Kinetix 6000 Multi-axis Servo Drives

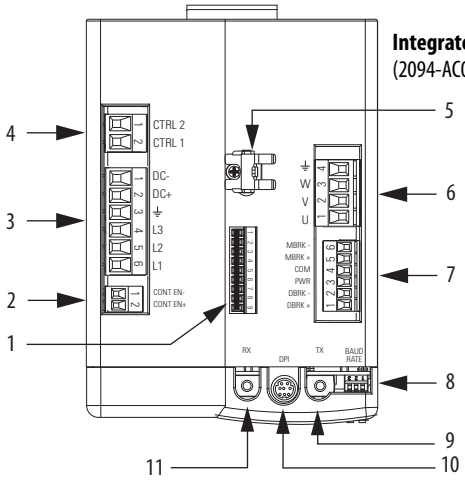
The Kinetix 6000 multi-axis servo drives provide powerful simplicity to handle even the most demanding applications quickly, easily, and cost-effectively. By providing advanced control capability along with innovative design and installation features, the Kinetix 6000 drives can significantly improve system performance while saving time and money. The compact size, simplified wiring, and easy-to-use components make the Kinetix 6000 drives an ideal choice for both OEMs and end-users. Target applications for the Kinetix 6000 drives include packaging, material handling, converting, and assembly.

The Kinetix 6000 servo drives provide Integrated Motion capability through sercos interface and compatibility with Kinetix 6200 drives, letting you migrate to the enhanced features exactly when and where you need them.

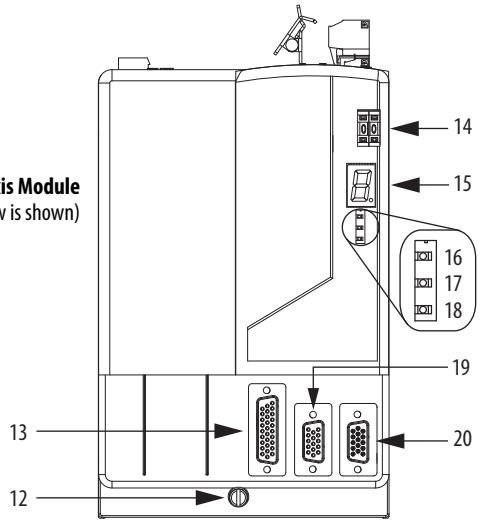
Kinetix 6000 Drive Features and Indicators

2094-AC*xx*-M*xx*-S and 2094-BC*xx*-M*xx*-S IAM Features and Indicators

Integrated Axis Module
(2094-AC05-M01-S top view is shown)



Integrated Axis Module
(2094-AC05-M01-S front view is shown)

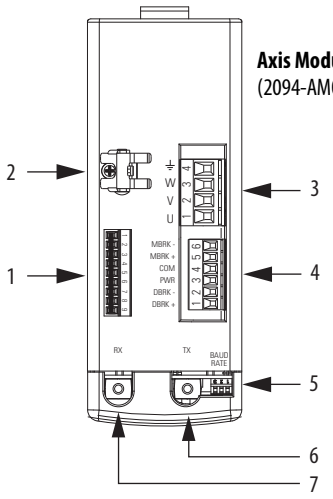


Item	Description
1	Safe Torque Off (STO) connector
2	Contactor enable (CED) connector
3	DC bus/AC input power (IPD) connector
4	Control power (CPD) connector
5	Motor cable shield clamp
6	Motor power (MP) connector
7	Motor/resistive brake (BC) connector

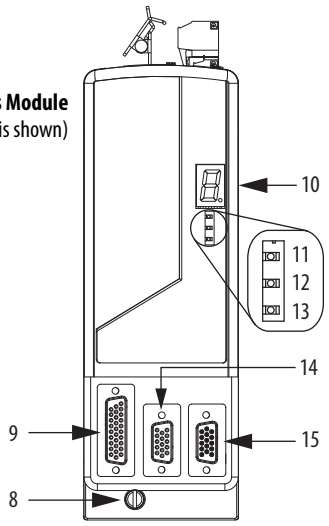
Item	Description
8	Sercos communication rate and optical power switches
9	Sercos transmit (Tx) connector
10	DPI connector
11	Sercos receive (Rx) connector
12	Mounting screw
13	I/O (IOD) connector
14	Sercos node address switch

Item	Description
15	Seven-segment fault status indicator
16	Drive status indicator
17	COMM status indicator
18	Bus status indicator
19	Motor feedback (MF) connector
20	Auxiliary feedback (AF) connector

2094-AM*xx*-S and 2094-BM*xx*-S AM Features and Indicators



Axis Module
(2094-AM01-S top view is shown)



Axis Module
(2094-AM01-S front view is shown)

Item	Description
1	Safe Torque Off (STO) connector
2	Motor cable shield clamp
3	Motor power (MP) connector
4	Motor/resistive brake (BC) connector
5	Sercos communication rate and optical power switches

Item	Description
6	Sercos transmit (Tx) connector
7	Sercos receive (Rx) connector
8	Mounting screw
9	I/O (IOD) connector
10	Seven-segment fault status indicator

Item	Description
11	Drive status indicator
12	COMM status indicator
13	Bus status indicator
14	Motor feedback (MF) connector
15	Auxiliary feedback (AF) connector

Technical Specifications - Kinetix 6000 Multi-axis Servo Drives

IAM Module (converter, 200V-class) Power Specifications (series A and C)

Attribute	2094-AC05-MP5-S	2094-AC05-M01-S	2094-AC09-M02-S	2094-AC16-M03-S	2094-AC32-M05-S
AC input voltage	195…264V rms, three-phase (230V nom)				
AC input frequency	47…63 Hz				
Main AC input current Nom (rms) Max inrush (0-pk) (1)	10 A 19 A		19 A 37 A	36 A 73 A	71 A 138 A
DC input voltage (common-bus follower)	275…375V DC				
DC input current (common-bus follower)	10 A		19 A	36 A	71 A
Control power AC input voltage	95…264V rms, single-phase (110…240V nom)				
Control power AC input current Nom (@ 220/230V AC) rms Nom (@ 110/115V AC) rms Max inrush (0-pk)	3 A 6 A 20 A			3 A 6 A 83 A (3)	
Nominal bus output voltage	325V DC				
Line loss ride through	20 ms				
Continuous output current to bus (A_{DC})	10 A		19 A	36 A	71 A
Peak output current to bus (A_{DC}) (2)	20 A		38 A	72 A	142 A
Bus overvoltage	415V DC				
Bus undervoltage	138V DC				
Internal shunt Continuous power Peak power	N/A N/A		50 W 8200 W	200 W 5700 W	200 W 5700 W
Internal shunt resistor	N/A		20 Ω	28.75 Ω	28.75 Ω
Shunt on	N/A		405V DC		
Shunt off	N/A		375V DC		
Continuous power output to bus	3 kW		6 kW	11.3 kW	22.5 kW
Peak power output	6 kW		12 kW	22.6 kW	45.0 kW
Efficiency	95%				
Converter inductance	N/A			150 µH	75 µH
Converter capacitance	270 µF		540 µF	1320 µF	1980 µF
Short-circuit current rating	200,000 A (rms) symmetrical				

(1) All 2094-*xCxx* IAM modules are limited to 2 contactor cycles per minute (with up to 4 axes), or 1 contactor cycle per minute (with 5…8 axes). The cycle capability also depends on the converter power rating and the total system capacitance. To calculate cycle capability, refer to the Kinetix 6000 Multi-axis Servo Drives User Manual, publication 2094-UM001.

(2) Peak output current duration equals 250 ms.

(3) For eight axis systems with 230V AC control input voltage and 50 °C (122°F) ambient temperature the maximum inrush duration is less than 1/2 line cycle. To calculate the maximum inrush duration for other configurations, refer to the Kinetix 6000 Multi-axis Servo Drives User Manual, publication 2094-UM001.

IAM Module (converter, 400V-class) Power Specifications (series A, B, and C)

Attribute	2094-BC01-MP5-S	2094-BC01-M01-S	2094-BC02-M02-S	2094-BC04-M03-S	2094-BC07-M05-S
AC input voltage	324…528V rms three-phase (360…480V nom)				
AC input frequency	47…63 Hz				
Main AC input current Nom (rms) Max inrush (0-pk) (1)	10.0 A 11.0 A		24.0 A 22.0 A	44.0 A 31.1 A	71.0 A 62.2 A
DC input voltage (common bus follower)	458…747V DC				
DC input current (common-bus follower)	9.0 A		22.6 A	41.5 A	67.7 A
Control power AC input voltage	95…264V rms single-phase (110…240V rms nom)				
Control power AC input current Nom (@ 220/230V AC) rms Nom (@ 110/115V AC) rms Max inrush (0-pk)	6 A 6 A 98 A (3)				
Control power cycling, max	2 cycles per minute with a 90% on-time, 10% off-time duty cycle				
Nominal bus output voltage	650V DC				
Line loss ride through	20 ms				
Continuous output current to bus (A_{DC})	9.0 A		22.6 A	41.5 A	67.7 A
Peak output current to bus (A_{DC}) Series A drives (2) Series B and C drives	18.1 A 22.6 A (4)		45.2 A 56.4 A (4)	83.1 A 103.8 A (4)	135.4 A 203.2 A (5)
Bus overvoltage	825V DC				
Bus undervoltage	275V DC				
Internal shunt Continuous power Peak power	50 W 5.6 kW			200 W 22.5 kW	
Internal shunt resistor	115 Ω			28.75 Ω	
Shunt on	805V DC				
Shunt off	755V DC				
Continuous power output to bus	6 kW		15 kW	27.6 kW	45 kW
Peak power output Series A drives (2) Series B and C drives	12 kW 15 kW (4)		30 kW 37.5 kW (4)	55.2 kW 69 kW (4)	90 kW 135 kW (5)
Efficiency	97%				
Converter inductance	500 µH			125 µH	75 µH
Converter capacitance	110 µF		220 µF	940 µF	1410 µF
Short-circuit current rating	200,000 A (rms) symmetrical				

(1) All 2094-*xCxx* IAM modules are limited to 2 contactor cycles per minute (with up to 4 axis modules), or 1 contactor cycle per minute (with 5 to 8 axis modules). The cycle capability also depends on the converter power rating and the total system capacitance. Refer to the Kinetix 6000 Multi-axis Servo Drives User Manual, publication 2094-UM001 when making calculations.

(2) Peak output current duration equals 250 ms.

(3) For eight axis systems with 230V AC control input voltage and 50 °C (122°F) ambient temperature the maximum inrush duration is less than 1/2 line cycle. To calculate the maximum inrush duration for other configurations, refer to the Kinetix 6000 Multi-axis Servo Drives User Manual, publication 2094-UM001.

(4) Converter peak output duration equals 400 ms with a duty cycle of 16%.

(5) Converter peak output duration equals 200 ms with a duty cycle of 3%.

Control Power Current Requirements

Modules on Power Rail	110/115V AC Input		220/230V AC Input	
	Input Current A	**Input VA** VA	**Input Current** A	**Input VA** VA
IAM module only	0.56	67	0.36	85
IAM and 1 AM module	0.99	119	0.64	153
IAM and 2 AM module	1.43	172	0.92	220
IAM and 3 AM module	1.87	224	1.20	287
IAM and 4 AM module	2.31	277	1.48	354
IAM and 5 AM module	2.74	329	1.75	421
IAM and 6 AM module	3.18	382	2.03	488
IAM and 7 AM module	3.62	434	2.31	555

AM Module (inverter, 200V-class) Power Specifications

Attribute (1)	**2094-AMP5-S (2094-AC05-MP5-S)**	**2094-AM01-S (2094-AC05-M01-S)**	**2094-AM02-S (2094-AC09-M02-S)**	**2094-AM03-S (2094-AC16-M03-S)**	**2094-AM05-S (2094-AC32-M05-S)**
Bandwidth (2) Velocity loop Current loop	500 Hz 1300 Hz				
PWM frequency	8 kHz		4 kHz		
Input voltage (nom)	325V DC				
Continuous current (rms)	3.7 A	6.0 A	10.6 A	17.3 A	34.6 A
Continuous current (0-pk)	5.2 A	8.5 A	15.0 A	24.5 A	48.9 A
Peak current (rms) (3)	7.4 A	12.0 A	21.2 A	34.6 A	51.9 A
Peak current (0-pk) (3)	10.5 A	17.0 A	30.0 A	48.9 A	73.4 A
Continuous power out (nom)	1.2 kW	1.9 kW	3.4 kW	5.5 kW	11.0 kW
Internal shunt Continuous power Peak power	N/A N/A			50 W 1400 W	
Internal shunt resistor	N/A			115 Ω	
Shunt on	N/A			405V DC	
Shunt off	N/A			375V DC	
Efficiency	98%				
Capacitance	390 µF	660 µF	780 µF	1320 µF	2640 µF
Capacitive energy absorption	15 J	25 J	29 J	50 J	99 J
Short-circuit current rating	200,000 A (rms) symmetrical				

(1) These specifications apply to the axis module specified in the column heading by catalog number and the same axis module (inverter section) that resides within an IAM power module.

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

(3) Peak current duration equals 100 ms.

IMPORTANT The peak current ratings of the Kinetix 6000 AM modules (series A, B, and C) are configured at the factory as 150% of continuous current. You can program 2094-BMP5-S, 2094-BM01-S, 2094-BM02-S, and 2094-BM03-S series-B and C drives and their equivalent IAM (inverter) modules, up to 250% of continuous inverter current. You can program the 2094-BM05-S (AM module) and the 2094-BC07-M05-S (inverter) module up to 200% of continuous inverter current.

AM Module (inverter, 400V-class) Power Specifications (series A, B, and C)

Attribute	2094-BMP5-S (2094-BC01-MP5-S)	2094-BM01-S (2094-BC01-M01-S)	2094-BM02-S (2094-BC02-M02-S)	2094-BM03-S (2094-BC04-M03-S)	2094-BM05-S (2094-BC07-M05-S)
Bandwidth (1) Velocity loop Current loop	500 Hz 1300 Hz				
PWM frequency	8 kHz		4 kHz		
Nominal input voltage	650V DC				
Continuous current (rms) (2)	2.8 A	6.1 A	10.3 A	21.2 A	34.6 A
Continuous current (sine) 0-pk (3)	4.0 A	8.6 A	14.6 A	30.0 A	48.9 A
Peak current (rms) (3) Series A drives Series B and C drives (3)	4.2 A 7.0 A	9.2 A 15.3 A	15.5 A 25.8 A	31.8 A 53.0 A	51.9 A 69.2 A
Peak current (0-pk) (3) Series A drives Series B and C drives (3)	5.9 A 9.9 A	12.9 A 21.6 A	21.8 A 36.4 A	45.0 A 75.0 A	73.4 A 97.9 A
Continuous power out, nom	1.8 kW	3.9 kW	6.6 kW	13.5 kW	22.0 kW
Internal shunt Continuous power Peak power	50 W 5.6 kW			200 W 22.5 kW	
Internal shunt resistor	115 Ω			28.75 Ω	
Shunt on	805V DC				
Shunt off	755V DC				
Efficiency	98%				
Capacitance	75 µF	150 µF	270 µF	840 µF	1175 µF
Capacitive energy absorption	10 J	19 J	35 J	108 J	152 J
Short-circuit current rating	200,000 A (rms) symmetrical				

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

(2) Continuous and peak current ratings are for high-speed operation. For constant velocity operation at an electrical output frequency below 5 Hz (75 rpm for 8-pole motors), the output current rating is reduced. See Motion Analyzer software to correctly size your drive.

(3) Applies to series-B and C drives when configured for Peak-enhanced mode. For more information on drive performance in the Peak-enhanced mode, refer to Peak Enhancement Specifications on page 81.

Peak Enhancement Specifications

Drives that support the Peak-enhanced mode have the capability of increasing the maximum inverter peak current to achieve greater overload performance.

IMPORTANT The peak enhancement feature requires the use of RSLogix 5000® software and drive firmware (as specified below) or the Studio 5000 Logix Designer application.

Peak Enhancement Software and Firmware Requirements

IAM Module Cat. No.	AM Module Cat. No.	RSLogix 5000 Software Version	Kinetix 6000 Drive Firmware Revision
2094-BC01-MP5-S	2094-BMP5-S	16 or later	1.111 or later
2094-BC01-M01-S	2094-BM01-S	16 or later	1.111 or later
2094-BC02-M02-S	2094-BM02-S	16 or later	1.111 or later
2094-BC04-M03-S	2094-BM03-S	17 or later	1.117 or later
2094-BC07-M05-S	2094-BM05-S	17 or later	1.117 or later

Kinetix 6000 Peak Overload Support

IAM/AM Module Cat. No.	Module	Safe Torque Off Drive	Series A	Series B and C
2094-BC*xx*-M*xx*	IAM	Non Safe Torque Off	Standard	N/A
2094-BM*xx*	AM			
2094-BC*xx*-M*xx*-S	IAM	Safe Torque Off	Standard	Standard or Peak enhanced (1)
2094-BM*xx*-S	AM			

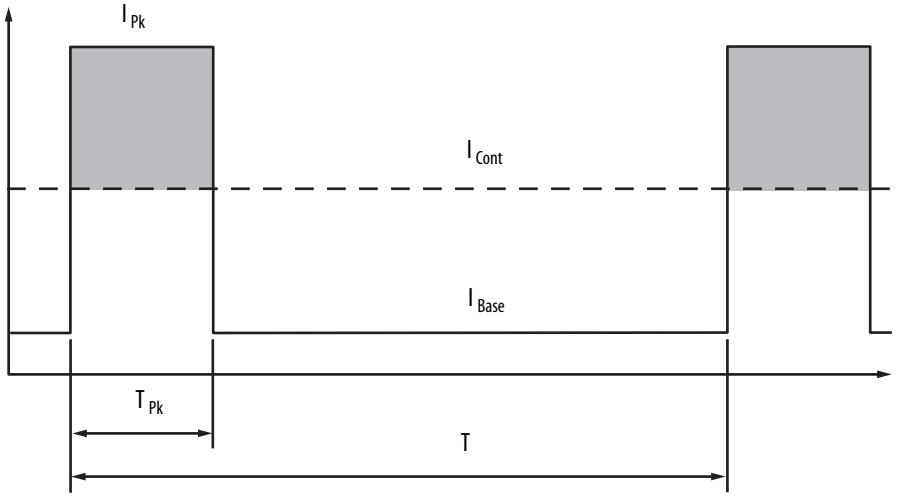
(1) Standard mode is enabled by default to preserve backward compatibility, but you can enable the Peak-enhanced mode to achieve increased peak current performance. Refer to the Kinetix 6000 Multi-axis Servo Drives User Manual, publication 2094-UM001, for information on enabling the Peak-enhanced mode.

Kinetix 6000 Peak Current Ratings

IAM/AM Module Cat. No.	Peak Inverter Current Rating		Peak Converter Current Rating	
	Standard	Peak Enhanced	Series A	Series B and C
2094-BC01-MP5-S	150%	250%	200%	250%
2094-BC01-M01-S	150%	250%	200%	250%
2094-BC02-M02-S	150%	250%	200%	250%
2094-BC04-M03-S	150%	250%	200%	250%
2094-BC07-M05-S	150%	200%	200%	300%
2094-BMP5-S	150%	250%	N/A	N/A
2094-BM01-S	150%	250%	N/A	N/A
2094-BM02-S	150%	250%	N/A	N/A
2094-BM03-S	150%	250%	N/A	N/A
2094-BM05-S	150%	200%	N/A	N/A

Load Duty-cycle Profile Example

$$D = \frac{T_{PK}}{T} \times 100\%$$

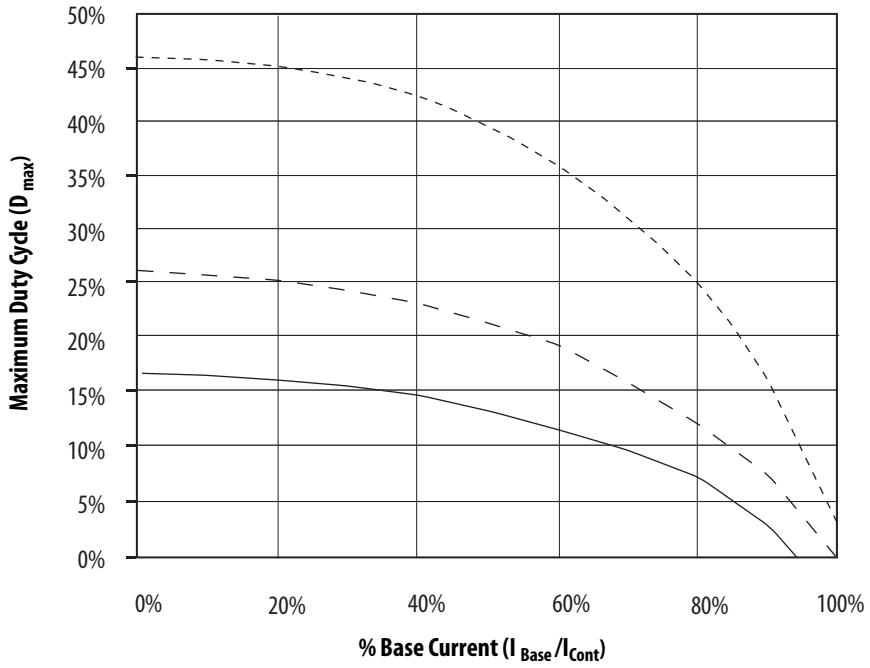


Peak Duty-cycle Definition of Terms

Term	Definition (1)
Continuous Current Rating (I_{Cont})	The maximum value of current that can be output continuously.
Peak Current Rating (I_{PKmax})	The maximum value of peak current that the drive can output. This rating is valid for only overload times less than T_{PKmax}.
Duty Cycle (D)	The ratio of time at peak to the Application Period and is defined as: $D = \frac{T_{PK}}{T} \times 100\%$
Time at Peak (T_{PK})	The time at peak current (I_{PK}) for a given loading profile. Must be less than or equal to T_{PKmax}.
Peak Current (I_{PK})	The level of peak current for a given loading profile. I_{PK} must be less than or equal to the Peak Current Rating (T_{PKMAX}) of the drive.
Base Current (I_{Base})	The level of current between the pulses of peak current for a given loading profile. I_{Base} must be less than or equal to the continuous current rating (I_{Cont}) of the drive.
Loading Profile	The loading profile is composed of I_{PK}, I_{Base}, T_{PK}, and D (or T) values and completely specify the operation of the drive in an overload situation. These values are collectively defined as the Loading Profile of the drive.
Application Period (T)	The sum of the times at I_{PK} (T_{PK}) and I_{Base}.

(1) All current values are specified as RMS.

Peak Enhanced Inverter Mode (T_{PK} < 2.0 s)



Legend (1)

I_{Pk} = 150%

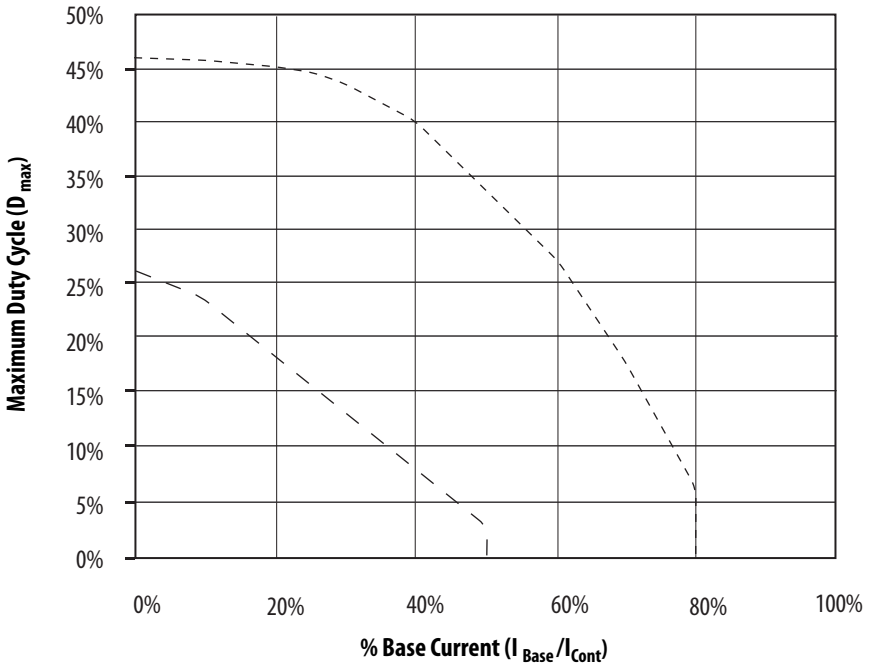
I_{Pk} = 200%

I_{Pk} = 250%

Applies to these Kinetix 6000 drives:
2094-BC01-MP5-S, 2094-BMP5-S,
2094-BC01-M01-S, 2094-BM01-S,
2094-BC02-M02-S, 2094-BM02-S,
2094-BC04-M03-S, 2094-BM03-S

(1) Base current (I_{Base}) and peak current (I_{PK} are a percentage of the continuous drive current rating (I_{Cont}).

Peak Inverter Overload (T_{PK} < 2.0 s)



Legend (1)

I_{Pk} = 150%

I_{Pk} = 200%

Applies to these Kinetix 6000 drives:
2094-BC07-M05-S, 2094-BM05-S

(1) Base current (I_{Base}) and peak current (I_{PK}) are a percentage of the continuous drive current rating (I_{Cont}).

Circuit Breaker/Fuse Specifications

The 2094-*x*C*xx*-M*xx*-S and 2094-*x*M*xx*-S drive modules 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 200,000 A.

Control and DC-bus Circuit-protection Specifications

IAM Module Cat. No.	Control Input Power		DC-bus Power	
	Bussmann Fuse [1]	Allen-Bradley Circuit Breaker [2] (non-UL)	Bussmann Fuse	Mersen Fuse [3]
2094-AC05-MP5-S	FNQ-R-10 (10 A)	1492-SPM2D060	N/A	A50P20-1
2094-AC05-M01-S				
2094-AC09-M02-S			FWH-35B	A50P35-4
2094-AC16-M03-S		1492-SPM2D200	FWH-60B	A50P60-4
2094-AC32-M05-S			FWH-125B	A50P125-4
2094-BC01-MP5-S	FNQ-R-10 (10 A) or FNQ-R-7.5 (7.5 A)	1492-SPM2D060 or 1492-SPM1D150	FWJ-20A14F	DCT20-2
2094-BC01-M01-S				
2094-BC02-M02-S			FWJ-40A	A70QS40-4
2094-BC04-M03-S			FWJ-70A	A70QS70-4
2094-BC07-M05-S			FWJ-125A	A70QS125-4

(1) Use FNQ-R-7.5 circuit breaker for higher single -cycle inrush current capability. This is recommended when the continuous control-power current exceeds 3.0 A.
(2) Use 1492-SPM1D150 circuit breaker for higher single -cycle inrush current capability. This is recommended when the continuous control-power current exceeds 3.0 A.
(3) Mersen fuses were formerly known as Ferraz Shawmut.

Input Power Circuit Protection (LIM)

The 2094-AL09 and 2094-BL02 line interface modules (LIM) contain supplementary protection devices and, when protected by suitable branch circuit protection, are rated for use on a circuit capable of delivering up to 5000 A. When these modules are used, protection on the line side of the LIM module is required. Fuses must be class J or CC only.

The 2094-AL*xx*S, 2094-BL*xx*S, and 2094-XL75S-C*x* LIM modules contain branch circuit rated devices suitable for use on a circuit capable of delivering up to 65,000 A (400V-class) or 100,000 A (200V-class).

Refer to the Line Interface Module Installation Instructions, publication 2094-IN005, for power specifications and more information on using the LIM module.

Input Power Circuit Protection (without LIM)

These fuses and Allen-Bradley circuit breakers are recommended for use with 2094-*x*C*xx*-M*xx*-S IAM modules when the line interface module (LIM) is not used.

IMPORTANT	LIM modules (catalog numbers 2094-AL*xx*S, 2094-BL*xx*S, and 2094-XL75S-C*x*) can provide branch circuit protection to the IAM module. Follow all applicable NEC and local codes.

Input Power UL Circuit-protection Specifications

Kinetix 6000 Drives		UL Applications			
IAM Module Cat. No.	**Drive Voltage (three-phase) nom**	**Bussmann Fuses Cat. No.**	**Miniature CB Cat. No.**	**Motor Protection CB, Self-protected CMC Cat. No.**	**Molded Case CB Cat. No.**
2094-AC05-MP5-S	230V	KTK-R-20 (20 A) Class CC	1489-M3D300	140M-F8E-C16	NA
2094-AC05-M01-S	230V	KTK-R-20 (20 A) Class CC		140M-F8E-C16	
2094-AC09-M02-S	230V	KTK-R-30 (30 A) Class CC	1489-M3D400	140M-F8E-C20	
2094-AC16-M03-S	230V	LPJ-45SP (45 A) Class J	N/A	NA	140G-G6C3-C50
2094-AC32-M05-S	230V	LPJ-80SP (80 A) Class J			140G-G6C3-C90
2094-BC01-MP5-S	360…480V	KTK-R-20 (20 A) Class CC	1489-M3D300	140M-F8E-C32	NA
2094-BC01-M01-S	360…480V	KTK-R-20 (20 A) Class CC		140M-F8E-C32	
2094-BC02-M02-S	360…480V	KTK-R-30 (30 A) Class CC	1489-M3D400	140M-F8E-C45	
2094-BC04-M03-S	360…480V	LPJ-45SP (45 A) Class J	N/A	NA	140G-G6C3-C50
2094-BC07-M05-S	360…480V	LPJ-80SP (80 A) Class J			140G-G6C3-C90

Input Power IEC (non-UL) Circuit-protection Specifications

Kinetix 6000 Drives		IEC (non-UL) Applications			
IAM Module Cat. No.	**Drive Voltage (three-phase) nom**	**Miniature CB Cat. No.**		**Motor Protection CB Cat. No.**	**Molded Case CB Cat. No.**
2094-AC05-MP5-S	230V	1492-SPM3D300	1489-M3D300	140M-F8E-C16	NA
2094-AC05-M01-S	230V			140M-F8E-C16	
2094-AC09-M02-S	230V	1492-SPM3D400	1489-M3D400	140M-F8E-C20	
2094-AC16-M03-S	230V	N/A	N/A	NA	140G-G6C3-C50
2094-AC32-M05-S	230V				140G-G6C3-C90
2094-BC01-MP5-S	360…480V	1492-SPM3D300	1489-M3D300	140M-F8E-C32	NA
2094-BC01-M01-S	360…480V			140M-F8E-C32	
2094-BC02-M02-S	360…480V	1492-SPM3D400	1489-M3D400	140M-F8E-C45	
2094-BC04-M03-S	360…480V	N/A	N/A	NA	140G-G6C3-C50
2094-BC07-M05-S	360…480V				140G-G6C3-C90

Contactor Ratings

This table lists the recommended contactor ratings for integrated axis modules installed without a line interface module.

IAM Module (200V-class) Cat. No.	Contactor
2094-AC05-MP5-S	100-C23*x*10 (AC coil) 100-C23*xx*10 (DC coil)
2094-AC05-M01-S	
2094-AC09-M02-S	100-C37*x*10 (AC coil) 100-C37*xx*10 (DC coil)
2094-AC16-M03-S	100-C72*x*10 (AC coil) 100-C72*xx*10 (DC coil)
2094-AC32-M05-S	100-C85*x*10 (AC coil) 100-C85*xx*10 (DC coil)

IAM Module (400V-class) Cat. No.	Contactor
2094-BC01-MP5-S	100-C23*x*10 (AC coil) 100-C23*xx*10 (DC coil)
2094-BC01-M01-S	
2094-BC02-M02-S	100-C37*x*10 (AC coil) 100-C37*xx*10 (DC coil)
2094-BC04-M03-S	100-C60*x*10 (AC coil) 100-C60*xx*10 (DC coil)
2094-BC07-M05-S	100-C85*x*10 (AC coil) 100-C85*xx*10 (DC coil)

Input Transformer for Control Power

Attribute	Value	Cat. No. (1)
Input volt-amperes	750VA	1497B-A10-*xx-x*-N
	1000VA	1497B-A11-*xx-x*-N
	1500VA	1497B-A12-*xx-x*-N
Input voltage	460V AC	
Output voltage	120…240V AC	

(1) Variables (*xx-x*) determine the input voltage and wiring configuration.

Power Dissipation Specifications

Use this table to size an enclosure and calculate required ventilation for your Kinetix 6000 drive system.

Bulletin 2094 Drive Modules	Usage as % of Rated Power Output (watts)				
	20%	40%	60%	80%	100%
IAM (converter) module (1)					
2094-AC05-MP5-S	8	11	15	19	24
2094-AC05-M01-S	9	12	16	20	25
2094-AC09-M02-S	14	20	28	36	46
2094-AC16-M03-S	19	30	43	58	74
2094-AC32-M05-S	41	68	100	136	176
2094-BC01-MP5-S	18	21	25	29	34
2094-BC01-M01-S					33
2094-BC02-M02-S	36	44	54	64	75
2094-BC04-M03-S	50	67	87	110	135
2094-BC07-M05-S	71	101	137	179	226
IAM (inverter) module or AM module (2)					
2094-AC05-MP5-S or 2094-AMP5-S	28	32	37	41	46
2094-AC05-M01-S or 2094-AM01-S	31	38	46	54	62
2094-AC09-M02-S or 2094-AM02-S	34	45	57	70	84
2094-AC16-M03-S or 2094-AM03-S	48	68	91	116	144
2094-AC32-M05-S or 2094-AM05-S	104	156	212	274	342
2094-BC01-MP5-S or 2094-BMP5-S	46	54	61	69	77
2094-BC01-M01-S or 2094-BM01-S	57	73	90	108	126
2094-BC02-M02-S or 2094-BM02-S	53	72	93	116	142
2094-BC04-M03-S or 2094-BM03-S	94	130	169	211	255
2094-BC07-M05-S or 2094-BM05-S	121	183	252	326	407
Shunt module - 2094-BSP2	68	121	174	227	280

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

Power dissipation specifications are based on these calculations. This is an example:
2094-BC02-M02-S with 4.52 A_{DC} (=20%) converter DC current and 10.3 A_{rms} (=100%) inverter output current.
Converter loss (36 W) + Inverter loss (142 W) = 178 W total power dissipation.

Weight Specifications

Kinetix 6000 Drive Module	Cat. No.	Weight, approx kg (lb)
IAM (200V-class)	2094-AC05-MP5-S	2.23 (4.9)
	2094-AC05-M01-S	2.27 (5.0)
	2094-AC09-M02-S	2.31 (5.1)
	2094-AC16-M03-S	4.71 (10.4)
	2094-AC32-M05-S	7.43 (16.4)
AM (200V-class)	2094-AMP5-S	1.46 (3.2)
	2094-AM01-S	1.50 (3.3)
	2094-AM02-S	1.54 (3.4)
	2094-AM03-S	3.13 (6.9)
	2094-AM05-S	3.18 (7.0)
Power rails (Slim)	2094-PRS1	1.05 (2.3)
	2094-PRS2	1.59 (3.5)
	2094-PRS3	2.14 (4.7)
	2094-PRS4	2.67 (5.9)
	2094-PRS5	3.11 (6.8)
	2094-PRS6	3.55 (7.8)
	2094-PRS7	3.99 (8.8)
	2094-PRS8	4.43 (9.7)

Kinetix 6000 Drive Module	Cat. No.	Weight, approx kg (lb)
IAM (400V-class)	2094-BC01-MP5-S	4.98 (11.0)
	2094-BC01-M01-S	5.03 (11.1)
	2094-BC02-M02-S	5.08 (11.2)
	2094-BC04-M03-S	9.60 (21.1)
	2094-BC07-M05-S	10.1 (22.3)
AM (400V-class)	2094-BMP5-S	2.44 (5.4)
	2094-BM01-S	2.49 (5.5)
	2094-BM02-S	2.54 (5.6)
	2094-BM03-S	4.58 (10.1)
	2094-BM05-S	4.98 (11.0)
Shunt module	2094-BSP2	3.10 (6.8)
Slot-filler module	2094-PRF	0.45 (1.0)

Maximum Feedback Cable Lengths

Although motor feedback cables are available in standard lengths up to 90 m (295.3 ft), the drive/motor/feedback combination can limit the maximum feedback cable length. These tables assume the use of recommended cables as shown in the Kinetix Motion Accessories Technical Data, publication KNX-TD004.

Cable Lengths for Compatible Rotary Motors

Motor Cat. No.	Absolute High-resolution (5V) Encoder m (ft)	Absolute High-resolution (9V) Encoder m (ft)	Incremental/TTL (5V) Encoder m (ft)	Resolver m (ft)
MPL-A15*xxx*… MPL-A2*xxx*-E/V	30 (98.4)			
MPL-A3*xxx*… MPL-A5*xxx*-S/M (1)	30 (98.4)			
MPL-B15*xxx*… MPL-B2*xxx*-E/V		90 (295.3)		
MPL-B3*xxx*… MPL-B5*xxx*-S/M		90 (295.3)		
MPL-A/B15*xxx*… MPL-A/B45*xxx*-H			30 (98.4)	
MPL-B*xxxx*-R				90 (295.3)
MPM-A*xxxxx*-S/M	30 (98.4)			
MPM-B*xxxxx*-S/M		90 (295.3)		

Cable Lengths for Compatible Rotary Motors (continued)

Motor Cat. No.	Absolute High-resolution (5V) Encoder m (ft)	Absolute High-resolution (9V) Encoder m (ft)	Incremental/TTL (5V) Encoder m (ft)	Resolver m (ft)
MPM-A/B*xxxxx*-2				90 (295.3)
MPF-A*xxxx*-S/M (1)	30 (98.4)			
MPF-B*xxxx*-S/M		90 (295.3)		
MPS-A*xxxx*-S/M	30 (98.4)			
MPS-B*xxxx*-S/M		90 (295.3)		
RDB-B215*xx*-7/3	30 (98.4)			
RDB-B290*xx*-7/3 or RDB-B410*xx*-7/3	90 (295.3)			
TLY-A*xxxx*-H			30 (98.4)	

(1) MPL-A5*xxx* and MPF-A5*xxx* motor encoders are rated for 9V, the remaining Bulletin MPL and MPF (200V-class) motor encoders are rated for 5V.

Cable Lengths for Compatible Linear Actuators

Actuator Cat. No.	Absolute High-resolution (5V) Encoder m (ft)	Absolute High-resolution (9V) Encoder m (ft)	Incremental/TTL (5V) Encoder m (ft)
MPMA-A*xxxxx* or MPAS-A*xxxxx*-V (ballscrew)	30 (98.4)		
MPMA-A*xxxxx* or MPAS-A*xxxxx*-A (direct drive)			30 (98.4)
MPMA-B*xxxxx* or MPAS-B*xxxxx*-V (ballscrew)		90 (295.3)	
MPMA-B*xxxxx* or MPAS-B*xxxxx*-A (direct drive)			30 (98.4)
MPAR-A*xxxxx*-V/M	30 (98.4)		
MPAR-B*xxxxx*-V/M		90 (295.3)	
MPAI-A*xxxxx*M3	30 (98.4)		
MPAI-B*xxxxx*M3		90 (295.3)	
LDAT-S*xxxxxx*-x*B*x			30 (98.4)

Cable Lengths for Compatible Linear Motors

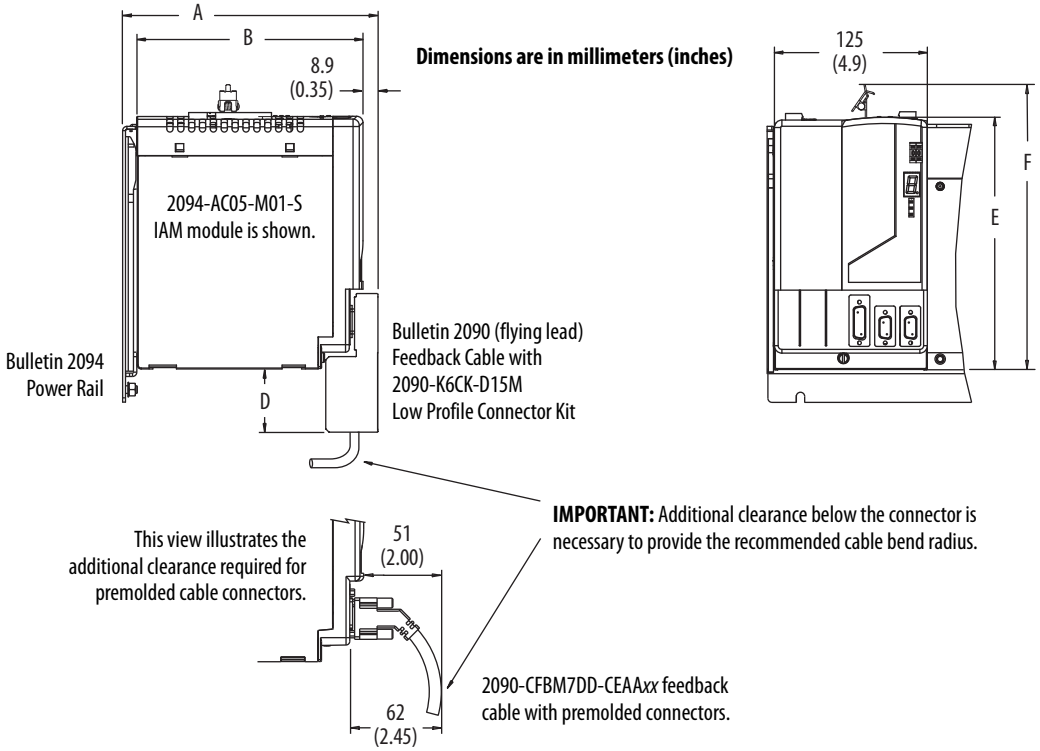
Motor Cat. No.	Absolute High-resolution (5V) Encoder m (ft)	Incremental/TTL (5V) Encoder m (ft)
LDC-Series or LDL-Series™	30 (98.4)	30 (98.4)

Maximum Power Cable Length

Although motor power cables are available in standard lengths up to 90 m (295.3 ft) and the Kinetix 6000 power rail is available in sizes up to eight axes, to meet CE requirements and improve system performance the combined motor power length for all axes on the same DC bus must not exceed 160 m (525 ft) for 200V-class systems and 240 m (787 ft) for 400V-class systems.

Dimensions - Kinetix 6000 Multi-axis Servo Drives

2094-AC05-MP5-S, 2094-AC05-M01-S, and 2094-AC09-M02-S Dimensions (200V-class)
2094-BC01-MP5-S, 2094-BC01-M01-S, and 2094-BC02-M02-S Dimensions (400V-class)

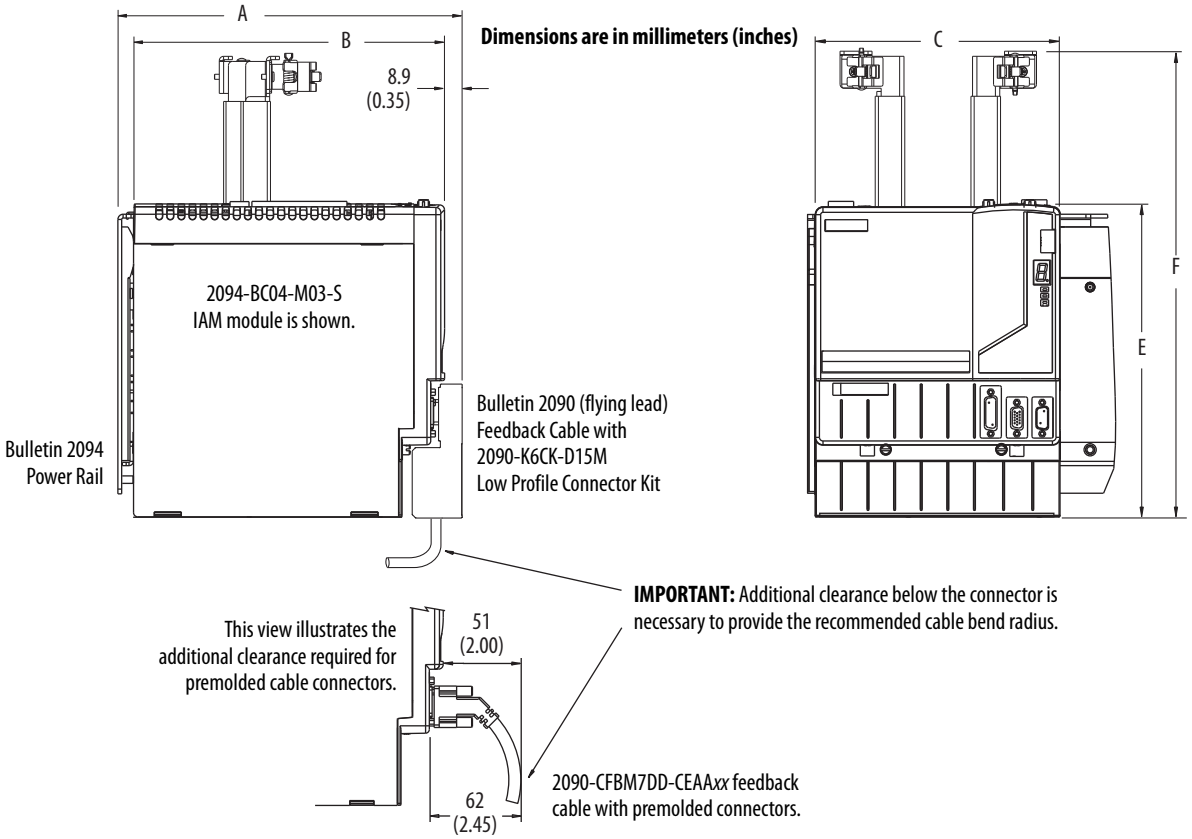


Modules are shown mounted to the power rail and the dimensions reflect that in the depth of the module.

IAM Module Dimensions

IAM Module Cat. No.	Series	A mm (in.)	B mm (in.)	D mm (in.)	E mm (in.)	F mm (in.)
2094-AC05-MP5-S	A and C	198 (7.8)	176 (7.0)	51 (2.0)	206 (8.2)	237 (9.3)
2094-AC05-M01-S						
2094-AC09-M02-S						
2094-BC01-MP5-S	A, B, and C	272 (10.7)	249 (9.8)	0 (0)	256 (10.1)	287 (11.3)
2094-BC01-M01-S						
2094-BC02-M02-S						

2094-AC16-M03-S and 2094-AC32-M05-S Dimensions (200V-class)
2094-BC04-M03-S and 2094-BC07-M05-S Dimensions (400V-class)

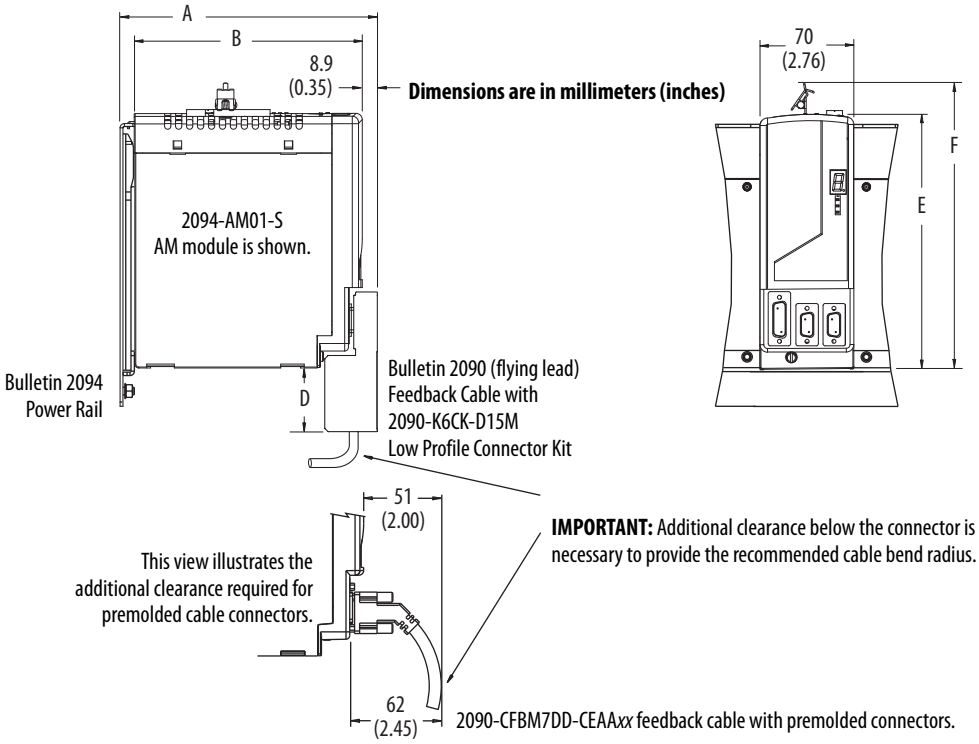


Modules are shown mounted to the power rail and the dimensions reflect that in the depth of the module.

IAM Module Dimensions

IAM Module Cat. No.	Series	A mm (in.)	B mm (in.)	C mm (in.)	E mm (in.)	F mm (in.)
2094-AC16-M03-S	A and C	198 (7.8)	176 (7.0)	125 (4.9)	302 (11.9)	420 (16.5)
2094-AC32-M05-S				196 (7.7)		
2094-BC04-M03-S	A	272 (10.7)	249 (9.8)	196 (7.7)	256 (10.1)	375 (14.7)
2094-BC07-M05-S					318 (12.5)	436 (17.2)
2094-BC04-M03-S	B and C	272 (10.7)	249 (9.8)	196 (7.7)	256 (10.1)	375 (14.7)
2094-BC07-M05-S						

2094-AMP5-S, 2094-AM01-S, and 2094-AM02-S Dimensions (200V-class)
2094-BMP5-S, 2094-BM01-S, and 2094-BM02-S Dimensions (400V-class)

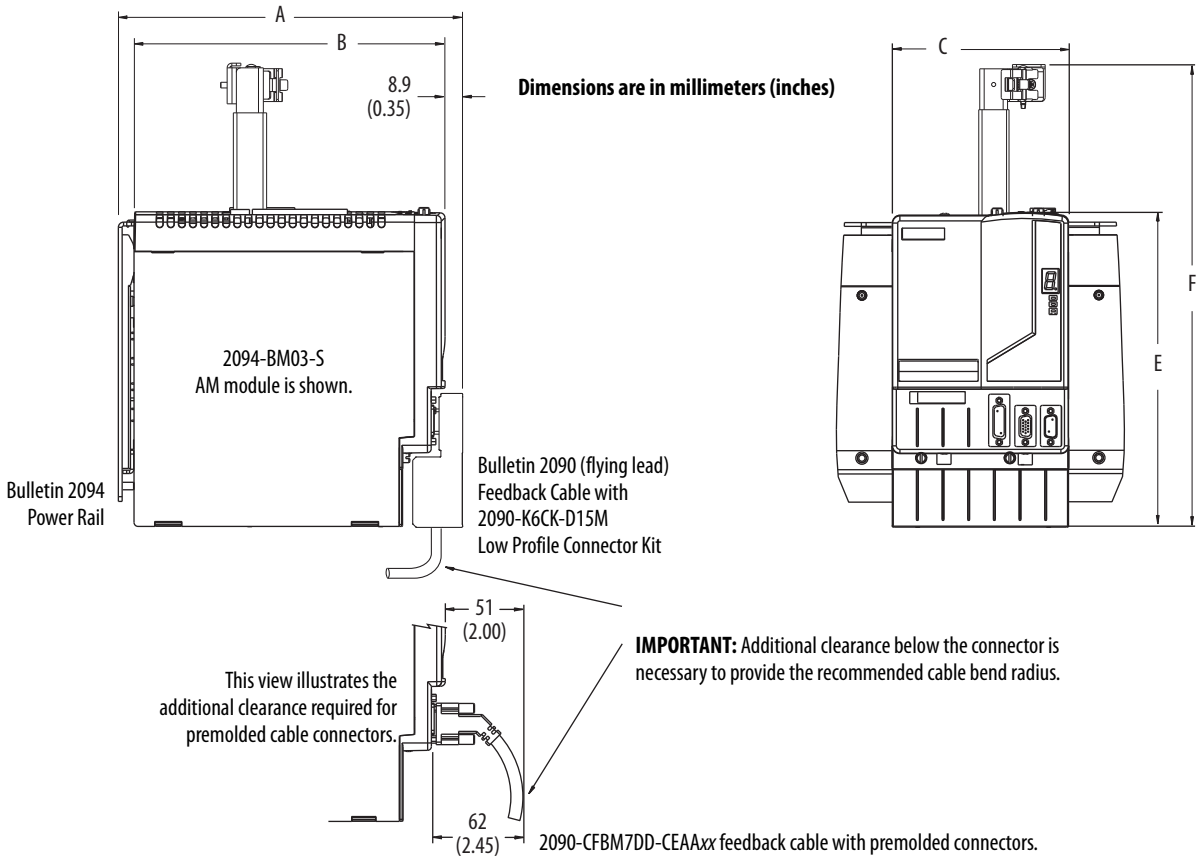


Modules are shown mounted to the power rail and the dimensions reflect that in the depth of the module.

AM Module Dimensions

AM Module Cat. No.	Series	A mm (in.)	B mm (in.)	D mm (in.)	E mm (in.)	F mm (in.)
2094-AMP5-S	A and C	198 (7.8)	176 (7.0)	51 (2.0)	206 (8.2)	237 (9.3)
2094-AM01-S						
2094-AM02-S						
2094-BMP5-S	A, B, and C	272 (10.7)	249 (9.8)	0 (0)	256 (10.1)	287 (11.3)
2094-BM01-S						
2094-BM02-S						

2094-AM03-S and 2094-AM05-S Dimensions (200V-class)
2094-BM03-S and 2094-BM05-S Dimensions (400V-class)



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

AM Module Dimensions

AM Module Cat. No.	Series	A mm (in.)	B mm (in.)	C mm (in.)	E mm (in.)	F mm (in.)
2094-AM03-S	A and C	198 (7.8)	176 (7.0)	70 (2.8)	302 (11.9)	420 (16.5)
2094-AM05-S						
2094-BM03-S	A	272 (10.7)	249 (9.8)	141 (5.5)	256 (10.1)	375 (14.7)
2094-BM05-S					318 (12.5)	436 (17.2)
2094-BM03-S	B and C	272 (10.7)	249 (9.8)	141 (5.5)	256 (10.1)	375 (14.7)
2094-BM05-S						

Environmental Specifications - Kinetix 6000 Servo Drives

Attribute	Operational Range	Storage Range (nonoperating)
Temperature, ambient	0…50 °C (32…122 °F)	-40…+70 °C (-40…+158 °F)
Relative humidity	5…95% noncondensing	5…95% noncondensing
Altitude	1000 m (3281 ft) 3000 m (9843 ft) with derating	3000 m (9843 ft) during transport
Vibration	5…55 Hz @ 0.35 mm (0.014 in.) double amplitude, continuous displacement; 55…500 Hz @ 2.0 g peak constant acceleration (10 sweeps in each of 3 mutually perpendicular directions)	
Shock	15 g, 11 ms half-sine pulse (3 pulses in each direction of 3 mutually perpendicular directions)	

Certifications - Kinetix 6000 Servo Drives

Agency Certification (1)	Standards
c-UL-us (2)	UL Listed to U.S. and Canadian safety standards (UL 508C File E59272).
	Solid-state motor overload protection provides dynamic fold-back of motor current when 110% of the motor rating is reached with a peak current limit based on the peak rating of the motor as investigated by UL to comply with UL 508C (UL File E59272).
CE	European Union 2004/108/EC EMC Directive compliant with IEC 61800-3:2004 + A1:2012: Adjustable Speed Electrical Power Drive Systems - Part 3; EMC requirements and specific test methods.
	European Union 2006/95/EC Low Voltage Directive compliant with: • IEC 61800-5-1:2007 - Adjustable speed electrical power drive systems. • IEC 50178:1997 - Electronic Equipment for use in Power Installations.
Functional Safety	TÜV certified for functional safety: up to Performance Level (PL) e, Category 3 according to ISO 13849; up to SIL CL3 according to IEC 61508, IEC 61800-5-2, and IEC 62061 when used as described in the Kinetix Safe Torque Off Feature Safety Reference Manual, publication GMC-RM002.
C-Tick	Australian Radiocommunications Act, compliant with: • Radiocommunications Act: 1992 • Radiocommunications (Electromagnetic Compatibility) Standard: 1998 • Radiocommunications (Compliance Labelling - Incidental Emissions) Notice: 1998 • AS/NZS CISPR 11: 2002 (Group 2, Class A)
KC	Korean Registration of Broadcasting and Communications Equipment, compliant with: • Article 58-2 of Radio Waves Act, Clause 3 • Registration number: KCC-REM-RAA-2094

(1) When product is marked, refer to publication 2094-CT002 for the Kinetix 6000 servo drives EU Declaration of Conformity certificate.
(2) UL has not evaluated the Safe Torque Off option in these products.

Accessories - Kinetix 6000 Servo Drives

Kinetix 6000 drive accessories include the Bulletin 2094 power rail, shunt module, slot filler module, mounting brackets, feedback connector kits, AC line filters, and other drive accessories common to Bulletin 2094 drives. For product specifications, including motor and interface cables, refer to the Kinetix Motion Accessories Specifications Technical Data, publication KNX-TD004.