YASKAWA

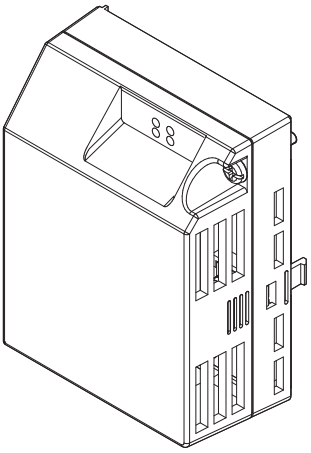
YASKAWA AC Drive V1000 Option

BACnet MS/TP

Installation & Technical Manual

Type: SI-B3/V

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



MANUAL NO. TOEP YAICOM 19B

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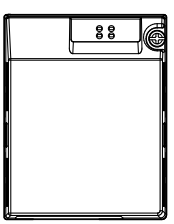
1 Preface and Safety

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

◆ Applicable Documentation

The following manuals are available for the SI-B3/V option:

	Yaskawa AC Drive V1000 Option SI-B3/V BACnet Installation & Technical Manual (TOEPYAICOM19)
	he Installation & Technical Manual is packaged with the SI-B3/V option and contains detailed information required to install the option and set up related drive parameters. This manual also contains information about troubleshooting procedures and BACnet supported objects.

	V1000 Series AC Drive Quick Start Guide (TOEPC71060647)
	This guide contains basic information required to install and wire the drive. It also gives an overview of fault diagnostics, maintenance, and parameter settings. The purpose of this guide is to prepare the drive for a trial run with an application and for basic operation. This manual is available for download on our documentation website, www.yaskawa.com.
	V1000 Series AC Drive Technical Manual (SIEPC71060618)
	This manual provides detailed information on parameter settings, drive functions, and MEMOBUS/Modbus specifications. Use this manual to expand drive functionality and to take advantage of higher performance features. This manual is available for download on our documentation website, www.yaskawa.com.

◆ Terms

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

Drive: Yaskawa V1000-Series Drive

Option: Yaskawa AC Drive V1000 SI-B3/V BACnet Option

◆ Registered Trademarks

All trademarks are the property of their respective owners.

◆ Supplemental Safety Information

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

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

⚠ DANGER

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

⚠ WARNING

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

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

⚠ CAUTION

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

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

NOTICE

Indicates a property damage message.

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

■ General Safety

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

⚠ DANGER

Heed the safety messages in this manual.

Failure to comply will result in death or serious injury.

The operating company is responsible for any injuries or equipment damage resulting from failure to heed the warnings in this manual.

Electrical Shock Hazard

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

Failure to comply will result in death or serious injury.

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

NOTICE

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

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

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

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

Do not operate damaged equipment.

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

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

Do not expose the drive to halogen group disinfectants.

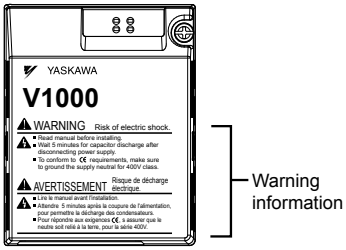
Failure to comply may cause damage to the electrical components in the drive.

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

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

■ Option Unit Warning Labels

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



■ Warning Contents

2 Product Overview

About this Product

The SI-B3/V option connects a V1000 drive to a Building Automation and Control network (BACnet) network and facilitates the exchange of data.

This manual explains option handling, installation, and specifications. The option is a simple networking solution that reduces the cost and time to wire and install factory automation devices, while providing interchangeability of like components from multiple vendors.

Users can monitor and control drives on a BACnet network using RS-485 technology and MS/TP (Master-Slave/Token-Passing) protocol. The drives conform to the BACnet application-specific controller (B-ASC) device profile.

Up to 127 drives can communicate on a single BACnet MS/TP network. Applications requiring more drives or BACnet devices require a BACnet router to allow another MS/TP network to be available with up to another 127 drives.

Applicable Models

The option can be used with the drive models in ***Table 1***.

Table 1 Applicable Models

Drive Series	Drive Model Number	Software Version <1>
V1000	CIMR-V□□A□□□□	VST910120 and later

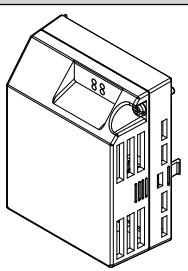
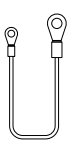
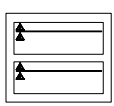
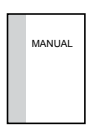
<1> See “PRG” on the drive nameplate for the software version number.

3 Receiving

Please perform the following tasks upon receipt of the option:

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

◆ Option Package Contents

Description	Option Unit	Ground Wire	Warning Labels	Installation Manual
–				
Quantity	1	4	1	1

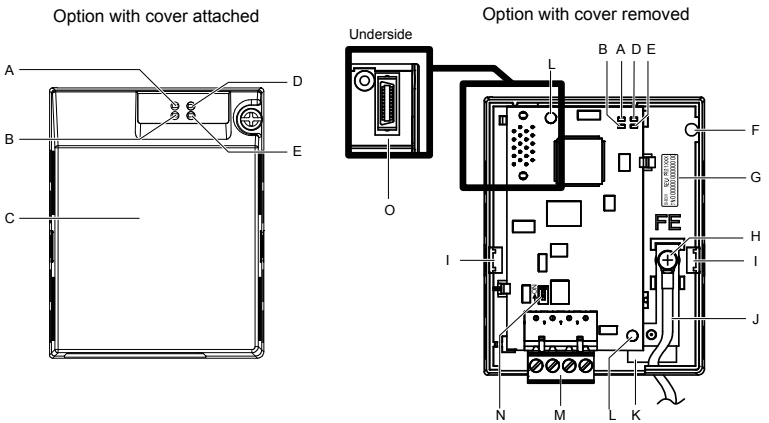
◆ Tools Required for Installation

- A Phillips screwdriver (M3, M3.5 to M6 metric or #1, #2 U.S. standard) is required to install the option. Screw sizes vary by drive capacity. Select a screwdriver appropriate for the drive capacity.
- A straight-edge screwdriver (blade depth: 0.4 mm, width: 2.5 mm) is required to wire the option terminal block.

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

4 Option Components

◆ SI-B3/V BACnet Option Unit



A – LED (MS) <1>
B – LED (NS) <1>
C – Option cover
D – LED (RX) <1>
E – LED (TX) <1>
F – Attachment screw hole for option cover
G – Nameplate
H – Functional earth cable connection (FE)
I – Mounting tab
J – Ground wire <2>
K – Pass-through hole for ground wire
L – Installation hole
M – Terminal block TB1
N – Terminating resistor switch S1
O – Option connector

Figure 1 Option Unit Components

<1> *Refer to Option LED Display on page 13* for details on the LEDs.

<2> A selection of ground wires are packaged loose in the option shipping package. Connect the appropriate ground wire based on drive model during installation.

■ SI-B3/V Option Software Version Location

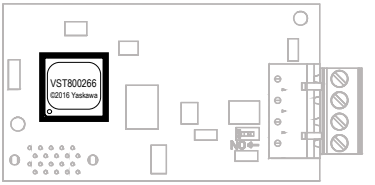
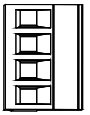


Figure 2 Option Card Software Version Location

◆ Terminal Block TB1

Refer to ***Table 2*** for details on removable terminal block TB1 terminal descriptions.

Table 2 Option Terminal Descriptions

Terminal	Pin	Signal	Description
	1	IG5	Isolated supply ground reference
	2	+	RX/TX (+) signal
	3	-	RX/TX (-) signal
	4	SHLD	Shield Ground

◆ Dimensions

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

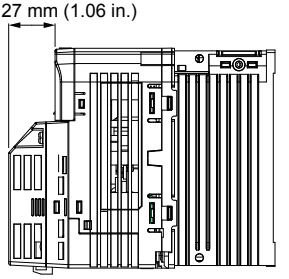


Figure 3 Dimensions

◆ Option LED Display

The option has four LEDs.

Two bi-color Status LEDs:

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

Two BACnet LEDs:

- Transmit (TX) green
- Receive (RX) green

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

Table 3 Option LED States

Name	Display		Operating Status	Remarks
	Color	Status		
MS	–	OFF	Power supply OFF	Power is not being supplied to the drive.
	Green	ON	Normal operation	The option is operating normally and initialization is complete.
	Green	Flashing	Standby/Initializing	The option is in process of configuring or waiting for configuration information.
	Red	Flashing	Minor fault	The option has detected a recoverable minor fault such as incomplete configuration.
	Red	ON	Major fault	The option has detected an unrecoverable major fault.
	Green/Red	Flashing	Option self-test	The option is in self-test mode.
NS	–	OFF	Power supply OFF	–
	Green	ON	Connected	The device is currently communicating on the network.
	Green	Flashing	Not connected	The device currently is not communicating, but is correctly configured. The state is “waiting” for communication to resume.
	Red	Flashing	Minor fault	A minor recoverable fault has occurred.
	Red	ON	Major fault	A non-recoverable major network fault has occurred.
	Green/Red	Flashing	Network test	Power-up sequence and testing
TX	–	OFF	No data being sent to the network	This node is not sending any data.
	Green	Flashing	Data being sent to the network	This node is sending network data.

Name	Display		Operating Status	Remarks
	Color	Status		
RX	–	OFF	No data seen on the network	The option is not physically connected to the network or there is no network activity.
	Green	Flashing	Data is seen on the network	The option is connected to a network.

■ Power-Up Diagnostics

An LED test is performed each time the drive is powered up. The initial boot sequence may take several seconds. After the LEDs have completed the diagnostic LED sequence, the option is successfully initialized. The LEDs then assume operational conditions as shown in ***Table 3***.

Table 4 Power-Up Diagnostic LED Sequence

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

5 Installation Procedure

◆ Section Safety

⚠ DANGER

Electrical Shock Hazard

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

Failure to comply will result in death or serious injury.

Disconnect all power to the drive and wait at least the amount of time specified on the drive front cover safety label. After all indicators are off, measure the DC bus voltage to confirm safe level, and check for unsafe voltages before servicing. The internal capacitor remains charged after the power supply is turned off.

⚠ WARNING

Electrical Shock Hazard

Do not remove the option unit cover while the power is on.

Failure to comply could result in death or serious injury.

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

Do not allow unqualified personnel to use equipment.

Failure to comply could result in death or serious injury.

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

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

Failure to comply could result in death or serious injury.

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

Failure to comply could result in death or serious injury.

⚠ WARNING

Fire Hazard

Tighten all terminal screws to the specified tightening torque.

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

NOTICE

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

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

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

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

Do not operate damaged equipment.

Failure to comply may cause further damage to the equipment.

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

Do not use unshielded cable for control wiring.

Failure to comply may cause electrical interference resulting in poor system performance.

Use shielded twisted-pair wires and ground the shield to the ground terminal of the drive.

Properly connect all pins and connectors.

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

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

Failure to comply could result in damage to the option.

◆ Prior to Installing the Option

Prior to installing the option, wire the drive, make necessary connections to the drive terminals, and verify that the drive functions normally without the option installed. Refer to the drive Quick Start Guide for information on wiring and connecting the drive.

◆ Installing the Option

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

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

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

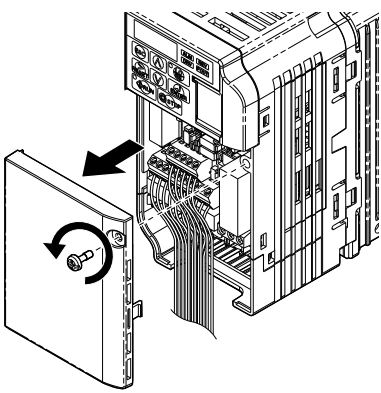


Figure 4 Remove the Front Cover

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

Table 5 Installation Steps Based on Drive Model

Enclosure Type	Drive Model	Proceed to Step	Page
IP20/Open-Chassis	CIMR-V□□A□□□□B	3	***18***
IP20/NEMA Type 1 <1>	CIMR-V□□A□□□□F	6	***19***

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

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

Refer to ***Figure 6*** for drive models BA0006B to BA0018B, 2A0008B to 2A0069B, and 4A0001B to 4A0038B, which require removing the terminal cover prior to removing the bottom cover.

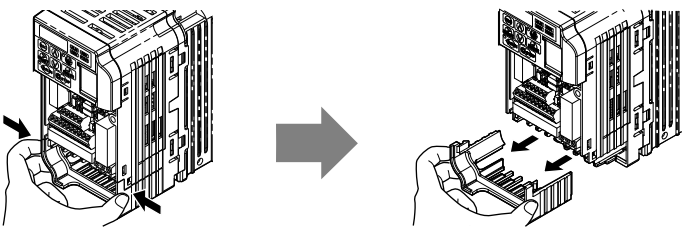


Figure 5 Remove the Bottom Cover on an IP20/Open-Chassis Drive(Models BA0001B to BA0003B and 2A0001B to 2A0006B)

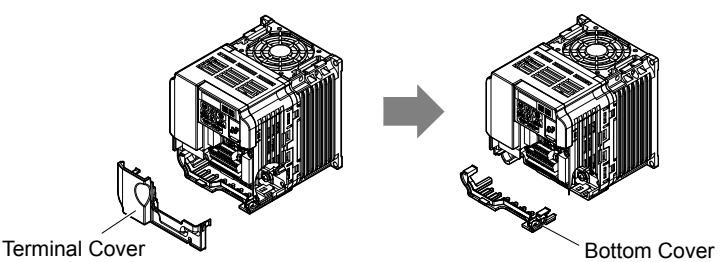


Figure 6 Remove the Terminal Cover and Bottom Cover on an IP20/Open-Chassis Drive(Models BA0006B to BA0018B; 2A0008B to 2A0069B; 4A0001B to 4A0038B)

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

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

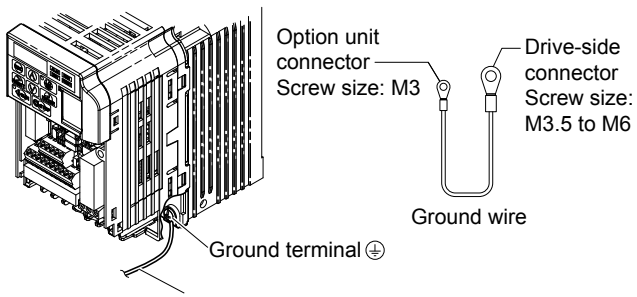


Figure 7 Connect the Ground Wire on an IP20/Open-Chassis Drive

Table 6 Ground Wire Selection

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

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

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

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

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

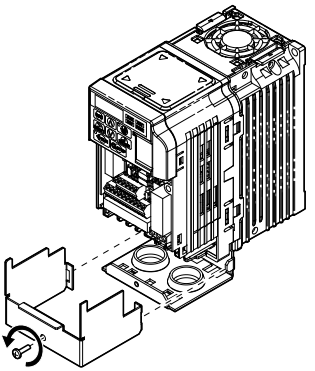


Figure 8 Remove the NEMA Type 1 Terminal Cover(Models BA0001F to BA0003F and 2A0001F to 2A0006F)

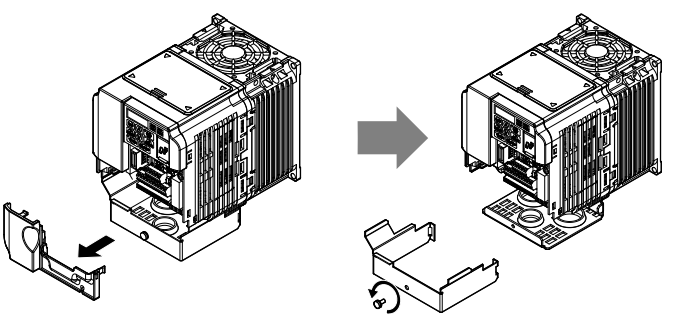


Figure 9 Remove the Terminal Cover on an IP20/NEMA Type 1 Drive (Models BA0006F to BA0018F; 2A0008F to 2A0069F; 4A0001F to 4A0038F)

7. For models BA0001F to BA0003F and 2A0001F to 2A0006F, loosen the screws attaching the NEMA Type 1 conduit bracket to the drive to remove the NEMA Type 1 conduit bracket.

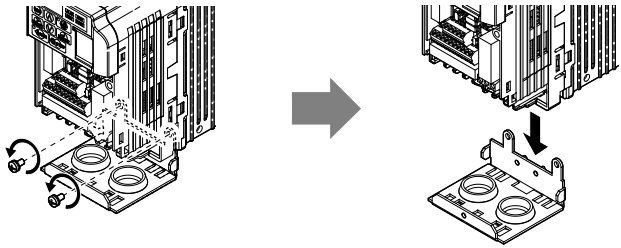


Figure 10 Remove the NEMA Type 1 Conduit Bracket (Models BA0001F to BA0003F and 2A0001F to 2A0006F)

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

Note: The different ground wires packaged with the option connect the option to different drive models. Select the proper ground wire depending on drive size. Refer to ***Table 6*** on page ***19*** for ground wire selection by drive model.

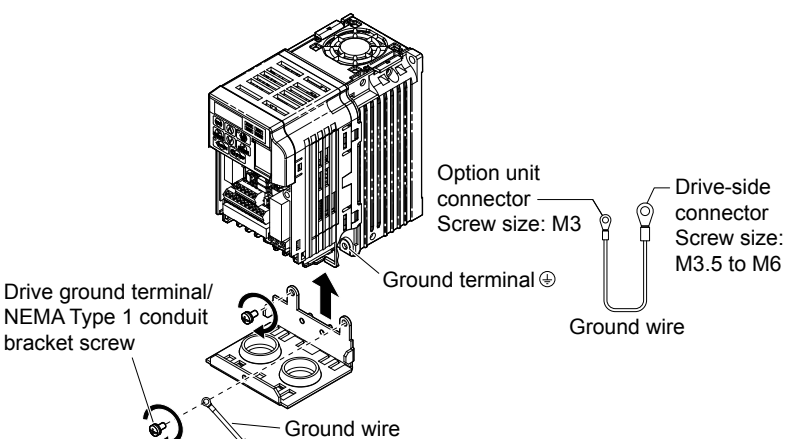
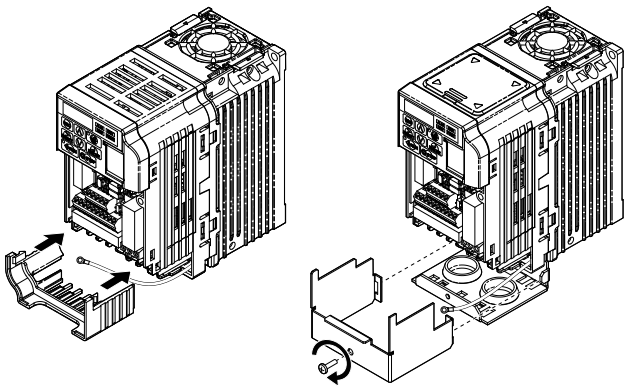


Figure 11 Reattach the NEMA Type 1 Conduit Bracket and Connect the Ground Wire(Models BA0001F to BA0003F and 2A0001F to 2A0006F)

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



IP20/Open-Chassis IP20/NEMA Type 1 Enclosure

Figure 12 Reattach the Bottom Cover

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

Refer to ***Figure 13*** and ***Figure 14*** for drive models BA0006 to BA0018, 2A0008 to 2A0020, and 4A0001 to 4A0011, which require routing the ground wire through the provided notch when reinstalling the terminal cover.

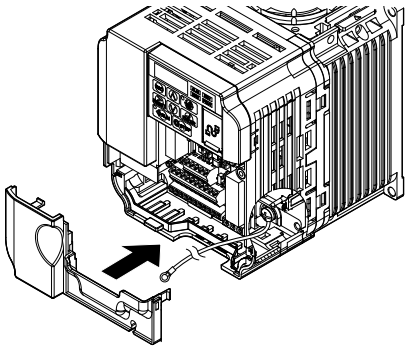


Figure 13 Reattach the Terminal Cover (Models BA0006 to BA0018; 2A0008 to 2A0069; 4A0001 to 4A0038)

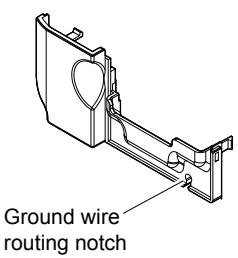


Figure 14 Terminal Cover Ground Wire Notch (Models BA0006 to BA0018; 2A0008 to 2A0020; 4A0001 to 4A0011)

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

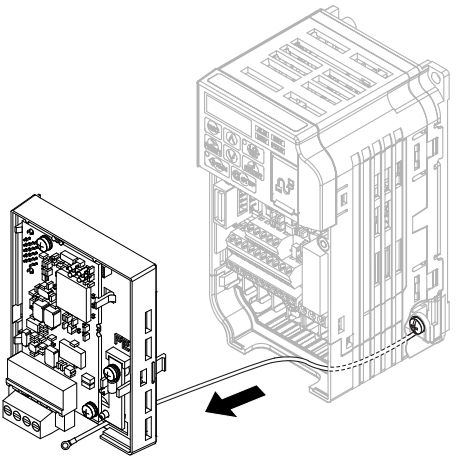


Figure 15 Ground Wire Routing

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

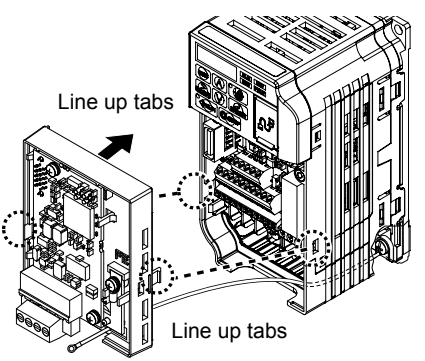


Figure 16 Connect the Option

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

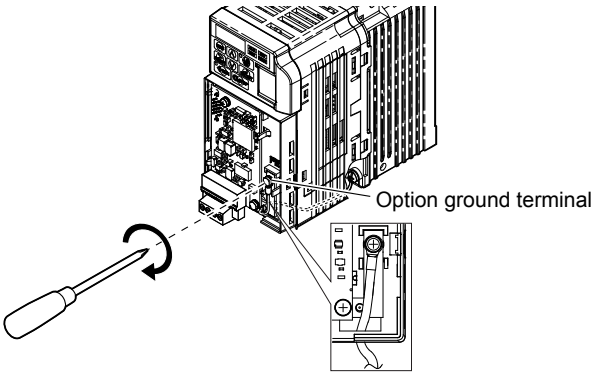


Figure 17 Connect the Ground Wire to the Option

14. Connect the BACnet communication cables to the option modular connector terminal block (TB1).

Note: Separate the communications cables from the main circuit cables and other wiring and power cables. Use properly grounded shielded cables for the communication cables to prevent problems caused by electrical interference.

Figure 19 explains the wiring for multiple connections using BACnet communication.

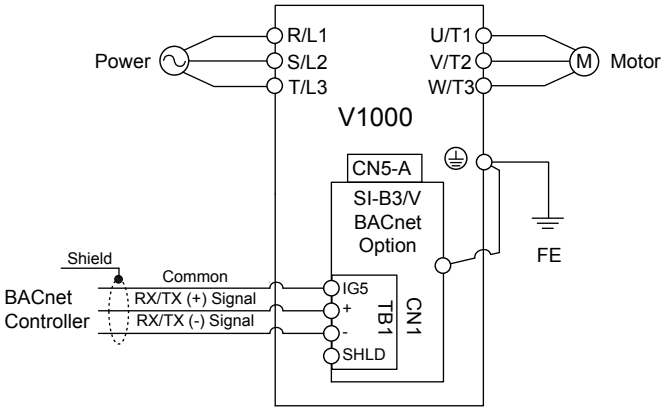


Figure 18 Option Connection Diagram

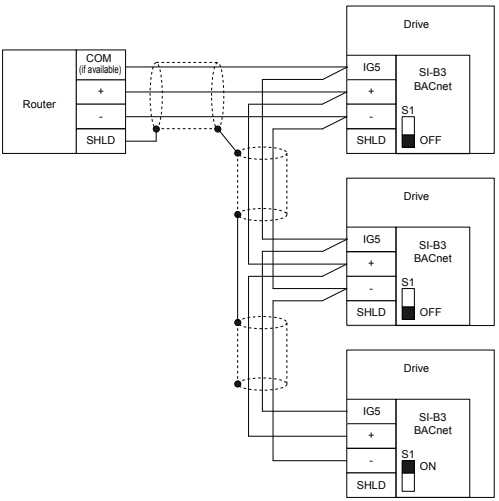


Figure 19 Connection Diagram for Multiple Connections

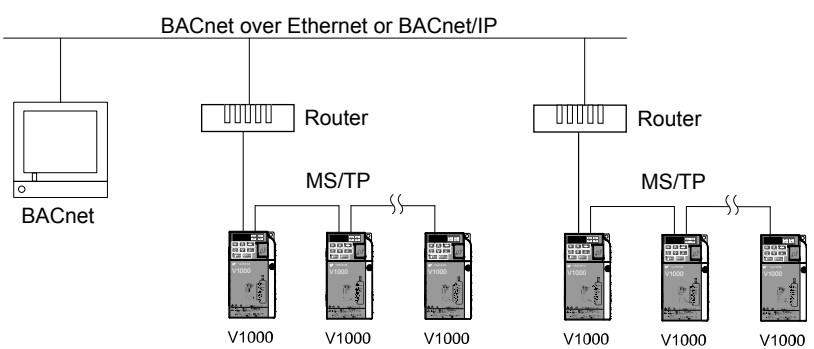


Figure 20 Connecting Multiple Drives to a BACnet Workstation – System Overview

The two ends of the BACnet network must be terminated with a 120 ohm resistor between the “+” and “-” and signals. The SI-B3/V has a built in termination resistor that can be enabled or disabled using DIP switch S1. If a drive is located at the end of a network line, enable the termination resistor by setting DIP switch S1 to the ON

position. Disable the termination resistor on all slaves that are not located at the end of the network line by setting DIP switch S1 to the OFF position (The factory setting for DIP switch S1 is OFF).

15. Attach the option cover by aligning the tabs with the mounting holes, seat the front cover into place, and tighten the screw on the front.

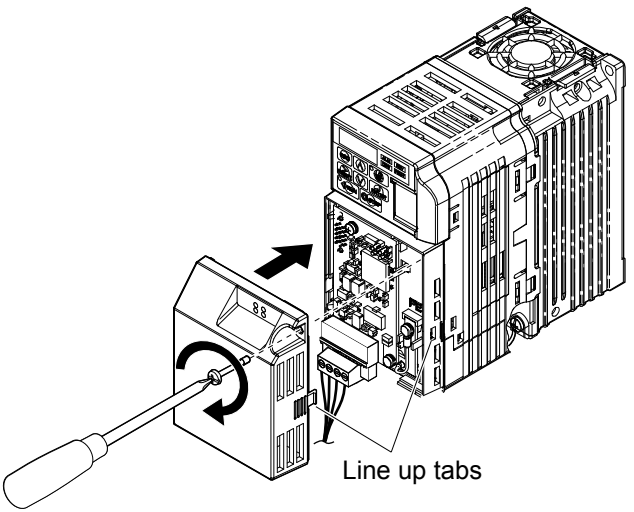


Figure 21 Attach the Option Cover

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

16. Set drive parameters in ***Table 7*** for proper option performance.

◆ BACnet Node Addressing

The BACnet node address is configurable by parameter F6-45 in the drive. This defines the physical address of the drive on the MS/TP network. In addition, both the Device Object Instance Identifier (parameters F6-48 and F6-49) and the Device Object Name are configurable. These allow the drive to have a virtual address and simplify the controller configuration.

After setting the addressing, a controller can initiate communication to the drive. The drive will perform the specified function and then send a response back to the controller. The drive will usually respond immediately, but may delay its response until it gets the token for commands that may take extra local processing time.

◆ Electronic Protocol Implementation Conformance Statement (EPIC) Files

For easy network implementation of drives equipped with the SI-B3/V option, an EPIC file can be obtained from: U.S.: http://www.yaskawa.com Other areas: Contact a Yaskawa representative.

Refer to BACnet Protocol Implementation Conformance Statement (PICS) on page 46 for the SI-B3/V PICS.

6 Related Drive Parameters

The following parameters are used to set up the drive for operation with the option. Parameter setting instructions can be found in the drive Quick Start Guide or Technical Manual.

Confirm proper setting of the all parameters in ***Table 7*** before starting network communications. After changing parameter settings, cycle power to the drive for the new settings to take effect.

Table 7 Related Parameters

No.	Name	Description	Values
b1-01 *<1>*	Frequency Reference Selection	Selects the frequency reference input source. 0: Operator - Digital preset speed d1-01 to d1-17 1: Terminals - Analog input terminal A1 or A2 2: MEMOBUS/Modbus communications 3: Option PCB 4: Pulse Input (Terminal RP)	Default: 1 Range: 0 to 4 (Set to 3 for BACnet)
b1-02	Run Command Selection	Selects the run command input source. 0: Digital Operator - RUN and STOP keys 1: Digital input terminals S1 to S7 2: MEMOBUS/Modbus communications 3: Option PCB	Default: 1 Range: 0 to 3 (Set to 3 for BACnet)
F6-04 *<2>*	bUS Error Detection Time	Sets the delay time for error detection if a bUS error occurs.	Default: 2.0 s Range: 0.0 to 5.0
F6-14 *<2>*	bUS Error Auto Reset	Allows the drive to automatically reset from a bUS error after reestablishing communications. 0: Disabled 1: Enabled	Default: 0 Range: 0, 1
F6-45	Drive Node Address	Sets the BACnet MS/TP MAC address (physical node address).	Default: 1 Range: 0 to 127
F6-46	Communication Speed Selection	Sets the communication speed. 0: 1200 bps 1: 2400 bps 2: 4800 bps 3: 9600 bps 4: 19200 bps 5: 38400 bps 6: 57600 bps 7: 76800 bps 8: 115200 bps	Default: 3 Range: 0 to 8
F6-47	Drive Transmit Wait Time	Sets the time the drive waits after receiving data from a master before transmitting response data.	Default: 5 ms Range: 5 to 65
F6-48 *<3>*	BACnet Device Object Identifier 0	Sets the Instance Identifier of the BACnet Device Object, where the F6-48 value is the least significant word.	Default: 1 Range: 0 to FFFFH
F6-49 *<3>*	BACnet Device Object Identifier 1	Sets the Instance Identifier of the BACnet Device Object, where the F6-49 value is the most significant word.	Default: 0 Range: 0 to 3FH

No.	Name	Description	Values
F7-16 <2>	Communication Loss Time Out	Sets the time out value for communication loss detection in tenths of a second. A value of 0 disables the connection time out. Example: An entered value of 100 represents 10.0 seconds.	Default: 0.0 s Range: 0.0 to 30.0

<1> To start and stop the drive with the option master device using serial communications, set b1-02 to 3. To control the drive frequency reference via the master device, set b1-01 to 3.

<2> Available for option card software versions VST800265 and later. Refer to ***Figure 2*** to find the option card software version number.

<3> These parameters set the Instance Identifier of the BACnet Device Object, where the F6-48 value is the least significant word and the F6-49 value is the most significant word. Example 1: Set the Device Object Instance Identifier of "1234". 1234 decimal is equal to 4D2H (hexadecimal). Set F6-48 to 4D2H and F6-49 to 0. Example 2: Set Device Object Instance Identifier to "1234567". 1234567 decimal is equal to 12D687H. Set F6-48 to D687H and set F6-49 to 12H.

7 Troubleshooting

◆ Drive-Side Error Codes

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

■ Faults

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

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

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

Digital Operator Display		Fault Name
bUS	bUS	Option Communication Error • The connection was lost after establishing initial communication. • Only detected when the Run command or frequency reference is assigned to the option (b1-01 = 3 or b1-02 = 3).
Cause		**Possible Solution**
Master controller (PLC) has stopped communicating		• Check that power is supplied to the PLC • Check that PLC is not in program mode
Communication cable is not connected properly		• Check for faulty wiring • Correct any wiring problems
A data error occurred due to noise		• Check the various options available to minimize the effects of noise • Counteract noise in the control circuit, main circuit, and ground wiring • If a magnetic contactor is identified as a source of noise, install a surge absorber to the contactor coil • Make sure the cable used meets requirements • Make sure the option ground wire is connected between option FE terminal and the drive ground terminal connected to earth ground • If available, use IG5 to connect to network common.
Option is damaged		If there are no problems with the wiring and the error continues to occur, replace the option.

Digital Operator Display		Fault Name
EF0	EF0	Option Card External Fault
		The alarm function for an external device has been triggered.
Cause		**Possible Solutions**
An external fault was received from the PLC and F6-03 is set to a value other than 3.		• Remove the cause of the external fault. • Remove the external fault input from the PLC.
Problem with the PLC program		Check the PLC program and correct problems.

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

Digital Operator Display		Fault Name
oFA01	oFA01	Option Card Fault
		Option not properly connected
Cause		**Possible Solution**
The option card connection is faulty		• Turn off the power and reconnect the option card. • Check if the option card is properly plugged into the option port. Make sure the card is fixed properly.

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

■ Minor Faults and Alarms

Digital Operator Display		Minor Fault Name	
CALL	CALL	Serial Communication Transmission Error	
		Communication has not yet been established.	
Cause		**Possible Solutions**	**Minor Fault (H2-□□ = 10)**

Communications wiring is faulty, there is a short circuit, the wiring is incorrect, or the connections are poor.	• Check for wiring errors. • Correct the wiring. • Check for disconnected cables and short circuits. Repair as needed.	YES
Programming error on the master side.	Check communications at start-up and correct programming errors.	
Communications circuitry is damaged.	• Perform a self-diagnostics check. • If the problem continues, replace the control board or the entire drive. Contact Yaskawa for instructions on replacing the control board.	

Digital Operator Display		Minor Fault Name	
CYPo	CyPo	Cycle Power to Active Parameters	
		Comm. Option Parameter Not Upgraded	
Cause		**Possible Solutions**	**Minor Fault (H2-□□ = 10)**
Drive is not compatible with the option software version.		Turn off the power and upgrade the communication option parameters. **Note:** An alarm is triggered when the option software version is earlier or an incompatible option is installed to the drive.	YES

■ Communication Errors

Errors that may occur when accessing drive parameters using the BACnet objects are shown in ***Table 8***.

Table 8 MEMOBUS to BACnet Error Conversion

Error Code	Description
03d	BN_ERR_DEVICE_IS_BUSY Writing to a parameter was attempted while the drive was saving parameters to non-volatile memory.
27d	BN_ERR_READ_ACCESS_DENIED Invalid parameter register number used when reading.
37d	BN_ERR_VALUE_OUT_OF_RANGE Value written to the parameter is out of the valid range.
40d	BN_ERR_WRITE_ACCESS_DENIED An invalid parameter register number was used when writing. Writing to a parameter was attempted while the drive was in a mode that disables writing (i.e., writing while the drive was Auto-Tuning). Writing to a parameter was attempted while the DC Bus had an Undervoltage (Uv) fault.

■ bUS Fault Tolerance

bUS Fault Auto-Restart

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

Setting F6-14 = 0 (Disabled) or F6-01 = 3 or greater (Alarm only) will cause the drive to declare an alarm after the time set in F6-04 has passed.

Setting F6-14 = 1 (Enabled) AND F6-01 ≠ 3 (Fault) will cause the following operation: The bUS fault occurs after the F7-16 + F6-04 delay time and the Run command is removed from the drive. Then the option throws a bUS fault to the drive. When the condition is removed, the option commands a fault reset and returns control of the drive to the BACnet network.

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

bUS Fault Delay

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

The setting value of F7-16 + F6-04 is the length of time that the option will delay sending the bUS fault to the drive.

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

Note: The option will only read parameters F6-04 and F7-16 from the drive during power-up.

8 Drive Operations by BACnet

The drive operations that can be performed by BACnet communication depend on drive parameter settings. This section explains the functions that can be used and related parameter settings.

◆ Observing the Drive Operation

A controller can perform the following actions with BACnet communications at any time regardless of parameter settings:

- observe drive status and drive control terminal status from a controller
- read and write parameters
- set and reset faults
- set multi-function inputs.

Note: Input settings from the input terminals So and from BACnet communications are both linked by a logical OR operation.

◆ Controlling the Drive

Select an external reference and adjust the parameters in ***Table 9*** accordingly to start and stop the drive or set the frequency reference using BACnet communications.

Table 9 Setting Parameters for Drive Control from BACnet

Reference Source	Parameter	Name	Required Setting
External Reference 1	b1-01	Frequency Reference Selection 1	3
	b1-02	Run Command Selection 1	3
External Reference 2	b1-15	Frequency Reference Selection 2	3
	b1-16	Run Command Selection 2	3

9 BACnet Objects Supported

◆ Present Value Access

The Present Value (PV) of BACnet objects can be read. In addition, some PVs can be written or commanded. A commandable PV is similar to writing the value, but the value is actually written into a priority array. The value occupying the highest priority in the array will be used by the drive. The convention for showing how the PV is accessed is shown in *Table 10* and will be noted for the PV of each object.

Table 10 Present Value Access Values

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 11 Object Properties

Property	Object Type						
	Device	Analog Input	Analog Output	Analog Value	Binary Input	Binary Output	Binary Value
Object_Identifier	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Object_Name	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Object_Type	Yes	Yes	Yes	Yes	Yes	Yes	Yes
System_Status	Yes	–	–	–	–	–	–
Vendor_Name	Yes	–	–	–	–	–	–
Vendor_Identifier	Yes	–	–	–	–	–	–
Model_Name	Yes	–	–	–	–	–	–
Firmware_Revision	Yes	–	–	–	–	–	–
Protocol_Version	Yes	–	–	–	–	–	–
Protocol_Revision	Yes	–	–	–	–	–	–
Protocol_Services_Supported	Yes	–	–	–	–	–	–
Protocol_Object_Types_Supported	Yes	–	–	–	–	–	–
Object_List	Yes	–	–	–	–	–	–
Max_ADPU_Length_Accepted	Yes	–	–	–	–	–	–
Segmentation_Supported	Yes	–	–	–	–	–	–

Property	Object Type						
	Device	Analog Input	Analog Output	Analog Value	Binary Input	Binary Output	Binary Value
ADPU_Timeout	Yes	–	–	–	–	–	–
Number_Of_ADPU_Retries	Yes	–	–	–	–	–	–
Max_Masters	Yes	–	–	–	–	–	–
Max_Info_Frames	Yes	–	–	–	–	–	–
Device_Address_Binding	Yes	–	–	–	–	–	–
Database_Revision	Yes	–	–	–	–	–	–
Present_Value	–	Yes	Yes	Yes	Yes	Yes	Yes
Status_Flags	–	Yes	Yes	Yes	Yes	Yes	Yes
Event_State	–	Yes	Yes	Yes	Yes	Yes	Yes
Reliability	–	Yes	Yes	Yes	Yes	Yes	Yes
Out_Of_Service	–	Yes	Yes	Yes	Yes	Yes	Yes
Units	–	Yes	Yes	Yes	–	–	–
Priority_Array	–	–	Yes <1>	Yes <1>	–	Yes	Yes
Relinquish_Default	–	–	Yes <1>	Yes <1>	–	Yes	Yes
Polarity	–	–	–	–	Yes	Yes	–
Inactive_Text	–	–	–	–	Yes	Yes	Yes
Active_Text	–	–	–	–	Yes	Yes	Yes

<1> For Commandable Object Instances only.

◆ Analog Input Objects

Table 12 Analog Input Objects

Object ID	Object Name	Modbus Address	Precision	Range	Units	PV Access
AI1	Analog Input 1 Level	004EH	XXXX.X	–	%	R
AI2	Analog Input 2 Level	004FH	XXXX.X	–	%	R
AI3	Not Used AI3	–	–	–	–	–
AI4	Not Used AI4	–	–	–	–	–
AI5	Not Used AI5	–	–	–	–	–
AI6	Display Format o1-03	0502H	XXXXX	–	–	R
AI7	Scale Format b5-20	01E2H	XXXXX	–	–	R
AI8	Inverter Model o2-04	0508F	XXXXX	–	–	R
AI9	Rated Current n9-01	05D0H	XXXX.X	–	Amps	R

◆ Analog Output Objects

Table 13 Analog Output Objects

Object ID	Object Name	Modbus Address	Precision	Range	Units	PV Access
AO1	Analog Output 1 Level	0007H	XXXX.X	0 to 100.0	%	C
AO2	Not Used AO2	0008H	XXXX.X	0 to 100.0	%	C

◆ Analog Value Objects

Table 14 Analog Value Objects

Object ID	Object Name	Modbus Address	Precision	Range	Units	PV Access
AV1	Operation Cmd	0001H	XXXXX	0 to 65535	–	C
AV2	Frequency Cmd	0002H	XXX.XX Depends on o1-03	0.00 to 600.00	Hz Depends on o1-03	C
AV3	PI Setpoint Cmd	0006H	XXX.XX	0.00 to 100.00	%	C
AV4	MF Output 1 Cmd	0009H	XXXXX	0 to 255	–	C
AV5	Reference Select Cmd	000FH	XXXXX	–	–	C
AV6	Drive Status	0020H	XXXXX	–	–	R
AV7	Fault Details	0021H	XXXXX	–	–	R
AV8	Data Link Status	0022H	XXXXX	–	–	R
AV9	Frequency Reference	0040H	XXX.XX Depends on o1-03	–	Hz Depends on o1-03	R
AV10	Output Frequency	0041H	XXX.XX Depends on o1-03	–	Hz Depends on o1-03	R
AV11	Output Voltage	0045H	XXXX.X	–	Volts	R
AV12	Output Current	0026H	XXXX.X	–	Amps	R
AV13	Output Power	0047	XXXX.X (for drives rated above 11 kVA) XXX.XX (for drives rated 11 kVA or lower)	–	kW	R
AV14	Torque Reference (U1-09)	0048H	XXXX.X	–	%	R
AV15	MF Input Status	002BH	XXXXX	–	–	R

Object ID	Object Name	Modbus Address	Precision	Range	Units	PV Access
AV16	Drive Status 2	002CH	XXXXX	–	–	R
AV17	MF Output Status	002DH	XXXXX	–	–	R
AV18	DC Bus Voltage	0031H	XXXX.X	–	Volts	R
AV19	PI Feedback Level	0038H	XXXX.X	–	%	R
AV20	PI Input Level	0039H	XXXX.X	–	%	R
AV21	PI Output Level	003AH	XXXX.X	–	%	R
AV22	CPU Software	004DH	XXXXX	–	–	R
AV23	Flash Number	005BH	XXXXX	–	–	R
AV24	Comm Error Detail	003DH	XXXXX	–	–	R
AV25	kVA Setting	0508H	XXXXX	–	–	R
AV26	Control Method	0102H	XXXXX	–	–	R
AV27	Accel Time	0200H	XXXX.X (when C1-10 = 1) XXX.XX (when C1-10 = 0)	0.0 to 6000.0 (when C1-10 = 1) 0.00 to 600.00 (when C1-10 = 0)	Sec	W
AV28	Decel Time	0201H	XXXX.X (when C1-10 = 1) XXX.XX (when C1-10 = 0) (when C1-10 = 0)	0.0 to 6000.0 (when C1-10 = 1) 0.00 to 600.00 (when C1-10 = 0)	Sec	W
AV29 <1>	Parameter Number	–	XXXXX	0 to FFFFH	–	W
AV30 <1>	Parameter Data	–	XXXXX	0 to FFFFH	–	W
AV31 <2>	Not Used AV31	08F5H	–	–	–	R
AV32 <2>	Not Used AV32	08F5H	–	–	–	R
AV33 <2>	Drive kWh	005CH & 005DH	XXXXXXX .X	0.0 to 32767999.9	–	R
AV34 <2>	Not Used AV34	08F5H	–	–	–	R
AV35 <3>	Drive Run Time	004CH	XXXX	–	Hours	R
AV36 <3>	Output Freq In %	003FH	XXX.XX	–	%	R
AV37 <3>	Output Freq In RPM	003EH	XXXX	–	RPM	R
AV38 <3>	Torque Iq (U6-01)	0051H	XXX.X	–	%	R
AV39 <3>	Drv Ctrl Status	07DDH	X	–	–	R

Object ID	Object Name	Modbus Address	Precision	Range	Units	PV Access
AV40 <3>	Last Drive Fault	0081H	XXX.XX	–	–	R
AV41 <3>	Not Used AV41	08F5H	XXXX	–	–	R
AV42 <3>	Current Sys Fault	0080H	XXXX	–	–	R

<1> *Refer to Accessing Drive Parameters and the Enter Command on page 44* for an explanation of how to read and write drive parameters not listed in the analog or binary objects.

<2> Available for option card software versions VST800265 and later. Refer to *Figure 2* to find the option card software version number.

<3> Available for option card software versions VST800266 and later. Refer to *Figure 2* to find the option card software version number.

◆ Binary Input Objects

Table 15 Binary Input Objects

Object ID	Object Name	Modbus Address	Active Text	Inactive Text	PV Access
BI1	Input Terminal 1	002BH:bit 0	ON	OFF	R
BI2	Input Terminal 2	002BH:bit 1	ON	OFF	R
BI3	Input Terminal 3	002BH:bit 2	ON	OFF	R
BI4	Input Terminal 4	002BH:bit 3	ON	OFF	R
BI5	Input Terminal 5	002BH:bit 4	ON	OFF	R
BI6	Input Terminal 6	002BH:bit 5	ON	OFF	R
BI7	Input Terminal 7	002BH:bit 6	ON	OFF	R
BI8	Multi-Function Out 1	0020H:bit 5	ON	OFF	R
BI9	Multi-Function Out 2	0020H:bit 6	ON	OFF	R
BI10 to BI27 <1>	Not Used BIoo	n/a	ALARM	OK	R
BI28 <1>	Drive Fault Status	004BH:bit 7	FAULT	OK	R
BI29 <1>	Drive Alarm Status	004BH:bit 6	ALARM	OK	R
BI30 <1>	Not Used BI30	n/a	ALARM	OK	R

<1> Available for option card software versions VST800266 and later. Refer to *Figure 2* to find the option card software version number.

◆ Binary Output Objects

Table 16 Binary Output Objects

Object ID	Object Name	Modbus Address	Active Text	Inactive Text	PV Access
BO1	MF Output M1-M2	0009H:bit 0	ON	OFF	C
BO2	MF Output P1-PC	0009H:bit 1	ON	OFF	C
BO3	MF Output P2-PC	0009H:bit 2	ON	OFF	C
BO4	Ref Sel: PI Setpoint	000FH:bit 1	ON	OFF	C
BO5	Ref Sel: Term S5 IN	0001H: bit 8	ON	OFF	C
BO6	Ref Sel: Term S6 IN	0001H: bit 9	ON	OFF	C
BO7	Ref Sel: Term S7 IN	0001H: bit 10	ON	OFF	C

◆ Binary Value Objects

Table 17 Binary Value Objects

Object ID	Object Name	Modbus Address	Active Text	Inactive Text	PV Access
BV1	Run FWD Cmd	0001H:bit 0	RUN	OFF	C
BV2	Run REV Cmd	0001H:bit 1	REV	OFF	C
BV3	Ext Fault Cmd	0001H:bit 2	FAULT	OFF	C
BV4	Fault Reset Cmd	0001H:bit 3	RESET	OFF	C
BV5	Com Net Cmd	0001H:bit 4	COM	LOCAL	C
BV6	Com Cntrl Cmd	0001H:bit 5	COM	LOCAL	C
BV7	MF Input 3 Cmd	0001H:bit 6	ON	OFF	C
BV8	MF Input 4 Cmd	0001H:bit 7	ON	OFF	C
BV9	MF Input 5 Cmd	0001H:bit 8	ON	OFF	C
BV10	MF Input 6 Cmd	0001H:bit 9	ON	OFF	C
BV11	MF Input 7 Cmd	0001H:bit 10	ON	OFF	C
BV12	Set Fault Contact Cmd	0009H:bit 6	ENABLE	OFF	C
BV13	RUN-STOP	0020H:bit 0	RUN	OFF	R
BV14	REV-FWD	0020H:bit 1	REV	FWD	R
BV15	READY	0020H:bit 2	READY	OFF	R
BV16	FAULT	0020H:bit 3	FAULTED	OFF	R
BV17	Data Set Error	0020H:bit 4	ERROR	OFF	R
BV18	Overcurrent – Gnd Fault	0021H:bit 0	OC-GF	OFF	R
BV19	Main Ckt Overvoltage	0021H:bit 1	OV	OFF	R

Object ID	Object Name	Modbus Address	Active Text	Inactive Text	PV Access
BV20	Drive Overload	0021H:bit 2	OL2	OFF	R
BV21	Drive Overheat	0021H:bit 3	OH1-OH2	OFF	R
BV22	Fuse Blown	0021H:bit 5	PUF	OFF	R
BV23	PI Feedback Loss	0021H:bit 6	FBL	OFF	R
BV24	External Fault	0021H:bit 7	EF0-EF	OFF	R
BV25	Hardware Error	0021H:bit 8	CPF	OFF	R
BV26	Mtr Ovrld-OvrTorque	0021H:bit 9	OL1-OL3	OFF	R
BV27	Overspeed	0021H:bit 10	OS-DEV	OFF	R
BV28	Main Ckt Undervoltage	0021H:bit 11	UV	OFF	R
BV29	MCU, Cntl Pwr Sy Err	0021H:bit 12	UV1-2-3	OFF	R
BV30	Output Phase Loss	0021H:bit 13	LF	OFF	R
BV31	Communication Error	0021H:bit 14	CE	OFF	R
BV32	Operator Disconnect	0021H:bit 15	OPR	OFF	R
BV33	Operating	002CH:bit 0	OPERATING	OFF	R
BV34	Zero Speed	002CH:bit 1	ON	OFF	R
BV35	Frequency Agree	002CH:bit 2	ON	OFF	R
BV36	Desired Freq Agree	002CH:bit 3	ON	OFF	R
BV37	Frequency Detect 1	002CH:bit 4	ON	OFF	R
BV38	Frequency Detect 2	002CH:bit 5	ON	OFF	R
BV39	Drv Startup Complete	002CH:bit 6	ON	OFF	R
BV40	Low Voltage Detect	002CH:bit 7	ON	OFF	R
BV41	Base Block	002CH:bit 8	ON	OFF	R
BV42	Frequency Ref Mode	002CH:bit 9	COM	LOCAL	R
BV43	Run Command Mode	002CH:bit 10	COM	LOCAL	R
BV44	Overtorque Detect	002CH:bit 11	ON	OFF	R
BV45	Frequency Refer Lost	002CH:bit 12	ON	OFF	R
BV46	Retry Error	002CH:bit 13	ON	OFF	R
BV47	Modbus Comms Error	002CH:bit 14	ON	OFF	R
BV48	Modbus Timeout Error	002CH:bit 15	ON	OFF	R
BV49	CRC Error	003DH:bit 0	ON	OFF	R
BV50	Invalid Data Length	003DH:bit 1	ON	OFF	R
BV51	Parity Error	003DH:bit 3	ON	OFF	R
BV52	Overrun Error	003DH:bit 4	ON	OFF	R
BV53	Framing Error	003DH:bit 5	ON	OFF	R

Object ID	Object Name	Modbus Address	Active Text	Inactive Text	PV Access
BV54	Timeout Error	003DH:bit 6	ON	OFF	R
BV55 <1>	Parameter Accept	0910H:bit 0	ON	OFF	W
BV56 <1>	Parameter Enter	0900H:bit 0	ON	OFF	W
BV57	Drive Comms Error	-	ON	OFF	R

<1> *Refer to Accessing Drive Parameters and the Enter Command on page 44* for an explanation of how to read and write drive parameters not listed in the analog or binary objects.

◆ Device Object

The Device Object fully describes the BACnet device to the network. Notable is that the Device Object Instance ID and the Device Object Name are configurable.

The Device Object Instance ID is a unique internetwork-wide numerical value. It is a 22-bit value that can range from 0 to 4,194,303. It is configurable by parameters F6-48 and F6-49. Any changes to these parameters will not take effect until the power is cycled to the drive.

The Device Object Name is a unique internetwork-wide character string. It is a 20-character string. It is writable from the BACnet network. Any new string written will not take effect until the power is cycled to the drive.

10 Accessing Drive Parameters and the Enter Command

◆ Reading Drive Parameters

Reading drive parameters not listed in the analog or digital objects is accomplished using AV29 and AV30 as shown below:

1. In decimal, write the desired Modbus register to AV29.
2. In decimal, read the value at the given register from AV30.

For example, to read the Frequency Reference Upper Limit, read from parameter d2-01.

Parameter d2-01 is located at Modbus register 0289H, which is decimal 649.

Set AV29 to “649”

Read AV30 to get the value.

◆ Writing Drive Parameters

Writing drive parameters not listed in the analog or digital objects is accomplished using AV29, AV30, and BV55 or BV56 as shown below:

1. In decimal, write the desired Modbus register to AV29.
2. In decimal, write the value to be written into AV30.
3. At this point the value is pending. One of two actions must be taken to complete the writing process:

   Set BV55 to “ON” to move data to active memory.

   Set BV56 to “ON” to move data into active memory and save to non-volatile memory.

For example, to reset the KWH Monitor, write a value of “1” to parameter o1-12.

Parameter o1-12 is located at Modbus register 0512H, which is decimal 1298.

Set AV29 to “1298”

Set AV30 to “1”

Set BV55 to “ON” or “1”.

◆ Enter Command

Enter Commands are only required when using AV29 and AV30 to write drive parameters. An Enter command is not required when reading or writing to the other BACnet objects.

When writing parameters to the drive from a controller using BACnet communications, an Enter command must be issued to enable these parameters. This section describes the types and functions of the Enter commands.

■ Enter Command Types

The drive supports two types of Enter commands as shown in *Table 18*.

Table 18 Enter Command Types

BACnet Object	Modbus Address	Description
BV55 (Write "ON")	0910H (bit 0)	Writes data in the active RAM only. Parameter changes are lost when the drive is shut off.
BV56 (Write "ON")	0900H (bit 0)	Simultaneously writes data into the EEPROM (non-volatile memory) of the drive and enables the data in active RAM. Parameter changes remain after cycling power.

Note: The EEPROM can only be written to 100,000 times, so it is recommended to limit the number of times writing to the EEPROM. The Enter command registers 0900H and 0910H are write-only and if these registers are read, the register address will be read as "OFF" or "Ø". However, BACnet objects BV55 and BV56 can be read without error.

11 BACnet Protocol Implementation Conformance Statement (PICS)

Date: 06/01/2016

Vendor Name: Yaskawa

Product Name: AC Motor Controller

Product Model Number: SI-B3

Application Software Version: VST80026x **Firmware Revision:** 1.8 **BACnet Protocol Revision:** 4

Product Description: The Yaskawa SI-B3/V BACnet option connects a V1000 Drive to a standard BACnet MS/TP network. The V1000 may be fully controlled and monitored over BACnet. All drive parameters are available for reading and writing.

BACnet Standardized Device Profile (Annex L):

• BACnet Operator Workstation (B-OWS)

• BACnet Building Controller (B-BC)

• BACnet Advanced Application Controller (B-AAC)

• BACnet Application Specific Controller (B-ASC)

• BACnet Smart Sensor (B-SS)

• BACnet Smart Actuator (B-SA)

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 - ReadProperty Multiple - B (DS-RPM-B)

• Data Sharing - WriteProperty Multiple - B (DS-WPM-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)

Segmentation Capability:

• Segmented requests supported Window Size____

• Segmented responses supported Window Size____

Standard Object Types Supported:

• Device Object

• Analog Input Object

• Analog Output Object

• Analog Value Object

• Binary Input Object

• Binary Output Object

• Binary Value Object

Data Link Layer Options:

• BACnet IP, (Annex J)

• BACnet IP, (Annex J), Foreign Device

• ISO 8802-3, Ethernet (Clause 7)

• ANSI/ATA 878.1, 2.5 Mb. ARCNET (Clause 8)

• ANSI/ATA 878.1, RS-485 ARCNET (Clause 8), baud rate(s)____

• MS/TP master (Clause 9), baud rate(s): 9600bps, 19200bps, 38400bps, 76800bps.

• 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):____

• LonTalk, (Clause 11), medium:____

• 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

• BACnet/IP Broadcast Management Device (BBMD)

Does the BBMD support registrations by Foreign Devices? □ Yes □ No

Character Sets Supported:

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

• ANSI X3.4 • IBM • /Microsoft • DBCS • ISO 8859-1 • ISO 10646 (UCS-2) • ISO 10646 (UCS-4) • JIS C 6226

If this product is a communication gateway, describe the types of non-BACnet equipment/networks(s) that the gateway supports:

Not supported

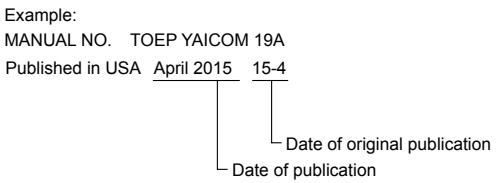
12 Specifications

Table 19 Option Specifications

Item	Specification
Model	SI-B3/V option
Interface	MS/TP (Master-Slave/Token-Passing)RS-485
Option Conformance	BTL certified
Connector Type	4-pin removable terminal block
Max Number of Drives	128 addresses available per MS/TP network segment. Actual maximum number of units depends on total network transceiver load. Refer to EIA-485 standards for details on network hardware specifications.
Protocol	BACnet MS/TP
Communication Speed	1200, 2400, 4800, 9600,19200, 38400, 57600, 76800, 115200 bps
Ambient Temperature	-10 to +60 °C
Humidity	95% relative humidity (non-condensing)
Storage Temperature	-20 to +85 °C
Area of Use	Indoors
Altitude	Up to 1000 meters without derating, up to 3000 m with output current and voltage derating.

Revision History

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



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December 2017	<2>	2	Revision: Table 1. software version
May 2016	<1>	5	Revision: Connection diagrams
		6	Addition: Parameters F6-04, F6-14, and F7-16
		All	Addition: Support for option software versions VST800265 and VST800266
		9	Addition: AV31 to AV42
			Addition BI10 to BI30
April 2015	-	-	First Edition

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YASKAWA AC Drive V1000 Option

BACnet MS/TP

Installation & Technical Manual

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