YASKAWA

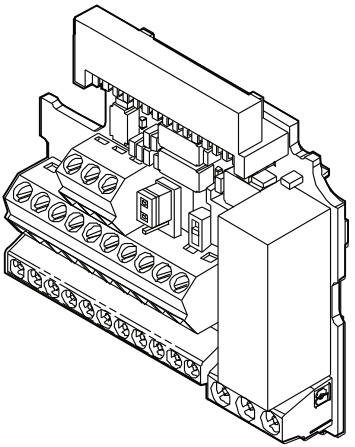
YASKAWA AC Drive - V1000 Option

Dual Safe Disable Input

Installation Manual

Type: JVOP-TBVA03B□A

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. EZZ022486

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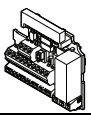
1 Preface and Safety

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, EXPRESSED 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 option:

Option

	**Yaskawa AC Drive-V1000 Option JVOP-TBVA03B□A Dual Safe Disable Input Installation Manual Manual No: EZZ022486 (This book)**	Read this manual first. The V1000 Option Dual Safe Disable Input Installation Manual contains procedures for mounting and replacing a standard V1000 I/O terminals with the JVOP-TBVA03B□A option.

Yaskawa Drive

	**Yaskawa AC Drive-V1000 Quick Start Guide**	To obtain instruction manuals for Yaskawa products access these sites: U.S.: http://www.yaskawa.com Europe: http://www.yaskawa.eu.com Japan: http://www.e-mechatronics.com Other areas: contact a Yaskawa representative. For questions, contact the local Yaskawa sales office or the nearest Yaskawa representative.
	Yaskawa AC Drive-V1000 Technical Manual	

◆ Terms

Drive:	Yaskawa AC Drive -V1000 Series.
Note:	Indicates supplemental information that is not related to safety messages.
Option:	Yaskawa AC Drive - V1000 Option Dual Safe Disable Input JVOP-TBVA03B□A

◆ General Safety

General Precautions
• The diagrams in this section may include option units and drives without covers or safety shields to illustrate details. Be sure to reinstall covers or shields before operating any devices. The option board should be used 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.

DANGER! *Electrical Shock Hazard. Do not install the option, connect or disconnect wiring while the power is on. Disconnect all power to the drive, wait at least five minutes after all indicators are off, measure the DC bus voltage to confirm safe level, and check for unsafe voltages before servicing to prevent electric shock. 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.*

WARNING! *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.*

WARNING! *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.*

WARNING! *Do not remove the drive cover while the power to the drive is on. Failure to comply could result in death or serious injury. Failure to comply could result in death or serious injury.*

WARNING! *Sudden Movement Hazard. Ensure start/stop and safety circuits are wired properly and in the correct state before energizing the drive. Failure to comply could result in death or serious injury from moving equipment. When programmed for 3-Wire control, a momentary closure on terminal S1 may cause the drive to start.the drive.*

WARNING! *When the application preset function is executed (or A1-06 is set to any value other than 0) the drive I/O terminal functions change.This may cause unexpected operation and potential damage to equipment or injury.*

NOTICE: *Do not modify the drive or option circuitry. Failure to comply could result in damage to the drive or option and will void warranty. Yaskawa is not responsible for any modification of the product made by the user. This product must not be modified.*

NOTICE: *Damage to Equipment. 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.*

NOTICE: *Install an MC on the input side of the drive when the drive should not automatically restart after power loss. To get the full performance life out of the electrolytic capacitors and circuit relays, refrain from switching the MC more than once every 30 minutes. Frequent use can damage the drive. Use the drive to stop and start the motor.*

2 Product Overview

◆ About This Product

The JVOP-TBVA03B□A option provides an integrated dual Safe Disable input safety function for YASKAWA V1000 series AC drives. The option provides two independent safety circuits designed to prevent unexpected motor start and to ensure that torque-generating energy cannot affect the motor when the Safe Disable inputs are properly utilized in accordance with IEC/EN 61800-5-2. The JVOP-TBVA03B□A option can reduce the need for conventional safety switchgear and provide safer, faster electronic switching for safety functions.

This option replaces the standard V1000 I/O terminals containing a single Safe Disable input, with I/O terminals that provide two independent Safe Disable inputs. This option eliminates the RS-422 MEMOBUS/Modbus communication terminals that are available on the standard V1000 I/O terminals. These instructions describe replacement of the V1000 AC drive's standard I/O terminals (ETC74002□□) with the JVOP-TBVA03B□A option.

■ Safe Disable Function Description

The Safe Disable function can be utilized to perform a safe stop according to IEC/EN 61800-5-2, stop category 0 (Uncontrolled stop by power removal). the feature is designed to meet the requirements of the ISO/EN13849-1, Safety Category 3, PL d, and IEC/EN61508, SIL2.

Removing the voltage from V1000 I/O terminals H1 and H2 disables the drive output power supply to the motor by disabling the drive's output transistors. "Hbb" is displayed on the V1000 digital operator during STO activation. Both Safe Disable inputs H1 and H2 should be used to activate the STO function. The drive output will also stop and the drive's digital operator will display "HbbF" if a single Safe Disable input is opened. The Safe Disable input wiring must be checked if "HbbF" is displayed. The Safe Disable functions with induction and permanent magnet motors.

Option Specifications

Specification		Description
Inputs/Outputs		Two independent Safe Disable inputs
Operation Time		The time from input open to drive output stop is less than 1 ms.
Failure Probability	**Demand Rate Low**	PFD=1.24E $^{-07}$
	Demand Rate High/Continuous	PFH=5.17E $^{-10}$
Performance Level		The Safe Disable inputs satisfy requirements of Performance Level (PL) d according to ISO/EN 13849-1, Safety Category 3, PL d, and IEC/EN 61508, SIL2. The Safe Disable input meets IEC/EN 61800-5-2, stop category 0 (Uncontrolled stop by power removal).

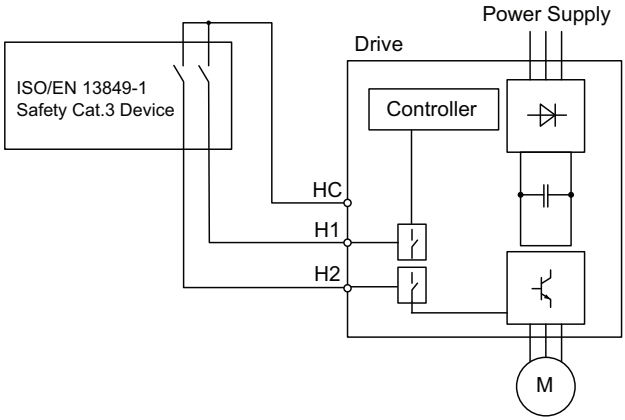


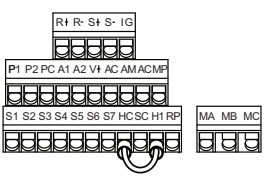
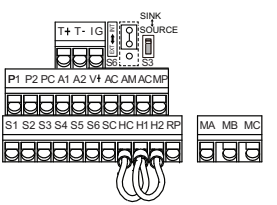
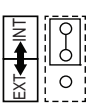
Figure 1 Safe Disable Wiring Example

Note: The time from STO input activation until drive output shutoff is ≤ 1 ms.

■ Key Differences between the Option and the Standard V1000 I/O terminals

- The Option contains six digital inputs, S1~S6 in lieu of seven S1~S7 inputs provided with the standard V1000 AC drive.
- The Option provides two Safe Disable inputs (H1-H2) when compared to the standard V1000 I/O which has a single Safe Disable input (H1).
- An Internal/External power supply can be selected for the Safe Disable signals via use of Jumper (S6).
- RS-422 MEMOBUS/Modbus communication is eliminated when this option is used.
- All other Option specifications remain the same as the standard V1000 I/O terminals.

Table 1 Terminal Configurations

Model V1000	Standard V1000 I/O	JVOP-TBVA03B□A Option
Safety Input	1 System (H1-HC)	2 System (H1-H2-HC)
Safety Input Power Supply	Internal	Internal/External
Contact Input	S1~S7	S1~S6
MEMOBUS/Modbus Communication	RS-422/485 (R+,R-,S+,S-,IG)	RS-485 (T+,T-,IG)
Terminal Configuration		
Safety Input Power supply mode setting Jumper (S6)	Not available	

◆ Applicable Drive Models

This option can be used with the drive models listed in ***Table 2***.

Table 2 Applicable Models

Drive Series	Drive Model Number	Software Version <1>
V1000	CIMR-V□□A□□□□□	All

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

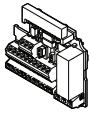
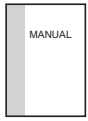
3 Receiving

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 Components

Table 3 Option Package Contents

Description:	Option	Installation Manual
–		
Quantity:	1	1

◆ Tools Required for Installation

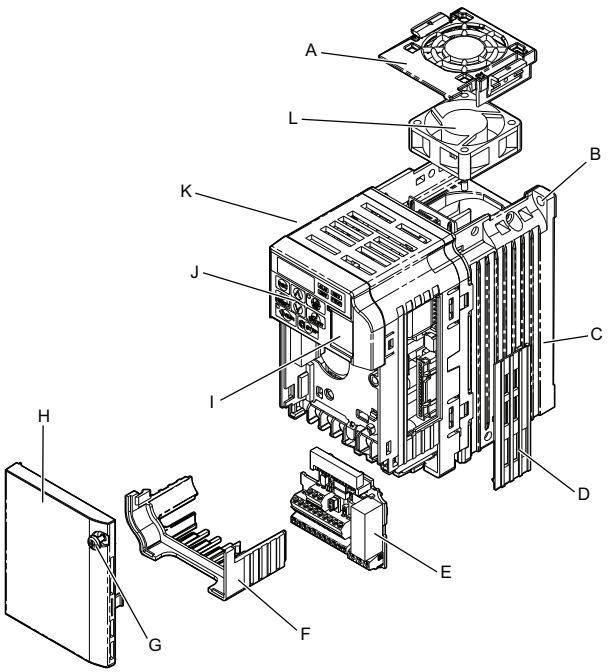
- A Phillips screwdriver (M3 metric/#1, #2 U.S. standard size <1>) is required to install the option and remove drive front covers.

<1> Screw sizes vary by drive capacity. Select a screwdriver appropriate for the drive capacity.

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

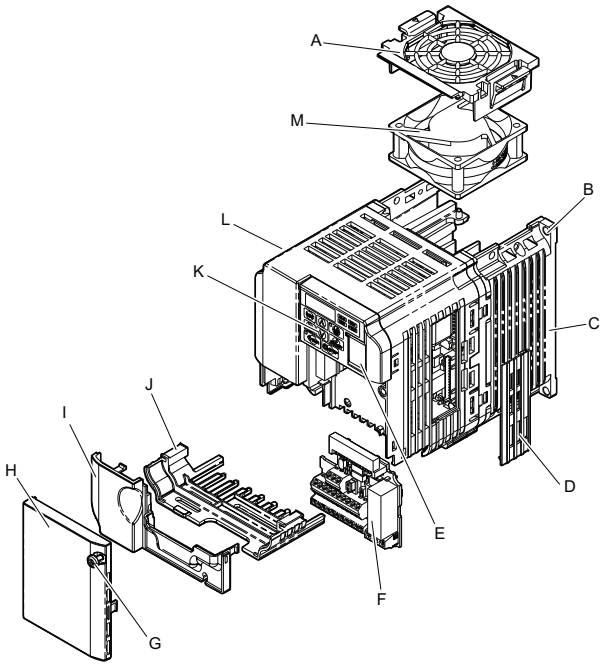
4 Drive and Option Components

This section illustrates the drive components that are mentioned in this manual.



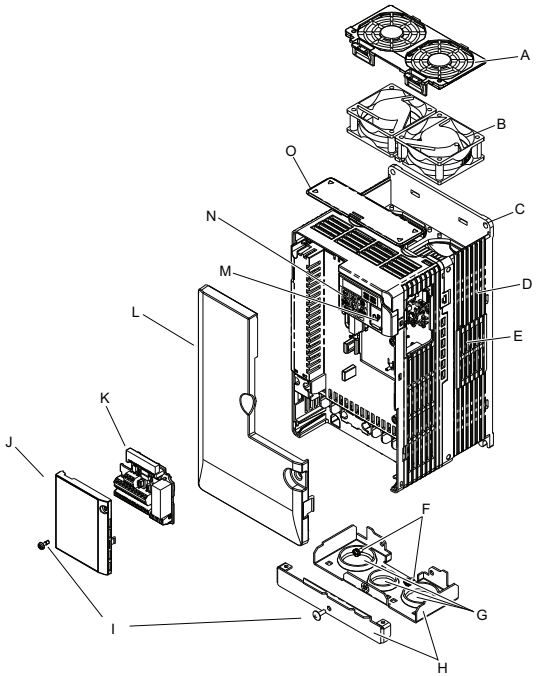
A – Fan Cover
B – Mounting Hole
C – Heat Sink
D – 24 V Control Power Supply Connector Cover
E – Dual Safe Disable Input Option JVOP-TBVA03B□A
F – Bottom Cover
G – Mounting Screw
H – Front Cover
I – Comm. Port
J – LED operator
K – Case
L – Cooling Fan

Figure 2 Drive Models: B□0001 to B□0003, 2□0001 to 2□0006



A – Fan Cover
B – Mounting Hole
C – Heat Sink
D – 24 V Control Power Supply Connector Cover
E – Comm Port
F – Dual Safe Disable Input Option JVOP-TBVA03B□A
G – Mounting Screw
H – Front Cover
I – Terminal Cover
J – Bottom Cover
K – LED Operator
L – Case
M – Cooling Fan

Figure 3 Drive Models: B□0006 to B□0018, 2□0008 to 2□0020, 4□0001 to 4□0011



A – Fan Cover
B – Cooling Fan
C – Mounting Hole
D – Heat Sink
E – 24 V Control Power Supply Connector Cover
F – Bottom Cover Mounting Screw
G – Rubber Bushing
H – Bottom Cover
I – Mounting Screw
J – Front Cover
K – Dual Safe Disable Input Option JVOP-TBVA03B□A
L – Terminal Cover
M – Comm. Port
N – LED Operator
O – Top Cover

Figure 4 Drive Models: 2□0030 to 2□0069, 4□0018 to 4□0038

5 Control Circuit I/O Connections

Connect the drive and peripheral devices as shown in ***Figure 5***.

◆ Standard Connection Diagram

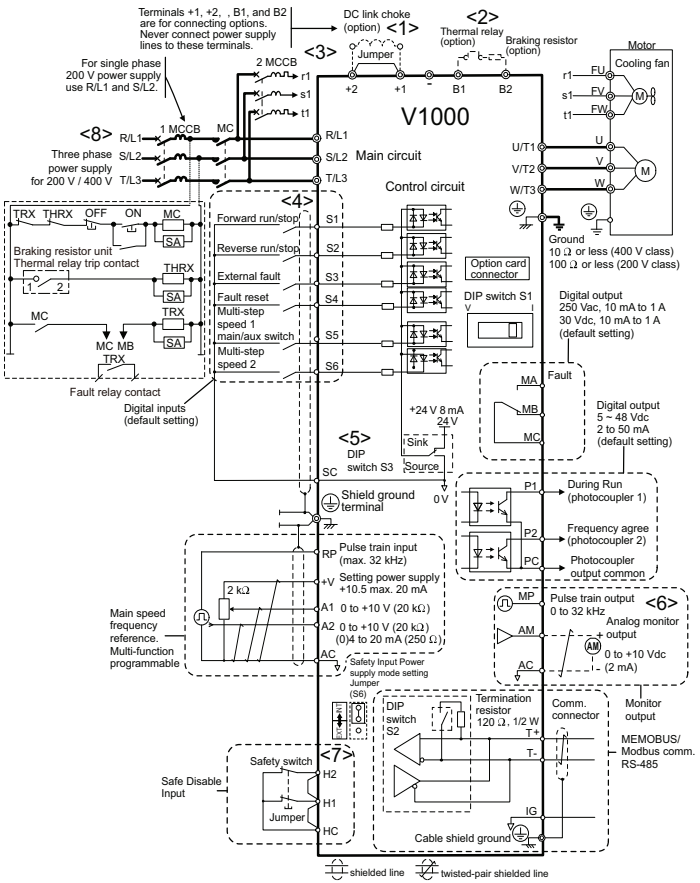


Figure 5 Drive Standard Connection Diagram

<1> Remove the jumper when installing an optional DC link choke.

<2> The MC on the input side of the main circuit should open when the thermal relay is triggered.

<3> Self-cooled motors do not require separate cooling fan motor wiring.

<4> This shows the connection in the case of a sequence connection by the sequence input signal (S1 ~ S6) being a zero voltage contact or an NPN transistor. Default Setting: Sink Mode (0 V Common).

<5> Use only a +24 V internal power supply in sinking mode; the source mode requires an external power supply.

<6> Monitor outputs work with devices such as analog frequency meters, ammeters, voltmeters and wattmeters; they are not intended for use as a feedback-type of signal.

<7> If stopping with an external safety switch, be sure to remove the short-circuit lead between HC-H1-H2.

<8> Wiring sequence should shut off power to the drive when a fault output is triggered.

◆ Control Circuit Terminal Board Functions

Drive parameters determine which functions apply to the multi-function digital inputs (S1 to S7), multi-function digital outputs (MA, MB), multi-function pulse inputs and outputs (RP, MP) and multi-function photocoupler outputs (P1, P2). The default is called out next to each terminal in ***Figure 3*** and in ***Table 4***.

■ Input Terminals

Table 4 Control Circuit Input Terminals

Type	No.	Terminal Name (Factory Setting)	Function (Signal Level)
Multi-Function Digital Inputs	S1	Multi-function input 1 (Closed: Forward run, Open: Stop)	Photocoupler 24 Vdc, 8 mA **Note:** Drive preset to sinking mode. When using source mode, set DIP switch S3 to allow for a 24 Vdc (±10%) external power supply.
	S2	Multi-function input 2 (Closed: Reverse run, Open: Stop)	
	S3	Multi-function input 3 (External fault (N.O.)	
	S4	Multi-function input 4 (Fault reset)	
	S5	Multi-function input 5 (Multi-step speed reference 1)	
	S6	Multi-function input 6 (Multi-step speed reference 2)	
	SC	Multi-function input common (Control common)	Sequence common

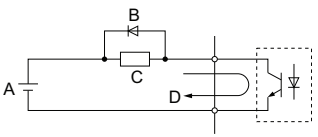
Type	No.	Terminal Name (Factory Setting)	Function (Signal Level)
Multi-Function Digital Inputs (continued)	HC	Power supply for safe disable input	+24 Vdc, (maximum 10 mA allowed)
	H1	Safe disable Input 1	One or both open: Output disabled (always use both inputs) Closed: Normal operation **Note:** Disconnect wire jumper between HC, H1, and H2 when using the safe disable input. The wire length should not exceed 30 m.
	H2	Safe disable Input 2	

■ Output Terminals

Table 5 Control Circuit Output Terminals

Type	No.	Terminal Name (Factory Setting)	Terminal Function (Signal Level)
Multi-Function Digital Output <1>	MA	N.O. (fault)	Digital output 30 Vdc, 10 mA to 1 A; 250 Vac, 10 mA to 1 A Minimum load: 5 Vdc, 10 mA (reference value)
	MB	N.C. output (fault)	
	MC	Digital output common	
Multi-Function Photocoupler Output	P1	Photocoupler output 1 (During run)	Photocoupler output 48 Vdc, 2 to 50 mA <2>
	P2	Photocoupler output 2 (Frequency agree)	
	PC	Photocoupler output common	
Monitor Output	MP	Pulse train output (Output frequency)	32 kHz (max) <3> <4>
	AM	Analog monitor output (Output frequency)	0 to 10 Vdc (2 mA or less) Resolution: 1/1000
	AC	Analog monitor output	0 V

<1> Do not assign functions to digital relay outputs that involve frequent switching. This may shorten relay performance life. Switching life is estimated at 2000,000 times (assumes 1 A, resistive load).
<2> Connect a suppression diode as shown in ***Figure 6*** when driving a reactive load such as a relay coil. Ensure the diode rating is greater than the circuit voltage.
<3> When set for sourcing, +5 V/1.5 kΩ or higher, +8 V/3.5 kΩ or higher, +10 V/10 kΩ or higher.
<4> When set for sinking, the external power supply should be +12 Vdc, ±5% with 16 mA or less.



A – External power, 48 V maximum
B – Suppression diode
C – Coil
D – 50 mA or less

Figure 6 Connecting a Suppression Diode

◆ Control Circuit Terminal Configuration

■ Wiring Configuration When Safety Functions Are Not Used

Configure the Option at the terminal locations shown in ***Figure 7***.

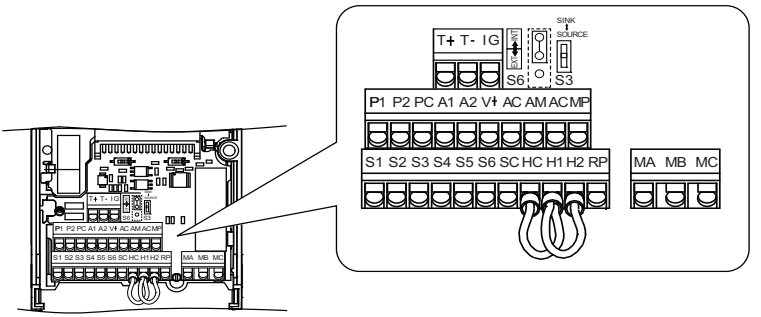


Figure 7 Removable Control Circuit Terminal Board

Connect terminal HC, H1 and H2 of terminal block TB6 with wire jumpers if the (STO) function is not used. Loosen the screws and insert the jumper wires into the terminals as shown in ***Figure 8***.

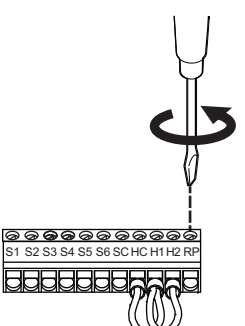


Figure 8 Jumper Connections when the (STO) Function is Not Used

■ Wire Size

Table 6 Wire Size and Torque Specifications (Same for All Models)

Terminal	Screw Size	Tightening Torque (N•m) (in-lbs)	Bare Wire Terminal		Ferrule-Type Terminal		Wire Type
			Applicable Wire Size mm^2 (AWG)	Recomm. Wire mm^2 (AWG)	Applicable Wire Size mm^2 (AWG)	Recomm. Wire mm^2 (AWG)	
MA, MB, MC	M3	0.5 to 0.6 (4.4 to 5.3)	Stranded Wire: 0.25 to 1.5 (24 to 16) Solid Wire: 0.25 to 1.5 (24 to 16)	0.75 (18)	0.25 to 1.0 (24 to 17)	0.5 (20)	Shielded line, etc.
S1~S6, SC, RP, +V, A1, A2, AC, HC, H1, H2, P1, P2, PC, MP, AM, AC, S+, S-, R+, R-, IG	M2	0.22 to 0.25 (1.9 to 2.2)	Stranded Wire: 0.25 to 1.0 (24 to 17) Solid Wire: 0.25 to 1.5 (24 to 16)		0.25 to 0.5 (24 to 20)		

◆ Internal/External Mode Setting

An Internal/External power supply is selected for the Safe Disable signals via use of Power Supply mode setting Jumper (S6).

Table 7 Internal/External Power Supply Mode Setting (Jumper S6)

Set Value	Details
INT	Internal power supply mode: (default setting)
EXT	External power supply mode

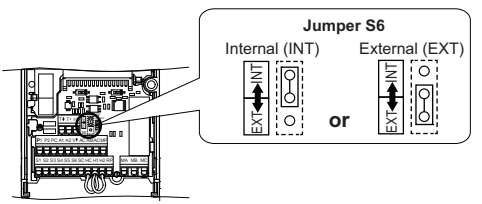


Figure 9 Jumper S6 Settings

1. Internal power supply mode.
Internal power supply mode is selected with Jumper (S6) set to INT. Connect Safe Disable input signals (H1, H2, HC) as shown in ***Figure 10***.

NOTICE: *Equipment Damage. Do not apply external power to H1 or H2 terminals with Jumper S6 set to INT (internal). The internal safety circuit for H1 and H2 can be damaged if external power is applied with Jumper S6 switch set to INT (internal).*

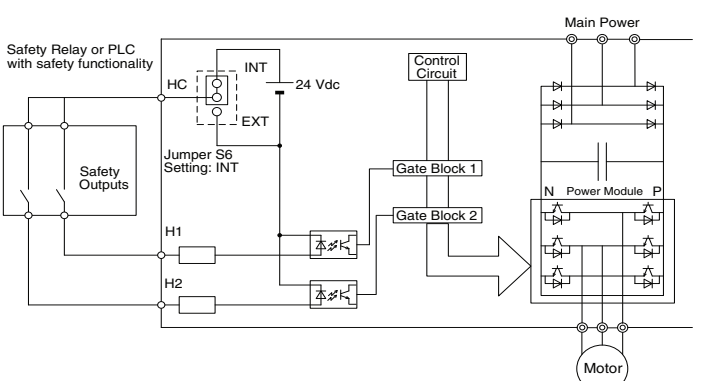


Figure 10 Safe Disable Wiring (S6 set to INT)

2. External power supply mode.
External power supply modes is selected with Jumper (S6) set to EXT. Connect Safe Disable input signals (H1, H2, HC) as shown in ***Figure 11***.

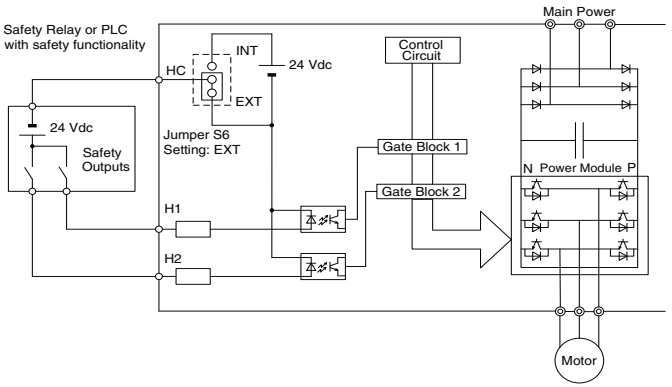


Figure 11 Safe Disable Wiring (S6 set to EXT)

◆ RS-485 MEMOBUS/Modbus Communication Interface

The option terminal board functions only in RS-485 MEMOBUS/Modbus communication mode, because RS-422 mode is eliminated. ***Figure 12*** explains the wiring diagrams for multiple connections using RS-485 MEMOBUS/Modbus communication.

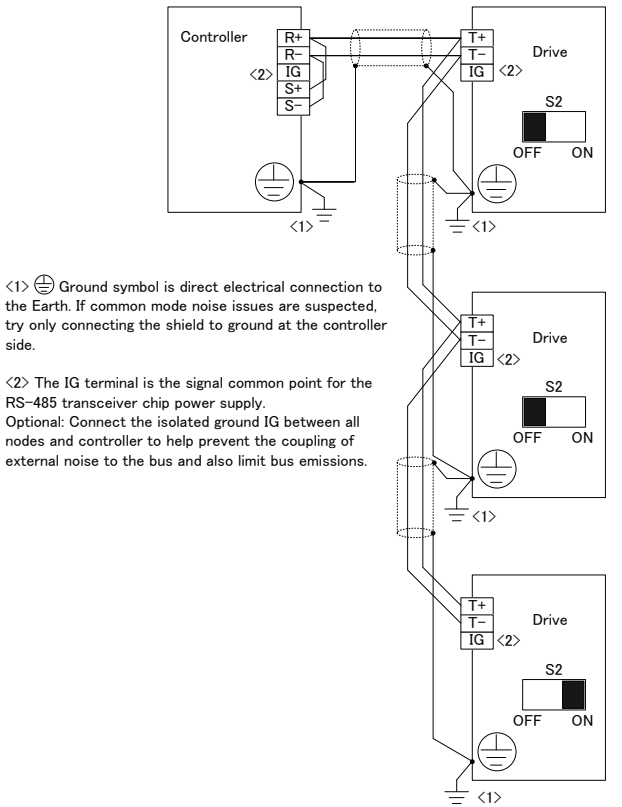


Figure 12 RS-485 Interface

1. Turn on DIP switch (S2) on the terminal board located at the end of the network. Turn off (S2) for all other slaves.
2. Set V1000 parameter H5-07 to "1" to use the RS-485 interface.

◆ Sinking/Sourcing Mode Switch

Set the DIP switch S3 on the front of the drive to switch the digital input terminal logic between sinking mode and sourcing mode; the drive is preset to sinking mode.

Table 8 Sinking/Sourcing Mode Setting

Set Value	Details
SINK	Sinking Mode (0 V common): default setting
SOURCE	Sourcing Mode (+24 V common)

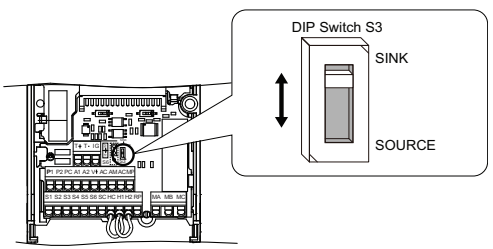


Figure 13 DIP Switch S3

■ Transistor Input Signal Using 0 V Common/Sink Mode

Set the DIP switch S3 to SINK and use the internal 24 V power supply when controlling the digital inputs by NPN transistors (0 V common/sinking mode).

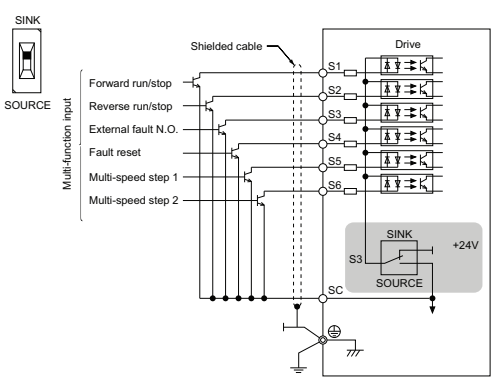


Figure 14 Sinking Mode: Sequence from NPN Transistor (0 V Common)

■ Transistor Input Signal Using +24 V Common/Source Mode

Set the DIP switch S3 to SOURCE when controlling digital inputs by PNP transistors (+24 V common/sourcing mode) and use an external 24 V power supply.

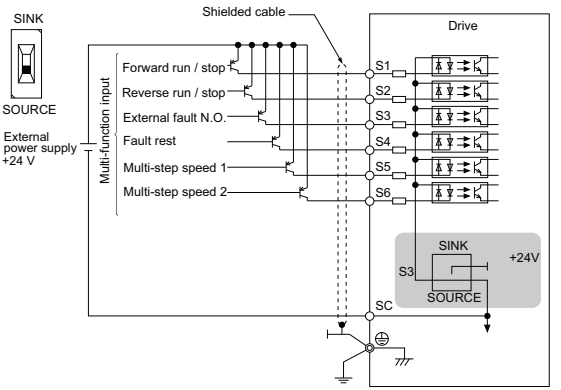


Figure 15 Source Mode: Sequence from PNP Transistor (+24 V Common)

6 Parameter and Error Display

◆ Changes to the Drive's Fault Display

Table 9 External Fault Display (Input Terminals S1~S6)

LED Operator Display		Name
EF7	EF7	External fault display EF7 is not available when using the Option.

◆ Changes to the Drive's Parameters

Table 10 Parameter List

H1: Multi-Function Contact Input		
No.	**Parameter Name**	**Content**
H1-07	Digital Input S7 Function Selection	Parameter H1-07 is not available when using the Option.

7 Standards Compliance

◆ UL Standards Compliance Precautions

Table 11 Control Circuit Terminal Power Supply Requirements

Type	Terminal Name	Power Supply Specification
Multi-Function Photocoupler Output	P1, P2, PC	Use a Class 2 (UL standard) power source.
Multi-Function Digital Inputs (Digital Input)	S1, S2, S3, S4, S5, S6, SC	Use the LVLC power supply inside the drive. A Class 2 power supply is required when using an external power supply.
Multi-Function Analog Inputs (Main Speed Frequency Reference Input)	A1, A2, AC	
Multi-Function Pulse Train Input (Main Speed Frequency Reference Input)	RP	
Pulse Train Output (Output frequency)	MP	

◆ Safe Disable Input Precautions

■ Installation

The factory installed wire jumpers between terminals HC, H1 and H2 must be removed entirely if the Safe Disable function is utilized.

Connect the drive to an ISO/EN 13849-1, Safety Category 3 or higher, interrupting device.

■ Installation Precautions

- Conduct a a thorough risk assessment of the safety system to ensure the Safe Disable function fulfills the safety requirements of the application.
- The wiring distance for the Safe Disable inputs should not exceed 30 m.
- Install the drive in a control panel with a minimum protection degree of IP54 to maintain ISO/EN 13849-1, safety category 3 compliance.
- Install the Safe Disable wiring connections in a manner that prevents short circuits if the safety device and the drive are installed in separate cabinets.
- Ensure the power supply of the drive is de-energized before installation or maintenance work is performed. The Safe Disable function does not de-energize the power supply to the drive and does not provide electrical isolation.
- The Safe Disable function activation time from H1, H2 input activation until the drive output is switched off is ≤ 1 ms.

Considerations when using the Safe Disable Function with Permanent Magnet (PM) motors:

It is possible that voltage and current may flow to the motor terminals in the event of a failure in two or more drive output IGBT's. This results in torque production in PM motors that will cause rotor movement of 1/8 to 1/4 rotations in 8-pole to 4-pole PM motors. Take precautions to ensure this failure mode is not safety-critical for the application before employing the Safe Disable function.

Note: This failure mode mentioned above will not produce torque or cause rotation in an induction motor (IM).

8 Option Installation

◆ Copying Drive Parameter Settings for Restoration Prior to Option Installation

NOTICE

Loss of Data

Manually record all customer modified drive parameter settings before removing and replacing the terminal board if the COPY function will not be used to restore settings after Option installation.

All customer modified parameter settings will need to be restored using one of the methods described in this section after Option hardware installation.

■ Manually Restoring Parameter Settings if Not Using the Optional JVOP-180,181,182 or DriveWizard Industrial® Software

Record all customer modified parameters from the drive before installing the Option. All drive parameter settings will be initialized to factory defaults after Option installation. One of the methods in this section is required to restore the drive parameters to the customer values. Re-enter the manually recorded parameter setting values to the drive after Option installation.

■ Automatically Restoring Customer Modified Parameters Using the Copy Function (Use of Optional Devices is Required)

Note: One of these optional devices is required to automatically restore customer modified parameter settings; JVOP-180, JVOP-181, or JVOP-182 or DriveWizard Industrial® software.

Parameter settings can be copied to using one of these optional devices/tools to simplify parameter restoration. The drive supports the following options for this purpose:

USB/Copy Unit (JVOP-181)

The copy unit is an external option connected to the drive to copy parameter settings to another drive. It includes a USB adapter to connect the drive to a PC. (JVOP-181 is sold separately).

LCD Operator (JVOP-180)

The copy unit is an external option connected to the drive to copy parameter settings to another drive. It includes a USB adapter to connect the drive to a PC. (JVOP-180 is sold separately).

LED Operator (JVOP-182)

The LED operator operates the drive and supports copying, importing, and verifying parameter settings. (JVOP-182 is sold separately).

Note: Use of the LCD operator requires drive firmware version PRG: 1012 or later. The LCD operator is not compatible with drive firmware version PRG: 5010.

DriveWizard Industrial®

DriveWizard Industrial® is a PC software tool for parameter management, monitoring, and diagnosis. DriveWizard Industrial® can load, store, and copy drive parameter settings. For details, refer to Help in the DriveWizard Industrial® software.

The installation files for DriveWizard Industrial® can be obtained at no charge from:

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

◆ (READ)/Back-Up Customer Modified Parameter Settings Using the Optional COPY Function

1. **Turn the drive power ON and confirm that no CPF error occurs**.
   If there is no “CPF” fault then “manually record” the values of the parameters in ***Table 12*** for use later in this procedure at Step ***9.***
2. **Use the COPY function of one of these optional devices (JVOP-181, JVOP-180, or JVOP-182 sold separately) and perform parameter (READ)/Back-Up.**
   a. Set parameter o3-02=1 Enable parameter (READ)/Back-Up in the digital operator.
   b. Set parameter o3-01=1 (READ)/Back-Up parameters from drive to digital operator.

Note: 1. DriveWizard Industrial® software may also be used to back-up customer parameter settings.
2. In cases where a CPF error has occurred, manually reset the CPF fault as the (READ)/Back-Up function will be unavailable.

Table 12 Manually Record These Parameter Settings

Parameter No.	Parameter Name
A1-02	Control Method Selection
C6-01	Drive Duty Selection
o2-04	Drive Model Selection

3. **De-energize/Power OFF the drive after parameter (READ)/Back-Up is finished**.

◆ Replace the Standard Drive I/O terminals with the Option

WARNING! *Electrical Shock Hazard. Do not connect or disconnect wiring while the power is on. Failure to comply can result in serious personal injury. Before servicing the drive, 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 at least five minutes after all indicators are OFF and measure the DC bus voltage level to confirm safe level.*

NOTICE: *Damage to Equipment. 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.*

1. Remove the Terminal Board

Remove the terminal board only after all custom parameter settings have been recorded manually or electronically backed-up using the (READ)/Back-Up function.
Drive Models B□0001~B□0003, 2□0001~2□0006
Loosen the screw on the front of the drive and remove the front cover.

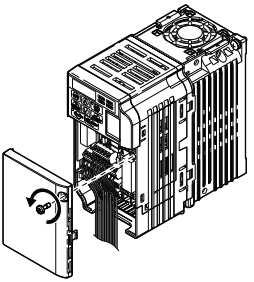


Figure 16 Remove the Front Cover

2. Pull the pin on the ground terminal out of the removable I/O terminal board.

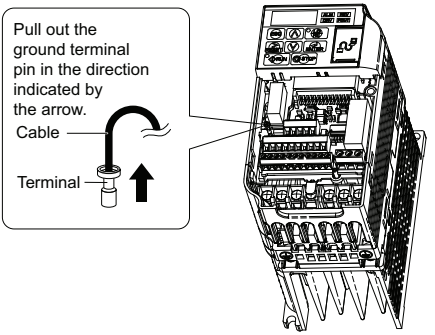


Figure 17 Pull Out the Ground Terminal

3. **Push down the installation pin on the I/O terminal board with a screwdriver.**

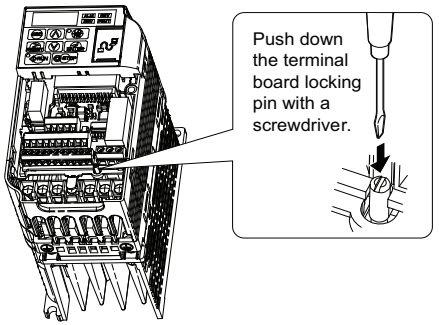


Figure 18 Depress the Plastic Tab

4. **While holding down the locking pin from step 3, slide the removable I/O terminal board in the direction of the arrow in *Figure 19*.**

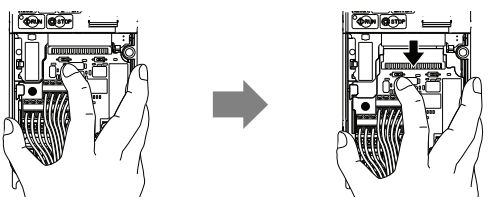


Figure 19 Remove the Terminal Board

5. **Install the JVOP-TBVA03B☐A Option on the drive according to *Figure 20*.**

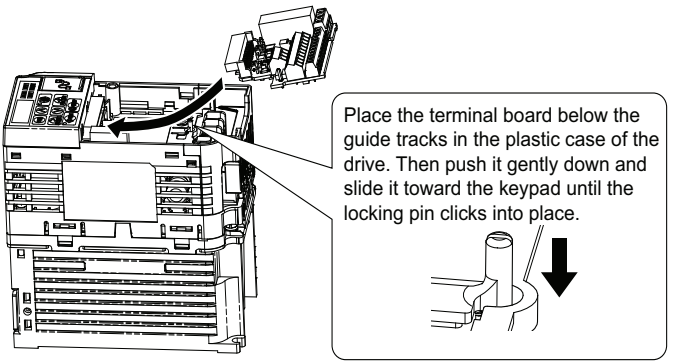


Figure 20 Terminal Board Reinstallation

6. **Ensure the terminal board is firmly fastened to the connector.**

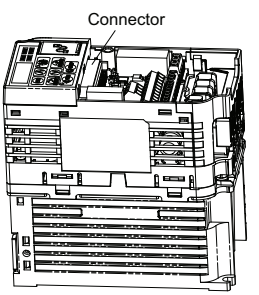


Figure 21 Terminal Board Reinstalled

7. **Reinstall the cover and proceed to Step *8.***

◆ Restore Customer Modified Parameter Settings

8. **After the terminal board replacement is complete, turn drive power ON.**
The drive will display oPE04 (terminal board replacement detection).
If using the COPY function proceed to Step ***9.***
If not using the COPY function, proceed to Step ***10.***

9. **Automatically restore customer modified parameter settings using the COPY function.**
a. Set the parameters (A1-02 and o2-04) using settings backed up in Step ***1.***
b. Set A1-03=2220 to initialize parameters after drive replacement. This will clear ***oPE04*** error.
c. Set C6-01 (ND/HD selection).
d. Set o3-01=2 (COPY parameters from the digital operator, writing them to the drive.)
e. After COPY is complete, set o3-02=0 (READ operation prohibited). This will lock the READ operation to prevent accidental overwriting of the data stored in the LED operator.
f. Use the VERIFY mode to compare the parameter settings in the drive to those in the digital operator to confirm the parameter settings match. Refer to ***Verifying Parameter Changes: Verify Menu on page 31***.
g. The parameter settings are complete.

10. **Manually restore customer modified parameter settings**.
Refer to the manual record of parameter settings recorded prior to Option installation.
Set the following parameters:
a. A1-02 - Control Method Selection - Setting 0: V/f Control, Setting 2: Open Loop Vector, or Setting 5: PM Open Loop Vector.
b. o2-04 - Drive Model Selection - Set o2-04 to the appropriate value per the “Defaults by Drive Model and Duty Rating (ND/HD)” table found in the V1000 Technical Manual.
c. Set A1-03=2220 (2220 initialize), and perform initialization. This will clear the oPE04 error.
d. Set H5-07=1 (RS-485 interface). Set C6-01 (ND/HD selection).
e. Manually reset the parameters prior to replacing the terminal board with the customer modified parameter settings that were manually recorded prior to installing the Option.
f. Use the VERIFY mode to compare the parameter settings in the drive to those in the digital operator to find if the parameter settings match. Refer to ***Verifying Parameter Changes: Verify Menu on page 31***.
g. The parameter settings are completed.

11. **Verifying Parameter Changes: Verify Menu**
The Verify Menu lists edited parameters from the Programming Mode or as a result of Auto-Tuning. The Verify Menu helps determine which settings have been changed, and is particularly useful when replacing a drive. If no settings have been changed the Verify Menu will read  .
NOTE: The Verify Menu will not display parameters from the A1 group (except for A1-02), even if those parameters have been changed from default settings.
Using ***Table 13*** and the drive’s digital operator, verify the customer modified parameters are properly restored.

Table 13 Verifying Customer Modified Parameters are Restored

Step			Display/Result
1.	Turn on the power to the drive. The initial display appears.	→	
2.	Press  until the display shows the "Verify" representation.	→	
3.	Press  to enter the list of parameters that have been edited from the original factory default settings. Scroll through the list by pressing the  key.	→	

12. This completes the Option installation procedure.

9 Related Parameter Descriptions

◆ A1-03: Initialization

Resets parameter settings back to original default values. After the initialization this parameter automatically returns to 0.

No.	Parameter Name	Setting Range	Default
A1-03	Initialize Parameters	0, 1110, 2220, 3330, 5550	0

Setting 0: No Initialize

Setting 1110: User Initialize

The modified drive parameters are returned to the values selected as user settings. User settings are stored when parameter o2-03 = "1: Set Defaults".

Setting 2220: 2-Wire Initialization

Resets all parameters back to their original default settings with digital inputs S1 and S2 configured as forward run and reverse run, respectively. A 2-wire sequence assigns functions to input terminals S1 and S2.

Setting 3330: 3-Wire Initialization

The drive parameters are returned to factory default values with digital inputs S1, S2, and S5 configured as run, stop, and forward/reverse respectively. A 3-wire sequence assigns functions to input terminals S1, S2, and S5.

Setting 5550: oPE04 Reset

If parameters on a certain drive have been edited and then a different terminal board is installed with different settings saved in its built-in memory, an oPE04 error will appear on the display. To use the parameter settings saved to the terminal board memory, set A1-03 to "5550".

◆ o3-01: Copy Function Selection

This parameter controls the copying of parameters to and from the LED operator (option). The copy function will change certain parameter default settings depending on the regional specification of the drive.

No.	Parameter Name	Setting Range	Default
o3-01	Copy Function Selection	0 to 3	0

0: COPY SELECT (no function)

1: INV --> OP READ

All parameters are copied from the drive to the digital operator.

Note: Set o3-02 to 1 to unlock copy protection.

2: OP --> INV WRITE

All parameters are copied from the digital operator to the drive.

3: OP<-->INV VERIFY

Parameter settings in the drive are compared to those in the digital operator using VERIFY function.

Note: When using the copy function, the drive model number (o2-04) and the software number (U1-14) must match or an error will occur.

◆ o3-02: Copy Allowed Selection

Enables and disables the digital operator copy functions.

No.	Parameter Name	Setting Range	Default
o3-02	Copy Allowed Selection	0 or 1	0

0: Disabled

No digital operator copy (READ) functions are allowed.

1: Enabled

Copying (READ) functions allowed.

◆ H5-07: RTS Control Selection

Enables or disables RTS control.

No.	Parameter Name	Setting Range	Default
H5-07	RTS Control Selection	1	1

0: Disabled - RTS is Always ON

Do not set H5-07 = 0.

1: Enabled - RTS Switches while Sending

The Option terminal board only functions with H5-07=1: RS-485 interface.

◆ Related Operation Errors

LED Operator Display		Error Name
oPE04	oPE04	I/O Terminal Board Replacement Detection
Cause		**Possible Solutions**
The drive, control board, or I/O terminal board has been replaced and the parameter settings between the main control board and the I/O terminal board no longer match.		Set A1-03 to 5550 to load the parameter settings into the drive memory that are stored in the I/O terminal board. Set parameter A1-03 to 2220 or 3330 to initialize parameters if not using parameters that have been stored in the I/O terminal board.

10 Revision History

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

Example:

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- September 2012: Date of publication
- 11-5: Date of original publication
- 1: Revision number

Date Published	Rev. No.	Section	Revised Content
January 2016	2	2	Added option specifications section.
April 2015	1	1, 2, 3, 5, 7, 8, 9	Added H2 terminal dual function and removed MEMOBUS/ Modbus RS-422 capability. Revised control circuit terminals contained in all figures. Changed document name from Dual Input Safe Torque Off (STO) to Dual Safe Disable Input.
January 2014	–	–	Initial release.

YASKAWA AC Drive-V1000 Option

Dual Safe Disable Input

Installation Manual

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