Installation Instructions

Kinetix 2000 Integrated Axis Module and Axis Module

Catalog Numbers 2093-AC05-MP1, 2093-AC05-MP2, 2093-AC05-MP5, 2093-AMP1, 2093-AMP2, 2093-AMP5, 2093-AM01, 2093-AM02

About This Publication

This publication provides basic information for installing an integrated axis module (IAM) and up to seven axis modules (AMs) on a Kinetix 2000 power rail.

Refer to the Kinetix 2000 User Manual, publication 2093-UM001, for power up procedures, troubleshooting information, and instructions on integrating a Kinetix 2000 system ControlLogix, CompactLogix, and SoftLogix modules or PCI cards. The user manual provides detailed wiring examples, and information about installing or removing equipment and accessories not described in this document.

Publication 2093-IN001A-EN-P - December 2006

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://literature.rockwellautomation.com) 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.

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

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

Before You Begin

Remove all packing material, wedges, and braces from within and around the components. After unpacking, check the catalog number on the name-plate against the purchase order.

Drive Component Box Contents

Drive component	Ships with
Integrated axis module (IAM)	• Wiring plugs for main ac input power (IPD), control ac input power (CPD), contactor enable relay (CED), motor power (MP), and motor brake (BC). • This manual - Installation Instructions, publication 2093-IN001.
Axis module (AM)	• Wiring plugs for motor power (MP) and motor brake (BC). • This manual - Installation Instructions, publication 2093-IN001.

The motor feedback connector, and the auxiliary feedback and I/O connector are not provided. Refer to the Kinetix Motion Control Selection Guide, publication GMC-SG001, for cable or connector kit catalog numbers.

Installing a Kinetix 2000 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.

WARNING

To avoid the hazard of electrical shock, perform all mounting and wiring of modules (IAM, AM, shunt module, or slot filler) and the power rail before you apply 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.

Set the IAM Ground Jumper for the Power Grounding Configuration

Setting the IAM ground jumper is necessary only when using an ungrounded power configuration, for example a dc common bus configuration. Refer to the Kinetix 2000 User Manual, publication 2093-UM001, for diagrams depicting grounded and ungrounded input power configurations.

Follow these steps to set the ground jumper for an ungrounded power source.

1. Remove the front panel on your IAM.

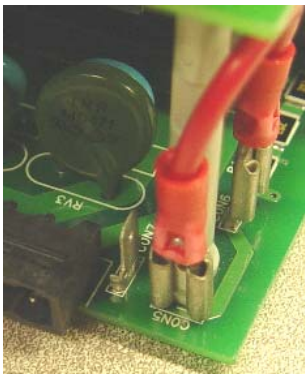
IMPORTANT Disconnect all headers from the electrical connectors, and the SERCOS fiber-optic cables on the IAM, before attempting to remove the front panel.

2. Move the jumper wire to connect CON6 to CON7.

IMPORTANT A jumper wire and the grounding connections (CON5, CON6, and CON7) are located on the lower front of the power converter (leftmost) board, below the input power (IPD) connector.

The factory default configuration, grounded power, has the jumper installed between CON5 and CON6.

Grounded Configuration
CON5 to CON6 (default setting)



Ungrounded Configuration
CON7 to CON6

3. Replace the IAM front panel.

You are now ready to mount the IAM on the power rail.

Determine Mounting Order

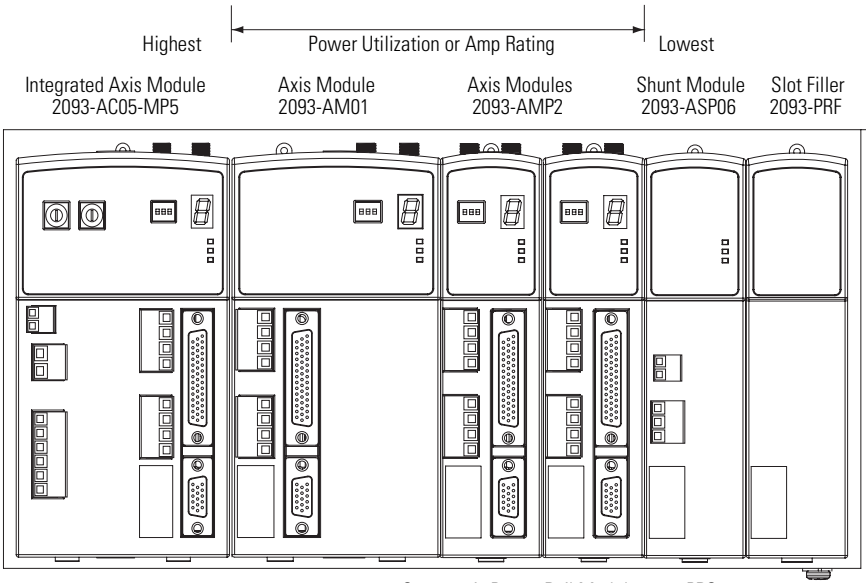
Mount axis modules in the order (left to right) shown in the figure.

IMPORTANT The integrated axis module (IAM) must be positioned in the leftmost slot of the power rail, followed by axis modules (AM).

Mount axis modules (AM) from left to right starting with the highest power utilization.

The shunt module is mounted to the right of the last AM, except the eight-axis power rail (2093-PRS8S) requires it be mounted in the rightmost slot.

Module Mounting Order



Seven-axis Power Rail Module 2093-PRS7

WARNING

To avoid personal injury due to electrical shock, place a slot filler module (catalog number 2093-PRF) in all empty slots on the power rail.

An unoccupied slot in the power rail will disable the Kinetix 2000 system, but control ac power will continue to be applied to the power rail.

Mount a Module

Follow these steps to mount an axis module on the Kinetix 2000 power rail.

IMPORTANT The IAM must be positioned in the leftmost slot of the power rail, followed by AMs in descending order of power utilization.

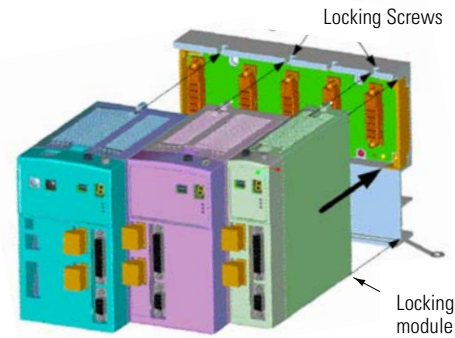
ATTENTION

To avoid damage to the pins located on the back of each module and to make sure that module pins mate properly with the power rail, install modules as shown below.

The power rail must be mounted with the connectors in an upright or vertical orientation to the panel. This provides proper cooling of the modules. Do not mount modules if the power rail is not within 3° of vertical.

1. Align the module locking screw with its corresponding slot on the power rail.
2. Push the module straight forward, by applying force at the top and bottom edges of the front cover.

   The module is fully seated when each locking clip snaps into the bottom of the power rail, and the locking screw boss is flush at the top of the power rail.



Top Front View of IAM (2093-AC05-MP*x*)

Top Front View of Double-wide AM (2093-AM0*x*), Single-wide AM (2093-AMP*x*).

Shunt module (2093-ASP06) and slot filler (2093-PRF) are not shown.

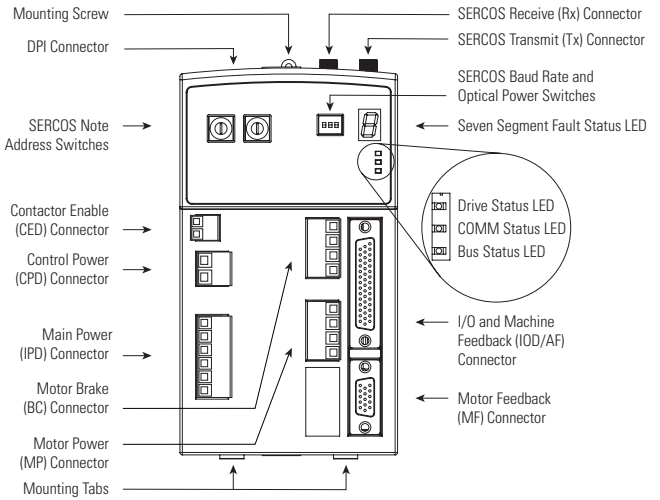
3. Torque mounting screw to 0.7 Nm (6 lb-in).

IAM and AM Connector Data

Power, feedback, and I/O connector locations and signal descriptions for your Kinetix 2000 axis modules (IAM or AM) are provided in this section.

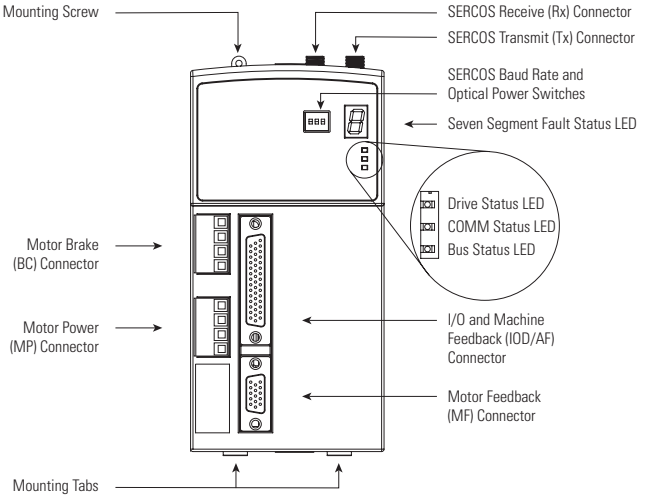
Integrated Axis Module Connectors and Indicators

Integrated Axis Module, Front View
(2093-AC05-MP*x* shown)



Axis Module Connectors and Indicators

Axis Module, Front View
(2093-AM0*x* shown)



Connector Descriptions

Designator	Description	Connector
BC	Motor brake	4-position plug/header
CED [1]	Contactor enable	2-position plug/header
CPD [1]	Control input power (drive)	2-position plug/header
DPI [1]	Drive peripheral interface (factory use only)	8-pin mini-DIN
IOD/AF	User I/O (drive) and auxiliary feedback	44-pin high-density D-shell (female)
IPD [1]	230V ac input power (drive) and dc bus	6-position plug/header
MF	Motor feedback	15-pin high-density D-shell (female)
MP	Motor power	4-position plug/header
Tx and Rx	SERCOS transmit and receive	SERCOS fiber-optic (2)

(1) Connector is only on integrated axis modules (2093-AC05-MP*x*).

Contactor Enable and Power Connector Pinouts

These connectors are supplied with removable wiring plugs. The pins are numbered consecutively from top to bottom.

IMPORTANT These connectors are available only on an integrated axis module (IAM), 2093-AC05-MP*x*.

Contactor Enable (CED) Connector

CED Pin	Description	Signal
1	Relay-driven dry contact used in the safety string for a three-phase power contactor.	CONT EN+
2		CONT EN-

Control Power (CPD) Connector

CPD Pin	Description	Signal
1	Control power VAC input line 1	CTRL 1
2	Control power VAC input line 2	CTRL 2

Main Power and DC Bus (IPD) Connector

IPD Pin	Description	Signal
1	Single- or three-phase input power (230V ac)	L1
2		L2
3		L3 (1)
4	Chassis ground	⏚
5	An integral, unregulated power supply, consisting of ac line, three-phase bridge rectifier, and filter capacitors	DC+
6		DC-

(1) Not used with single-phase power.

Motor Power and Brake Connector Pinouts

These connectors are supplied with removable wiring plugs, and are keyed to prevent incorrect insertion. The pins are numbered consecutively from top to bottom.

Motor Brake Control (BC) Connector

BC Pin	Description	Signal
1	+24V brake power (from LIM or customer supplied)	PWR
2	Motor brake connections	MBRK+
3		MBRK-
4	Motor brake common	COM

Motor Power (MP) Connector

MP Pin	Description	Signal
1	Three-phase motor power	U
2		V
3		W
4	Chassis ground	⏚

I/O Connector Pinouts

These connections require customer-supplied connectors. The pins are numbered as shown in a diagram following each pinout table.

IAM and AM I/O and Auxiliary Feedback 44-pin (IOD/AF) Connector

IOD/AF Pin	Description	Signal
1	Reserved	—
2	Reserved	—
3	Reserved	—
4	Reserved	—
5	Reserved	—
6	Reserved	—
7	Reserved	—
8	Reserved	—
9	Reserved	—
10	Reserved	—
11	Reserved	—
12	Reserved	—
13	Reserved	—
14	Reserved	—
15	Reserved	—
16	Data/index negative input	DATA- / I- (1)
17	Data/index positive input	DATA+ / I+ (1)
18	Encoder 5V power supply	EPWR_5V (1)
19	Encoder common	ECOM (1)

IOD/AF Pin	Description	Signal
23	Registration 2	REG2 (2)
24	24V power to registration	24V_REG (2)
25	Registration common	24VCOM_REG (2)
26	Registration 1	REG1 (2)
27	24V power to registration	24V_REG (2)
28	24V common	24VCOM (2)
29	Overtravel negative input	OT- (2)
30	24V power output	24V PWR (2)
31	Cosine/negative input B	COSINE-/B- (1)
32	Cosine/positive input B	COSINE+/B+ (1)
33	Sine/negative input A	SINE-/A- (1)
34	Sine/positive input A	SINE+/A+ (1)
35	Reserved	—
36	24V common	24VCOM (2)
37	Overtravel positive input	OT+ (2)
38	24V power output	24VPWR (2)
39	24V common	24VCOM (2)
40	Home input	HOME (2)
41	24V power output	24VPWR (2)

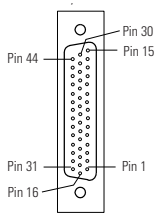
IOD/AF Pin	Description	Signal
20	Encoder 9V power supply	EPWR_9V [1]
21	Reserved	—
22	Registration common	24VCOM_REG [2]

IOD/AF Pin	Description	Signal
42	24V common	24VCOM [2]
43	Enable	ENABLE [2]
44	24V power output	24VPWR [2]

[1] Machine Feedback

[2] User I/O

IMPORTANT +24V_PWR and +24V_COM are a 24V dc power source that should be used only to power inputs on the 44-pin I/O and AF connector.



IAM and AM Motor Feedback 15-pin (MF) Connector

MF Pin	Stegmann (1)	Tamagawa (2)	Sine/ Cosine (3)	Sine/ Cosine (4)	AQB (3)	AQB (4)	Renishaw (5)
1	AM+	—	AM+	AM+	AM+	AM+	AM+
2	AM-	—	AM-	AM-	AM-	AM-	AM-
3	BM+	—	BM+	BM+	BM+	BM+	BM+
4	BM-	—	BM-	BM-	BM-	BM-	BM-
5	DATA+	DATA+	IM+	IM+	IM+	IM+	IM+
6	ECOM	ECOM	ECOM	ECOM	ECOM	ECOM	ECOM
7 (6)	—	—	—	—	—	—	—
8	—	—	S3	—	S3	—	S3
9	—	—	—	—	—	—	E_OT+
10	DATA-	DATA-	IM-	IM-	IM-	IM-	IM-
11 (7)	TS	TS	TS	TS	TS	TS	TS
12	—	—	S1	—	S1	—	S1
13	—	—	S2	—	S2	—	S2
14	EPWR_5V	EPWR_5V	EPWR_5V	EPWR_5V	EPWR_5V	EPWR_5V	EPWR_5V
15	—	—	—	—	—	—	E_OT-

(1) Hiperface encoder includes SKS, SKM, SRS, SRM type encoders.

(2) Encoder is 17-bit serial.
3.6V battery connections are located in the 2090-K2CK-D15M connector kit.

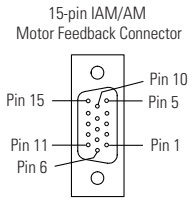
(3) Encoder is an incremental with Halls.

(4) Encoder is an incremental without Halls.

(5) Renishaw encoder is used on Raptor linear motor by Anorad.

(6) Pin 9 is EPWR_9V connection that can be used for third-party motor applications, Hiperface for example.

(7) Not applicable unless motor has integrated thermal protection.



Wiring Requirements

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

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.

IMPORTANT NEC and local electrical codes take precedence over the values and methods provided.

CED, CPD, and IPD Wiring Requirements

Connector	Connects to Terminals		Recommended Wire and Size mm^2 (AWG)	Strip Length mm (in.)	Torque Value Nm (lb-in)
	Pin	Signal			
Contactor enable (1)	CED-1 CED-2	CONT EN+ CONT EN-	Solid H05(07) V-U: 1.5 (16) Stranded H07 V-R: 1.5 (16) Flexible H05(07) V-K: 1.5 (16) Flexible with ferrule: 1.5 (16)	6.5 (0.26)	0.5 (4.4)

Connector	Connects to Terminals		Recommended Wire and Size mm² (AWG)	Strip Length mm (in.)	Torque Value Nm (lb-in)
	Pin	Signal			
Control power	CPD-1 CPD-2	CTRL 1 CTRL 2	Solid H05(07) V-U: 2.5 (14) Stranded H07 V-R: 2.5 (14) Flexible H05(07) V-K: 2.5 (14) Flexible with ferrule: 2.5 (14)	7.0 (0.28)	0.5 (4.4)
Main ac and dc bus [2] input power	IPD-1 IPD-2 IPD-3 IPD-4 IPD-5 IPD-6	L1 L2 L3 ⏚ DC+ DC-		7.0 (0.28)	0.5 (4.4)

(1) The gauge of the contactor enable wiring depends on the system configuration. Consult your machine builder, the NEC, and applicable local codes.

(2) Keep dc common bus connections (leader IAM to follower IAM) as short as possible.

BC and MP Wiring Requirements

Connector	Connects to Terminals		Wire Size mm² (AWG)	Strip Length m (in.)	Torque Value Nm (lb-in)
	Pin	Signal			
Brake	BC-1 BC-2 BC-3 BC-4	PWR BRK+ BRK- COM	Solid H05(07) V-U: 0.75 (18) Stranded H07 V-R: 0.75 (18) Flexible H05(07) V-K: 0.75 (18) Flexible with ferrule 0.75 (18)	7 (0.28)	0.5 (4.4)
Motor	MP-1 MP-2 MP-3 MP-4	U V W ⏚	Motor power cable depends on motor/drive combination 2.5 (14)	7 (0.28)	0.5 (4.4)

IOD/AF and MF Signal Wiring

Refer to the Kinetix Motion Control Selection Guide, publication GMC-SG001, for breakout boards and cables, or pre-molded and flying lead cable options available for the Kinetix 2000 product line.

Additional Resources

The following documents contain additional information concerning related Allen-Bradley products.

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

For	Read This Document	Publication Number
Information on installing, configuring, startup, troubleshooting, and applications for your Kinetix 2000 multi-axis servo system	Kinetix 2000 User Manual	2093-UM001
Information on the installation of your Kinetix 2000 shunt module	Kinetix 2000 Shunt Module Installation Instructions	2093-IN002
Information on the installation of your Kinetix 2000 slot filler module	Kinetix 2000 Slot Filler Module Installation Instructions	2093-IN003
Information on the installation of your Kinetix 2000 power rail	Kinetix 2000 Power Rail Installation Instructions	2093-IN004
Information, examples, and techniques designed to minimize system failures caused by electrical noise	System Design for Control of Electrical Noise Reference Manual	GMC-RM001
Specifications, motor/servo-drive system combinations, and accessories for Kinetix motion control products	Kinetix Motion Control Selection Guide	GMC-SG001
Online product selection and system configuration tools, including AutoCAD (DXF) drawings	Rockwell Automation Configuration and Selection Tools website	http://www.ab.com/e-tools/
For declarations of conformity (DoC) currently available from Rockwell Automation	Rockwell Automation Product Certification website	http://www.rockwellautomation.com/products/certification
A glossary of industrial automation terms and abbreviations	Rockwell Automation Industrial Automation Glossary	AG-7.1

Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products. At http://support.rockwellautomation.com, 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://support.rockwellautomation.com.

Installation Assistance

If you experience a problem with a hardware module 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 module up and running.

United States	1.440.646.3223 Monday – Friday, 8am – 5pm EST
Outside United States	Please contact your local Rockwell Automation representative for any technical support issues.

New Product Satisfaction Return

Rockwell 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, it may need to be returned.

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

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