Installation Instructions

Original Instructions

Kinetix 3 Component Servo Drives

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

Summary of Changes

This publication contains new and updated information as indicated in the following table.

Topic	Page
Added an important statement to step 2 of the Mount the Kinetix 3 Drive procedure.	4
Updated the first paragraph under Fuse/Contactor Specifications	18

About the Kinetix 3 Drives

Kinetix® 3 component servo drives provide simple solutions for applications with output power requirements in the range of 50...1500 W (0.6...9.9 A rms).

See the Kinetix 3 Component Drive User Manual, publication 2071-UM001, for detailed information on how to wire, apply power, troubleshoot, and integrate with Micro800® or MicroLogix™ controller platforms.

Catalog Number Explanation

This publication applies to the following Kinetix 3 drives.

Cat. No.	Input Voltage	Continuous Output Power	Continuous Output Current (0-pk)
2071-AP0	240V AC rms, 1 Ø	50 W	0.85 A
2071-AP1		100 W	1.56 A
2071-AP2		200 W	2.40 A
2071-AP4		400 W	4.67 A
2071-AP8	240V AC rms, 1 Ø or 3 Ø	800 W	7.07 A
2071-A10	220V AC rms, 3 Ø	1.0 kW	9.90 A
2071-A15		1.5 kW	13.99 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.

Safety Information

SHOCK HAZARD: Capacitors retain charge for approximately 300 s after power is removed. Disconnect incoming power and wait at least five minutes before touching the drive. There is a status indicator on the front of the drive that shows there is charge on the capacitors. Failure to observe this precaution could result in severe bodily injury or loss of life.

WARNING: The opening of branch-circuit protective device can be an indication that a fault has been interrupted. To reduce the risk of fire or electric shock, parts that carry current and other components of the controller must be examined and replaced if damaged.

Parts List

The Kinetix 3 drive ships with the following:

- A general-purpose power input (IPD) header, shunt resistor (BC) header, and motor power (MP) header
- A connector tool for open 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

TIP The breakout boards for motor feedback (catalog number 2071-TBMF) and I/O connections (catalog number 2071-TBIO) are not provided. See the Kinetix Servo Drives Specifications Technical Data, publication GMC-TD003, for more information.

Control and configuration serial interface cables (catalog numbers 2090-CCM*xx*DS-*xx*AA*xx*) and replacement connector sets (catalog number 2071-CONN1) are also available. See the Kinetix Motion Accessories Specifications Technical Data, publication GMC-TD004, for more information.

Install the Kinetix 3 Drive

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

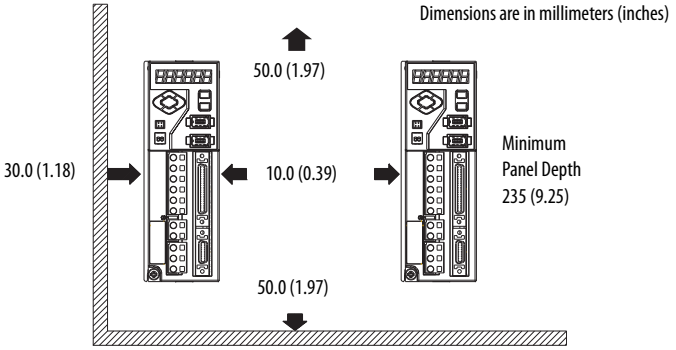
SHOCK HAZARD: To avoid hazard of electrical shock, mount and wire of the Kinetix 3 drive before you apply power. Once power is applied, connector terminals can have voltage present even when not in use.

ATTENTION: Plan the installation of your system so that you can cut, drill, tap, and weld with the system that is 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 and 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.



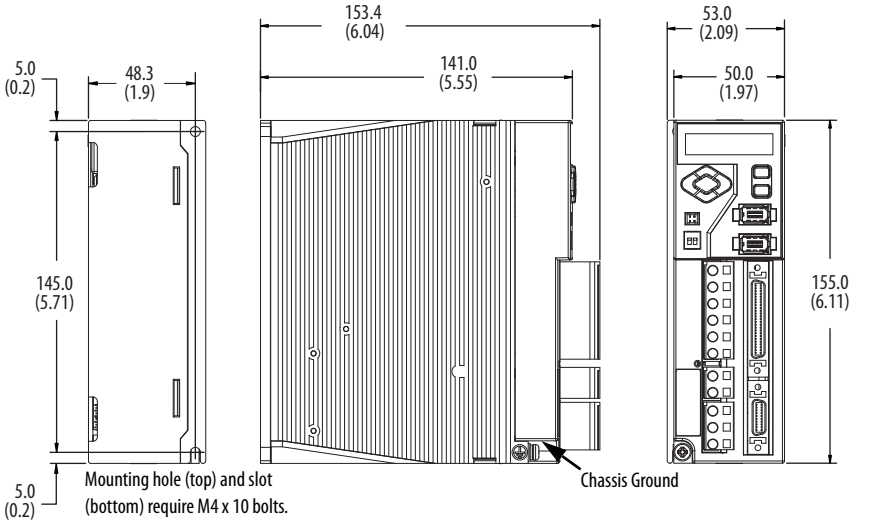
IMPORTANT	Mount the module in an upright position as shown. Do not mount the module on its side.

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

IMPORTANT	The panel you install inside the enclosure for mounting your system components must be on a flat, rigid, vertical surface that won't be subjected to shock, vibration, moisture, oil mist, dust, or corrosive vapors in accordance with pollution degree 2 (EN 61800-5-1).

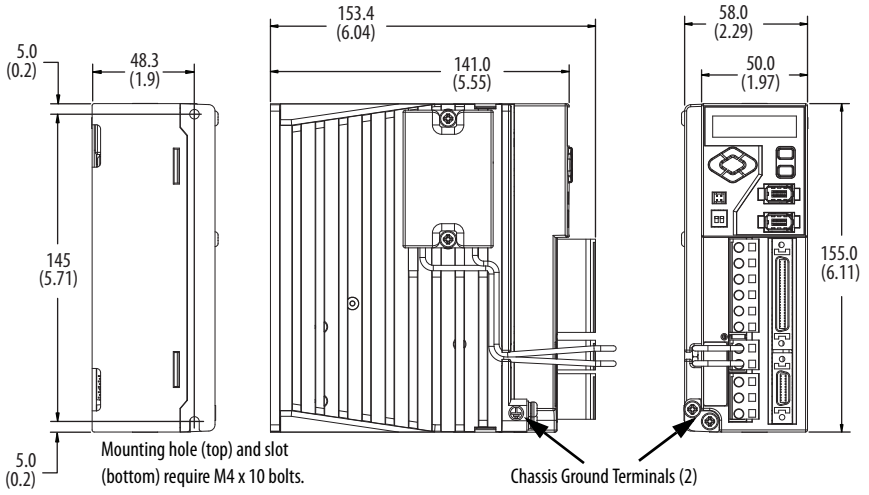
Product Dimensions

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



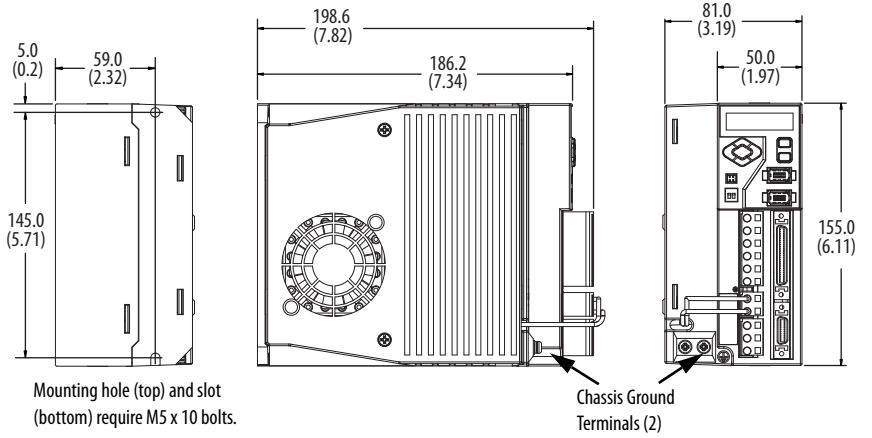
Dimensions are in millimeters (inches). Drives are designed to metric dimensions; inches are a mathematical conversion.

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

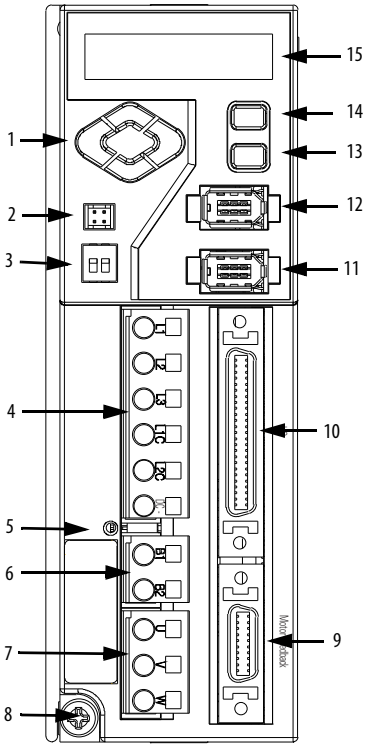


Dimensions are in millimeters (inches). Drives are designed to metric dimensions; inches are a mathematical conversion.

Connector Data

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

Kinetix 3 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 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

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

Motor Feedback (MF) Connector

MF Pin	Description	Signal
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	2071-A*xx* (Series A)		2071-A*xx* (Series B)	
	Description	Signal	Description	Signal
1	RS-232 transmit	XMT	RS-232 transmit	XMT
2	RS-232 receive	RCV	RS-232 receive	RCV
3	Reserved	–	+5V DC	+5V DC
4	+5V power ground	GND	+5V power ground	GND
5	RS-485 +	DX+	RS-485 +	DX+
6	RS-485 -	DX-	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

I/O (IOD) Connector (continued)

IOD Pin	Description	Signal
10	E-stop (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-
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 output 4	FAULT1 OUTPUT4
38	Alarm output 2 Digital output 5	FAULT2 OUTPUT5
39	Alarm output 3 Digital output 6	FAULT3 OUTPUT6

I/O (IOD) Connector (continued)

IOD Pin	Description	Signal
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

The wires must be copper with 75 °C (167 °F) minimum rating. The phase connections of the main AC power are arbitrary and earth ground connection is required for safe and proper operation.

Drive Cat. No.	Description	Terminals		Recommended Wire Size mm^2 (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 only for shunt resistor connection.

ATTENTION: To avoid personal injury and equipment damage, be sure of the following:

- 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.
- Motor power connectors are used only for connection purposes. Do not use motor power connector to turn the unit on and off.
- Shielded power cables are grounded to help prevent potentially high voltages on the shield.

Connectors and Cables

Connector	Type of Connector	Wire Size	Cat. No.
Input Power	Single-row, spring clamp connectors spaced 7.5 mm (0.30 in.)	2.5…0.08 mm^2 (12…28 AWG) 8 mm (0.31 in.) of wire that is 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

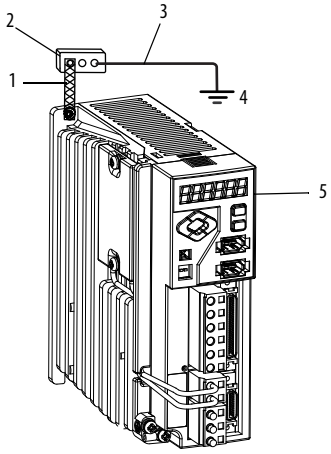
(1) The tool (Wago 231-131) for opening individual cage-clamp power connectors is supplied with the drive. You can purchase the replacement tool separately.

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
	Drive to 1203-USB converter (1)	2090-CCMUSDS-48AA01
		2090-CCMUSDS-48AA03

(1) For use with Kinetic lication3 drives series B and later.

Ground Your Kinetix 3 Drive to the Subpanel

Bond the Kinetix 3 drive to the cabinet ground bus. To ground, attach a braided ground strap or 0.4 mm^2 (12 AWG) solid-copper wire, 100 mm (3.9 in.) long between the top mounting screw and the bonded cabinet ground.

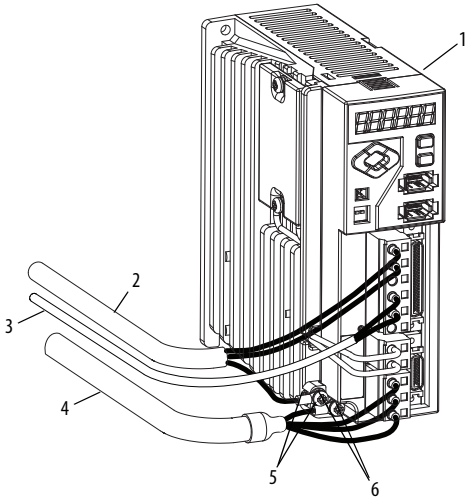


Item	Description
1	Mounting screw
2	Braided ground strap
3	Bonded cabinet-ground bus
4	Ground grid or power distribution ground
5	2071-AP4 Kinetix 3 drive shown

Kinetix 3 Drive Power and Ground Wiring

This installation applies to a TL-Series™ (Bulletin TL) motor with 2090-DANPT-16S*xx* cable.

Terminate the input-power 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).

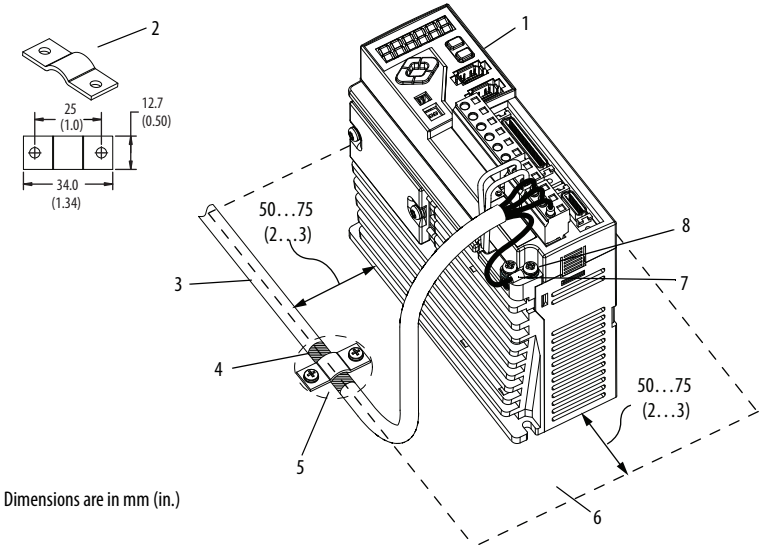


Item	Description
1	2071-AP4 Kinetix 3 drive shown
2	Input power cable
3	Control power cable
4	Motor power cable
5	Ring lug
6	Ground screw (1)

(1) 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 ground screws on the heatsink.

This installation applies to TL-Series™ (Bulletin TLY) rotary motors, LDC-Series™ and LDL-Series™ linear motors, and MP-Series™ (Bulletin MPAS), TL-Series (Bulletin TLAR), and LDAT-Series actuators.

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



Dimensions are in mm (in.)

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 (1)

(1) 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 ground screws on the heatsink.

Motor Overload Protection

This servo drive uses solid-state motor overload protection that operates in accordance with UL 508C. Motor overload protection algorithms (thermal memory) that predict actual motor temperature that is based on operating conditions as long as control power is continuously applied. However, when control power is removed, thermal memory is not retained.

This drive also provides an input for an external temperature sensor or thermistor device, which is embedded in the motor, to support the UL requirement for motor overload protection.

The drive supports some motors that do not contain temperature sensors or thermistors; therefore, motor overload protection against excessive consecutive motor overloads followed by power-up is not supported.

This servo drive meets the following UL 508C requirements for solid-state overload protection.

Motor Overload Protection Trip Point	Value
Ultimately	100% overload
Within 8 minutes	200% overload
Within 20 seconds	600% overload

ATTENTION: Avoid overheat damage to your motor from excessive and successive motor overload faults by following the motor and drive-combination wiring diagram that is provided in the user manual.

See your servo drive user manual for the interconnect diagram that illustrates the wiring between your motor and drive.

Fuse/Contactor Specifications

The Kinetix 3 drives use internal solid-state motor short-circuit protection and, when protected by suitable branch circuit protection, are rated for use on a circuit capable of delivering up to 100,000 A. Fuses or circuit breakers, with adequate withstand and interrupt ratings, as defined in NEC or applicable local codes, are permitted.

The following fuse examples are recommended for use with Kinetix 3 drives.

Fuse and Contactor Specifications

Drive Cat. No.	AC Input Power (1) (2) (3) Recommended Fuse	Control Power (2) (4) Recommended Fuse	Contactor (5)
2071-AP0	FNQ-R-7	FRS-R-2-1/2 FNQ-R-7-1/2 LPJ-6	100-K05xy
2071-AP1			
2071-AP2			100-K09xy
2071-AP2	FNQ -R-10		100-K12xy
2071-AP8	FNQ-R-20 LPJ-20		100-C16*xy*
2071-A10			
2071- A15	FNQ-R-30 LPJ-30		100-C23*xy*

(1) Fuses that are specified are Bussmann fuses.
(2) FNQ-R fuses are described as time-delay fuses, Class CC.
(3) LPJ fuses are described as dual-element time-delay fuses, Class J.
(4) FRS-R fuses are described as dual-element time-delay fuses, Class RK5.
(5) For contactors: *x* represents coil voltage, *y* represents the number of contacts.

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
Kinetix 3 Component Servo Drive User Manual, publication 2071-UM001	Information on how to install, configure, start up, and troubleshoot your Kinetix 3 servo drive system.
Kinetix Servo Drives Specifications Technical Data, publication GMC-TD003	Information on the specifications for the Kinetix 3 drive
Motor Feedback Breakout Board Installation Instructions, publication 2071-IN003	Information on how to install and wire a Kinetix 3 motor feedback breakout board.
I/O Breakout Board Installation Instructions, publication 2071-IN002	Information on how to install and wire a Kinetix 3 motor I/O breakout board.
Serial Communication Cables Installation Instructions, publication 2090-IN019	Information on how to install and the schematics for the serial communication cables that are 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	
Micro810® Programmable Controllers Users Manual, publication 2080-UM001	
Micro830® and Micro850® Programmable Controllers User Manual, publication 2080-UM002	
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.rockwellautomation.com/global/certification/overview.page	Provides declarations of conformity, certificates, and other certification details.

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

Rockwell Automation Support

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Technical Support Center	Knowledgebase Articles, How-to Videos, FAQs, Chat, User Forums, and Product Notification Updates.	https://rockwellautomation.custhelp.com/
Local Technical Support Phone Numbers	Locate the phone number for your country.	http://www.rockwellautomation.com/global/support/get-support-now.page
Direct Dial Codes	Find the Direct Dial Code for your product. Use the code to route your call directly to a technical support engineer.	http://www.rockwellautomation.com/global/support/direct-dial.page
Literature Library	Installation Instructions, Manuals, Brochures, and Technical Data.	http://www.rockwellautomation.com/global/literature-library/overview.page
Product Compatibility and Download Center (PCDC)	Get help determining how products interact, check features and capabilities, and find associated firmware.	http://www.rockwellautomation.com/global/support/pcdc.page

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Your comments will help us serve your documentation needs better. If you have any suggestions on how to improve this document, complete the How Are We Doing? form at http://literature.rockwellautomation.com/idc/groups/literature/documents/du/ra-du002_-en-e.pdf.

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