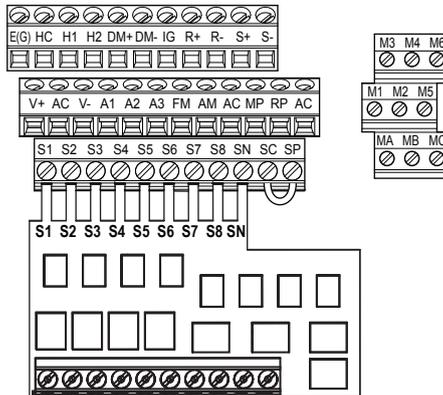


YASKAWA AC Drive A1000 Option 120 Vac Digital input Installation Manual

Type: DI-101

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



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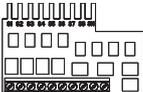
1 Preface and Safety

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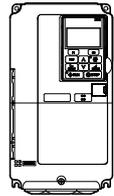
◆ Applicable Documentation

The following manuals are available for the option and drive:

Option

	Yaskawa AC Drive -A1000 Option DI-101 120 Vac Interface Installation Manual Manual No: TOEP YEAOPT 07	Read this manual first. The installation manual is packaged with the DI-101 120 Vac Interface Option and contains installation procedures and precautions.
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Yaskawa Drive

	Yaskawa AC Drive A1000-Series Quick Start Guide	The drive manuals cover basic installation, wiring, operation procedures, functions, troubleshooting, and maintenance information. The manuals also include important information about parameter settings and drive tuning. Access these sites to obtain Yaskawa instruction manuals: U.S.: http://www.yaskawa.com Europe: http://www.yaskawa.eu.com Japan: http://www.e-mechatronics.com For questions, contact your local Yaskawa sales office or the nearest Yaskawa representative.
	Yaskawa AC Drive A1000-Series Technical Manual	

◆ Terms

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

Drive: Yaskawa AC Drive A1000-Series

Option: Yaskawa AC Drive A1000-Series Option Digital Input DI-101

◆ Registered Trademarks

Trademarks are the property of their respective owners.

◆ Supplemental Safety Information

Read and understand this manual before installing, operating, or servicing this option. Install the option according to this manual and local codes.

The following conventions indicate safety messages in this manual. Failure to heed these messages could cause fatal injury or damage products and 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.

CAUTION

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

NOTICE

Indicates an equipment damage message.

1 Preface and Safety

■ General Safety

General Precautions

- The diagrams in this book may include options and drives without covers or safety shields to illustrate details. Be sure to reinstall covers or shields before operating any devices. Use the option 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 new copies of the manual, contact a Yaskawa representative or the nearest Yaskawa sales office and provide the manual number shown on the front cover.

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.

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.

Do not expose the drive or option to halogen group disinfectants.

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

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.

2 Product Overview

◆ About this Product

The DI-101 option has eight optically isolated input terminals that can be used to connect external 120 Vac control circuitry to the A1000 drive. The DI-101 option mounts directly to the A1000 control board terminals (S1 to S8 and SN). This option makes it possible to control the A1000 digital inputs with 120 Vac.

This manual explains the handling, installation and specifications of this product.

◆ Applicable Models

The option can be used with the drive models in [Table 1](#).

Table 1 Applicable Models

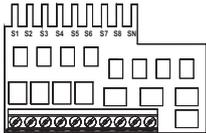
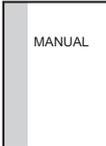
Drive Series	Drive Model Number
A1000	All models (excluding A1000 HHP models)

3 Receiving

Please perform the following tasks upon receiving 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 option packaging. (Refer to [Figure 1](#) on page 9 for more information)
- Contact your supplier if you have received the wrong model or the option does not function properly.

◆ DI-101 Option Package Contents

Description:	PCB 120 V Interface Card UTC000450, RB	Installation Manual
-		
Quantity:	1	1

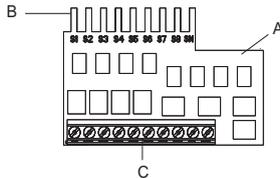
◆ Tools Required for Installation

- A Phillips screwdriver (M3 metric / #1, #2 U.S. standard size) is required to install the option.
- 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 option cables for wiring are not listed in this manual.

4 Option Components

◆ DI-101 Option



- A – DI-101 120 V Interface Card
- B – Option terminals (to drive)
- C – Option terminal block (to control wiring)

Figure 1 DI-101 Option

◆ Option Terminal Block TB1

An 10-position terminal block is provided for the connection of 120 Vac and common signal control wires.

Table 2 Option Terminal Functions

Terminal Functions				
DI-101 Option Terminal Block	Terminal	Signal Function	Description	Signal Level
	S1	Forward Run / Stop </>	Forward Run when closed, stop when open (H1-01)	120 Vac ±10 %
	S2	Reverse Run / Stop </>	Reverse Run when closed, stop when open (H1-02)	
	S3	Multi-function Input </>	Multi-function contact inputs (H1-03 to H1-08)	
	S4	Multi-function Input </>		
	S5	Multi-function Input </>		
	S6	Multi-function Input </>		
	S7	Multi-function Input </>		
	X2	Common	Control Input Common	
	X2	Common (spare)	Control Input Common	

<1> Terminal functions S1 to S8 may change based on drive programming.

5 Installation Procedure

◆ Section Safety

DANGER

Electric 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. The internal capacitor remains charged after the power supply is turned off.

WARNING

Electrical Shock Hazard

Do not remove the front covers of the drive 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. Use the option 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 touch circuit boards while the power to the drive is on.

Failure to comply could result in death or serious injury.



WARNING

Do not use damaged wires, place excessive on wiring, or damage the wire insulation.
Failure to comply could result in death or serious injury.

Fire Hazard

Tighten all terminal screws to the specified tightening torque.

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

NOTICE

Damage to Equipment

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

Failure to comply may result in ESD damage to circuitry.

Never shut the power off while the drive is running or 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.

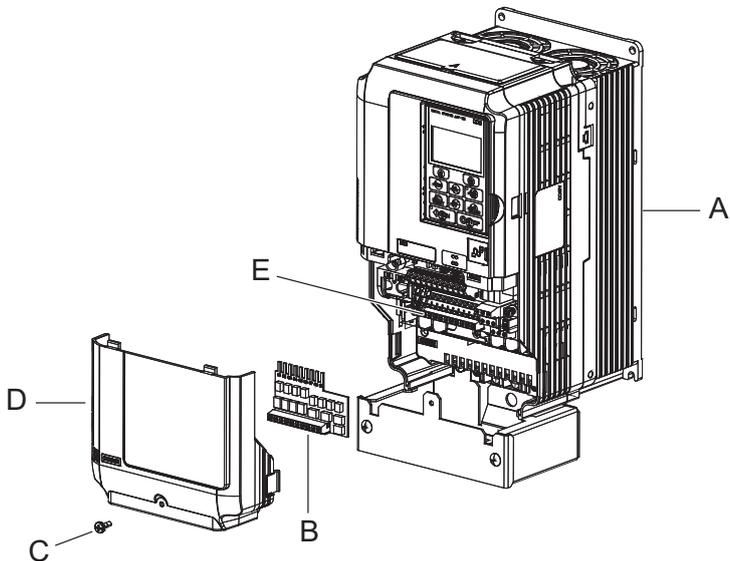
Failure to comply may result in damage to the option.

5 Installation Procedure

◆ Prior to Installing the Option

Prior to installing the option, wire the drive, make the necessary connections to the drive terminals, and verify that the drive functions normally. Refer to the Quick Start Guide packaged with the drive for information on wiring and connecting the drive.

Figure 2 is an exploded view of the drive with the option and related components for reference.



A – A1000 Drive

B – DI-101 Option

C – Cover Screw

D – Terminal Cover

E – A1000 TB1 - Digital Input Terminal Block,
Insertion Point for DI-101 Option

Figure 2 Drive Components with Option

◆ Installing the Option

Refer to the following instructions to install the option.

1. Shut off power to the drive, wait the appropriate amount of time for voltage to dissipate. Remove the terminal cover screw (C) then remove the terminal cover (D). Refer to the Quick Start Guide packaged with the drive for directions on removing the cover. Cover removal varies depending on drive size.

DANGER! *Electrical Shock Hazard. 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 to prevent electric shock. The internal capacitor remains charged even after the power supply is turned off.*

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.*

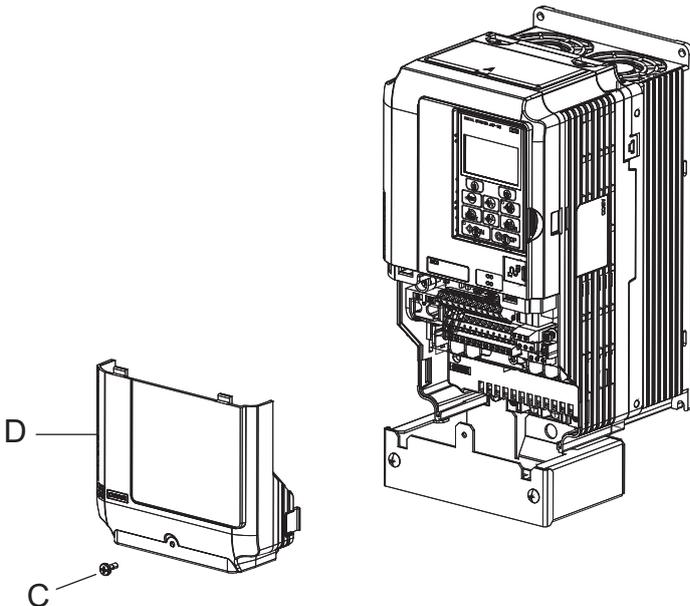


Figure 3 Terminal Cover Removal

5 Installation Procedure

2. Loosen terminals S1 to S8 and SN on the A1000 drive digital Input terminal block TB1.

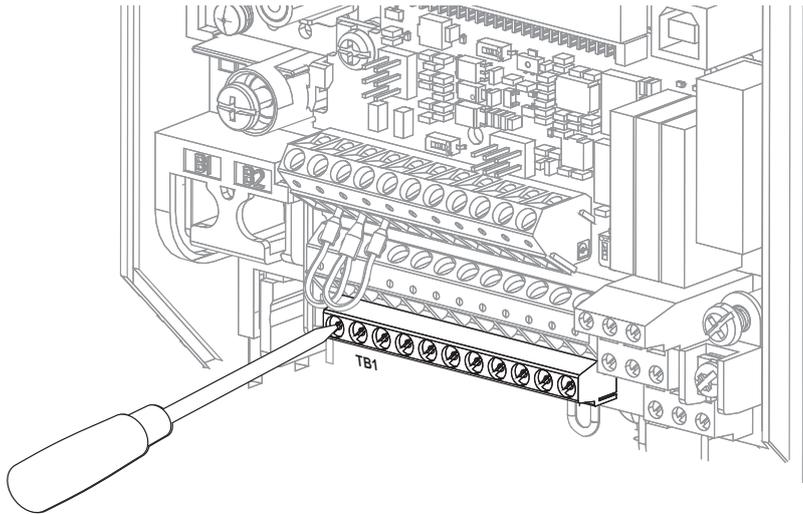


Figure 4 Loosen Drive Control Terminals TB1 S1 to S8 and SN

3. Remove the DI-101 option from the ESD bag.

NOTICE: When handling printed circuit boards (PCB) always use electrostatic discharge (ESD) protection. Keep the boards in the ESD bag as long as you can. Do not lay the board on any surfaces without the ESD protection. When handling, always hold the board from the edges and do not touch the components. Before installing this option, a technically qualified individual, familiar with this type of equipment and the hazards involved, should read this entire installation guide.

5 Installation Procedure

4. Insert the DI-101 option (B) into the A1000 drive control terminals TB1, S1 to S8 and SN at the insertion point (E). Refer to [Figure 6](#) for the proper placement of the option terminals into the drive TB1 terminals. Secure the DI-101 option by tightening the TB1 terminals S1 to S8 and SN. Refer to [Wire Gauges, Tightening Torques, and Crimp Terminals on page 20](#) to confirm that the proper tightening torque is applied to each terminal.

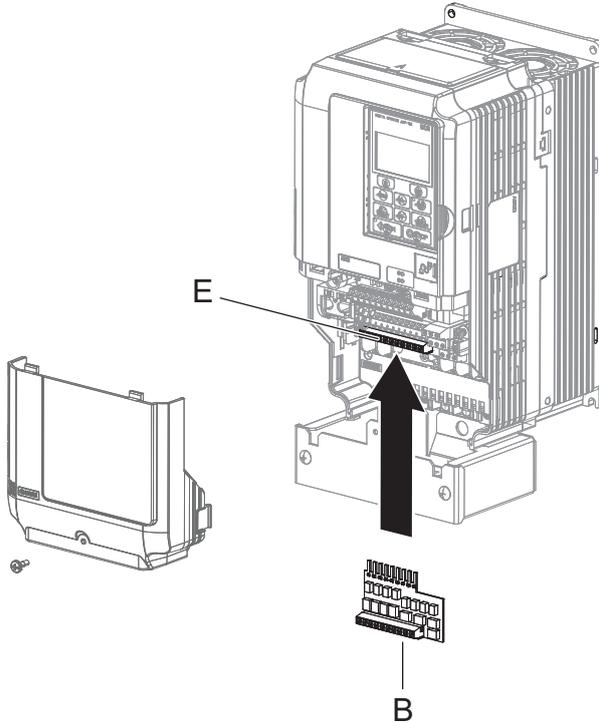


Figure 5 DI-101 Option Insertion into TB1

5 Installation Procedure

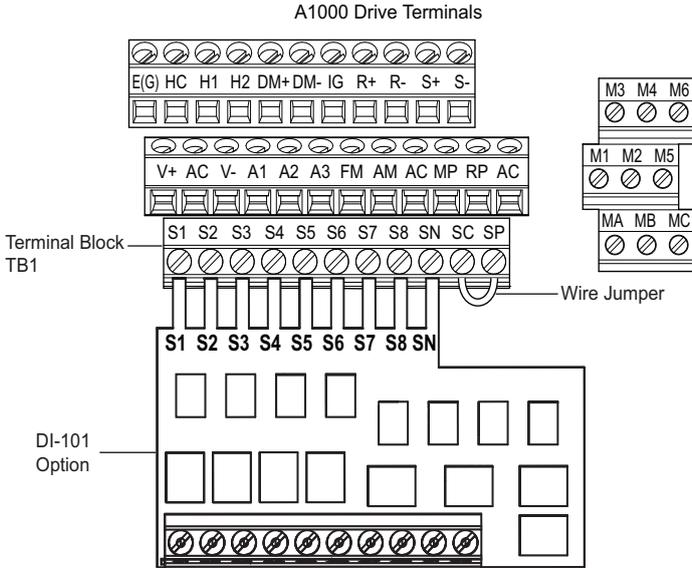


Figure 6 DI-101 Option to Drive Connection

5. Ensure the factory installed wire jumper is present between TB1 terminals SC to SP. If no wire jumper is present, prepare and install a jumper according to [Figure 7](#). Route the customer-supplied option wiring through one of the cable glands on the A1000 drive bottom conduit bracket.

6. Prepare the external 120 Vac control circuit wires (customer supplied) for terminals S1 to S8 and X2 on the DI-101 option as shown in **Figure 7**.

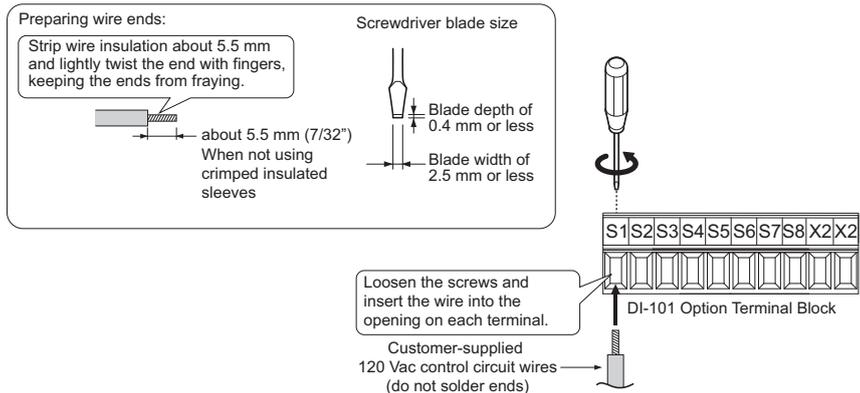


Figure 7 Preparing Cable Wiring

7. Connect the customer wiring to the DI-101 option terminal block. Refer to **Figure 8** for a wiring diagram example showing customer interface circuitry. **Refer to Wire Gauges, Tightening Torques, and Crimp Terminals on page 20** to confirm that the proper tightening torque is applied to each terminal. Take particular precaution to ensure each wire is properly connected and wire insulation is not accidentally pinched into electrical terminals.

WARNING! Fire Hazard. Tighten terminal screws to the specified tightening torque. Loose electrical connections could result in death or serious injury by fire due to overheating. Tightening screws beyond the specified tightening torque may cause erroneous operation, damage the terminal block, or cause a fire.

5 Installation Procedure

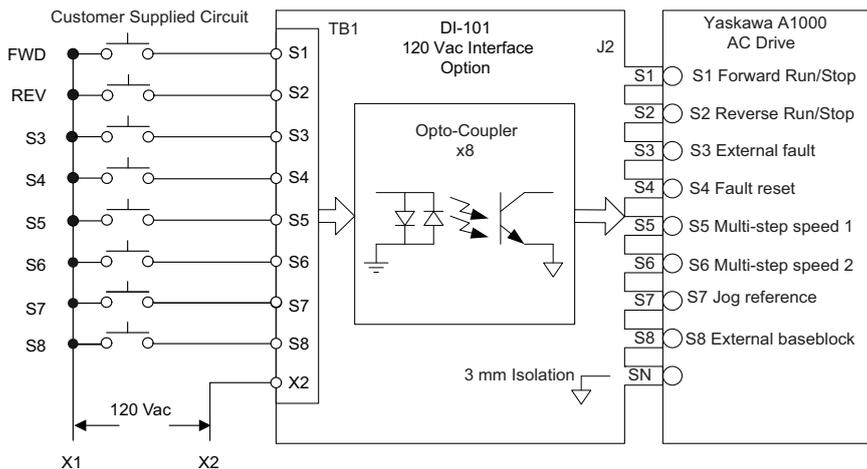


Figure 8 Wiring Diagram Example

To ensure accurate control, use a stable 120 Vac power supply for the DI-101 input voltage source.

8. Replace terminal cover (D) and secure screw (C).

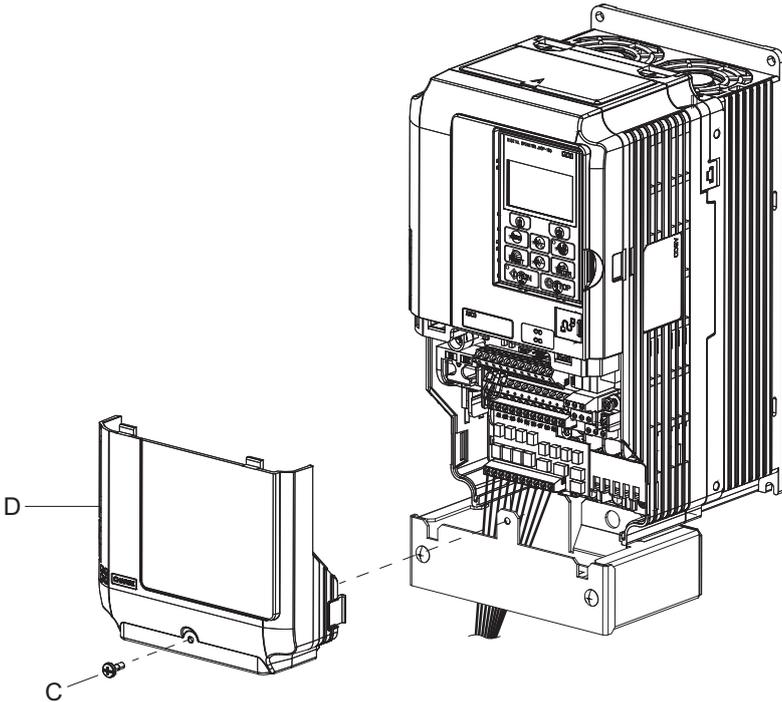


Figure 9 Replace the Terminal Cover

5 Installation Procedure

◆ Wire Gauges, Tightening Torques, and Crimp Terminals

■ Wire Gauges and Tightening Torques

Wire gauge and torque specifications are listed in [Table 3](#).

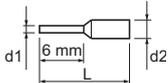
Table 3 Wire Gauges and Tightening Torques

Terminal signal	Screw Size	Tightening Torque N.m (in.lb)	Bare Cable		Crimp Terminals		Wire Type
			Applicable Gauges mm ²	Recomm. Gauge mm ²	Applicable Gauges mm ²	Recomm. Gauge mm ²	
S1 to S8 and X2	M2	0.22 to 0.25 (1.95 to 2.21)	Stranded wire: 0.25 to 1.0 (24 to 17 AWG) Solid wire: 0.25 to 1.5 (24 to 16 AWG)	0.75 (18 AWG)	0.25 to 0.5 (24 to 20 AWG)	0.5 (20 AWG)	Stranded or solid wire

■ Crimp Terminals

Yaskawa recommends using CRIMPFOX 6 by Phoenix Contact or equivalent crimp terminals with the specifications listed in [Table 4](#) for simpler and more reliable wiring.

Table 4 Crimp Terminal Sizes

	Wire Gauge mm ²	Phoenix Contact Model	L mm (in)	d1 mm (in)	d2 mm (in)
	0.25 (24 AWG)	AI 0.25 - 6YE	10.5 (13/32)	0.8 (1/32)	2 (5/64)
	0.34 (22 AWG)	AI 0.34 - 6TQ	10.5 (13/32)	0.8 (1/32)	2 (5/64)
	0.5 (20 AWG)	AI 0.5 - 6WH	14 (9/16)	1.1 (3/64)	2.5 (3/32)

6 Troubleshooting

Troubleshooting tips are provided below. Verify these points if the drive performance is not as expected after installing the option:

- Verify all wire connections are tight.
- Verify all DI-101 PCB Fingers are fully inserted into the A1000 TB1 drive terminals and the terminals are fully tightened.
- Verify the factory installed wire jumper is installed between A1000 TB1 terminals SC to SP.
- Verify the signal is present at the DI-101 option input terminals by using an AC voltmeter to measure for a 120 Vac input signal is present on any activated terminals S1 thru S8 with respect to the X2 terminal.
- Verify the digital input is recognized by the drive by viewing Input Terminal Status monitor parameter U1-10.
- Verify the drive Multi-Function Digital Input parameters (H1-01 through H1-08) of the drive are set correctly for the expected S1 to S8 input terminal behavior.

◆ Preventing Noise Interference

Take the following steps to prevent erroneous operation caused by conducted electrical noise interference:

- Use shielded wire for the signal lines less than 24 V.
- Limit the length of I/O signal wiring to less than 50 m (164 ft.).
- Use separate conduits or cable tray separation for 120 Vac control wiring, DC signal and other I/O wiring, main circuit power lines.
- Use noise suppression on relay coils.
- Ensure adequate system and drive grounding.

7 Specifications

Table 5 Option Specifications

Specification	Data
Inputs	8 Digital Inputs , +2 Neutral Common
Input Impedance	10 Kohms
On-State Voltage	93 to 132 Vac (110/120 Vac +10 % / -15 %)
On-State Current, Nominal	12.5 mA @ 120 Vac
Off-State Voltage, Maximum	19 Vac
Off-State Leakage Current, Maximum	4.0 mA
Operating Frequency	57 to 63 Hz (+/- 15 %)
On-State Response Time, Maximum	50 ms
Off-State Response Time, Maximum	50 ms
Terminal Wiring	16 AWG to 26 AWG
Area of Use	Indoors
Operating Temperature	-10 to +60 degrees C
Storage Temperature	-20 to +85 degrees C (short-term temperature during transport)
Humidity	95% Relative Humidity or less (non condensing)

◆ Revision History

Revision dates and manual numbers are located on the bottom of the back cover.

MANUAL NO. TOEP YEAOPT 07

Published in USA May 2011 11-5 

└── Date of publication

└── Date of original publication

└── Revision number

Date of Publication	Revision Number	Section	Revised Content
August 2018	1	Pg. 16, Cover	Corrected M4/M6 terminal designations
May 2011	-	-	First edition

YASKAWA AC Drive A1000 Option 120 Vac Digital input Installation Manual

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YASKAWA

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Specifications are subject to change without notice for ongoing product modifications and improvements.

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TOEPYEAOPT07

MANUAL NO.
TOEP YEAOPT 07 <1>

Published in USA August 2018