Allen-Bradley

Kinetix 3 Component Servo Drives

Catalog Numbers 2071-AP0, 2071-AP1, 2071-AP2, 2071-AP4, 2071-AP8, 2071-A10, 2071-A15

About the Kinetix 3 Drives

Kinetix 3 component servo drives provide simple solutions for applications with output power requirements in the range of 1.30...12.37 A rms (50...1500 W).

Refer to the Kinetix 3 Component Drive User Manual, publication 2071-UM001, for detailed information on wiring, applying power, troubleshooting, and integrating with MicroLogix controller platforms.

For application-related information about Kinetix 3 drives, refer to the online help provided with Ultraware software, version 1.79 or later, catalog number 2098-UWCPRG.

Important User Information

Solid-state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (Publication SGI-1.1 available from your local Rockwell Automation sales office or online at http://www.rockwellautomation.com/literature/) describes some important differences between solid-state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid-state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

Reproduction of the contents of this manual, in whole or in part, without written permission of Rockwell Automation, Inc., is prohibited.

Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

	Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
	Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard and recognize the consequences.
	Labels may be on or inside the equipment, for example, drive or motor, to alert people that dangerous voltage may be present.
	Labels may be on or inside the equipment, for example, drive or motor, to alert people that surfaces may reach dangerous temperatures.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

Catalog Number Explanation

This publication applies to the following Kinetix 3 drives.

Cat. No.	Component Servo Drive (230V)
2071-AP0	Kinetix 3, 220V AC, 1 Ø, 0.6 A
2071-AP1	Kinetix 3, 220V AC, 1 Ø, 1.1 A
2071-AP2	Kinetix 3, 220V AC, 1 Ø, 1.7 A
2071-AP4	Kinetix 3, 220V AC, 1 Ø, 3.3 A
2071-AP8	Kinetix 3, 220V AC, 1 or 3 Ø, 5.0 A
2071-A10	Kinetix 3, 220V AC, 3 Ø, 7.0 A
2071-A15	Kinetix 3, 220V AC, 3 Ø, 9.9 A

Before You Begin

Remove all packing materials, wedges, and braces from within and around the components. After unpacking, check the item nameplate catalog number against the purchase order.

Parts List

The Kinetix 3 drive ships with:

- a general purpose power input (IPD) header, shunt resistor (BC) header, and motor power (MP) header.
- a connector tool for opening wire clamps on the power connector.
- a ground clamp and two #6-32 x 1 screws to provide ground and strain relief for the motor power cable.
- these installation instructions, publication 2071-IN001.

Replacement connector sets (catalog number 2071-CONN1), are also available.

Refer to the Kinetix Motion Control Selection Guide, publication GMC-SG001, for more information on replacement connector sets.

Install the Kinetix 3 Drive

These procedures assume you have prepared your panel, and understand how to bond your system. For installation instructions regarding equipment and accessories not included here, refer to the instructions that came with those products.

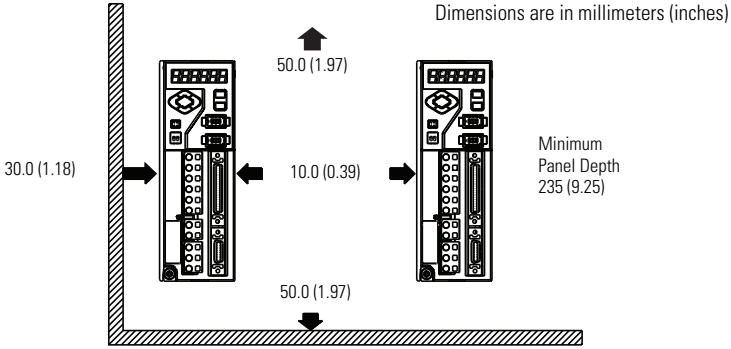
SHOCK HAZARD: To avoid hazard of electrical shock, perform all mounting and wiring of the Kinetix 3 drive prior to applying power. Once power is applied, connector terminals may have voltage present even when not in use.

ATTENTION: Plan the installation of your system so that you can perform all cutting, drilling, tapping, and welding with the system removed from the enclosure. Because the system is of the open type construction, be careful to keep any metal debris from falling into it. Metal debris or other foreign matter can become lodged in the circuitry, which can result in damage to components.

Mount the Kinetix 3 Drive

Follow these steps to mount the drive.

1. Observe these clearance requirements when mounting the drive to the panel.

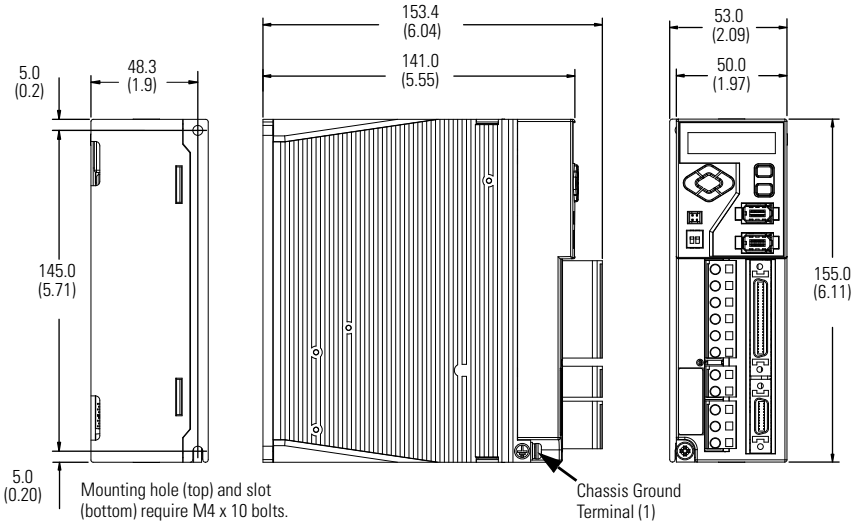


IMPORTANT	Mount the module in an upright position as shown. Do not mount the module on its side.

2. Mount the Kinetix 3 drive to the cabinet subpanel with an M4 (#6-32) steel machine screw torqued to 1.1 N•m (9.8 lb•in).

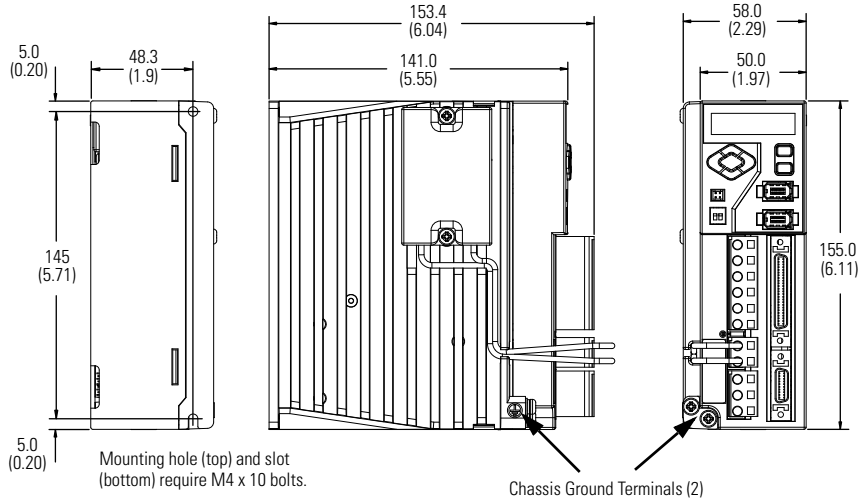
Product Dimensions

Catalog Numbers 2071-AP0, 2071-AP1, and 2071-AP2



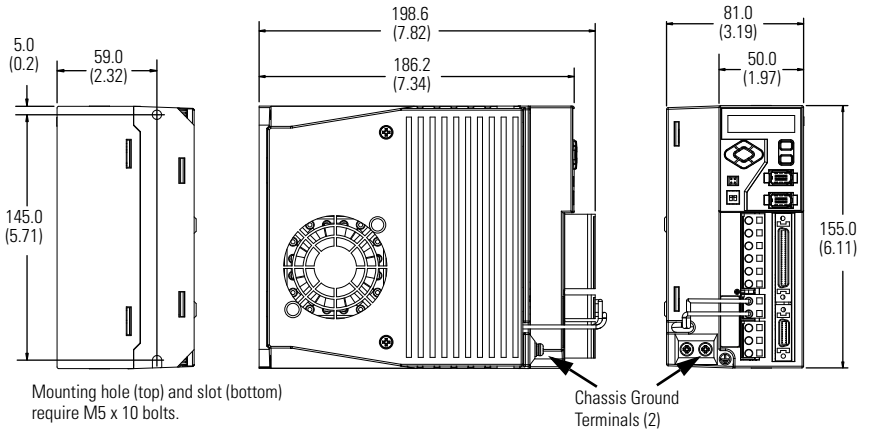
Dimensions are in millimeters (inches). Drives are designed to metric dimensions; inches are a mathematical conversion.

Catalog Number 2071-AP4



Dimensions are in millimeters (inches). Drives are designed to metric dimensions; inches are a mathematical conversion.

Catalog Numbers 2071-AP8, 2071-A10, and 2071-A15

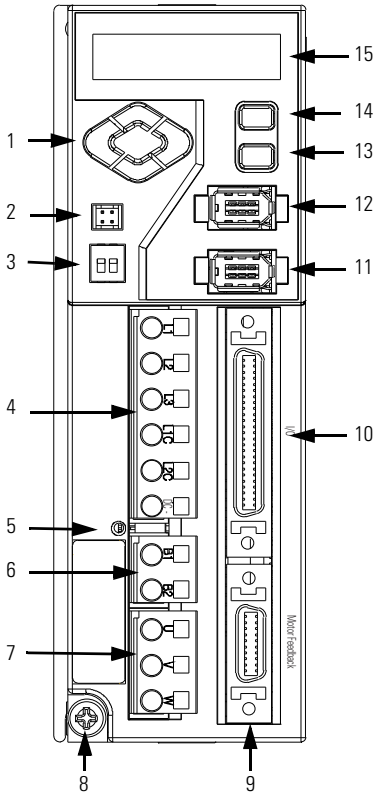


Dimensions are in millimeters (inches). Drives are designed to metric dimensions; inches are a mathematical conversion.

Connector Data

Use this illustration to identify the Kinetix 3 drive features and indicators.

Kinetix 3 Drive Features and Indicators



Item	Description
1	Left/right and up/down keys
2	Analog output (A.out)
3	RS-485 communication termination switch
4	Input power (IPD)
5	Main power indicator
6	Shunt power (BC)
7	Motor power (MP)
8	Ground lug
9	Motor feedback (MF)
10	Input/output (I/O)
11	Serial interface (Comm0B) (down)
12	Serial interface (Comm0A) (up)
13	Enter key
14	Mode/set key
15	7-segment status indicator

Kinetix 3 Drive Connectors

Designator	Description	Connector
A.out	Analog output	4-pin connector header
IPD	AC and control power input	6-pin quick-connect terminal block
BC	Shunt power	2-pin quick-connect terminal block
MP	Motor power	3-pin quick-connect terminal block
Comm0A	Serial interface up	6-pin IEEE 1394 connector
Comm0B	Serial interface down	6-pin IEEE 1394 connector
IOD	I/O	50-pin mini-D connector
MF	Motor feedback	20-pin mini-D connector

Analog Output (A.out) Connector

A.out Pin	Description	Signal
1	Analog output #1	AOUT1
2	Analog output #1 ground	ACOM
3	Analog output #2	AOUT2
4	Analog output #2 ground	ACOM

Input Power (IPD) Connector

IPD Pin	Description	Signal
L1	Main AC power	L1
L2	Main AC power	L2
L3	Main AC power(1)	L3
L1C	L1C - Control power	L1C
L2C	L2C - Control power	L2C
DC	DC bus negative	DC- (not supported)

(1) L3 is not used for single phase drives.

Shunt Power (BC) Connector

BC Pin	Description	Signal
B1	Shunt resistor + DC bus positive	B1 (not supported)
B2	Shunt resistor -	B2

Motor Power (MP) Connector

MP Pin	Description	Signal
U	Motor power U	U
V	Motor power V	V
W	Motor power W	W

Motor Feedback (MF) Connector

MF Pin	Description	Signal
1	Encoder power ground	ECOM
2	Thermal sensor input	TS
3	A positive differential input	A+
4	A negative differential input	A-
5	B positive differential input	B+
6	B negative differential input	B-
7	Index positive differential input	I+
8	Index negative differential input	I-
9	Negative limit sensor input	LMT-
10	Serial positive Hall feedback S1	SD+ S1
11	Shield drain	GND
12	Reserved	—
13	Serial negative	SD-
14	Hall feedback S2	S2
15	Reserved	—
16	Hall feedback S3	S3
17	Positive limit sensor input	LMT+
18	BAT+ for motor side	BAT+
19	BAT- for motor side	BAT-
20	Encoder +5 input power	EPWR

Serial Interface (Comm0A, up) and (Comm0B, down) Connector

Comm0A and Comm0B Pin	Description	Signal
1	RS-232 transmit	XMT
2	RS-232 receive	RCV
3	Reserved	—
4	+5V power ground	GND
5	RS-485 +	DX+
6	RS-485 -	DX-

I/O (IOD) Connector

IOD Pin	Description	Signal
1	24V Input	+24V PWR
2	24V Input	+24V PWR
3	Digital input 1 (/SV-ON)	INPUT1
4	Digital input 2 (P-OT)	INPUT2
5	Digital input 3 (N-OT)	INPUT3
6	Digital input 4 (/P-CON)	INPUT4
7	Digital input 5(/A-RST))	INPUT5
8	Digital input 6 (/N-TL)	INPUT6
9	Digital input 7 (/P-TL)	INPUT7
10	ESTOP (default: disable)	ESTOP
11	Follower input A+	PLUS +
12	Follower input A-	PLUS -
13	Follower input B+	SIGN +
14	Follower input B-	SIGN -
15	High frequency pulse input A+	HF_PULS +
16	High frequency pulse input A-	HF_PULS -
17	Encoder z-pulse	Z-PULSE+
18	Encoder z-pulse	Z-PULSE-
19	Velocity command input+	VCMD+
20	Velocity command input-	VCMD-
21	Current command input+	ICMD+
22	Current command input-	ICMD-
23	High frequency pulse input B+	HF_SIGN +
24	High frequency pulse input B-	HF_SIGN -
25	O/C for sign of 24V level	24V_SIGN +
26	Digital input 8	INPUT8
27	Digital input 9	INPUT9
28	Digital input 10	INPUT10
29	Buffered encoder channel A+	AM+
30	Buffered encoder channel A-	AM-
31	Buffered encoder channel B+	BM+
32	Buffered encoder channel B-	BM-

I/O (IOD) Connector (cont.)

IOD Pin	Description	Signal
33	Buffered encoder channel Z+	IM+
34	Buffered encoder channel Z-	IM-
35	Serial data of absolute encoder	PS+
36	Serial data of absolute encoder	PS-
37	Alarm output 1 Digital output4	FAULT1 OUTPUT4
38	Alarm output 2 Digital output5	FAULT2 OUTPUT5
39	Alarm output 3 Digital output6	FAULT3 OUTPUT6
40	Alarm output Digital outputs ground	FCOM OUT COM
41	Digital output 1 + (P_COM+)	OUTPUT1+
42	Digital output 1 – (P_COM-)	OUTPUT1-
43	Digital output 2 + (TG_ON+)	OUTPUT2+
44	Digital output 2 – (TG_ON-)	OUTPUT2-
45	Servo alarm +	FAULT+
46	Servo alarm -	FAULT-
47	Digital output 3 + (BK+)	OUTPUT3+
48	Digital output 3 – (BK-)	OUTPUT3-
49	O/C for pulse of 24V level	24V_PULS +
50	Reserved	—

Power Wiring Requirements

Wire should be copper with 75 °C (167 °F) minimum rating. Phasing of main AC power is arbitrary and earth ground connection is required for safe and proper operation.

Cat. No.	Description	Terminals		Recommended Wire Size mm² (AWG)	Strip Length mm (in.)	Torque Value N•m (lb•in)
		Pin	Signal			
2071-AP0 2071-AP1 2071-AP2 2071-AP4	Input and control power	IPD-L1 IPD-L2 IPD-L1C IPD-L2C	L1 L2 L1C L2C	2.5 (14)	8 (0.3)	N/A
		Ground screw	Ground			1.25 (11)
2071-AP8		IPD-L1 IPD-L2 (IPD-L3) IPD-L1C IPD-L2C	L1 L2 (L3) L1C L2C			N/A
		Ground screw	Ground			1.25 (11)
2071-A10 2071-A15		IPD-L1 IPD-L2 IPD-L3 IPD-L1C IPD-L2C	L1 L2 L3 L1C L2C			N/A
		Ground screw	Ground			1.25 (11)
2071-*xxx*	Motor power	MP-U MP-V MP-W	U V W			N/A
		Ground screw	GND			1.25 (11)
2071-*xxx*	Shunt resistor (1)	BC-B1 BC-B2	B1 B2			N/A

(1) Use for shunt resistor connection only.

ATTENTION: To avoid personal injury and/or equipment damage, make sure installation complies with specifications regarding wire types, conductor sizes, branch circuit protection, and disconnect devices. The National Electrical Code (NEC) and local codes outline provisions for safely installing electrical equipment.
To avoid personal injury and/or equipment damage, make sure motor power connectors are used for connection purposes only. Do not use them to turn the unit on and off.
To avoid personal injury and/or equipment damage, make sure shielded power cables are grounded to prevent potentially high voltages on the shield.

Mating Connectors and Cables

Connector	Type of Connector	Wire Size	Cat. No.
Input Power	Single-row, spring clamp connectors with 7.5 mm (0.30 in.) spacing	2.5…0.08 mm^2 (12…28 AWG) 8 mm (0.31 in.) of wire exposed	2071-CONN1 (1)
Output (Motor) Power			
Input/Output	50-pin mini-D	0.25…0.05 mm^2 (24…30 AWG)	2071-TBIO
Motor Feedback	20-pin mini-D		2071-TBMF

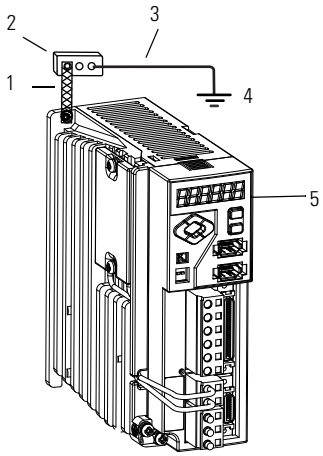
(1) The tool (Wago 231-131) for opening individual cage-clamp power connectors is supplied with the drive. You can purchase the replacement tool separately.

Connector	Type of Mating Cable	Cable
Serial Interface Comm0A, Comm0B	Configuration	2090-CCMPCDS-23AA01
		2090-CCMPCDS-23AA03
	Control	2090-CCMCRDS-48AA01
		2090-CCMCRDS-48AA03
	Drive to drive control	2090-CCMDSDS-48AA01
		2090-CCMDSDS-48AAP3

Ground Your Kinetix 3 Drive to the Subpanel

If the Kinetix 3 drive is mounted on a painted subpanel, bond it to the cabinet ground bus. To do this, attach a braided ground strap or 0.4 mm^2 (12 AWG) solid copper wire that is 100 mm (3.9 in.) long between the top mounting screw and the bonded cabinet ground.

Connecting the Braided Ground Strap Example

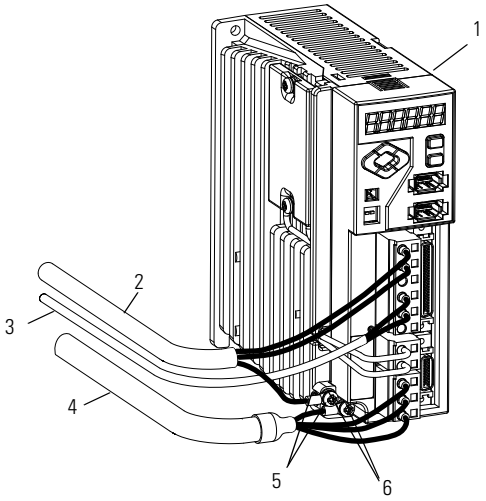


Item	Description
1	Mounting screw
2	Braided ground strap
3	Bonded cabinet ground bus
4	Ground grid or power distribution ground
5	2071-AP4 Kinetix 3 drive shown

Kinetix 3 Drive Power and Ground Wiring (Bulletin TL motors)

Follow this procedure to install a Bulletin TL motor with catalog number 2090-DANPT-16S*xx* cable.

Terminate the power-input ground wire with a ring lug. Attach input-power and motor-power grounds to ground screws, and torque to 1.25 N•m (11 lb•in).

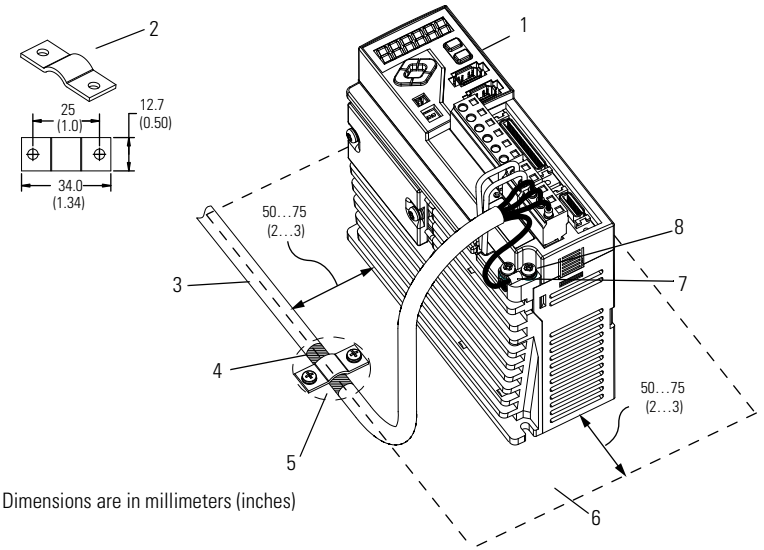


Item	Description
1	2071-AP4 Kinetix 3 drive shown.
2	Input power cable.
3	Control power cable.
4	Motor power cable.
5	Ring lug.
6	Ground screw, 2071-AP0, 2071-AP1, and 2071-AP2 drives have one grounding screw on the heatsink. 2071-AP4, 2071-AP8, 2071-A10, and 2071-A15 drives have two grounding screws on the heatsink.

Kinetix 3 Drive Power and Ground Wiring (Bulletin TLY, LDC-Series, and LDL-Series motors and MPAS and TLAR actuators)

Follow this procedure to install Bulletin TLY, LDC-Series, and LDL-Series motors and MPAS and TLAR actuators with catalog number 2090-CPWM4DF-*xx*AF*xx* or 2090-CPWM6DF-16AA*xx*.

1. Terminate the power-input ground wire with a ring lug as shown in Kinetix 3 Drive Power and Ground Wiring (Bulletin TL motors) on page 15.



Dimensions are in millimeters (inches)

Item	Description
1	2071-AP4 Kinetix 3 drive shown.
2	Motor-power ground clamp.
3	Motor power cable.
4	Expose 25 mm (1 in.) of cable shield.
5	If panel is painted, remove paint to provide metal-to-metal contact.
6	Sub panel.
7	Ring lug.
8	Ground screw. 2071-AP0, 2071-AP1, and 2071-AP2 drives have one grounding screw on the heatsink. 2071-AP4, 2071-AP8, 2071-A10, and 2071-A15 drives have two grounding screws on the heatsink.

2. Terminate motor-power ground wire with a ring lug.

3. Attach power-input ground wire and motor-power ground wire to ground screws.
4. Torque the ground screw to 1.25 N•m (11 lb•in).
5. Locate a suitable position for installing the cable shield clamp within 50...75 mm (2...3 in.) of the drive.
6. Lay out and drill holes for the cable clamp.

ATTENTION: Plan the installation of your system so that you can perform all cutting, drilling, tapping, and welding with the system removed from the enclosure. Because the system is of the open type construction, be careful to keep any metal debris from falling into it. Metal debris or other foreign matter can become lodged in the circuitry, which can result in damage to components.

7. Locate the position on the motor power cable that comes under the clamp and remove about an 25.4 mm (1 in.) of the cable jacket to expose the shield braid.
8. Position the exposed portion of the cable braid directly in line with the clamp.
9. Clamp the exposed shield to the panel with the clamp and two #6-32 x 1 screws provided.
10. Repeat steps 1...9 for each Kinetix 3 drive you are installing.

.

Additional Resources

These documents contain additional information concerning related Rockwell Automation products.

Resource	Description
Kinetix 3 Component Servo Drive User Manual, publication 2071-UM001	Information on installing, configuring, starting up, troubleshooting, and specifications for your Kinetix 3 servo drive system.
Motor Feedback Breakout Board Installation Instructions, publication 2071-IN003	Information on installing and wiring a Kinetix 3 motor feedback breakout board.
I/O Breakout Board Installation Instructions, publication 2071-IN002	Information on installing and wiring a Kinetix 3 motor I/O breakout board.
Serial Communication Cables Installation Instructions, publication 2090-IN019	Information on installing and schematics for the serial communication cables used with a Kinetix 3 drive.
MicroLogix 1100 Programmable Controllers Installation Instructions, publication 1763-IN001	Information on how to assemble and mount the controller, how to upgrade firmware, and controller technical specifications.
MicroLogix 1400 Programmable Controllers Installation Instructions, publication 1766-IN001	Information on how to assemble and mount the controller, how to upgrade firmware, and controller technical specifications.
Kinetix 3 Component Servo Drive Serial Host Command Reference Manual, publication 2071-RM001	Information on the serial communication commands, both ASCII and ModBus, for interfacing a motion controller with the Kinetix 3 drive.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, http://www.ab.com	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at http://www.rockwellautomation.com/literature/. To order paper copies of technical documentation, contact your local Rockwell Automation distributor or sales representative.

Notes:

Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products. At http://www.rockwellautomation.com/support/, you can find technical manuals, a knowledge base of FAQs, technical and application notes, sample code and links to software service packs, and a MySupport feature that you can customize to make the best use of these tools.

For an additional level of technical phone support for installation, configuration and troubleshooting, we offer TechConnect support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit http://www.rockwellautomation.com/support/.

Installation Assistance

If you experience a problem within the first 24 hours of installation, please review the information that's contained in this manual. You can also contact a special Customer Support number for initial help in getting your product up and running.

United States or Canada	1.440.646.3434
Outside United States or Canada	Use the Worldwide Locator at http://www.rockwellautomation.com/support/americas/phone_en.html, or contact your local Rockwell Automation representative.

New Product Satisfaction Return

Rockwell Automation tests all of its products to ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned, follow these procedures.

United States	Contact your distributor. You must provide a Customer Support case number (call the phone number above to obtain one) to your distributor to complete the return process.
Outside United States	Please contact your local Rockwell Automation representative for the return procedure.

Documentation Feedback

Your comments will help us serve your documentation needs better. If you have any suggestions on how to improve this document, complete this form, publication RA-DU002, available at http://www.rockwellautomation.com/literature/.

Rockwell Otomasyon Ticaret A.Ş., Kar Plaza İş Merkezi E Blok Kat:6 34752 İçerenköy, İstanbul, Tel: +90 (216) 5698400

www.rockwellautomation.com

Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444
Europe/Middle East/Africa: Rockwell Automation NV, Pegasus Park, De Kleetlaan 12a, 1831 Diegem, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640
Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

Rockwell Automation Publication 2071-IN001B-EN-P - August 2010 PN-85627
Supersedes Publication 2071-IN001A-EN-P - April 2010 and 2071-DU001A-EN-P - August 2010