 2 Level)*	004F	0 - 100.0	%	R
AI3 *1	Drive Analog Input 3 Level *(Drv Anlg In 3 Level)*	0050	0 - 100.0	%	R
AI4 *2	Bypass Analog Input 1 Level *(Byp Anlg In 1 Level)*	8795	0 - 100.0	%	R
AI6	Display Format o1-03	0502	0 - 65535	-	R
AI7	Scale Format b5-20	01E2	0 - 65535	-	R
AI8	Inverter Model o2-04	0508	0 - 65535	-	R
AI9	Rated Current n9-01	05D0	0 - 6553.5 (for drives rated higher than 11 kVA) 0 - 655.35 (for drives rated 11 kVA or lower)	A	R
AI10 *2	Motor Current UB-01	8780	0 - 655.35	A	R
AI11 *2	Contactor Voltage	8790	0 - 65535	V	R

*1 Not available on all drives. Refer to the Technical Manual of your drive, and check if the Modbus register of the applicable object exists.
*2 Available on bypasses only.

◆ Analog Output Objects

Object ID	Object Name *(Network Display, if Different)*	Modbus Register (Hex.)	Range	Unit	PV Access
AO1	Drive Analog Output 1 Level Drive Terminal FM (set H4-01 = 0) *(Drv Anlg Out1 Level)*	0007	0 - 100.0	%	C
AO2 *1	Drive Analog Output 2 Level Drive Terminal AM (set H4-01 = 0) *(Drv Anlg Out2 Level)*	0008	0 - 100.0	%	C

*1 Not available on all drives. Refer to the Technical Manual of your drive, and check if the Modbus register of the applicable object exists.

◆ Analog Value Objects

Object ID	Object Name *(Network Display, if Different)*	Modbus Register (Hex.)	Range	Unit	PV Access
AV1 *1	Drive Operation Command *(Operation Cmd)*	0001	0 - 65535	Bitmap	C
AV2	Frequency Cmd	0002	0 - 600.00	Determined by o1-03	C
AV3	PI Setpoint Cmd	0006	0 - 100.00	%	C
AV4	Drive Multi-Function Output Command *(MF Output Cmd)* • Bit 0: Multi-FunctionDigital Output 1 (terminal M1-M2) • Bit 1: Multi-FunctionDigital Output 2 (terminal M3-M4) • Bit 2: Multi-Function Digital Output 3 (terminal M5-M6) (Z1000U: MD-ME-MF) • Bit 3: Reserved • Bit 4: Reserved • Bit 5: Reserved • Bit 6: Enables the function in bit 7 • Bit 7: Fault Contact Output (terminal MA-MB-MC)	0009	0 - 255	Bitmap	C

Object ID	Object Name *(Network Display, if Different)*	Modbus Register (Hex.)	Range	Unit	PV Access
	• Bit 8 to F: Reserved **Note:** When using AV4, do not use BO1 to BO3 or BV12.				
AV5	Drive Reference Select Command *(Reference Select Cmd)* • Bit 0: Reserved • Bit 1: PID Setpoint Input • Bit 2: Reserved • Bit 3: Reserved • Bit 4: PI2 Target Input • Bit 5 to B: Reserved • Bit C: Multi-Function Input 5 • Bit D: Multi-Function Input 6 • Bit E: Multi-Function Input 7 • Bit F: Reserved **Note:** When you use AV5, you must not use AV1, BO4, or BV9 to BV11.	000F	0 - 32767	Bitmap	C
AV6	System Status • Bit 0: During Run (drive or bypass) • Bit 1: During Reverse • Bit 2: System Ready • Bit 3: System Faulted • Bit 4: Data Setting Error • Bit 5: Multi-Function Digital Output 1 (terminal M1-M2) • Bit 6: Multi-FunctionDigital Output 2 (terminal M5-M6) • Bit 7: Multi-FunctionDigital Output 3 (terminal M5-M6) (Z1000U: MD-ME-MF) • Bit 8 to D: Reserved • Bit E: ComRef status • Bit F: ComCtrl status	0020	0 - 65535	Bitmap	R
AV7	Fault Details • Bit 0: oC [Overcurrent], GF [Ground Fault] • Bit 1: ov [Overvoltage] • Bit 2: oL2 [Drive Overload] • Bit 3: oH1 [Heatsink Overheat], oH2 [External Overheat (H1-XX=B)] • Bit 4 to 6: Reserved • Bit 7: EF to EF7 [External Fault] • Bit 8: CPFxx [Hardware Fault] (includes oFAxx) • Bit 9: oL1 [Motor Overload], oL3 [Overtorque Detection 1], UL3 [Undertorque Detection 1] • Bit A: Reserved • Bit B: Uv [Undervoltage] • Bit C: Uv1 [DC Bus Undervoltage], Uv2 [Control Power Undervoltage], Uv3 [Soft Charge Answerback Fault] • Bit D: LF [Output Phase Loss], PF [Input Phase Loss] • Bit E: CE [Modbus Communication Error], bUS [Option Communication Error] • Bit F: oPr [Keypad Connection Fault]	0021	0 - 65535	Bitmap	R
AV8	Data Link Status • Bit 0: Writing Data • Bit 1: Reserved • Bit 2: Reserved • Bit 3: Upper or lower limit error • Bit 4: Data conformity error • Bit 5: Writing to EEPROM • Bit 6 to F: Reserved	0022	0 - 63	Bitmap	R
AV9	Frequency Reference	0040	0 - 600.00	Determined by o1-03	R
AV10	Output Frequency	0041	0 - 600.00	Determined by o1-03	R
AV11	Output Voltage	0045	0 - 6553.5	V	R
AV12	Output Current	0026	0 - 6553.5	A	R

Object ID	Object Name *(Network Display, if Different)*	Modbus Register (Hex.)	Range	Unit	PV Access
AV13	Output Power	0047	0 - 6553.5 > 11 kVA 0 - 655.35 ≤ 11 kVA	KW	R
AV14 *3	Torque Reference	0048	0 - 100.0	%	R
AV15	Drive Multi-Function Input Status *(MF Input Status)*	002B	0 - 255	Bitmap	R
AV16	Drive Status 2	002C	0 - 65535	Bitmap	R
AV17	Drive Multi-Function Output Status *(MF Output Status)*	002D	0 - 135	Bitmap	R
AV18	DC Bus Voltage	0031	0 - 6553.5	V	R
AV19	PI Feedback Level	0038	0 - 100.0	%	R
AV20	PI Input Level	0039	0 - 100.0	%	R
AV21	PI Output Level	003A	0 - 100.0	%	R
AV22	CPU Software Drive SW Num for bypass	005B 004D for bypass	0 - 65535	-	R
AV23	Flash Number Bypass SW Num for bypass	004D 8791 for bypass	0 - 65535	-	R
AV25	KVA Setting	0508	-	Enumerated Data Vendor Specific	R
AV26	Control Method	0043	-	Enumerated Data Vendor Specific	R
AV27	Accel Time	0200	0 - 6000.0	Sec	W
AV28	Decel Time	0201	0 - 6000.0	Sec	W
AV29	Parameter Number	#### Register number to access	0 - 65535	-	W
AV30	Parameter Data	#### Write data or read data of the register set in AV29	0 - 65535	-	W
AV31 *2	Motor Current	8780	0 - 6553.5 > 11 kVA 0 - 655.35 ≤ 11 kVA	A	R
AV32 *2	120V to Kx Coils	8790	0 - 65535	V	R
AV33	Drive kWh consumed *(kWh consumed)*	005C - 005D 0820 - 0822 for Z1000U	0 - 999999999	kWh	R
AV34	Drive kWh Regenerated *(kWh Regenerated)* Z1000U only	0823 - 0825 Z1000U only	0 - 999999999 Z1000U only	kWh Z1000U only	R
AV35	Drive Run Time	004C	0 - 65535	Hours	R
AV36	Output Freq in %	003F	0 - 100.00	%	R
AV37	Output Freq in RPM	003E	0 - 65535	RPM	R
AV38	Torque Iq (U6-01)	0051	0 - 6553.5	%	R
AV39	Drive HOA Status (GA800, GA700, or GA500: Drive Lo/Re Status)	004B (07DA for Z1000U)	0 - 2	-	R
AV40	Last Drive Fault	0081	0 - 65535	-	R
AV41 *2	Last BypassFault	878C	0 - 65535	-	R
AV42	Current Sys Fault *(Current Sys Flt)*	0080	0 - 65535	-	R
AV43 *4	Ext Drive Cmd Update	15C5	0 - 65535	-	C
AV44 *4	Ext Drive 1 Command	15C6	0 - 65535	-	C
AV45 *4	Ext Drive 1 Freq Ref	15C7	0 - 65535	-	C
AV46 *4	Ext Drive 2 Command	15C8	0 - 65535	-	C
AV47 *4	Ext Drive 2 Freq Ref	15C9	0 - 65535	-	C
AV48 *4	Ext Drive 3 Command	15CA	0 - 65535	-	C
AV49 *4	Ext Drive 3 Freq Ref	15CB	0 - 65535	-	C

Object ID	Object Name *(Network Display, if Different)*	Modbus Register (Hex.)	Range	Unit	PV Access
AV50 *4	Ext Drive 4 Command	15CC	0 - 65535	-	C
AV51 *4	Ext Drive 4 Freq Ref	15CD	0 - 65535	-	C
AV52 *4	Ext Drive 1 Status	15E7	0 - 65535	-	R
AV53 *4	Ext Drive 1 Freq Output *(Ext Drive 1 Freq Out)*	15E8	0 - 65535	-	R
AV54 *4	Ext Drive 2 Status	15E9	0 - 65535	-	R
AV55 *4	Ext Drive 2 Freq Output *(Ext Drive 2 Freq Out)*	15EA	0 - 65535	-	R
AV56 *4	Ext Drive 3 Status	15EB	0 - 65535	-	R
AV57 *4	Ext Drive 3 Freq Output *(Ext Drive 3 Freq Out)*	15EC	0 - 65535	-	R
AV58 *4	Ext Drive 4 Status	15ED	0 - 65535	-	R
AV59 *4	Ext Drive 4 Freq Output *(Ext Drive 4 Freq Out)*	15EE	0 - 65535	-	R
AV60 *4	Ext Drive Register Write Access *(Gateway Reg 0x15CE)*	15CE	0 - 65535	-	W
AV61 *4	Ext Drive Write Register Number *(Gateway Reg 0x15CF)*	15CF	0 - 65535	-	W
AV62 *4	Ext Drive Write Register Data *(Gateway Reg 0x15D0)*	15D0	0 - 65535	-	W
AV63 *4	Ext Drive Register Read Access *(Gateway Reg 0x15EF)*	15EF	0 - 65535	-	R
AV64 *4	Ext Drive Read Register Number *(Gateway Reg 0x15F0)*	15F0	0 - 65535	-	R
AV65 *4	Ext Drive Read Register Data *(Gateway Reg 0x15F1)*	15F1	0 - 65535	-	R

*1 Use with caution because bits 4 to A of AV1 will be logically ORed with the physical digital inputs. This can cause hard-wired Normally Closed inputs to operate incorrectly.
*2 Available on bypasses only.
*3 Not available on all drives. Refer to the Technical Manual of your drive, and check if the Modbus register of the applicable object exists.
*4 See Gateway Mode features in drive manuals for use instructions of AV43-AV65. Not visible when connected to a drive that does not support Gateway Mode.

◆ Binary Input Objects

Object ID	Object Name *(Network Display, if Different)*	Modbus Register (Hex.)	Active Text	Inactive Text	PV Access
BI1	Drive Input Terminal 1 *(Input Terminal 1)*	002B: Bit 0	ON	OFF	R
BI2	Drive Input Terminal 2 *(Input Terminal 2)*	002B: Bit 1	ON	OFF	R
BI3	Drive Input Terminal 3 *(Input Terminal 3)*	002B: Bit 2	ON	OFF	R
BI4	Drive Input Terminal 4 *(Input Terminal 4)*	002B: Bit 3	ON	OFF	R
BI5	Drive Input Terminal 5 *(Input Terminal 5)*	002B: Bit 4	ON	OFF	R
BI6	Drive Input Terminal 6 *(Input Terminal 6)*	002B: Bit 5	ON	OFF	R
BI7	Drive Input Terminal 7 *(Input Terminal 7)*	002B: Bit 6	ON	OFF	R
BI8	Drive MF Output 1 *(Multi Function Out 1)*	0020: Bit 5	ON	OFF	R
BI9	Drive MF Output 2 *(Multi Function Out 2)*	0020: Bit 6	ON	OFF	R
BI10	Drive MF Output 3	0020: Bit 7	ON	OFF	R

Object ID	Object Name *(Network Display, if Different)*	Modbus Register (Hex.)	Active Text	Inactive Text	PV Access
	(Multi Function Out 3) BYP DI-1 STAT for bypass	8781 for bypass: Bit 0			
BI11	Drive Input Terminal 8 *(Input Terminal 8)* BYP DI-2 STAT for bypass	002B: Bit 7 8781 for bypass: Bit 1	ON	OFF	R
BI12 *1	BYP DI-3 STAT	8781: Bit 2	ON	OFF	R
BI13 *1	BYP DI-4 STAT	8781: Bit 3	ON	OFF	R
BI14 *1	BYP DI-5 STAT	8781: Bit 4	ON	OFF	R
BI15 *1	BYP DI-6 STAT	8781: Bit 5	ON	OFF	R
BI16 *1	BYP DI-7 STAT	8781: Bit 6	ON	OFF	R
BI17 *1	BYP DI-8 STAT	8781: Bit 7	ON	OFF	R
BI18 *1	BYP DO-1 STAT	8782: Bit 0	ON	OFF	R
BI19 *1	BYP DO-2 STAT	8782: Bit 1	ON	OFF	R
BI20 *1	BYP DO-3 STAT	8782: Bit 2	ON	OFF	R
BI21 *1	BYP DO-4 STAT	8782: Bit 3	ON	OFF	R
BI22 *1	BYP DO-5 STAT	8782: Bit 4	ON	OFF	R
BI23 *1	BYP DO-6 STAT	8782: Bit 5	ON	OFF	R
BI24 *1	BYP DO-7 STAT	8782: Bit 6	ON	OFF	R
BI25 *1	BYP DO-8 STAT	8782: Bit 7	ON	OFF	R
BI26 *1	BYP DO-9 STAT	8783: Bit 0	ON	OFF	R
BI27 *1	BYP DO-10 STAT	8783: Bit 1	ON	OFF	R
BI28	Drive Fault Status	004B: Bit 7	FAULT	OK	R
BI29	Drive Alarm Status	004B: Bit 6	ALARM	OK	R
BI30 *1	Sys Alarm Status	8784: Bit 8	ALARM	OK	R
BI31 *2	Safe Torque Off HW Status *(Saf Trq Off Hw Stat)*	0020: Bit 12	ALARM	OK	R
BI32 *2	Safe Torque Off Status *(Saf Trq Off Stat)*	0020: Bit 13	ALARM	OK	R

*1 Available on bypass only.
*2 Not available on Z1000U.

◆ Binary Output Objects

Object ID	Object Name	Modbus Register (Hex.)	Active Text	Inactive Text	PV Access
BO1	MF Output, M1-M2 (GA500: MF Output MA-MB-MC) Set *H2-01* = *F* to use	0009: Bit 0	ON	OFF	C
BO2	MF Output, M3-M4 (GA500: MF Output P1 - C1) Set *H2-02* = *F* to use	0009: Bit 1	ON	OFF	C
BO3	MF Output, M5-M6 (Z1000U: MF Output MD-ME-MF) (GA500: MF Output P2 - C2) Set *H2-03* = *F* to use	0009: Bit 2	ON	OFF	C
BO4	Ref Sel: PI Setpoint	000F: Bit 1	ON	OFF	C
BO5	Ref Sel:Term S5 IN	0001: Bit 8	ON	OFF	C
BO6	Ref Sel:Term S6 IN	0001: Bit 9	ON	OFF	C
BO7	Ref Sel:Term S7 IN	0001: Bit A	ON	OFF	C
BO8 *1 *2	BYP DO-07 COMMAND	8403: Bit 6	ON	OFF	C
BO9 *1 *2	BYP DO-08 COMMAND	8403: Bit 7	ON	OFF	C

Object ID	Object Name	Modbus Register (Hex.)	Active Text	Inactive Text	PV Access
BO10 *1 *2	BYP DO-09 COMMAND	8403: Bit 8	ON	OFF	C
BO11 *1 *2	BYP DO-010 COMMAND	8403: Bit 9	ON	OFF	C

*1 Set the corresponding *Z2-xx parameter = 99 - Not Used*.
*2 Available on bypass only.

◆ Binary Value Objects

Object ID	Object Name *(Network Display, if Different)*	Modbus Register (Hex.)	Active Text	Inactive Text	PV Access
BV1 *1	Run FWD Cmd	0001: Bit 0	RUN	OFF	C
BV2 *2	Run REV Cmd	0001: Bit 1	REV	OFF	C
BV3	Drive EF0 *(Ext Fault Cmd)*	0001: Bit 2	FAULT	OFF	C
BV4	Drive Fault Reset *(Fault Reset Cmd)*	0001: Bit 3	RESET	OFF	C
BV5	Drive Com Net Command *(Com Net Cmd)*	-	COM	LOCAL	C
BV6	Drive Com Control Command *(Com Control Cmd)*	-	COM	LOCAL	C
BV7 *3	Drive Multi-Function Input 3 Command *(MF Input 3 Cmd)*	0001: Bit 6	ON	OFF	C
BV8 *3	Drive Multi-Function Input 4 Command	0001: Bit 7	ON	OFF	C
BV9 *3	Drive Multi-Function Input 5 Command *(MF Input 5 Cmd)*	0001: Bit 8	ON	OFF	C
BV10 *3	Drive Multi-Function Input 6 Command *(MF Input 6 Cmd)*	0001: Bit 9	ON	OFF	C
BV11 *3	Drive Multi-Function Input 7 Command *(MF Input 7 Cmd)*	0001: Bit A	ON	OFF	C
BV12 *4	Set Fault Contact Cmd *(Set Flt Contact Cmd)*	0009: Bit 6&7	ENABLE	OFF	C
BV13	RUN-STOP	0020: Bit 0	RUN	OFF	R
BV14	REV-FWD	0020: Bit 1	REV	FWD	R
BV15	READY	004B: Bit 5	READY	OFF	R
BV16	FAULT	0020: Bit 3	FAULTED	OFF	R
BV17	Data Set Error	004B: Bit 8	ERROR	OFF	R
BV18	Overcurrent – Ground Fault *(Overcurrent– Gnd Flt)*	0021: Bit 0	OC – GF	OFF	R
BV19	Main Circuit Overvoltage *(Main Ckt Overvoltage)*	0021: Bit 1	OV	OFF	R
BV20	Drive Overload	0021: Bit 2	OL2	OFF	R
BV21	Drive Overheat	0021: Bit 3	OH1-OH2	OFF	R
BV22	Fuse Blown	0021: Bit 5	PUF	OFF	R
BV23	PI Feedback Loss	0021: Bit 6	FBL	OFF	R
BV24	External Fault	0021: Bit 7	EF0 – EF	OFF	R
BV25	Hardware Error	0021: Bit 8	CPF	OFF	R
BV26	Motor Overload – Overtorque *(Mtr OvrLd – OvrTorque)*	0021: Bit 9	OL1 – OL3	OFF	R
BV27	Overspeed	0021: Bit A	OS –DEV	OFF	R
BV28	Main Circuit Undervoltage *(Main Ckt Undrvoltage)*	0021: Bit B	UV	OFF	R
BV29	MCU, Control Power Supply Error *(MCU Cntrl Pwr Sy Err)*	0021: Bit C	UV1-2-3	OFF	R
BV30	Output Phase Loss	0021: Bit D	LF	OFF	R
BV31	BUS Fault	0021: Bit E	BUS	OFF	R

Object ID	Object Name *(Network Display, if Different)*	Modbus Register (Hex.)	Active Text	Inactive Text	PV Access
BV32	Operator Disconnect	0021: Bit F	OPR	OFF	R
BV33	Operating	002C: Bit 0	OPERATING	OFF	R
BV34	Zero Speed	002C: Bit 1	ON	OFF	R
BV35	Frequency Agree	002C: Bit 2	ON	OFF	R
BV36	Desired Frequency Agree *(Desired Freq Agree)*	002C: Bit 3	ON	OFF	R
BV37	Frequency Detect 1	002C: Bit 4	ON	OFF	R
BV38	Frequency Detect 2	002C: Bit 5	ON	OFF	R
BV39	Drive Startup Complete *(Drv Startup Complete)*	002C: Bit 6	ON	OFF	R
BV40	Low Voltage Detect	002C: Bit 7	ON	OFF	R
BV41	Base Block	002C: Bit 8	ON	OFF	R
BV42	Frequency Reference Mode *(Frequency Ref Mode)*	002C: Bit 9	LOCAL	COM	R
BV43	Run Command Mode	002C: Bit A	LOCAL	COM	R
BV44	Over Torque Detect	002C: Bit B	ON	OFF	R
BV45	Frequency Reference Loss *(Frequency Ref Loss)*	002C: Bit C	ON	OFF	R
BV46	Retry Error	002C: Bit D	ON	OFF	R
BV55	Parameter Accept	Executes the RAM enter command.	ON	OFF	W
BV56	Parameter Enter	Executes the ROM enter command.	ON	OFF	W
BV58 **5*	Bypass Forward Run Cmd *(BYP Run Fwd CMD)*	0001: Bit 0	ON	OFF	C
BV59 **6*	Bypass Reverse Run Cmd *(BYP Run Rev CMD)*	0001: Bit 1	ON	OFF	C
BV60 **7 *8*	Emergency Override Drive Reverse *(Em Over DRV REV CMD)*	Internal	ON	OFF	C
BV61 **9*	Bypass Transfer to Bypass Cmd *(BYP Xfer to BYP CMD)*	8400: Bit 3	ON	OFF	C
BV62 **9*	Emergency Overide Bypass *(Em Over BYPASS CMD)*	8400: Bit 4	ON	OFF	C
BV63 **7*	Emergency Override Drive Forward *(Em Over DRV FWD CMD)*	Internal	ON	OFF	C
BV64 **9*	Bypass Motor OR Select Command *(BYP Mtr OR Sel CMD)*	8400: Bit 6	ON	OFF	C
BV65 **9*	Bypass Motor AND Select Command *(BYP Mtr AND Sel CMD)*	8400: Bit 7	ON	OFF	C
BV69 **9 *10*	Bypass BYPASS Select Command *(BYP BYPASS Sel CMD)*	8400: Bit C	BYP	DRV	C
BV70 **9*	Bypass Fault Reset Command *(BYP Fault Reset CMD)*	8400: Bit D	ON	OFF	C
BV71 **9*	Bypass External Fault Command *(BYP Ext Fault CMD)*	8400: Bit E	ON	OFF	C
BV72 **9 *11*	Bypass DI-01 Command *(BYP DI-01 Command)*	8402: Bit 0	ON	OFF	C
BV73 **9 *11*	Bypass DI-02 Command *(BYP DI-02 Command)*	8402: Bit 1	ON	OFF	C
BV74 **9 *11*	Bypass DI-03 Command *(BYP DI-03 Command)*	8402: Bit 2	ON	OFF	C
BV75 **9 *11*	Bypass DI-04 Command *(BYP DI-04 Command)*	8402: Bit 3	ON	OFF	C
BV76 **9 *11*	Bypass DI-05 Command *(BYP DI-05 Command)*	8402: Bit 4	ON	OFF	C

Object ID	Object Name *(Network Display, if Different)*	Modbus Register (Hex.)	Active Text	Inactive Text	PV Access
BV77 **9 *11*	Bypass DI-06 Command *(BYP DI-06 Command)*	8402: Bit 5	ON	OFF	C
BV78 **9 *11*	Bypass DI-07 Command *(BYP DI-07 Command)*	8402: Bit 6	ON	OFF	C
BV79 **9 *11*	Bypass DI-08 Command *(BYP DI-08 Command)*	8402: Bit 7	ON	OFF	C
BV80 **9*	Bypass HAND Mode Status *(BYP HAND Mode Status)*	8784: Bit 0	ON	OFF	R
BV81 **9*	Bypass OFF Mode Status *(BYP OFF Mode Status)*	8784: Bit 1	ON	OFF	R
BV82 **9*	Bypass AUTO Mode Status *(BYP AUTO Mode Status)*	8784: Bit 2	ON	OFF	R
BV83 **9*	Bypass DRIVE Mode Status *(BYP DRV Mode Status)*	8784: Bit 3	ON	OFF	R
BV84 **9*	Bypass BYPASS Mode Status *(BYP BYPASS Mode Stat)*	8784: Bit 4	ON	OFF	R
BV85 **9*	Bypass Emergency Run Bypass Status *(BYP Em-Over BYP Stat)*	8784: Bit 5	ACTIVE	OFF	R
BV86 **9*	Bypass Emergency Run Drive Fwd Status *(BYP Em-Over DRV Stat)*	8784: Bit 6	ACTIVE	OFF	R
BV87 **9*	Bypass Safety Status *(BYP Safety Status)*	8784: Bit 7	OPEN	CLOSED	R
BV88 **9*	Bypass BAS Interlock Status *(BYP BAS Interlk Stat)*	8785: Bit 0	OPEN	CLOSED	R
BV89 **9*	Bypass Run Status *(BYP RUN Status)*	8785: Bit 1	RUN	OFF	R
BV90 **9*	Bypass Fault Status *(BYP Fault Status)*	8785: Bit 2	FAULT	OFF	R
BV91 **9*	Bypass Auto Transfer Status *(BYP Auto Xfer Status)*	8785: Bit 3	ACTIVE	OFF	R
BV92 **9*	Bypass Remote Transfer Status *(BYP Remote Xfer Stat)*	8785: Bit 4	ACTIVE	OFF	R
BV93 **9*	Bypass Energy Savings Status *(BYP Energy Save Stat)*	8785: Bit 5	ACTIVE	OFF	R
BV94 **9*	Bypass Motor 1 Select Status *(BYP Motor 1 Sel Stat)*	8785: Bit 6	SELECT	OFF	R
BV95 **9*	Bypass Motor 2 Select Status *(BYP Motor 2 Sel Stat)*	8785: Bit 7	SELECT	OFF	R
BV96 **9*	Bypass Drive Fault Status *(BYP Drive Flt Status)*	8786: Bit 0	FAULT	OFF	R
BV97 **9*	BYP Safety Status 2 *(BYP Safety Status 2)*	8786: Bit 1	OPEN	CLOSED	R
BV98 **9*	Bypass BAS Interlock Fault Status *(BYP BAS ILock Status)*	8786: Bit 2	FAULT	OFF	R
BV99 **9*	Bypass External Fault Status *(BYP Ext Fault Stat)*	8786: Bit 3	FAULT	OFF	R
BV101 **9*	Bypass Motor OL Status *(BYP Motor OL Stat)*	8786: Bit 5	FAULT	OFF	R
BV102 **9*	Bypass Motor 1 External OL Status *(BYP Motor 1 OL Stat)*	8786: Bit 6	FAULT	OFF	R
BV103 **9*	Bypass Motor 2 External OL Status *(BYP Mtr 2 OL Stat)*	8786: Bit 7	FAULT	OFF	R
BV104 **9*	Bypass Brownout Detect Status *(BYP Brownout Detect)*	8787: Bit 0	FAULT	OFF	R
BV105 **9*	Bypass Drive Comms Status *(BYP Drive Comms)*	8787: Bit 2	FAULT	OFF	R

Object ID	Object Name *(Network Display, if Different)*	Modbus Register (Hex.)	Active Text	Inactive Text	PV Access
BV106 *9	Bypass Loss of Load Status *(BYP Loss Of Load)*	8787: Bit 5	FAULT	OFF	R
BV107 *9	Option Board on Drive Status *(BYP Option Brd Comms)*	8787: Bit 4	FAULT	OFF	R

*1 Drive only. For bypass, use BV58.
*2 Drive only. For bypass, use BV59.
*3 Use with caution because objects BV7 to BV11 will be logically ORed with the physical digital inputs. This can cause hard-wired Normally Closed inputs to operate incorrectly.
*4 Not available on GA500.
*5 Bypass only. Command a drive forward run or a bypass run.
*6 Bypass only. Command a drive reverse run.
*7 Not available on Z1000U, GA500, GA700, or GA800. Available on HV600, FP605, and HV600 and FP605 Bypasses.
*8 Set *b1-04 = 0* to use.
*9 Available on bypass only.
*10 Set *Z1-39 = 3* to use.
*11 Set *Z3-12 = 1* to use. Use with caution because objects BV72 to BV81 will be logically ORed with the physical digital inputs. This can cause hard-wired Normally Closed inputs (for example, Safety or Interlock) to operate incorrectly.

◆ Device Object

Table 7.4 Device Objects

Property	Description
Active COV Subscriptions	Contains a list of all active COV subscriptions
APDU Timeout	10000 milliseconds (fixed)
Application Software Version	“VST9070xx” (fixed)
Database Revision	0
Daylight Savings Status	TRUE or FALSE
Device Address Binding	-
Firmware Revision	3.0x (fixed)
Local Date	Read from the drive (if available). Can also be set over the network.
Local Time	Read from the drive (if available). Can also be set over the network.
Location	Settable via the network. If not set, it will default to the drive model number and serial number. Example: “CIPR-HV60U4005 S/N:1W221325769xxxx”
Max APDU Length Accepted	1476 bytes (fixed)
Model Name	Drive model number and serial number. Example: “CIPR-HV60U4005 S/N:1W221325769xxxx”
Number of APDU Retries	0 (fixed)
Object Identifier	Instance: Numeric value set by F6-49 and F6-48 Type: “OBJECT_DEVICE” (fixed)
Object List	<List of all available objects>
Object Name	Settable via the network. If not set, it will default to: “Yaskawa” + “VFD” or BYP” + “ID” + F6-49 (Hex.) + F6-48 (Hex.) Example: “Yaskawa VFD ID092A5A”
Object Type	8: Object Device (fixed)
Protocol Object Types Supported	Analog Input, Analog Output, Analog Value, Binary Input, Binary Output, Binary Value, Device, Network Port
Protocol Revision	19 (fixed)
Protocol Services Supported	Subscribe COV, Read Property, Read Property Multiple, Write Property, Write Property Multiple, Device Communication Control, Reinitialize Device, Time Synchronization, Who Has, Who Is, UTC Time Synchronization, Subscribe COV Property
Protocol Version	1 (fixed)
Segmentation Supported	3: None
System Status	0: Operational 4: Non Operational (faulted)
UTC Offset	Settable from the network. Units are “minutes”.

Property	Description
Vendor Identifier	141 (fixed)
Vendor Name	Yaskawa (fixed)

◆ Network Port Object

Table 7.5 Network Port Objects

Property	Description
APDU Length	1476 (fixed)
BACnet IP Mode	0: Normal or 1: Foreign
BACnet IP UDP Port	Set by F7-50
Changes Pending	TRUE or FALSE
Foreign Device BBMD Address	Settable over network or using drive parameters: IP Address: Set by F7-51 to F7-54 Port: Set by F7-55
Foreign Device Subscription Lifetime	Settable over network or using F7-56 (seconds)
IP Address	Settable over network, set by F7-01 to F7-04, or set by DHCP server
IP Default Gateway	Settable over network, set by F7-09 to F7-12, or set by DHCP server
IP DHCP Enable	Settable over network or set by F7-13 (0 = FALSE, 1 or 2 = TRUE).
IP DNS Server	DNS server address assigned from DHCP server.
IP Subnet Mask	Settable over network, set by F7-05 to F7-08, or set by DHCP server
Link Speed	Network speed (bits per second)
MAC Address	Current IP address and port (IP1 : IP2 : IP3 : IP4 : Port Byte H : Port Byte L)
Network Number	-
Network Number Quality	-
Network Type	5: IPV4 (fixed)
Object Identifier	Instance: 1 (fixed) Type: OBJECT_NETWORK_PORT 1 (fixed)
Object Type	56: Object Network Port (fixed)
Out Of Service	FALSE (fixed)
Protocol Level	2: BACnet Application (fixed)
Reference Port	4194303 (fixed)
Reliability	0: No Fault Detected (fixed)
Status Flags	0000 (fixed)

8 Web Interface

The option 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 option into a web browser to access the home page.

Example: "http://192.168.1.20"

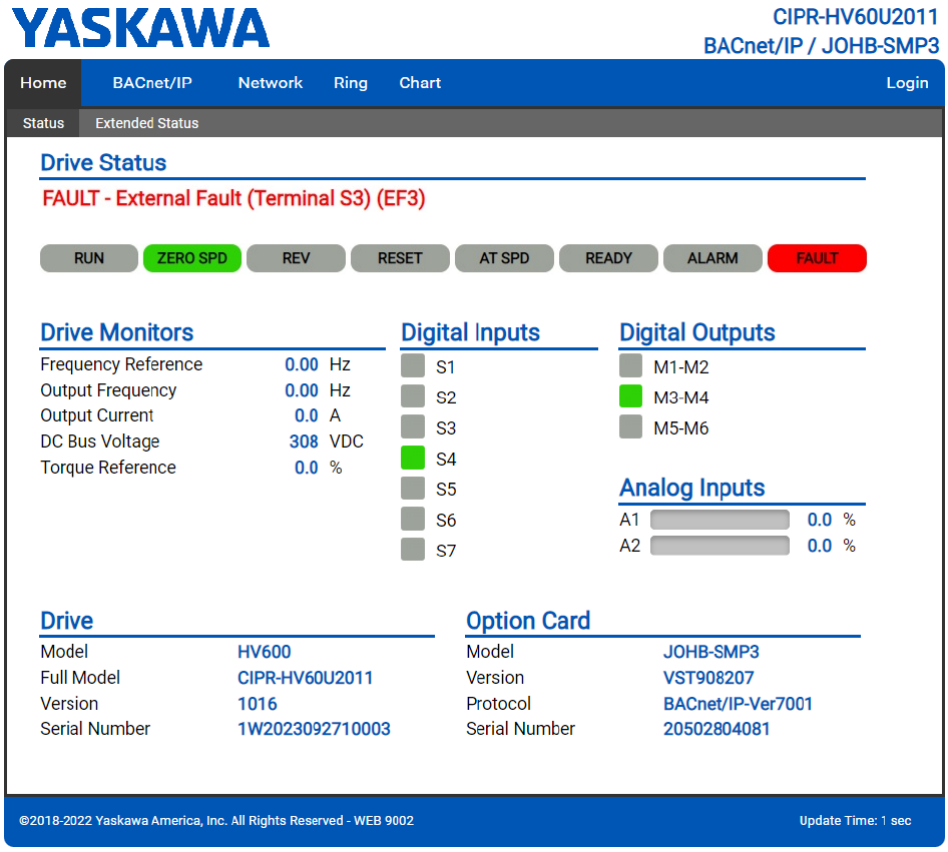
The JOHB-SMP3 IP Address is available using drive keypad to access Option Monitors *U6-80* to *U6-83*. Refer to Table 6.1 for more information.

◆ Home Page

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

Figure 8.1 Home Page View

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



If an 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 Technical Manual for your drive for details on the fault or minor fault.

◆ BACnet/IP Page

The BACnet/IP page shows basic information about the protocol.

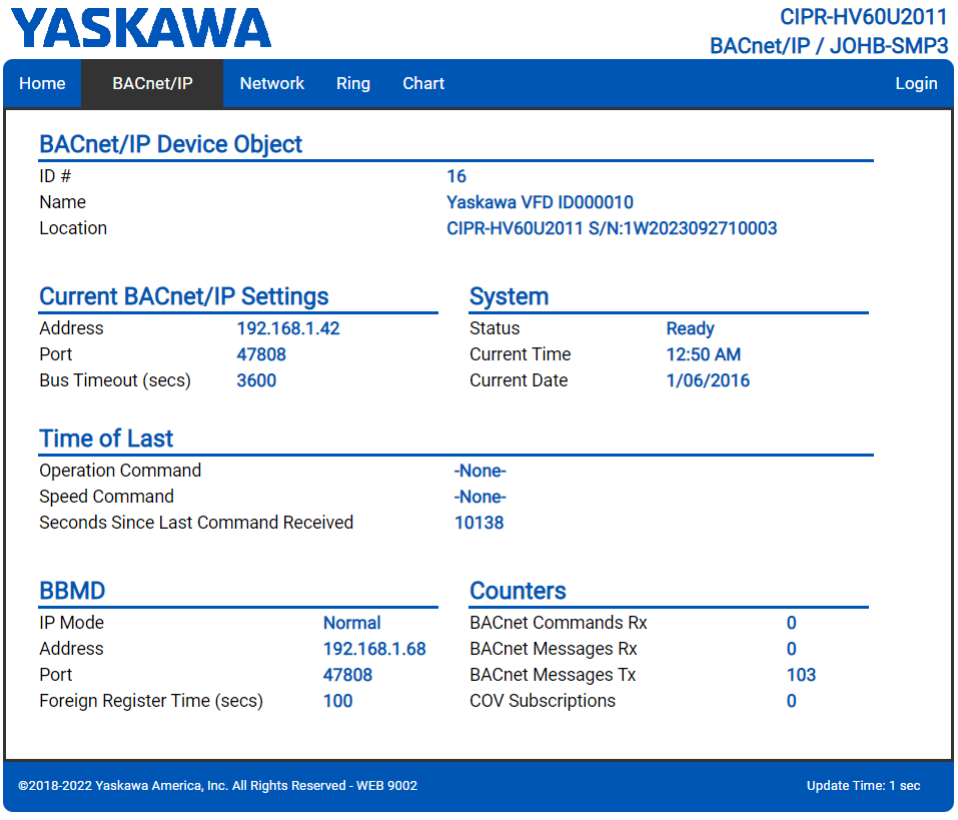


Figure 8.2 BACnet/IP Page View

◆ Network Page

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

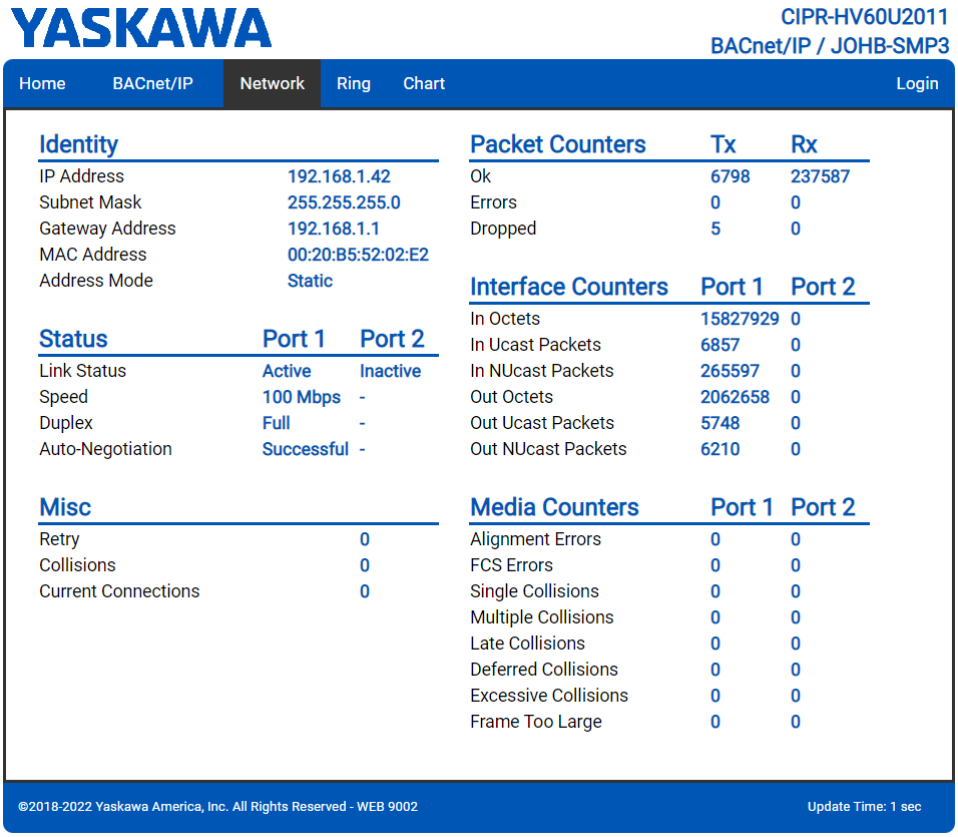


Figure 8.3 Network Page View

Table 8.1 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.
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 that the option will use.
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 of the option.
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 of the option.
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).

Name	Description
Msg Rx OK	Cumulative number of messages received successfully to JOHB-SMP3.
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 from JOHB-SMP3.
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 of the option.
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 RSTP network. RSTP can be enabled and disabled from this page, and the priority can be modified. To change either of these values, you must be logged into the page first.

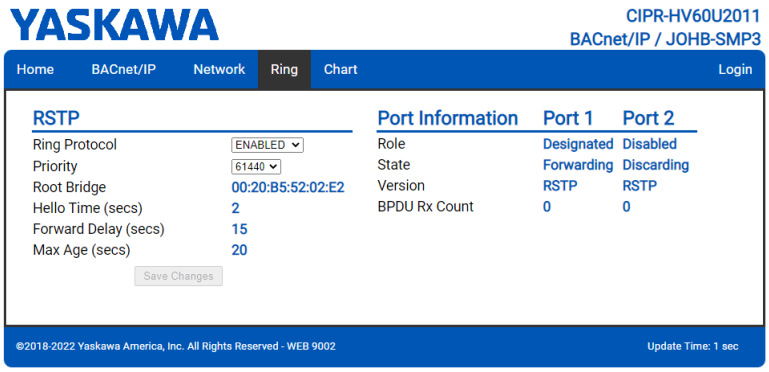


Figure 8.4 Ring Page View

■ 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 option defaults to the lowest priority, 61440. Refer to Table 8.2 for information on [Priority] field setting.

Table 8.2 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 Table 8.2 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 8.3 for the seven settings in the [Role] field.

Table 8.3 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.
N/A	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 8.4.

Table 8.4 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
- Terminal Analog Input 2
- Terminal Analog Input 3

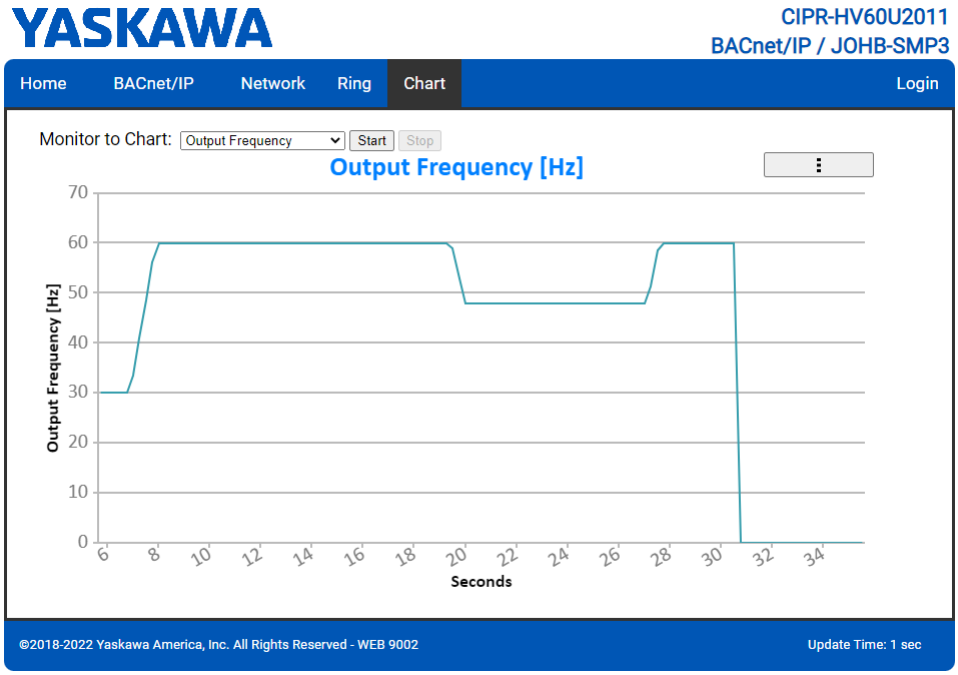


Figure 8.5 Chart Page View

◆ Email Alerts Page (Requires Security Login)

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 into the option.

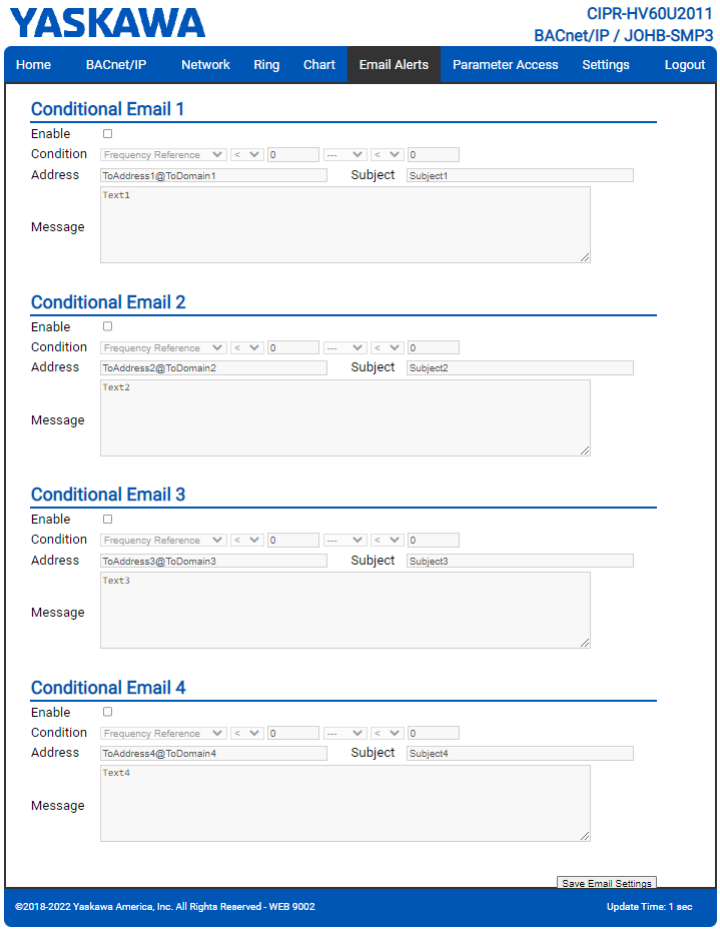


Figure 8.6 Email Alerts Page View

■ 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 (Requires Security Login)

The Parameter Access page lets you read parameters, monitors and other Memobus registers from the drive.

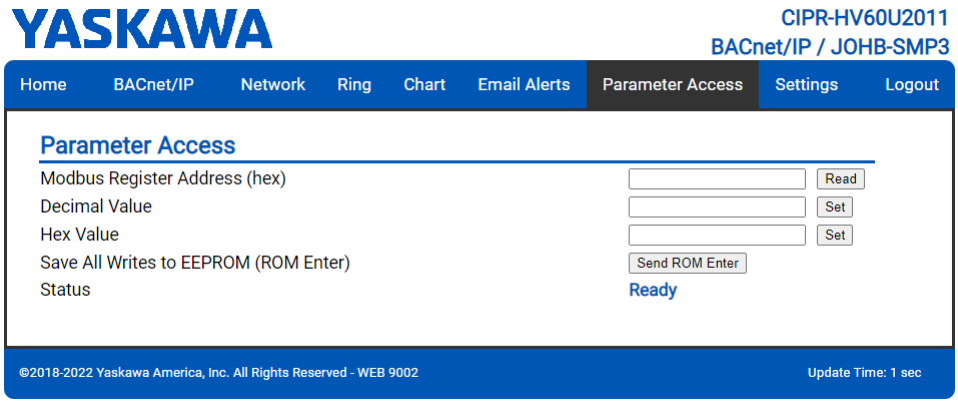


Figure 8.7 Parameter Access Page View

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 (Requires Security Login)

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

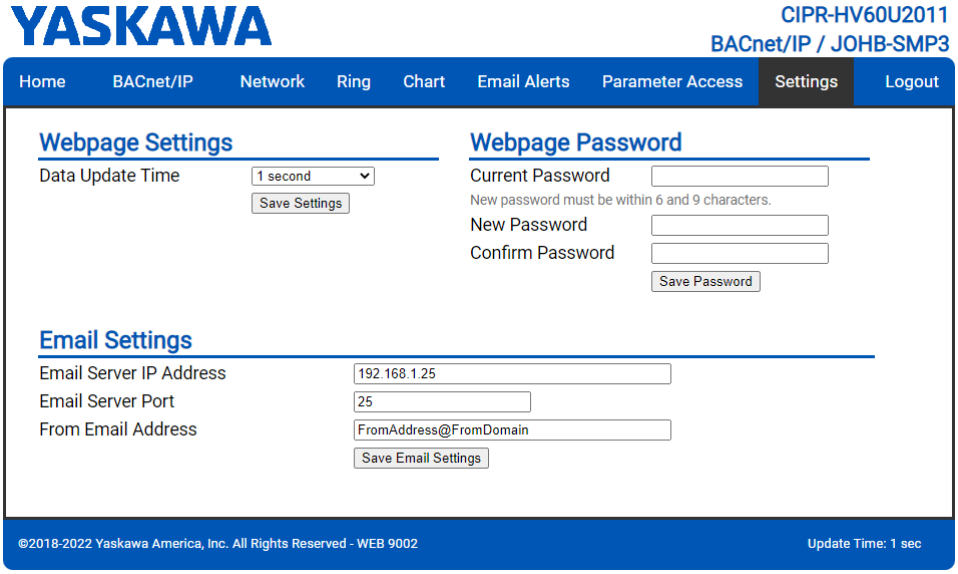


Figure 8.8 Settings Page View

■ 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 into the option, click “Save Email Settings”.

9 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. After restoring the failed path, RSTP disables any redundant paths without disrupting network traffic.

Note:

RSTP is compatible with option software versions PRG: 7001 and later. Refer to *U6-97 [OPT SPARE 4]* to check the option software version.

◆ 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 (e.g., path failures and restorations).

Take special care when using parameter *F7-57 [BACnet/IP bUS Timeout Value]*, Communication Timeout Loss, and be sure to give RSTP enough time for convergence. When *F7-57* 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

The option 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 option.

1. Use the keypad to read the IP address values from monitors *U6-80*, *U6-81*, *U6-82*, and *U6-83*.
   The IP address of the option is necessary to access the webpage.
   Refer to Table 9.1 for example values of the monitors for an option IP address of 192.168.1.20.

Table 9.1 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 38* for more information about the Home page.
3. Click [Ring] tab on top of the webpage.
   The Ring page is displayed with the [Ring Protocol] label in the [RSTP] field set to [DISABLED].
4. After changing the setting value of the [Ring Protocol] label to [ENABLED], click [Save Changes].
   The Ring page is automatically updated and RSTP is enabled.

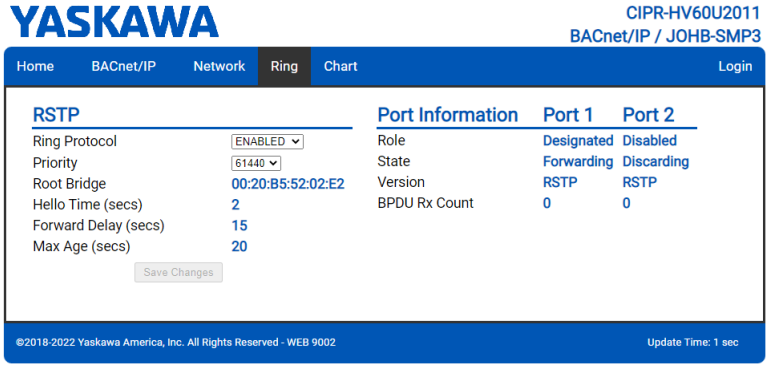


Figure 9.1 Ring Page View

◆ 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 9.2.

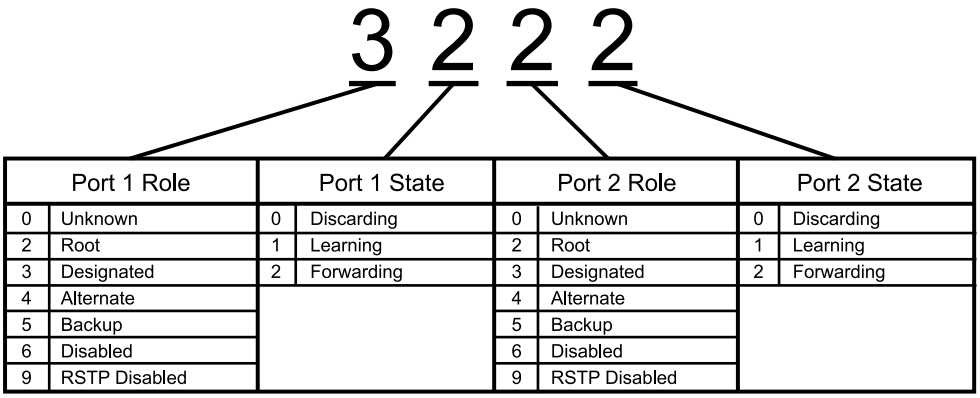


Figure 9.2 U6-96 Monitor Values

Refer to Table 8.3 for descriptions of the port role values.

Refer to Table 8.4 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 option 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.

10 Troubleshooting

◆ Drive-Side Error Codes

Drive-side error codes appear on the drive keypad. This section lists causes of the errors and possible corrective actions. Refer to the drive Technical Manual for additional error codes that may appear on the drive keypad.

■ Faults

Both *bUS [Option Communication Error]* and *EF0 [Option Card External Fault]* can appear as 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 properly connected to the option? Is it loose?
- Is the option properly installed?
- Is the host controller program working? Is the controller/host controller CPU stopped?
- Did a momentary power loss interrupt communications?

Code	Name	Causes	Possible Solutions
bUS	Option Communication Error	The drive did not receive a signal from the controller.	• Check for wiring errors. • Correct the wiring.
		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	• Prevent noise in the control circuit, main circuit, and ground wiring. • If you identify a magnetic contactor as a source of noise, install a surge absorber to the contactor coil. • Use only recommended cables or other shielded line. Ground the shield on the controller side or the drive input power side. • Separate all communication wiring from drive power lines. Install an EMC noise filter to the drive power supply input. • Decrease the effects of electrical interference from the host controller.
		Option is damaged	If there are no problems with the wiring and the error continues to occur, replace the option.
		Connection Time-out	Check if the CPU of the controller is not stopped.
		Duplicate IP Address found on network, or the network part of the optional IP address and the gateway address are different.	Change to a different IP address. If *F7-13 = 0 [Address Mode at Startup = Static]*, change parameters *F7-01 to F7-12 [IP Address, Subnet Mask, Gateway Address]*. 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.
EF0	Option Card External Fault	The option received an external fault from the controller.	1. Find the device that caused the external fault and remove the cause. 2. Clear the external fault input from the controller.
		A programming error occurred on the controller side.	Examine the operation of the controller program.
oFA00	Option Not Compatible with Port	The option connected to connector CN5-A is not compatible.	Connect the option to the correct connector. • Use connector CN5-A when you connect the option. To use other options, refer to those option manuals.
		Invalid DIP switch S1 setting.	Set the option DIP switch S1 as shown in page 12. Monitor, *U4-75 [Communication OPT Protocol]* will display the DIP switch S1 setting.
		BACnet/IP is not installed on the JOHB-SMP3 card.	Upgrade the software in the JOHB-SMP3. For details, consult your local Yaskawa representative.
		Drive software is not compatible with BACnet/IP on the JOHB-SMP3 card.	Upgrade the software in the drive. For details, consult your local Yaskawa representative.
oFA01	Option Card Fault (CN5-A)	The option connected to the option port CN5-A was changed during run.	1. De-energize the drive. 2. Connect the option to the correct option port.
oFA03, oFA04	Option Card Error (CN5-A)	A fault occurred in the option.	1. De-energize the drive. 2. Make sure that the option is correctly connected to the connector. 3. If the problem continues, replace the option.
oFA30 to oFA43	Option Card Connection Error (CN5-A)	A fault occurred in the option.	1. De-energize the drive. 2. Make sure that the option is correctly connected to the connector. 3. If the problem continues, replace the option.

Code	Name	Causes	Possible Solutions
oFb00	Option Not Compatible with Port	The option connected to connector CN5-B is not compatible.	Connect the option to the correct connector. • Use connector CN5-A when you connect the option. To use other options, refer to those option manuals.
oFb02	Option Fault	An option of the same type is already installed in the option port CN5-A, CN5-B, or CN5-C.	Connect the option to the correct connector.
oFC00	Option Fault (CN5-B)	The option connected to connector CN5-C is not compatible.	Connect the option to the correct connector. • Use connector CN5-A when you connect the option. To use other options, refer to those option manuals.
oFC02	Option Fault	An option of the same type is already installed in the option port CN5-A, CN5-B, or CN5-C.	Connect the option to the correct option port.
PSE	JOHB-SMP3 Protocol Set Error	Invalid DIP switch S1 setting.	Set the option DIP switch S1 as shown in page 12. Monitor, *U4-75 [Communication OPT Protocol]* will display the DIP switch S1 setting.
		BACnet/IP is not installed on the JOHB-SMP3 card.	Upgrade the software in the JOHB-SMP3. For details, consult your local Yaskawa representative.

■ Minor Faults and Alarms

Code	Name	Causes	Possible Solutions
PA1	PLC Alarm 1	Port 1 is at a link speed different from Port 2 (100 Mbps and 10 Mbps). Data will not be passed between the two ports in this condition.	• AUTO NEGOTIATE: When *F7-14 = 1 [Duplex Mode Selection = Auto/Auto (Auto Negotiation/Auto Negotiation)]*, make sure that the devices connected to the two ports of the JOHB-SMP3 have the same speed (both at 10 Mbps or both at 100 Mbps). • FORCED DUPLEX SETTING: When *F7-14 ≠1 [Duplex Mode Selection ≠ Auto/Auto (Auto Negotiation/Auto Negotiation)]*, set the two connected ports to the same speed using *F7-15*. You cannot set *F7-15* to 101 or 102.

◆ bUS Fault Tolerance

■ bUS Fault Auto-Restart

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

Setting *F6-14 = 0 [Disabled]* or *F6-01 = 3, 4, 5 [Alarm Only, Alarm (Run at d1-04), Alarm - Ramp Stop]* will not affect standard default drive behavior.

Setting *F6-14 = 1 [Enabled]* AND *F6-01 ≤ 2 [Fast Stop (Use C1-09)]* will cause the following operation:

1. The bUS fault occurs after the time set in *F7-57 [BACnet/IP bUS Timeout Value]*.
2. When the condition is removed, the option commands a fault reset and returns control of the drive to the BACnet/IP network.

Note:

A change of *F6-14* does not require a power cycle or parameter reload.

When *F7-57 > 0 [BACnet/IP BUS Timeout Value > 0 seconds]*, the BACnet/IP controller must periodically send a Frequency Reference Command (AV2), or a Run/Stop command (AV1, BV1, BV2, BV58, BV59 and AV43 to AV51 where supported). If the BACnet/IP controller does not send a command for the length of time set in *F7-57* and the drive is running, the drive will detect a *bUS [Option Communication Error]* fault.

To disable BACnet/IP Timeout detection, set *F7-57 = 0*. When this parameter is set to 0, a periodic command from the BACnet/IP controller is not necessary.

When you operate the drive in HAND or LOCAL modes, it automatically disables BACnet/IP Timeout detection. If you change drive control to AUTO or REMOTE, and the drive does not receive a command for the time set in *F7-57*, the drive will immediately detect a *bUS [Option Communication Error]* fault.

◆ Option Error Codes

■ Option Fault Monitors *U6-98* and *U6-99*

The option can declare error/warning conditions via drive monitor parameters on the drive keypad as shown in Table 10.1.

Table 10.1 Option Fault Monitor Descriptions

Status	Fault Declared	Status Value (U6-98/U6-99)	Description
No faults	-	0	No faults
Fatal error occurred	*EF0*	3	Network sent a message to force this node to the fault state.
Communications time-out (nonfatal)	*bUS*	1101	The drive has not received a BACnet/IP command for the length of time set in *F7-57*.
Duplicate IP Address	*bUS*	1102	This node and at least one other node have the same IP Address.
Default MAC Address	-	1103	Factory default MAC Address programmed into the option. **Note:** Return the option to Yaskawa or your nearest sales representative and request the setting change.
Network Link Down	*bUS*	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	*bUS*	1106	*F7-13 = 0 [Address Mode at Startup = Static]* is set and *F7-01 to F7-12 [IP Address 1 to 4, Subnet Mask 1 to 4, Gateway Address 1 to 4]* are set to an invalid configuration. If *F7-13 = 1 or 2 [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.

Two drive monitors, *U6-98 [First Fault]* and *U6-99 [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 option status. *U6-99* is cleared upon a network-issued fault reset and upon power-up.

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

◆ Communication Error

If there is no problem with the drive you are using, but you cannot communicate with other devices, take the following measures.

Status	Possible Solutions
The LINK/ACT LED will not illuminate.	Set to *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 2.5 minutes.
- When you start the self RAM check, the drive will detect *oFA00 [Option Not Compatible with Port]*.

1. Set DIP switch S1 as shown in Figure 10.1.

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.

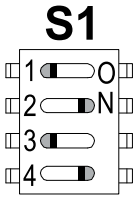


Figure 10.1 DIP Switch S1 Settings for the Self RAM Check

2. Apply power to the option.
   This will start the self RAM check.
3. Look at the LEDs on the option to see the status of the self RAM check.
   Refer to Table 10.2 for more information.

Table 10.2 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

11 European Standards

Figure 11.1 CE Mark

The CE mark indicates compliance with European safety and environmental regulations.

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

It is required for engaging in business and commerce in Europe.

This option displays the CE mark based on the EMC Directive 2014/30/EU.

Drives used in combination with this option and devices used in combination with the drive must also be CE certified and display the CE mark.

When using drives displaying the CE mark in combination with other devices, it is ultimately the responsibility of the user to ensure compliance with CE standards. Verify that conditions meet European standards after setting up the device.

◆ EMC Directive Compliance

This option is tested according to European standard EN 61800-3 and complies with the EMC Directive. The CE marking is declared based on the harmonized standards.

■ Option Installation

Verify the following installation conditions to make sure that other devices and machinery used with this option and drive also comply with EMC Directive:

1. Use dedicated shielded cable for the option and external device (encoder, I/O device, IO-Controller), or run the wiring through a metal conduit.

2. Keep wiring as short as possible and ground the largest possible surface area of the shield to the metal panel according to Figure 11.2, Figure 11.3, and Figure 11.4.

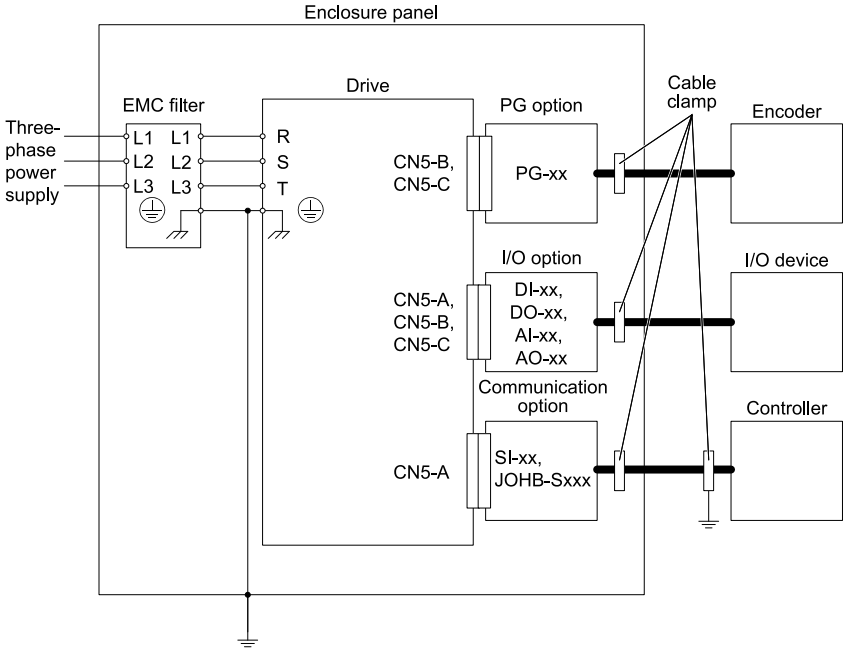


Figure 11.2 Option Installation for CE Compliance: GA700, GA800, Z1000U

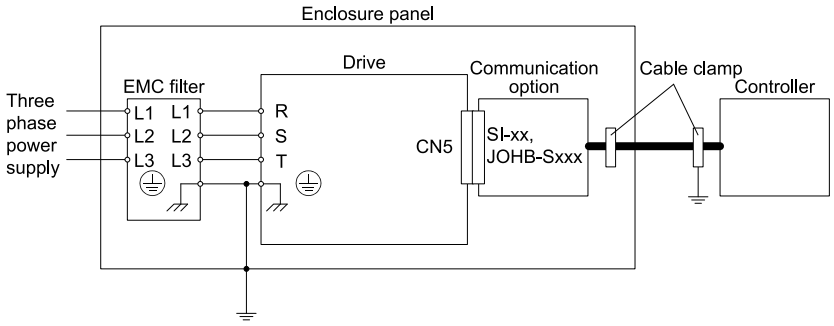


Figure 11.3 Option Installation for CE Compliance: GA500, HV600

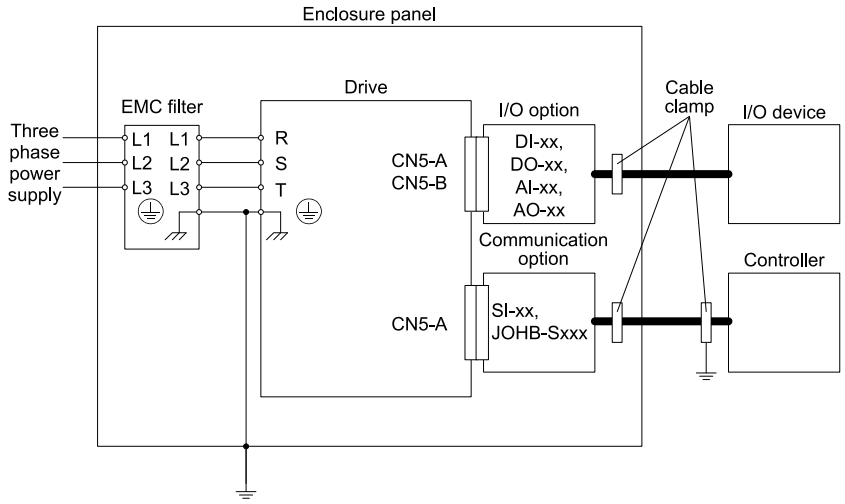
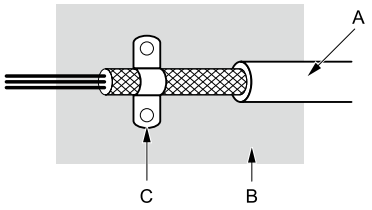


Figure 11.4 Option Installation for CE Compliance: FP605

3. Ground the largest possible surface area of the shield to the metal panel.
   Yaskawa recommends using cable clamps.



A - Braided shielded cable
B - Metal panel
C - Cable clamp (conductive)

Figure 11.5 Ground Area

12 United Kingdom Conformity Assessed Marking

Figure 12.1 UKCA Mark

The UKCA mark indicates compliance with United Kingdom safety and environmental regulations.

It is required for engaging in business and commerce in the United Kingdom.

United Kingdom standards include the Supply of Machinery (Safety) Regulations (Machinery) for machine manufacturers, the Electrical Equipment (Safety) Regulations (Low voltage) for electronics manufacturers, and the Electromagnetic Compatibility Regulations (EMC) for controlling noise.

This product displays the UKCA mark in accordance with the EMC.

Table 12.1 Designated Standards

Statutory Instruments	Designated Standards
Electromagnetic Compatibility Regulations S.I. 2016 No. 1091	EN 61800-3 *1
Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations S.I. 2012 No. 3032	EN IEC 63000 *1

*1 Refer to the "UK Declaration of Conformity" for the year of the Designated Standards.

When using drives displaying the UKCA mark in combination with other devices, it is ultimately the responsibility of the user to ensure compliance with UKCA standards. Verify that conditions meet applicable United Kingdom standards after setting up the device.

13 Precautions for Korean Radio Waves Act

Figure 13.1 KC Mark

This product confirms to broadcast and communications equipment for business use (Class A) and are designed for use in locations other than in ordinary houses.

Drives that bear the Korea Certification (KC) mark conform to the Korean Radio Waves Act. Be careful when you use the drive in Korea under the following conditions.

Table 13.1 Precaution When You Use this Drive

Precautions
This equipment is evaluated for compatibility for use in a business environment and may cause radio interference in a domestic environment.

Note:
The user guide applies only to “Business Broadcasting Communication Equipment”.

Comply with the EMC Directive to conform to the Korean Radio Act.

14 Specifications

◆ Specifications

Table 14.1 Option Specifications

Items	Specifications
Model	JOHB-SMP3
BACnet/IP Specification	BACnet Version 1 revision 19 (135-2016)
BACnet Device Profile	Basic Application Specific Controller (B-ASC)
Recommended Connector Type	Shielded Cat5e cable
Physical Layer Type	Isolated Physical Layer Ethernet
IP Address Setting	Programmable from drive keypad or network
Communication Speed	Programmable from drive keypad or network: 10/100 Mbps, auto-negotiate.
Duplex Mode	Half-forced, Auto-negotiate, Full-forced
Address Startup Mode	Static or DHCP Assigned. (BOOTP not compatible)
Ambient Temperature	-10 °C to +50 °C (14 °F to +122 °F)
Humidity	Up to 95% RH (no condensation)
Storage Temperature	-20 °C to +60 °C (-4 °F to +140 °F) allowed for short-term transport of the product
Area of Use	Indoors and free from: • Oil mist, corrosive gas, flammable gas, and dust • Radioactive materials or flammable materials, including wood • Harmful gas or fluids • Salt • Direct sunlight • Falling foreign objects
Altitude	Up to 1000 m (3281 ft) **Note:** You can use the option at a maximum of 4000 m (13123 ft), depending on the model of the drive and the operating conditions. Refer to the drive manuals for more information.

15 BACnet Protocol Implementation Conformance Statement

- Date: 05/01/2021
- Vendor Name: Yaskawa
- Product Name: AC Motor Controller
- Product Model Number: JOHB-SMP3
- Application Software Version: VST9070xx
- Firmware Revision: 3.x
- BACnet Protocol Revision: 19
- Product Description:
  The Yaskawa SMP3 BACnet/IP option kit provides BACnet communications for Yaskawa AC drives. The Yaskawa BACnet/IP feature connects the Yaskawa AC drives to a standard BACnet/IP network. These products may be fully controlled and monitored over BACnet. All drive parameters are available for reading and writing.
- BACnet Standardized Device Profile (Annex L):
  □ BACnet Cross-Domain Advanced Operator Workstation (B-XAWS)
  □ BACnet Advanced Operator Workstation (B-AWS)
  □ BACnet Operator Workstation (B-OWS)
  □ BACnet Operator Display (B-OD)
  □ BACnet Advanced Life Safety Workstation (B-ALSWS)
  □ BACnet Life Safety Workstation (B-LSWS)

□ BACnet Life Safety Annunciator Panel (B-LSAP)
□ BACnet Advanced Access Control Workstation (B-AACWS)
□ BACnet Access Control Workstation (B-ACWS)
□ BACnet Access Control Security Display (B-ACSD)
□ BACnet Building Controller (B-BC)
□ BACnet Advanced Application Controller (B-AAC)
■ BACnet Application Specific Controller (B-ASC)
□ BACnet Smart Actuator (B-SA)
□ BACnet Smart Sensor (B-SS)
□ BACnet Advanced Life Safety Controller (B-ALSC)
□ BACnet Life Safety Controller (B-LSC)
□ BACnet Advanced Access Control Controller (B-AACC)
□ BACnet Access Control Controller (B-ACC)
□ BACnet Router (B-RTR)
□ BACnet Gateway (B-GW)
□ BACnet Broadcast Management Device (B-BBMD)
□ BACnet Access Control Door Controller (B-ACDC)
□ BACnet Access Control Credential Reader (B-ACCR)
□ BACnet General (B-GENERAL)

- List all BACnet Interoperability Building Blocks Supported (Annex K):
  - Data Sharing-ReadProperty-B (DS-RP-B)
  - Data Sharing-WriteProperty-B (DS-WP-B)
  - Data Sharing-ReadPropertyMultiple-B (DS-RPM-B)
  - Data Sharing-WritePropertyMultiple-B (DS-WPM-B)
  - Data Sharing-Change Of Value-B (DS-COV-B)
  - Data Sharing-Change Of Value Property-B (DS-COVP-B)
  - Device Management-Dynamic Device Binding-B (DM-DDB-B)
  - Device Management-Dynamic Object Binding-B (DM-DOB-B)
  - Device Management-DeviceCommunicationControl-B (DM-DCC-B)
  - Device Management-ReinitializeDevice-B (DM-RD-B)
  - Device Management-TimeSynchronization-B (DM-TS-B)
  - Device Management-UTCTimeSynchronization-B (DM-UTC-B)
- Segmentation Capability:
  □ Able to transmit segmented messages / Window Size:
  □ Able to receive segmented messages / Window Size:
- Standard Object Types Supported:

Object Types	Descriptions
Device Object	Optional Writeable: – Location
Analog Input Object	Optional properties supported: – COV_Increment Optional Writeable: – COV_Increment - supported on various instances
Analog Output Object	-
Analog Value Object	Optional properties supported: – COV_Increment Optional Writeable: – COV_Increment - supported on various instances
Binary Input Object	-
Binary Output Object	-
Binary Value Object	-

- Data Link Layer Options:
  □ ARCNET (ATA 878.1), 2.5 Mb. (Clause 8)
  □ ARCNET (ATA 878.1), EIA-485 (Clause 8), baud rate(s):

■ BACnet IP, (Annex J)
□ BACnet IP, (Annex J), BACnet Broadcast Management Device (BBMD)
□ BACnet IP, (Annex J), Network Address Translation (NAT Traversal)
□ BACnet IPv6, (Annex U)
□ BACnet IPv6, (Annex U), BACnet Broadcast Management Device (BBMD)
□ BACnet/ZigBee (Annex O)
□ Ethernet, ISO 8802-3 (Clause 7)
□ LonTalk, ISO/IEC 14908.1 (Clause 11), medium:
□ MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400, 76800
□ MS/TP slave (Clause 9), baud rate(s)
□ Point-To-Point, EIA 232 (Clause 10), baud rate(s):
□ Point-To-Point, modem, (Clause 10), baud rate(s):
□ Other:

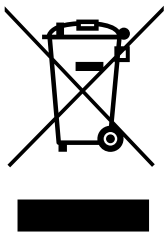
- Device Address Binding:
  Is static device binding supported? (This is currently necessary for two-way communication with MS/TP slaves and certain other devices.) □Yes ■No
- Networking Options:
  □ Router, Clause 6 - List all routing configurations, e.g., ARCNET-Ethernet, Ethernet-MS/TP, etc.
  □ Annex H, BACnet Tunneling Router over IP
- Character Sets Supported:
  Indicating support for multiple character sets does not imply that they can all be supported simultaneously.
  ■ ISO 10646 (UTF-8)
  □ IBM/Microsoft DBCS
  □ ISO 8859-1
  □ ISO 10646 (UCS-2)
  □ ISO 10646 (UCS-4)
  □ JIS X 0208
- If this product is a communication gateway, describe the types of non-BACnet equipment/networks(s) that the gateway supports:
  Not supported
  If this product is a communication gateway which presents a network of virtual BACnet devices, a separate PICS shall be provided that describes the functionality of the virtual BACnet devices. That PICS shall describe a superset of the functionality of all types of virtual BACnet devices that can be presented by the gateway.
- Network Security Options:
  ■ Non-secure Device - is capable of operating without BACnet Network Security
  □ Secure Device - is capable of using BACnet Network Security (NS-SD BIBB)
  – □ Multiple Application-Specific Keys
  – □ Supports encryption (NS-ED BIBB)
  – □ Key Server (NS-KS BIBB)

16 Disposal

◆ Disposal Instructions

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

◆ WEEE Directive



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

You must discard the product at an applicable collection point for electrical and electronic equipment (EEE). Do not discard the product with usual waste.

Revision History

Date of Publication	Revision Number	Section	Revised Content
November 2023	1	All	Revision: Reviewed and corrected entire documentation Addition: Information on GA500, GA700, GA800, and FP605 Bypass
		12	Addition: United Kingdom Conformity Assessed Marking
October 2022	-	-	First Edition

YASKAWA AC Drive Option

BACnet/IP

Technical Manual

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