

IMPULSE·G+ & VG+ *Series 4*

Adjustable Frequency/Vector Crane Controls

24 V Power Supply Installation Manual PS-A10H and PS-A10L



MAGNETEK
MATERIAL HANDLING

November 2011
Part Number: 144-23928
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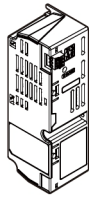
1. Preface and Safety

Magnetek manufactures products used as components in a wide variety of industrial systems and equipment. The selection and application of Magnetek products remain the responsibility of the equipment manufacturer or end user. Magnetek accepts no responsibility for the way its products are incorporated into the final system design. Under no circumstances should any Magnetek 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 Magnetek 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 Magnetek must be promptly provided to the end user. Magnetek offers an express warranty only as to the quality of its products in conforming to standards and specifications published in the Magnetek manual. **NO OTHER WARRANTY, EXPRESS OR IMPLIED, IS OFFERED.** Magnetek 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:

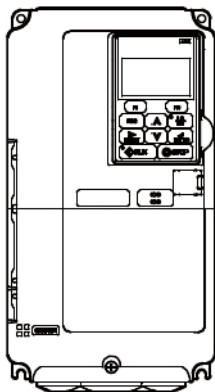
24 V Power Supply Option



**IMPULSE®•G+/VG+ Series 4
Option 24 V Power Supply
Installation Manual
Manual No: 144-23928**

Read this manual first.
The installation manual is packaged with the option and contains information required to install the option and set up related drive parameters.

IMPULSE•G+/VG+ Series 4 Drive



**IMPULSE®•G+/VG+ Series 4
Instruction Manual**

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 <http://www.magnetekmh.com> to obtain Magnetek instruction manuals.

Terms

Drive: IMPULSE®•G+/VG+ Series 4

Option: IMPULSE®•G+/VG+ Series 4 Option 24 VDC Power Supply

Registered Trademarks

Trademarks are the property of their respective owners.

Supplemental Safety Instructions

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

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations.



WARNING

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



CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It may also be used to alert against unsafe practices.

NOTICE

NOTICE indicates an equipment damage message.

NOTE: A *NOTE* statement is used to notify installation, operation, programming, or maintenance information that is important, but not hazard-related.

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 Magnetek representative and provide the manual number shown on the front cover.



DANGER

Heed the safety messages in this manual.

Failure to comply may 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.

Magnetek 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.

Option Label Warnings

Warning information is displayed on the option as shown in the Figure 1. Follow all warnings and safety instructions when using the product.

When using the drive in an area that may require displaying warning information in Japanese and English, a warning label is provided with the option. This label can be placed over the English and French warnings on the front of the option.

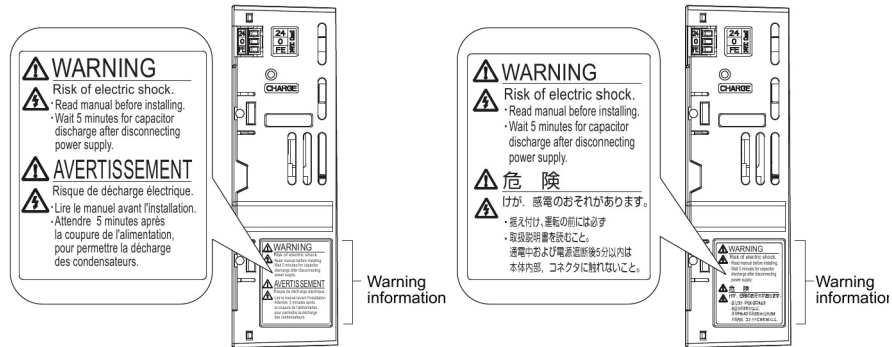


Figure 1: Warning Labels

2. Product Overview

About This Product

The 24 V Power Supply option maintains drive control circuit power in the event of a main power outage. As long as the control circuit has power, network communications and I/O data remain operational. The option provides external power to the control circuit only, and does not provide power to the main circuit of the drive.

It is possible to read fault and parameter data in the drive via the operator or network communications when the drive switches to the option as a back-up power supply.

NOTE: Parameter settings cannot be changed without drive main circuit power regardless of whether the control circuit has enough power to operate.

Applicable Models

The 24 V Power Supply Option can be used with the drive models in Table 1.

Table 1: Applicable Models

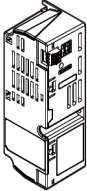



Drive Series	Drive Voltage Class	Option Model
G+/VG+ Series 4	230 V Class	PS-A10L
	460 V Class	PS-A10H
	575 V Class	

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 nameplate (refer to Figure 3 on page 1-8 for more information).
- Contact your supplier if you have received the wrong model or the option does not function properly.

Option Package Contents

Description:	Option Unit	Warning Label <1>	Screws (M3)	Installation Manual
--				
Quantity	1	1	3	1

<1> The warning label packaged with the option must be affixed to the option to maintain UL listing. Refer to Option Label Warnings on page 1-5 for instructions on label placement.

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: 0.015" [0.4 mm], width: 0.098" [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

24 V Power Supply Option

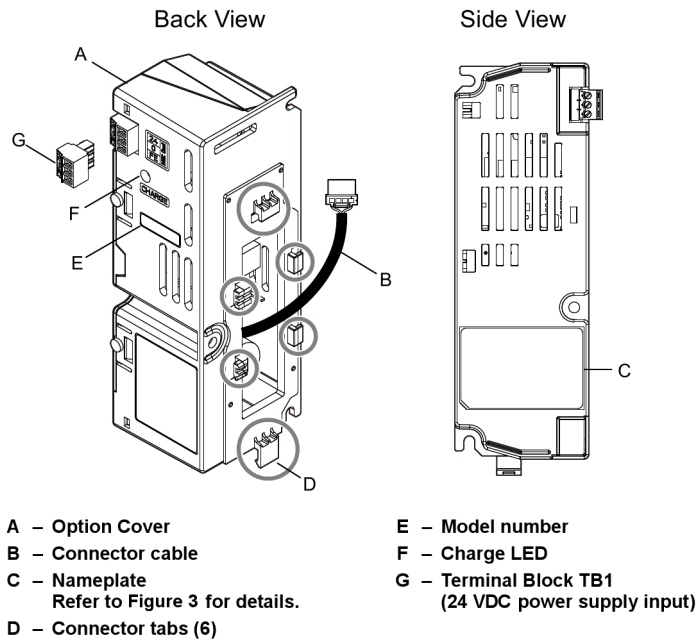


Figure 2: 24 VDC Power Supply Option Components

Option Nameplate

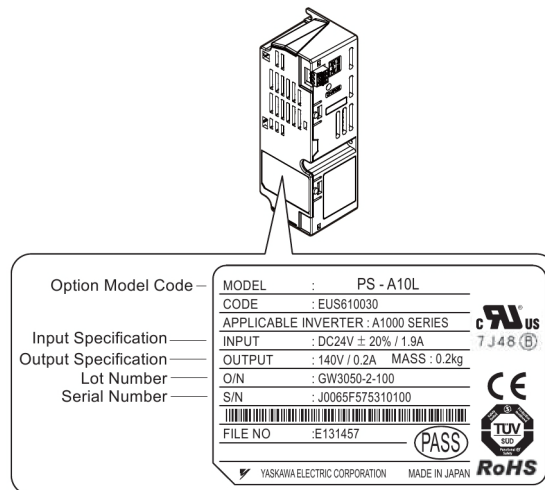
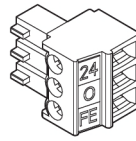


Figure 3: PS-A10L Nameplate Example

Terminal Block TB1



Refer to Table 2 for details on TB1 terminal functions.

Terminal Functions

Table 2: Option Terminal Functions

Terminal	Function
24	+24 VDC Input
0	0 V
FE	Ground

5. Installation and Uninstallation 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 before servicing. The internal capacitor remains charged after the power supply is turned off.



WARNING

Electrical Shock Hazard

Do not remove the front cover 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.

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.

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.

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 IMPULSE®•G+ & VG+ Series 4 Instruction Manual packaged with the drive for information on wiring and connecting the drive.

Single Drive Installation

Figure 4 shows the installation distance required to maintain sufficient space for airflow and wiring.

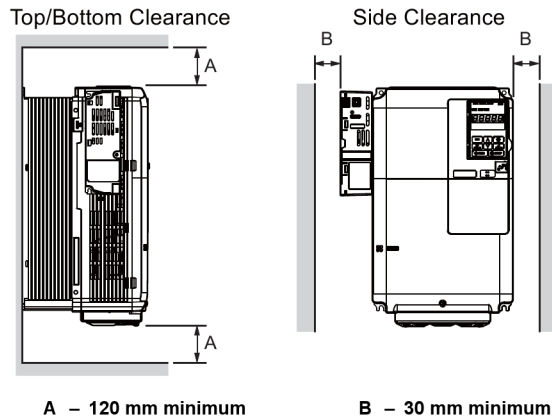


Figure 4: Correct Installation Spacing

NOTE: IP20/NEMA Type 1 Enclosure and IP00/Open-Chassis models require the same amount of space above and below the drive for installation.

Dimensions

The option is 163 mm (6.4 in.) tall and adds 50 mm (2.0 in.) to the width of the drive when installed.

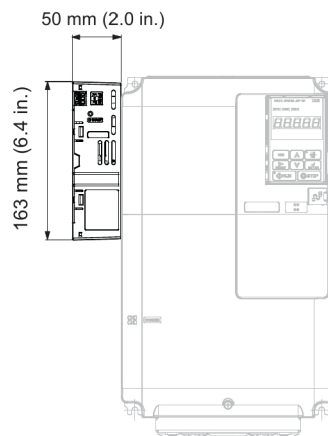


Figure 5: Dimensions

UL and CE Compliance

Installation Area

For compliance with UL and CE standards, the 24 V Power Supply Option should be placed within the enclosure.

This product must be used in areas with an environment rating no greater than pollution degree 2 according to UL standards.

NOTE: 575 V class drives (models 5XXX-G+/VG+S4) are not compliant with European Standards.

External Power Supply

Use a Class 2 power supply as defined by UL standards for the customer-supplied power supply connection to TB1.

Option Installation Methods

There are three different installation methods for the option based on drive model. Find the drive model number on the drive nameplate and refer to Table 3 to determine the proper option installation method for your drive.

Table 3: Model-Specific Installation Methods

Drive Model (-G/VG+S4)	Installation Method	Page
2003 to 2075, 4001 to 4039, 5001 to 5027	A	1-14
2085 to 2415, 4045 to 4370, 5032 to 5200	B	1-18
4450 to 4605	C	1-22

Installation Method A



DANGER

Electric 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. The internal capacitor remains charged 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.

1. Shut off power to the drive, wait the appropriate amount of time for voltage to dissipate, then remove the connector cover by pushing on the connector tab and sliding the cover towards the top of the drive as indicated by the arrow in Figure 6.

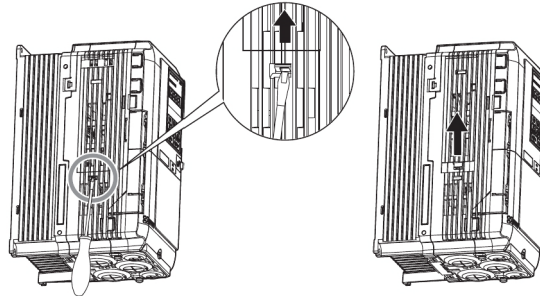


Figure 6: Remove the Connector Cover

2. Pull the loose end of the connection cable out of the option.

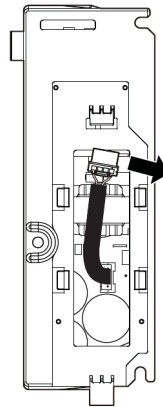


Figure 7: Pull Out the Connection Cable

3. Firmly plug the end of the connection cable into the CN19 connection port on the drive.

NOTICE

Make sure the connector is facing in the proper direction when plugging it into the drive. An improper connection can damage the connector and the drive.

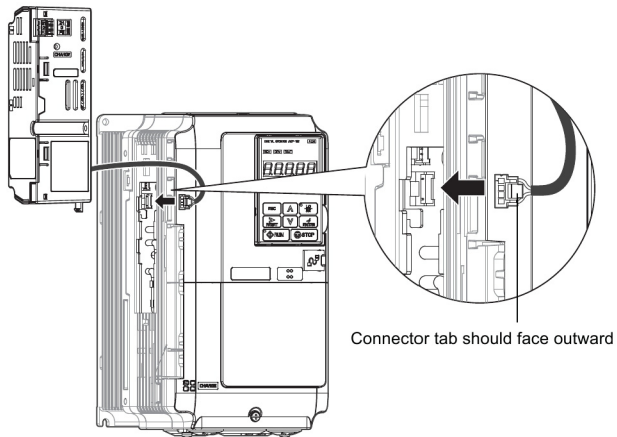


Figure 8: Plug the Connection Cable into the Drive

4. Align the connector tabs on the option with the insertion tabs on the drive as shown in Figure 9.

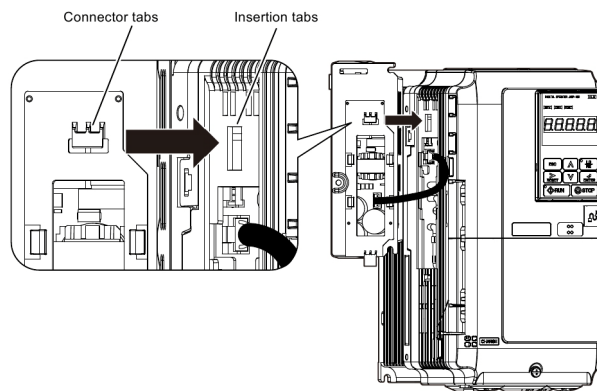


Figure 9: Align the Option and the Drive

NOTE: Take proper precautions when connecting the option so the option will easily fit onto the drive. Make sure the connector cable is not pinched between the option and the drive.

5. Slide the option downward as indicated in Figure 10 to lock it into place on the drive.

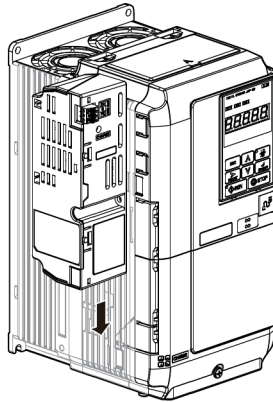


Figure 10: Slide the Option onto the Drive

6. Skip to Option Wiring on page 28.

Installation Method B



DANGER

Electric 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. The internal capacitor remains charged 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.

1. Shut off power to the drive, wait the appropriate amount of time for voltage to dissipate, then use a Phillips screwdriver (M4) to remove the screw holding the connector cover in place.

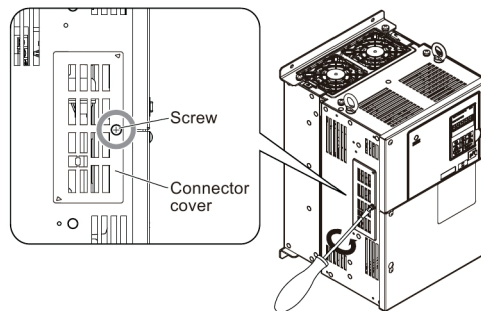


Figure 11: Remove the Connector Cover Screw

2. Slide the connector cover as shown in Figure 12.

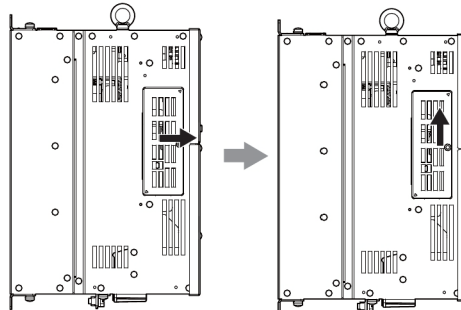


Figure 12: Slide the Connector Cover

3. Insert the blade of a straight-edge screwdriver into the opening shown in Figure 13. Pull the connector cover in the direction indicated by the arrow and remove it from the drive.

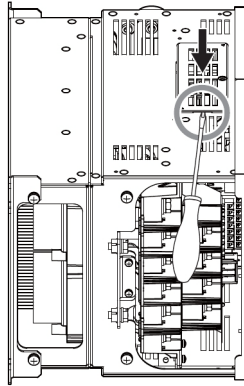


Figure 13: Remove the Connector Cover

4. Pull the loose end of the connection cable out of the option.

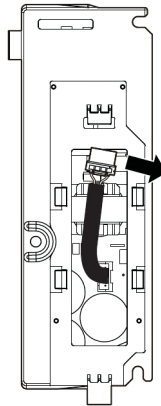


Figure 14: Pull Out the Connection Cable

5. Firmly plug the end of the connection cable into the CN19 connection port on the drive.

NOTICE

Make sure the connector is facing in the proper direction when plugging it into the drive. An improper connection can damage the connector and the drive.

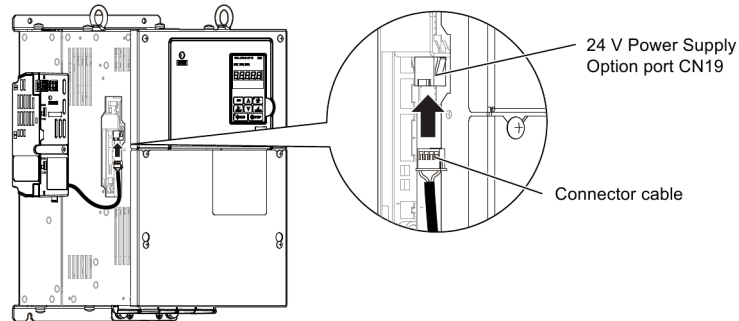


Figure 15: Plug in the Connector (2085-G+/VG+S4)

6. Align the connector tabs on the option with the insertion tabs on the drive as shown in Figure 16.

NOTE: Take proper precautions when connecting the option so the option will easily fit onto the drive. Make sure the connector cable is not pinched between the option and the drive.

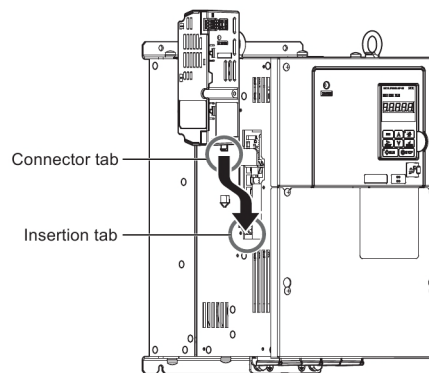


Figure 16: Tab Locations

7. Use a Phillips screwdriver (M4) and the screws included in the option package to fasten the option to the drive in the three locations shown in Figure 17.

NOTICE

Use only the screws packaged with the option; other screws may damage drive components.

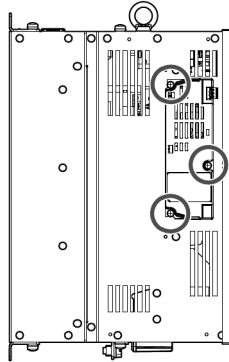


Figure 17: Location of Screws

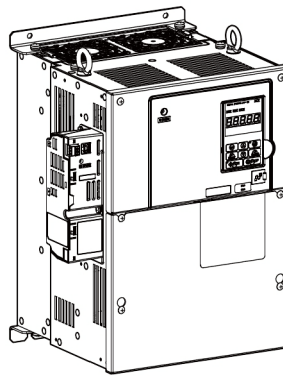


Figure 18: Option Properly Installed

8. Skip to Option Wiring on page 28.

Installation Method C



DANGER

Electric Shock Hazard

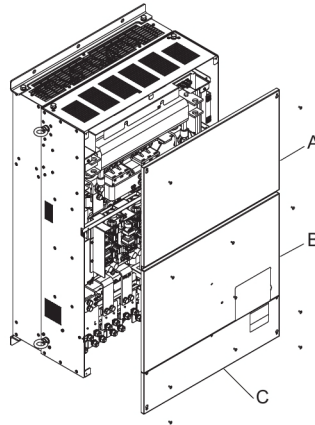
Disconnect all power to the drive and wait at least the amount of time specified on the drive front cover safety label. After all indicators are off, measure the DC bus voltage to confirm safe level, and check for unsafe voltages before servicing. The internal capacitor remains charged after the power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

1. Shut off power to the drive, wait the appropriate amount of time for voltage to dissipate, then use a Phillips screwdriver (M4) to remove the drive covers.

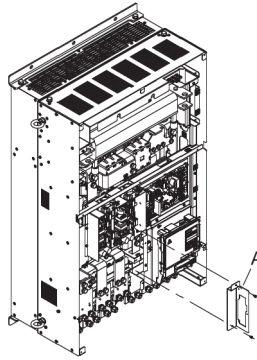


A – Front cover 1
B – Front cover 2

C – Terminal Cover

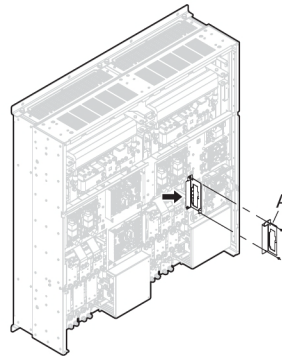
Figure 19: Remove the Covers

2. Remove the bracket used to hold the 24 V power supply unit in place.



A – Bracket for 24 V power supply unit

Figure 20: Removing the bracket (4450-G+/VG+S4, 4605-G+/VG+S4)



A – Bracket for 24 V power supply unit

Figure 21: Removing the bracket (4810-G+/VG+S4, 41090-G+/VG+S4)

3. Pull the loose end of the connection cable out of the option.

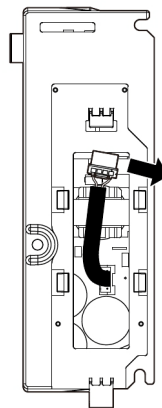


Figure 22: Pull Out the Connection Cable

4. As shown in Figure 23, the cable and connector should pass through the bracket.

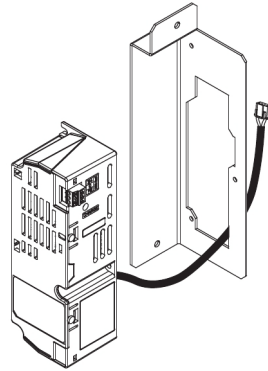
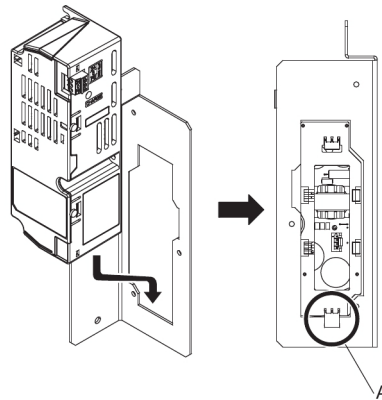


Figure 23: Pass the cable and connector through the bracket

5. Connect the option unit to the bracket so that the connector tabs on the unit catch and hold it in place.



A – Connector tabs to catch the bracket

Figure 24: Connecting the Option Unit to the Bracket

6. Use a Phillips screwdriver (M4) and the screws included in the option package to fasten the option to the bracket in the three locations shown in Figure 25.

NOTICE

Use only the screws packaged with the option; other screws may damage drive components.

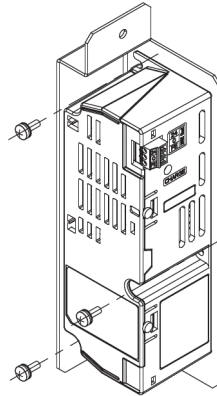


Figure 25: Securing the Option Unit to the Bracket

7. Firmly plug the end of the connection cable into the CN19 connection port on the drive.

NOTICE

Make sure the connector is facing in the proper direction when plugging it into the drive. An improper connection can damage the connector and the drive.

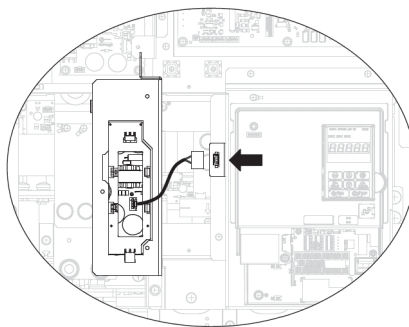
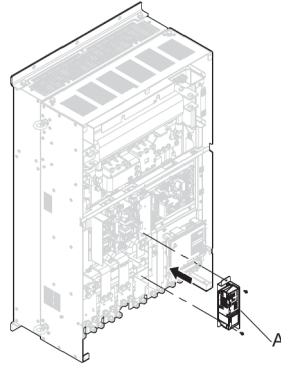


Figure 26: Plugging the connector

8. With the option unit now affixed to the bracket, reinstall the bracket back in its original location.

NOTE: Take proper precautions when connecting the option so the option will easily fit onto the drive. Make sure the connector cable is not pinched between the option and the drive.



A – Option unit affixed to the bracket

Figure 27: Installing the option unit

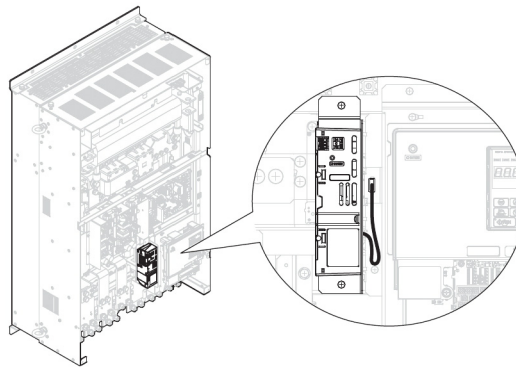
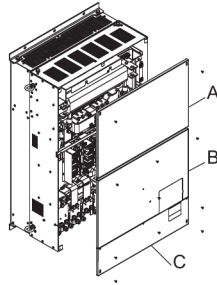


Figure 28: Option Properly Installed

9. Skip to Option Wiring on page 28. After wiring the terminal TB1, reinstall the drive covers to their original locations.



- A – Front Cover 1
- B – Front Cover 2
- C – Terminal Cover

Figure 29: Reinstall the covers to the drive

Option Wiring

1. Select an external power supply.

When the option is first switched on, two times the normal current will flow through the option for approximately 0.5 seconds. The option requires at least 3 A to function properly.



WARNING

Electric Shock Hazard

Use a battery or a double-reinforced UL Class 2 power supply to provide power to the option. Using a different type of power supply may result in death or serious injury by electrical shock or fire.

2. Wire the Terminal Block TB1.

Wire the external power supply to terminal block TB1 on the option.

Use a flat-blade screwdriver to loosen the screws on the 24 V power supply plug, connect wiring to the 24 V, 0, and FE terminals as shown in Figure 30, then tighten the terminal screws to hold wiring in place.

Refer to Wire Gauges and Tightening Torques on page 29 to confirm that the proper tightening torque is applied to each terminal. Take particular precaution to ensure that each wire is properly connected.

NOTICE

Be sure to properly connect an external 24 VDC power source to the power supply plug. Refer to Option Specifications on page 34 for details. Improper wiring practices could damage the option due to incorrect terminal connections.

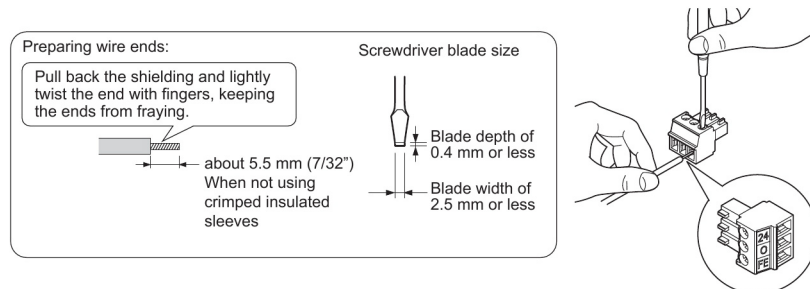


Figure 30: Wire the 24 V Power Supply Plug



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.

NOTICE

Heat shrink tubing or electrical tape may be required to ensure that cable shielding does not contact other wiring. Insufficient insulation may cause a short circuit and damage the option or drive.

Connection Diagram

Figure 31 illustrates the 24 VDC Power Supply Option and drive connections.

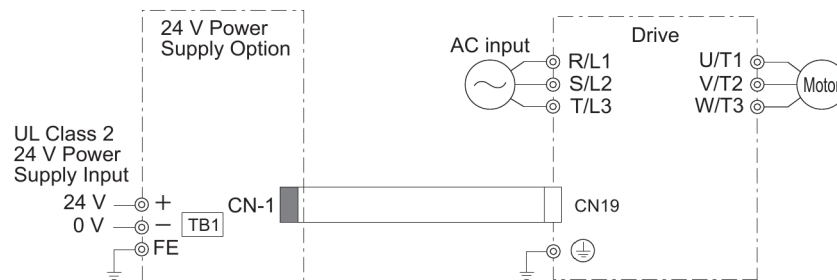


Figure 31: Connection Diagram for Drive and Option

NOTE: 24 VDC external power supply input is supplied by the customer.

Wire Gauges and Tightening Torques

Table 4: Wire Gauges and Tightening Torques

Terminal Number	Screw Size	Tightening Torque N-m (in-lb)	Bare Cable		Crimp Terminals		Wire Type
			Applicable Gauges mm ²	Recomm. Gauges mm ²	Applicable Gauges mm ²	Recomm. Gauges mm ²	
24, 0, FE	M2	0.22 to 0.2 (1.95 to 2.21)	Standard wire: 0.25 to 1.0 (24 to 17 AWG)	0.75 (18 AWG)	0.25 to 0.5 (24 to 20 AWG)	0.5 (20 AWG)	Shielded cable, etc.
			Single line: 0.25 to 1.5 (24 to 16 AWG)				

Wire Gauges for Connecting Multiple Drives

The option can be wired to three drives in parallel. Table 5 indicates the proper wire gauges for connecting multiple drives.

Table 5: Wire Gauges for Multiple Drives

Connectio	Recommended Gauges mm ²
2 to 3 drives wired in parallel	0.5 (20 AWG)

Uninstalling the Option

There are three different Uninstallation methods for the option based on drive model. Find the drive model number on the drive nameplate and refer to Table 6 to determine the proper option uninstallation method for your drive.

Table 6: Uninstallation Method

Drive Model	Uninstallation Method
2003 to 2075, 4001 to 4039, 5001 to 5027	A
2085 to 2415, 4045 to 4370, 5032 to 5200	B
4450 to 4605	C

Uninstallation Method A

Insert the blade of a straight-edge screwdriver as shown in Figure 32, and gently slide the option in the direction indicated by the arrow.

NOTICE

Do not use excessive force when uninstalling the option. Failure to comply can damage the cable and connector.

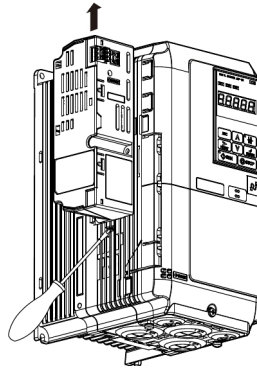


Figure 32: Uninstallation Method A

Uninstallation Method B

Remove the three screws used to fasten the option into place during installation as shown in Figure 33 to uninstall the option.

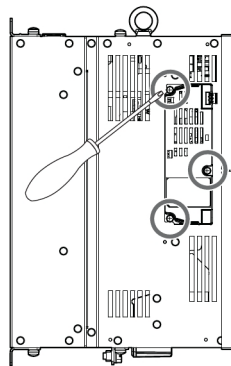
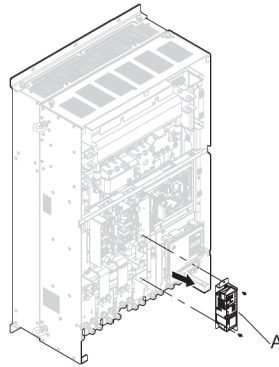


Figure 33: Uninstallation Method B

Uninstallation Method C

After removing the drive covers, remove the bracket and option unit as shown in Figure 34.



A – Remove the bracket and option unit

Figure 34: Uninstallation Method C

6. Verifying Operation

After properly wiring and installing the option, use the following procedure to check for normal operation:

1. Make sure the drive main circuit power is on, 24 VDC external power is supplied to the 24 V connector plug, and the 24 V connector plug is connected to the option.
2. Switch off the main power supply to the drive. The 24 VDC external power supply should provide power to the drive control unit.
3. Check for the red LED on the option indicating proper option operation.
4. The digital operator on the drive will display “Uv” for about 10 seconds to indicate an undervoltage condition on the drive. If “Uv” does not flash on the display screen, check the wiring. If “Uv” fails to appear on the digital operator after confirming proper wiring, the drive or option may be damaged.

Power Supply and the Control Circuit

Table 7 outlines the various conditions under which the option provides power to the control circuit.

Table 7: Power Supply and Control Circuit

Drive Main Circuit Input Power Supply	Power from 24 V Power Supply Option	Control Circuit Operation in Drive	Drive Operation
ON	ON		Possible
ON	OFF	Normal Operation	Possible
OFF	ON		Not Possible
OFF	OFF	Stop	Not Possible

7. Specifications

Table 8: Option Specifications

Items	Specifications
Option Input Operating Voltage	24 VDC \pm 20% (19.2 to 28.8 V)
Option 24 VDC Input Current	1.9 A
Consumption Power	38 W
Output Voltage	PS-A10L: 140 V PS-A10H: 280 V
Output Power	30 W
Output Ride-Thru time (when power is off)	Over 50 ms
Ambient Temperature	-10 °C to +60 °C (14 °F to 140 °F) <1>
Storage Temperature	-20 °C to +70 °C (-4 °F to 158 °F) allowed for short-term transport of the product
Maximum Possible Drive Connections	3
Weight	0.2 kg (0.4 lbs.)
Compliance	UL <2>, CE

<1> The option must be installed in an environment compatible with the drive environmental specifications.

<2> Use a Class 2, 24 VDC UL power supply to meet UL requirements.