

Catalog Number Explanation

Kinetix 2000 drive catalog numbers and descriptions are listed in the table below.

Kinetix 2000 Drive Catalog Numbers

Integrated Axis Modules (230V)	Catalog Number
Kinetix 2000, IAM, 230V, 3 kW ⁽¹⁾ Converter, 1 A Inverter	2093-AC05-MP1
Kinetix 2000, IAM, 230V, 3 kW ⁽¹⁾ Converter, 2 A Inverter	2093-AC05-MP2
Kinetix 2000, IAM, 230V, 3 kW ⁽¹⁾ Converter, 3 A Inverter	2093-AC05-MP5
Axis Modules (230V)	
Kinetix 2000, AM, 230V, 1 A Inverter	2093-AMP1
Kinetix 2000, AM, 230V, 2 A Inverter	2093-AMP2
Kinetix 2000, AM, 230V, 3 A Inverter	2093-AMP5
Kinetix 2000, AM, 230V, 6 A Inverter	2093-AM01
Kinetix 2000, AM, 230V, 9 A Inverter	2093-AM02
Power Rails	
Kinetix 2000, Single-Axis Power Rail	2093-PRS1
Kinetix 2000, Two-Axis Power Rail	2093-PRS2
Kinetix 2000, Three-Axis Power Rail	2093-PRS3
Kinetix 2000, Four-Axis Power Rail	2093-PRS4
Kinetix 2000, Five-Axis Power Rail	2093-PRS5
Kinetix 2000, Seven-Axis Power Rail	2093-PRS7
Kinetix 2000, Eight-Axis Power Rail with Shunt or Slot Filler	2093-PRS8S
Shunt Module	
Kinetix 2000, SM, 230V, 50 W	2093-ASP06
Slot Filler	
Kinetix 2000, SF, Power Rail Slot Filler	2093-PRF

⁽¹⁾ Derated to 2 kW for single-phase operation.

dissipation data from other equipment inside the enclosure (such as ControlLogix controller). Once the total amount of heat dissipation (in Watts) is known, the minimum enclosure size can be calculated.

Kinetix 2000 System Heat Dissipation Example

Enclosure Component	Description	Loading ⁽¹⁾	Heat Dissipation ⁽¹⁾ Watts	
2093-AC09-M02	Integrated axis module (IAM), 230V, three-phase	3 kW (converter section)	20%	7.0
		1 A (inverter section)	40%	33.6
2093-AM02	Axis module (AM), 230V, 9 A	60%	67.3	
2093-AM02	Axis module (AM), 230V, 9 A	60%	67.3	
2093-AM01	Axis module (AM), 230V, 6 A	40%	46.7	
2093-AM01	Axis module (AM), 230V, 6 A	40%	46.7	
2093-AM01	Axis module (AM), 230V, 6 A	20%	46.7	
2093-AL09	Line interface module (LIM), 230V, 6 kW, 6 A; 24V dc 3 A	100%	72.0	
2093-PR6	Power rail, 230V, 6 axis	N/A	0.0	
Total Kinetix 2000 system Wattage			387.3	

⁽¹⁾ To determine heat dissipation specifications for the Kinetix 2000 components, refer to Power Dissipation Specifications on page 160.

ControlLogix System Heat Dissipation Example

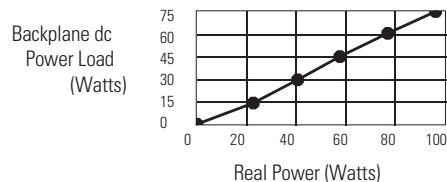
Enclosure Component	Description	Backplane Power Load ⁽¹⁾ Watts	Heat Dissipation ⁽¹⁾ Watts
1756-M08SE	8-axis SERCOS interface module	3.2	0
1756-L55M12	5555 ControlLogix processor	4.5	0
1756-IB16D	16 -point input module	0.84	5.8
1756-OB16D	16 -point output module	4.64	3.3
1756-ENBT	Ethernet communications module	4.0	0
Backplane total		17.18 ⁽²⁾	N/A
1756-PB72	24V dc ControlLogix power supply	N/A	25 ⁽²⁾
1756-A7	7-slot mounting chassis	N/A	N/A
Total ControlLogix system Wattage			34.1

⁽¹⁾ For ControlLogix module specifications, refer to the ControlLogix Selection Guide, publication 1756-SG001.

⁽²⁾ Real power heat dissipation is determined by applying the backplane power load (17.18 W) to the graph below.

ControlLogix Real Power

1756-P B72
1756-P B75



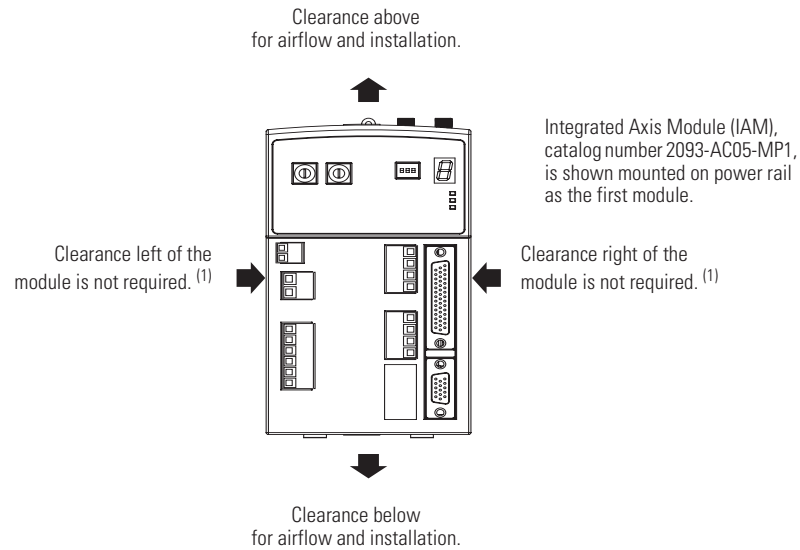
Minimum Clearance Requirements

This section provides information to assist you in sizing your cabinet and positioning your Kinetix 2000 system components.

IMPORTANT

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

Minimum Clearance Requirements



(1) The power rail, catalog number 2093-PRSxx, does not extend left of the first module or right of the last module.

Minimum Clearance Dimensions

Cat. No.	Clearance Above, Min	Clearance Below, Min	Cabinet Depth Clearance, Min ⁽¹⁾	
2093-AC05-MP1, 2093-AC05-MP2, 2093-AC05-MP5, 2093-AMP1, 2093-AMP2, 2093-AMP5, 2093-AM01, 2093-AM02	50.8 mm (2.0 in.)	50.8 mm (2.0 in.)	200 mm (7.9 in.)	If 15-pin connector kit, catalog number 2090-K2CK-D15M, is attached.
			235 mm (9.25 in.)	44-pin connector kit options include: <ul style="list-style-type: none"> • 2090-U3BK-D44xx connector kit (containing a 2090-U3BK-D44 terminal block and 2090-U3BK-D44xx cable) • 2090-U3BK-D44 terminal block and custom-built cable. • 2090-U3BK-D44 terminal block and flying lead cable.
2093-ASP06	305 mm (12.0 in.)	50.8 mm (2.0 in.)	200 mm (7.9 in.)	
2093-PRF	None	None	None	

(1) Additional clearance required to accommodate cable bend restrictions.

Refer to the Kinetix 2000 Power Rail Installation Instructions, publication 2093-IN004, when installing your power rail.

ATTENTION

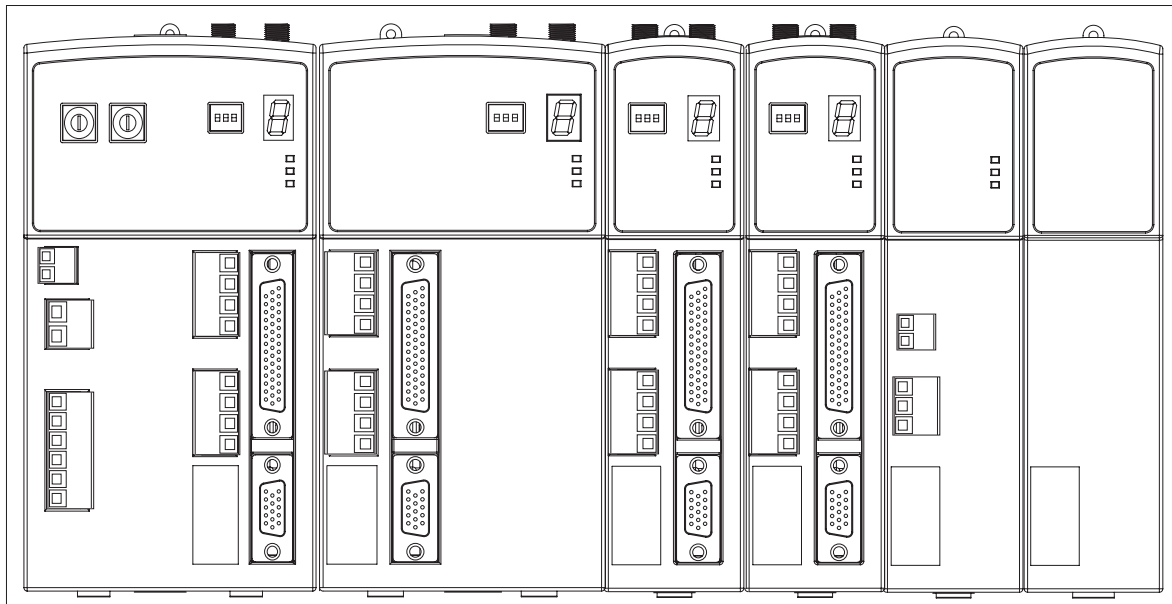
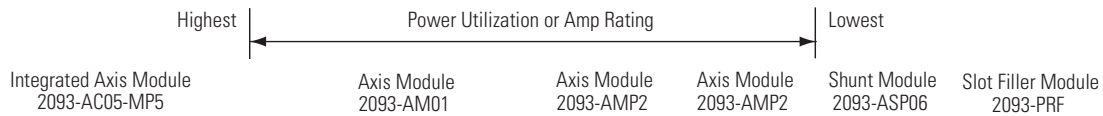


To avoid damage to the power rail during installation, do not remove the protective boots until the module for each slot is ready for mounting.

Determining Mounting Order

Mount IAM, AM, and SM modules in the order (left to right) shown in the figure. A slot filler (SF) must occupy any unoccupied slots. Mount axis modules according to power utilization (highest to lowest) from left to right starting with the highest power utilization. If power utilization is unknown, position axis modules (highest to lowest) from left to right based on Amp rating.

Module Mounting Order



Seven-axis Power Rail Module 2093-PRS7

IMPORTANT

Position the integrated axis module (IAM) in the leftmost slot of the power rail. Position your axis modules (AM), shunt module (SM), and slot fillers (SF) to the right of the IAM.

Install axis modules according to power utilization (highest to lowest) from left to right. The AM requiring the highest power utilization should be on the left.

Install the shunt module to the right of the last AM. Only slot fillers may be installed to the right of the shunt module.

Do not mount a shunt module on the power rail of a follower IAM. Common-bus follower IAMs will disable any rail mounted or external shunt modules.

SHOCK HAZARD

To avoid personal injury due to electrical shock, place a slot filler module in all empty slots on the power rail.

A unoccupied power rail connector will disable the Kinetix 2000 system, however control power will still be present.

2093-PRS8S Module Configuration

The 2093-PRS8S power rail is unique in that it has nine slots, but can accommodate only eight axis modules (IAM and AMs). The last slot must be occupied by a shunt module (SM) or a slot filler (SF), or a double-wide axis module (AM) occupying both slots 7 and 8.

The table shows valid 2093-PRS8S power rail configurations with the maximum number of axis modules. Configurations with fewer axis modules are valid when the slots to the right of the axis modules (IAM and AM) are occupied by a single shunt module (SM), or slot filler (SF) modules as described in Determining Mounting Order on page 38.

Valid 2093-PRS8S Module Positions

Slot Number								
0	1	2	3	4	5	6	7	8
IAM	AM ⁽¹⁾		AM		AM		AM ⁽²⁾	
IAM	AM		AM		AM		AM	SM or SF ⁽²⁾
IAM	AM		AM		AM	AM	AM	SM or SF ⁽²⁾
IAM	AM		AM	AM	AM	AM	AM	SM or SF ⁽²⁾
IAM	AM	AM	AM	AM	AM	AM	AM	SM or SF ⁽²⁾

⁽¹⁾ Axis modules (AM) are available in double-width (2093-AM01 and 2093-AM02) and single-width (2093-AMP1, 2093-AMP2, and 2093-AMP5).

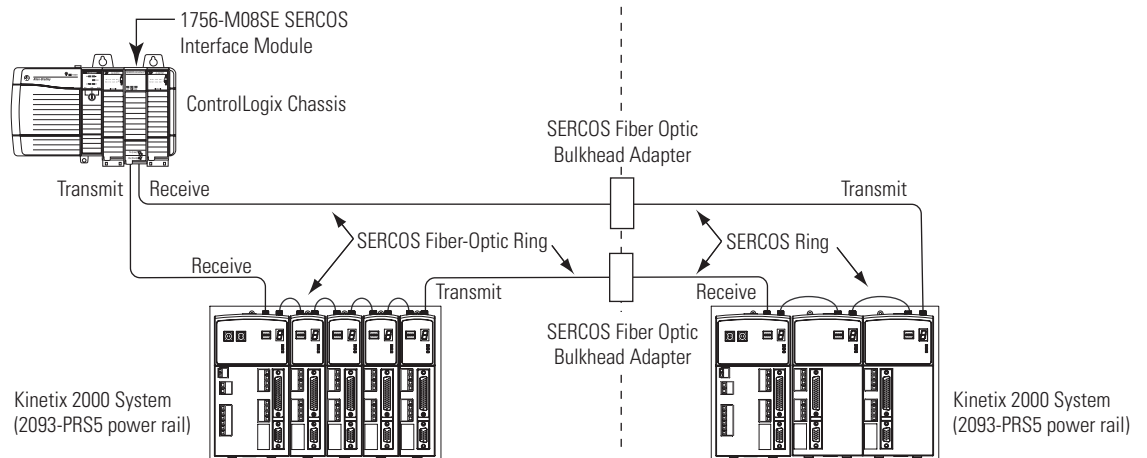
⁽²⁾ Only the following modules may occupy slot 8 in the 2093-PRS8S power rail: a shunt module (2093-ASP06), a slot filler (2093-PRF), or a double-width axis module (2093-AM01 or 2093-AM02) occupying both slots 7 and 8. Refer to the Node Addressing Example 4 on page 108 for information on slot assignment and logical addressing of an axis module in slot 8.

In this example, the second Kinetix 2000 system is located in a separate cabinet and connected with bulkhead adapters.

IMPORTANT

To avoid signal loss, do not use bulkhead adapters to connect glass cables. Use bulkhead adapters only for plastic-to-plastic cable connections.

Fiber-optic Cable Example 4 (bulkhead adapters)



SERCOS Cables

The Kinetix 2000 supports the SERCOS fiber optic cables listed in the table.

Refer to the Fiber-optic Cable Installation and Handling Instructions, publication 2090-IN010, for additional information.

SERCOS Cable Selection for Kinetix 2000 Drives

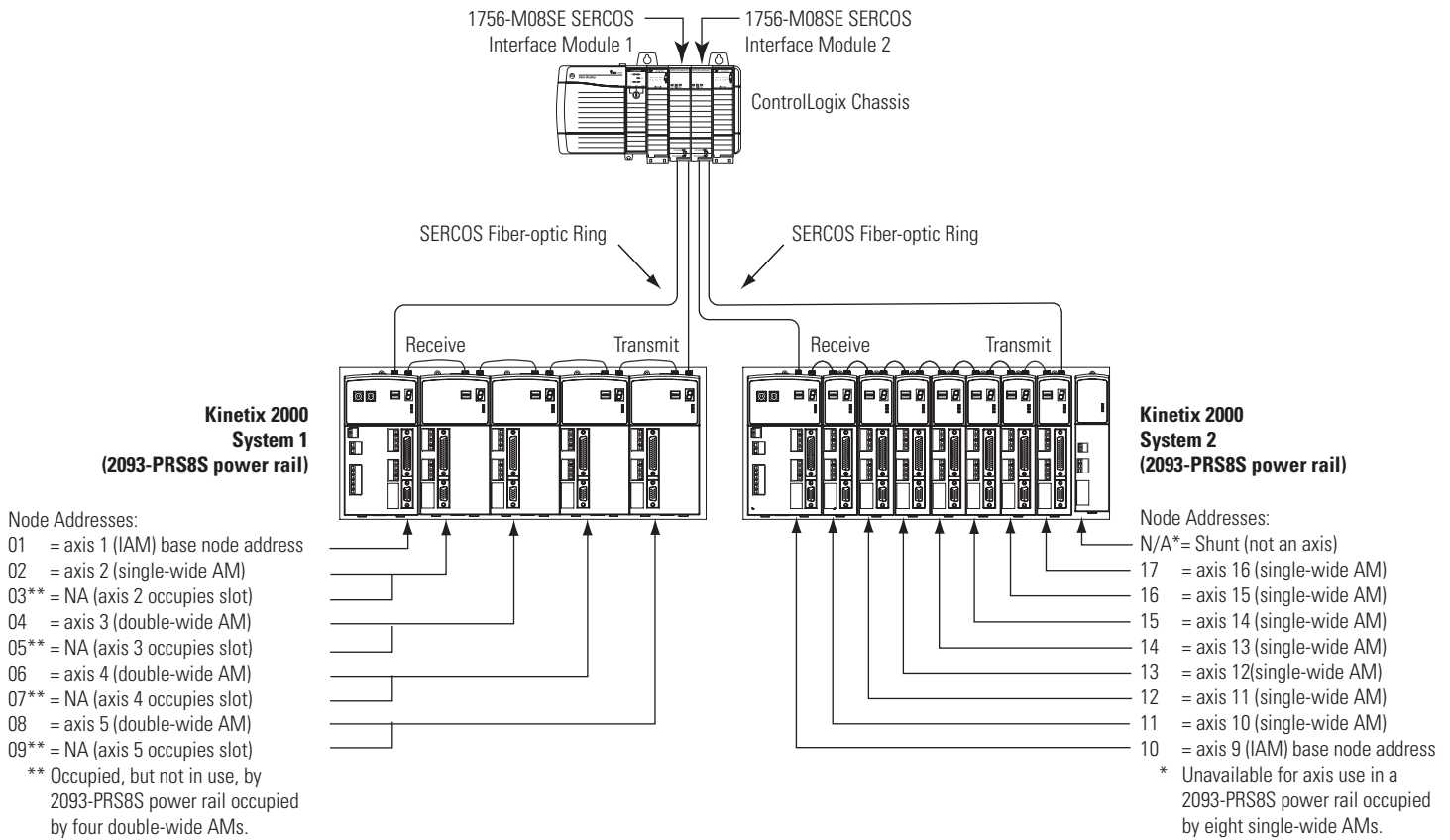
Connection	Adjacent Connection (module to the right)	Catalog Number of SERCOS Cable ⁽¹⁾
2093-AC05-MP1 2093-AC05-MP2 2093-AC05-MP5	2093-AMP1 2093-AMP2 2093-AMP5	2090-SCEP0-1 series B
2093-AC05-MP1 2093-AC05-MP2 2093-AC05-MP5	2093-AM01 2093-AM02	2090-SCEP0-2
2093-AMP1 2093-AMP2 2093-AMP5	2093-AMP1 2093-AMP2 2093-AMP5	2090-SCEP0-1 series B

SERCOS Cable Selection for Kinetix 2000 Drives

Connection	Adjacent Connection (module to the right)	Catalog Number of SERCOS Cable ⁽¹⁾
2093-AMP1 2093-AMP2 2093-AMP5	2093-AM01 2093-AM02	2090-SCEP0-2
2093-AM01 2093-AM02	2093-AM01 2093-AM02	2090-SCEP0-2
2093-AM01 2093-AM02	2093-AMP1 2093-AMP2 2093-AMP5	2090-SCEP0-1 series B

⁽¹⁾ Series B indicates an improved bend radius for use with Kinetix drives.

Node Addressing Example 4



In Example 4, xxxxx system 1 with an eight-axis power rail contains one IAM, and four double-wide AMs. xxxxx system 2 with an eight-axis power rail contains one IAM, eight single-wide AMs, and a shunt module.

SERCOS interface module 1 controls axes 1...5, and module 2 controls axes 9...16.

The shunt module (or a slot filler) in xxxxx system 2 occupies a slot, but is not assigned a node address, since future expansion of this system is impossible.

IMPORTANT

Only the following modules may occupy slot eight in the 2093-PRS8S power rail: a shunt module (2093-ASP06), a slot filler (2093-PRF), or a double-width axis module (2093-AM01 or 2093-AM02) occupying both slots seven and eight.

IMPORTANT

The node address for each axis module is determined by the base node-address switch setting on the IAM.

Do not position axis modules to the right of a shunt or slot filler modules. The added distance between non-adjacent axes can increase electrical noise and impedance, and requires longer fiber-optic cable lengths.

Inverter Power Specifications

The following tables list power specifications for the inverter section that resides within an integrated axis module or an axis module.

IAM Inverter Power Specifications

Attribute	2093-AC05-MP1	2093-AC05-MP2	2093-AC05-MP5
Bandwidth Velocity Loop ⁽¹⁾ Current Loop	500 Hz 860 Hz		
PWM frequency	8 kHz		
Nominal input voltage	325V dc		
Continuous current (rms)	1.0 A	2.0 A	3.0 A
Continuous current (0-pk)	1.41 A	2.83 A	4.24 A
Peak current (rms)	3.0 A	6.0 A	9.0 A
Peak current (0-pk)	4.20 A	8.48 A	12.7 A
Peak output current time, max	3 s from 0% drive utilization (0% soak)		
Continuous power out, nom	0.3 kW	0.6 kW	0.9 kW
Efficiency	98%		
Capacitance	200 μ F		
Capacitive energy absorption	7.5 J		
Inverter PCB leakage current	1 mA		

⁽¹⁾ Bandwidth values in the velocity loop vary based on tuning parameters and mechanical components.

AM Inverter Power Specifications

Specification	2093-AMP1	2093-AMP2	2093-AMP5	2093-AM01	2093-AM02
Bandwidth ⁽¹⁾ Velocity Loop Current Loop	500 Hz 860 Hz				
PWM frequency	8 kHz				
Nominal input voltage	325V dc				
Continuous current (rms)	1.0 A	2.0 A	3.0 A	6.0 A	9.5 A
Continuous current (0-pk)	1.41 A	2.83 A	4.24 A	8.48 A	13.4 A
Peak current (rms)	3.0 A	6.0 A	9.0 A	18.0 A	28.5 A
Peak current (0-pk)	4.20 A	8.48 A	12.7 A	25.5 A	40.3 A
Peak output current time (max)	3 s from 0% drive utilization (0% soak)				
Continuous power out (nom)	0.3 kW	0.6 kW	0.9 kW	1.9 kW	3.0 kW
Efficiency	98%				
Capacitance	200 μ F			540 μ F	
Capacitive energy absorption	7.5 J			20 J	
Inverter PCB leakage current	1 mA				

⁽¹⁾ Bandwidth values vary based on tuning parameters and mechanical components.

Power Dissipation Specifications

Use the following table to size an enclosure and calculate required ventilation for your Kinetix 2000 system.

Kinetix 2000 Modules		Usage as a Percentage of Rated Power Output (Watts)				
		20%	40%	60%	80%	100%
Converter (IAM) ⁽¹⁾						
2093-AC05-MP1	Three-phase	7.0	10.5	14.0	17.4	20.9
2093-AC05-MP2						
2093-AC09-MP5						
2093-AC05-MP1	Single-phase	5.8	8.0	10.3	12.6	14.8
2093-AC05-MP2						
2093-AC09-MP5						
Inverter (IAM and AM) ⁽¹⁾						
2093-AC05-MP1 and 2093-AMP1		31.6	33.6	35.6	37.6	39.6
2093-AC05-MP2 and 2093-AMP2		33.0	36.4	39.8	43.3	46.8
2093-AC05-MP5 and 2093-AMP5		36.2	42.9	49.8	56.8	63.9
2093-AM01		38.3	46.7	55.3	64.1	73.1
2093-AM02		44.3	55.6	67.3	79.2	91.4
Shunt module (SM)						
2093-ASP06		35.8	45.8	55.8	65.8	75.8
Power Rail						
2093-PRSxx		0	0	0	0	0
Connector Kit						
2093-K2CK-D15M		0	0	0	0	0

⁽¹⁾ Internal shunt power is not included in the calculations and must be added based on utilization.

Environmental Specifications

Attribute	Operational Range	Storage Range (non-operating)
Ambient Temperature	0...50 °C (32...122 °F)	-40...85 °C (-40...185 °F)
Relative Humidity	5...95% noncondensing	5...95% noncondensing
Altitude	1000 m (3281 ft) 3000 m (9843 ft) with derating ⁽¹⁾	3000 m (9843 ft) during transport
Environmental Rating	IP2X (EN60529) For use only in a Pollution Degree 2 Environment (UL508c, section 2.7) Open Device (UL508c, section 2.5)	
Vibration	5...55 Hz @ 0.35 mm (0.014 in.) double amplitude, continuous displacement; 55...500 Hz @ 2.0 g peak constant acceleration	
Shock	15 g, 11 ms half-sine pulse (3 pulses in each direction of 3 mutually perpendicular directions)	
Conformal Coating	IB31: DSP and SERCOS pins, anti-dust and anti-humidity 1B73LSE: Power Rail connector pins, Converter, Inverter, Shunt, Power Rail, and Slot Filler PCB assemblies, clear UL creepage and clearance issue.	

⁽¹⁾ Peak current output is derated by 15% for each 1000 m over 1000 m (3281 ft).

Weight Specifications

Kinetix 2000 Module	Catalog Number	Description, Approx. kg (lb)
IAM	2093-AC05-MP1	1.32 (2.9)
	2093-AC05-MP2	
	2093-AC05-MP5	
AM	2093-AMP1	0.67 (1.5)
	2093-AMP2	
	2093-AMP5	
	2093-AM01	0.95 (2.1)
	2093-AM02	
SM	2093-ASP06	0.59 (1.3)

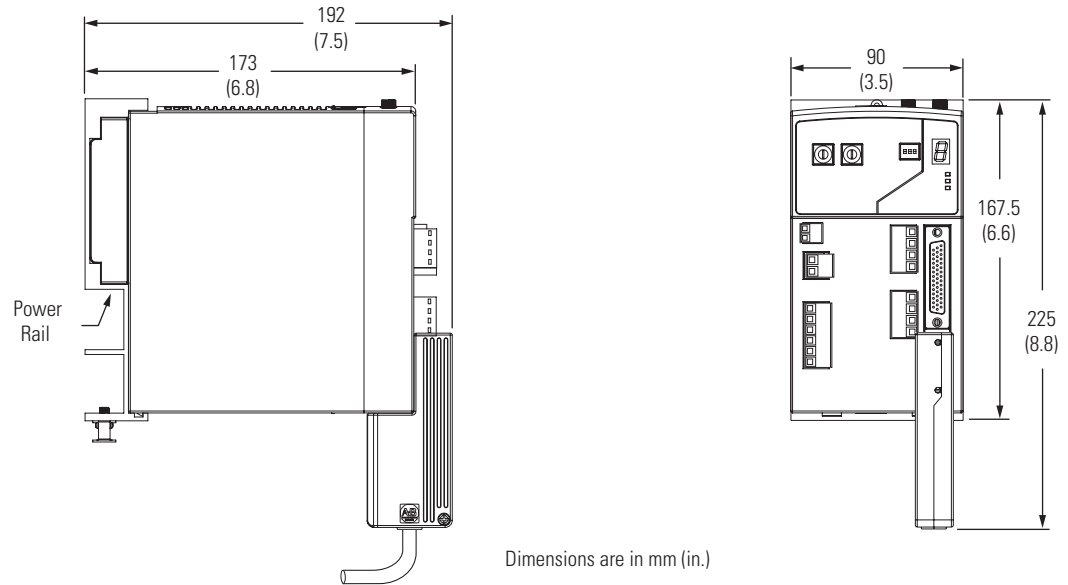
Kinetix 2000 Module	Catalog Number	Description, Approx. kg (lb)
Power Rails (Slim)	2093-PRS1	0.27 (0.6)
	2093-PRS2	0.38 (0.8)
	2093-PRS3	0.51 (1.1)
	2093-PRS4	0.64 (1.4)
	2093-PRS5	0.77 (1.7)
	2093-PRS7	1.03 (2.3)
	2093-PRS8S	1.28 (2.8)
Slot Filler Module	2093-PRF	0.15 (0.3)

Product Dimensions

This section contains product dimensions for your Kinetix 2000 system components.

Integrated Axis Module Dimensions

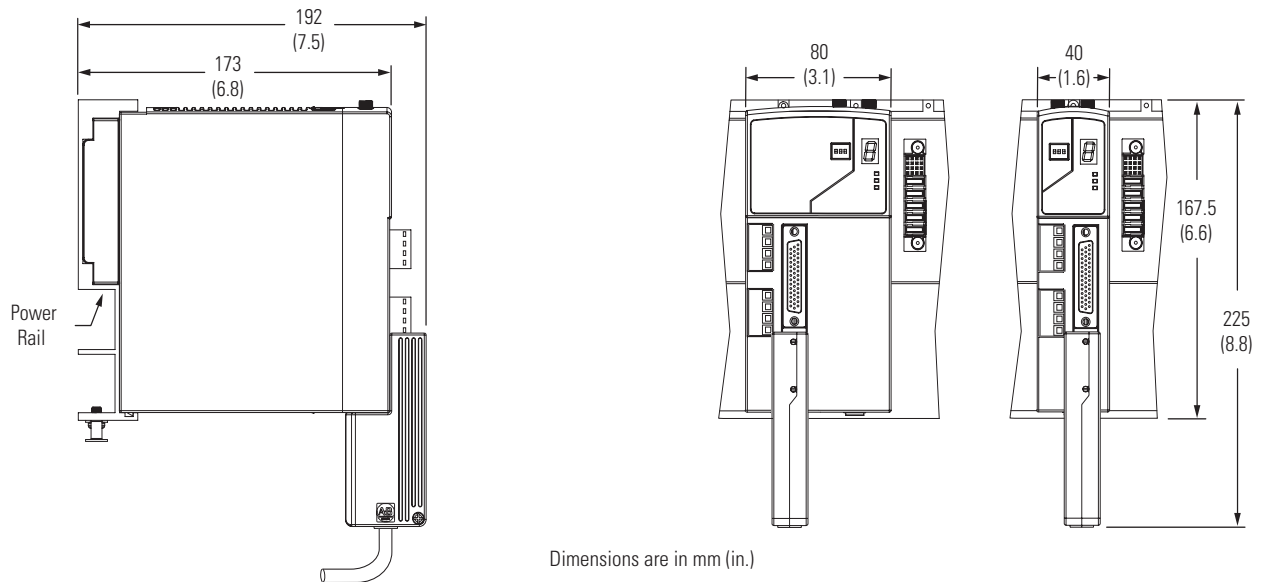
2093-AC05-MP1, 2093-AC05-MP2, 2093-AC05-MP5



Modules are shown mounted to the power rail and the dimensions reflect that in the depth of the module.

Axis Module Dimensions

2093-AM01, 2093-AM02 (double-wide), and 2093-AMP1, 2093-AMP2, 2093-AMP5 (single-wide)



Modules are shown mounted to the power rail and the dimensions reflect that in the depth of the module.

Kinetix 2000 Capacitance Values

Use the tables below when calculating total bus capacitance and additional bus capacitance for your Kinetix 2000 common bus application.

IAM and AM (230V) Modules

IAM Converter (230V)	Capacitance μF	IAM or AM Inverter (230V)	Capacitance μF
2093-AC05-MP1	540	2093-AC05-MP1 or 2093-AMP1	200
2093-AC05-MP2		2093-AC05-MP2 or 2093-AMP2	
2093-AC05-MP5		2093-AC05-MP5 or 2093-AMP5	
		2093-AM01	540
		2093-AM02	

SM (230V) Module

SM (230V)	Capacitance μF
2093-ASP06	164