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# 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 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.

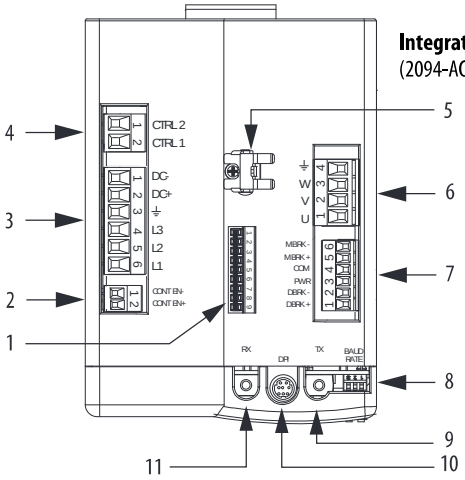
The Kinetix 6000 servo drives provide Integrated Motion capability through sercos interface and compatibility with Kinetix 6200 drives, letting you migrate to the enhanced features exactly when and where you need them.

Kinetix 6000 servo drives are compatible with Kinetix 6000M integrated drive-motor systems.

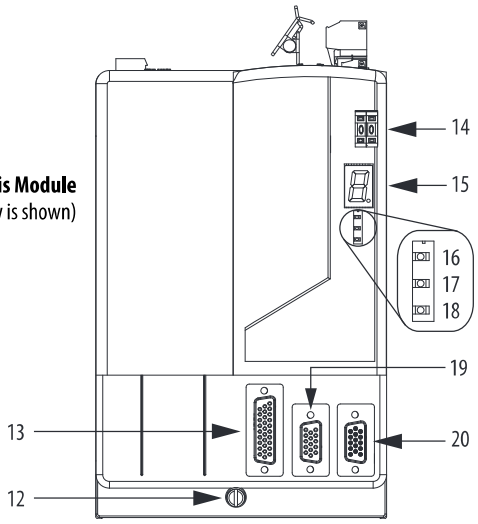
## Kinetix 6000 Drive Features and Indicators

### 2094-ACxx-Mxx-S and 2094-BCxx-Mxx-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 |

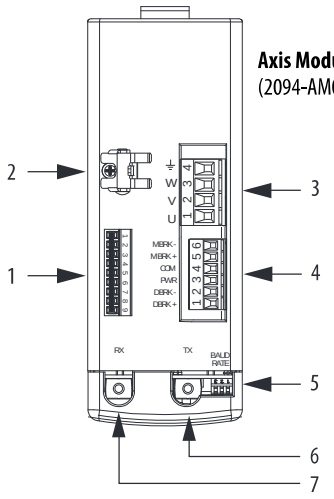
| Item | Description |
|---|---|
| 15 | Seven-segment fault status indicator |
| 16 | Drive status indicator |
| 17 | COMM status indicator |
| 18 | Bus status indicator |
| 19 | Motor feedback (MF) connector |
| 20 | Auxiliary feedback (AF) connector |



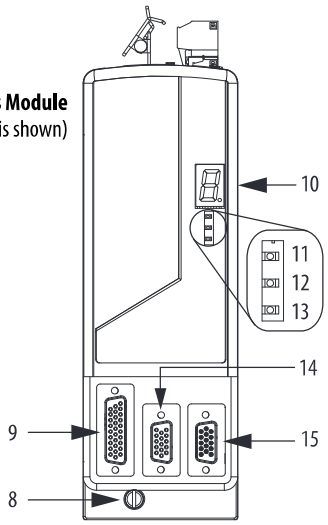
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### 2094-AMxx-S and 2094-BMxx-S AM Features and Indicators

**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 |



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# 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<br>Nom (rms)<br>Max inrush (0-pk) (1) | <br>10 A<br>19 A | | <br>19 A<br>37 A | <br>36 A<br>73 A | <br>71 A<br>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<br>Nom (@ 220/230V AC) rms<br>Nom (@ 110/115V AC) rms<br>Max inrush (0-pk) | <br>3 A<br>6 A<br>20 A | | | <br>3 A<br>6 A<br>83 A (2) | |
| 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 ($A_{DC}$) (3) | 20 A | | 38 A | 72 A | 142 A |
| Bus overvoltage | 415V DC | | | | |
| Bus undervoltage | 138V DC | | | | |
| Internal shunt<br>Continuous power<br>Peak power | <br>N/A<br>N/A | | <br>50 W<br>8200 W | <br>200 W<br>5700 W | <br>200 W<br>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) 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.

(3) Peak output current duration equals 250 ms.



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### 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<br>Nom (rms)<br>Max inrush (0-pk) (1) | <br>10.0 A<br>11.0 A | | <br>24.0 A<br>22.0 A | <br>44.0 A<br>31.1 A | <br>71.0 A<br>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<br>Nom (@ 220/230V AC) rms<br>Nom (@ 110/115V AC) rms<br>Max inrush (0-pk) | <br>6 A<br>6 A<br>98 A (2) | | | | |
| 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 ($A_{DC}$)<br>Series A drives (3)<br>Series B and C drives | <br>18.1 A<br>22.6 A (4) | | <br>45.2 A<br>56.4 A (4) | <br>83.1 A<br>103.8 A (4) | <br>135.4 A<br>203.2 A (5) |
| Bus overvoltage | 825V DC | | | | |
| Bus undervoltage | 275V DC | | | | |
| Internal shunt<br>Continuous power<br>Peak power | <br>50 W<br>5.6 kW | | | <br>200 W<br>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<br>Series A drives (3)<br>Series B and C drives | <br>12 kW<br>15 kW (4) | | <br>30 kW<br>37.5 kW (4) | <br>55.2 kW<br>69 kW (4) | <br>90 kW<br>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) 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.

(3) Peak output current duration equals 250 ms.

(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%.



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### 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 |
| IDM power interface [1] module (IPIM) | For specifications and an example for calculating the IPIM module current requirements, refer to the Kinetix 6000M Integrated Drive-Motor User Manual, publication 2094-UM003. | | | |

(1) For Kinetix 6000M systems, calculate the sum of the control power current requirements for each IPIM module on the power rail and add that value with the appropriate value from the table for the number of axes on the power rail.

### 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 | 500 Hz | | | | |
| Current loop | 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 | N/A | | | 50 W | |
| Peak power | N/A | | | 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 2.5 seconds.



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**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 | 500 Hz | | | | |
| Current loop | 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 | 4.2 A | 9.2 A | 15.5 A | 31.8 A | 51.9 A |
| Series B and C drives (3) | 7.0 A | 15.3 A | 25.8 A | 53.0 A | 69.2 A |
| Peak current (0-pk) (3) | | | | | |
| Series A drives | 5.9 A | 12.9 A | 21.8 A | 45.0 A | 73.4 A |
| Series B and C drives (3) | 9.9 A | 21.6 A | 36.4 A | 75.0 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 | 50 W | | | 200 W | |
| Peak power | 5.6 kW | | | 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 45.



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## *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**

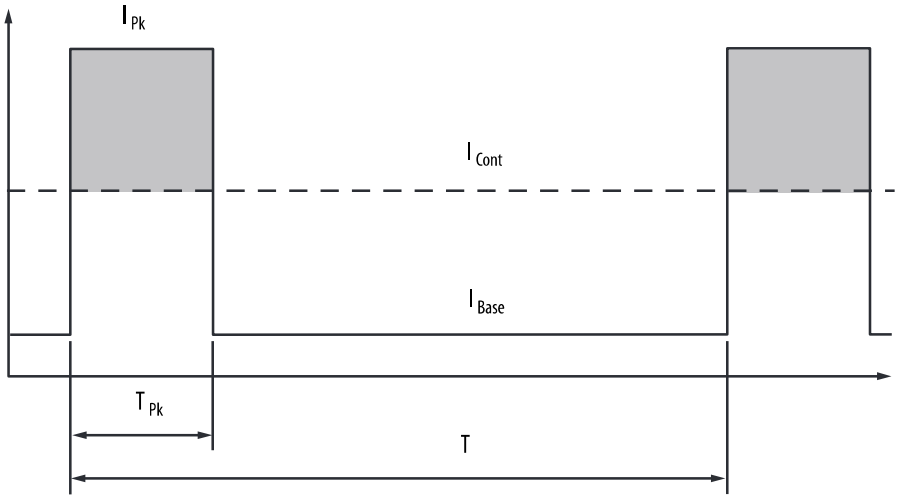
| IAM/AM Module Cat. No. | Peak Inverter Current Rating | | Peak Converter Current Rating | |
|---|---|---|---|---|
| | Standard | Peak Enhanced | Series A | Series B and C |
| 2094-BC01-MP5-S | 150% | 250% | 200% | 250% |
| 2094-BC01-M01-S | 150% | 250% | 200% | 250% |
| 2094-BC02-M02-S | 150% | 250% | 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 |



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### Load Duty-cycle Profile Example

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




### Peak Duty-cycle Definition of Terms

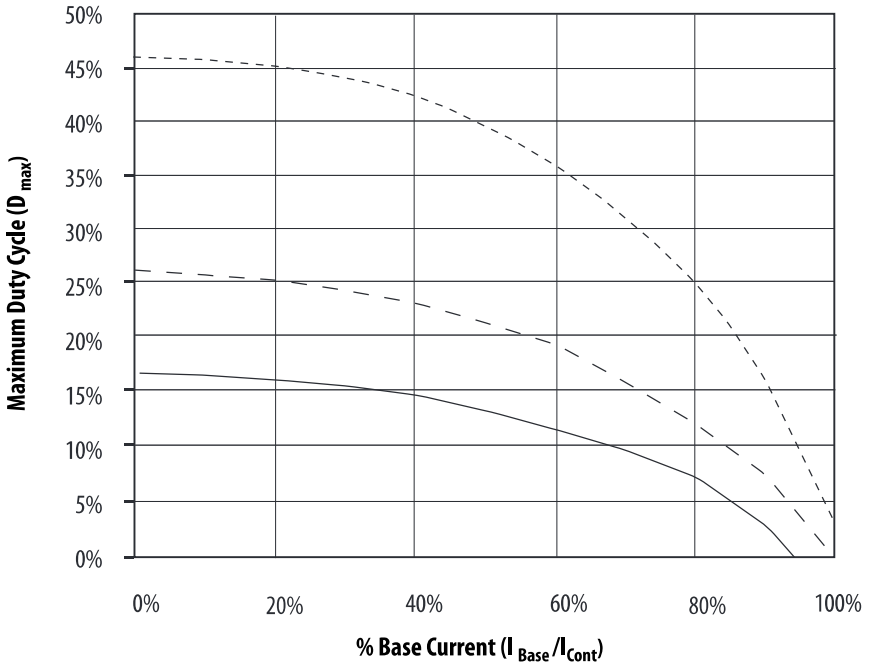
| Term | Definition (1) |
|---|---|
| Continuous Current Rating ($I_{Cont}$) | The maximum value of current that can be output continuously. |
| Peak Current Rating ($I_{PKmax}$) | The maximum value of peak current that the drive can output. This rating is valid for only overload times less than $T_{PKmax}$. |
| 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 comprised 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.



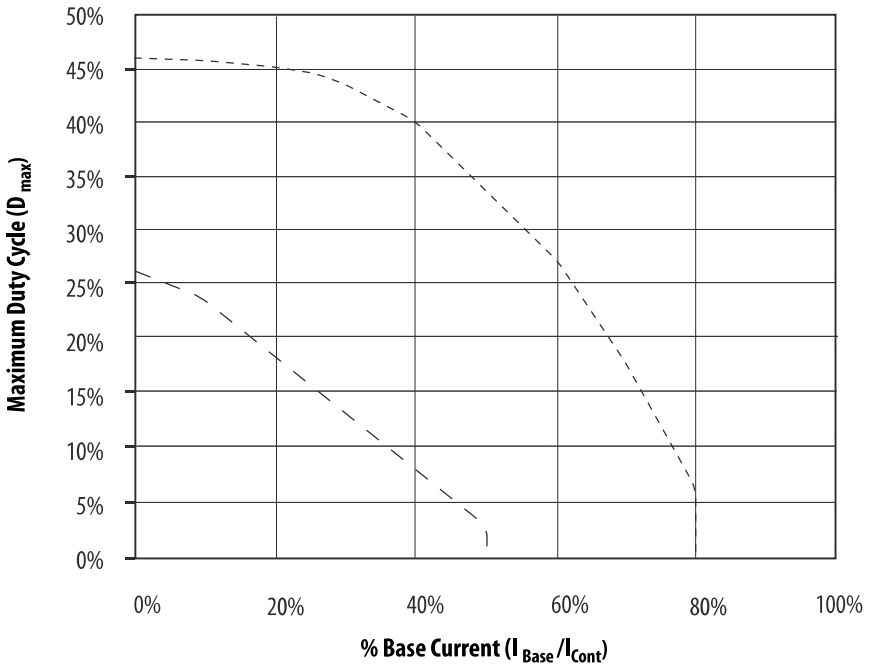
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### Peak Enhanced Inverter Mode ($T_{PK}$ < 2.0 s)




(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)




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



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## *Circuit Breaker/Fuse Specifications*

While circuit breakers offer some convenience, there are limitations for their use. Circuit breakers do not handle high current inrush as well as fuses. Make sure the selected components are properly coordinated and meet acceptable codes including any requirements for branch circuit protection. Evaluation of the short-circuit available current is critical and must be kept below the short-circuit current rating of the circuit breaker.

Use class CC, J, L, or R fuses, with current rating as indicated in the table below. The following fuse examples 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*) provide branch circuit protection to the IAM module. Follow all applicable NEC and local codes.

| IAM Module Cat. No. | V AC Input Power | | | Control Input Power | | DC Common Bus Fuse | |
|---|---|---|---|---|---|---|---|
| | Bussmann Fuse | Allen-Bradley Circuit Breaker | | Bussmann Fuse (1) | Allen-Bradley (2) Circuit Breaker | Bussmann Fuse | Ferraz Shawmut Fuse |
| | | Disconnect | Magnetic Contactor | | | | |
| 2094-AC05-MP5-S | KTK-R-20 (20 A) | 1492-SP3D300 | 140M-F8E-C16 | FNQ-R-10 (10 A) | 1492-SP2D060 | N/A | A50P20-1 |
| 2094-AC05-M01-S | | | | | | | |
| 2094-AC09-M02-S | KTK-R-30 (30 A) | 1492-SP3D400 | 140M-F8E-C20 | | | FWH-35B | A50P35-4 |
| 2094-AC16-M03-S | LPJ-45SP (45 A) | N/A | 140U-H6C3-C50 | | 1492-SP2D200 | FWH-60B | A50P60-4 |
| 2094-AC32-M05-S | LPJ-80SP (80 A) | N/A | 140U-H6C3-C90 | | | FWH-125B | A50P125-4 |
| 2094-BC01-MP5-S | KTK-R-20 (20 A) | 1492-SP3D300 | 140M-F8E-C32 | FNQ-R-10 (10 A) or FNQ-R-7.5 (7.5 A) | 1492-SP2D060 or 1492-SP1D150 | FWJ-20A14F | DCT20-2 |
| 2094-BC01-M01-S | | | | | | | |
| 2094-BC02-M02-S | KTK-R-30 (30 A) | 1492-SP3D400 | 140M-F8E-C45 | | | FWJ-40A | A70QS40-4 |
| 2094-BC04-M03-S | LPJ-45SP (45 A) | N/A | 140U-H6C3-C50 | | | FWJ-70A | A70QS70-4 |
| 2094-BC07-M05-S | LPJ-80SP (80 A) | | 140U-H6C3-C90 | | | FWJ-125A | A70QS125-4 |

(1) Use FNQ-R-7.5 fuse for higher single-cycle inrush current capability. This is recommended when the continuous control power current exceeds 3.0 A.

(2) Use 1492-SP1D150 circuit breaker for higher single-cycle inrush current capability. This is recommended when the continuous control power current exceeds 3.0 A.

## *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)<br>100-C23*xx*10 (DC coil) |
| 2094-AC05-M01-S | |
| 2094-AC09-M02-S | 100-C37*x*10 (AC coil)<br>100-C37*xx*10 (DC coil) |
| 2094-AC16-M03-S | 100-C72*x*10 (AC coil)<br>100-C72*xx*10 (DC coil) |
| 2094-AC32-M05-S | 100-C85*x*10 (AC coil)<br>100-C85*xx*10 (DC coil) |

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



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## 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 |
| IPIM module - 2094-SEPM-B24-S | To calculate power dissipation for IPIM modules on your 2094 power rail, refer to the Kinetix 6000M Integrated Drive-Motor User Manual, publication 2094-UM003. | | | | |

(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.



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## *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) |
| IPIM (400V-class) | 2094-SEPM-B24-S | 3.5 (7.8) |

## 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 GMC-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) | | |



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**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

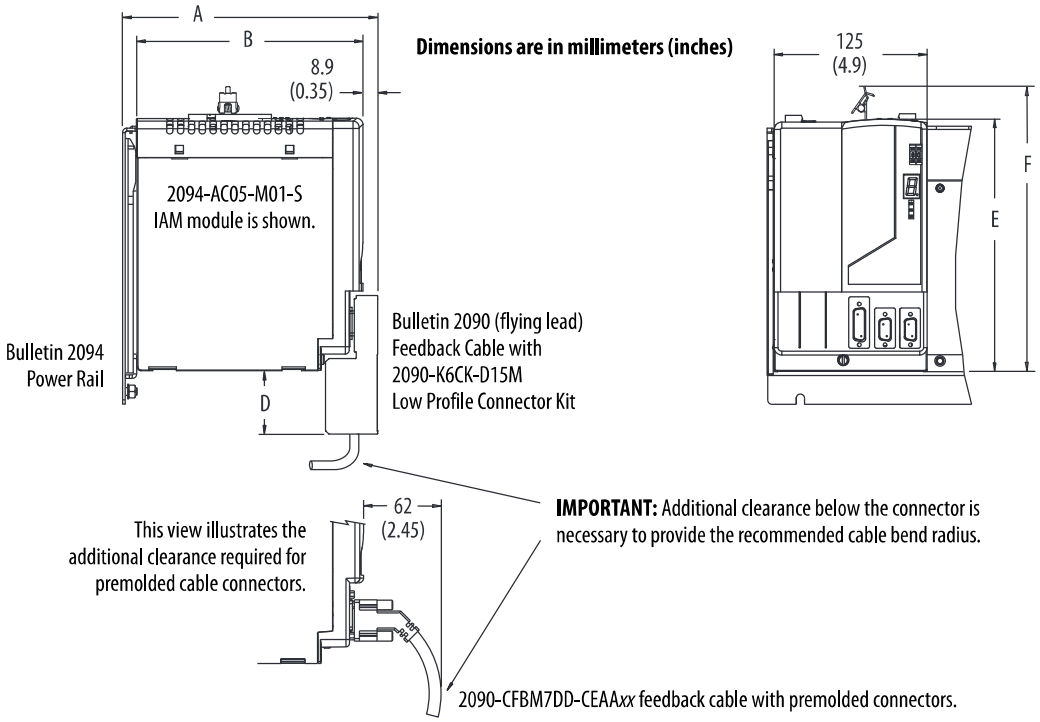
Although motor power cables are available in standard lengths up to 90 m (295.3 ft) and the Kinetix 6000 power rail is available in sizes up to eight axes, to meet CE requirements and improve system performance the combined motor power length for all axes on the same DC bus must not exceed 160 m (525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



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# 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.

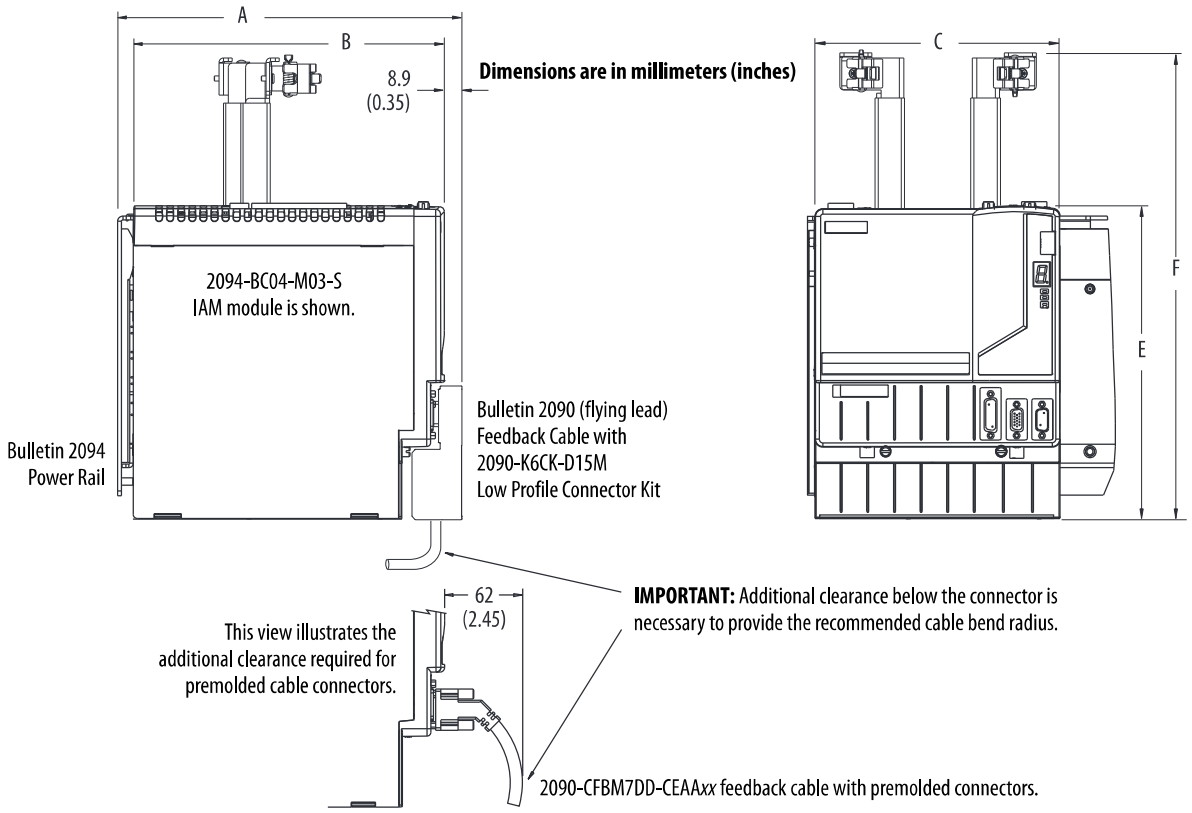
**IAM Module Dimensions**

| 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 | | | | | | |



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**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.

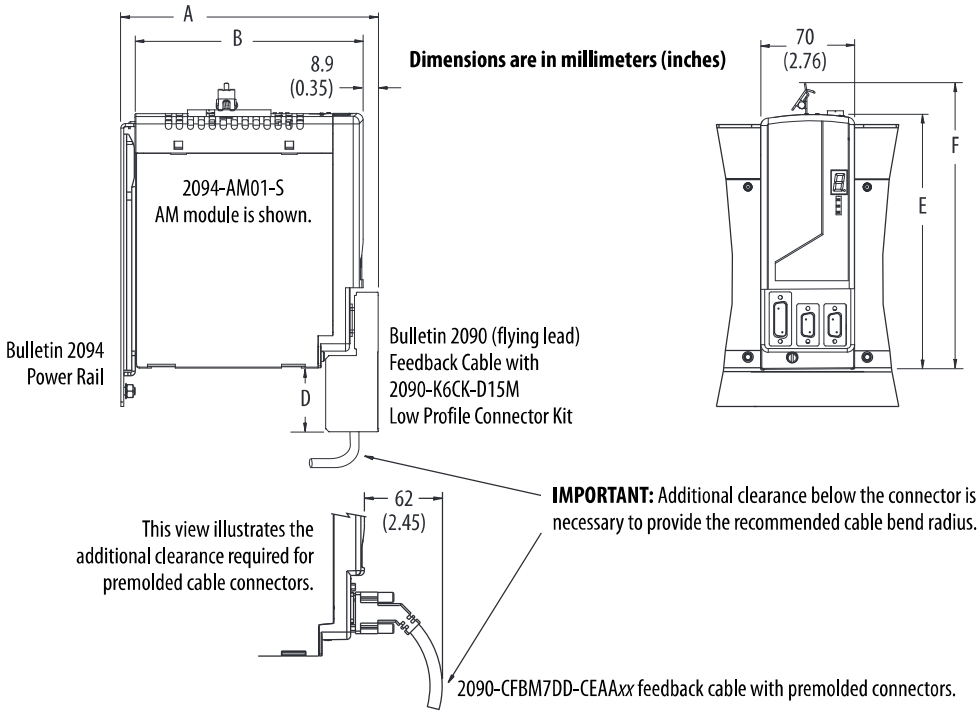
**IAM Module Dimensions**

| 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 | | | | | | |



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**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.

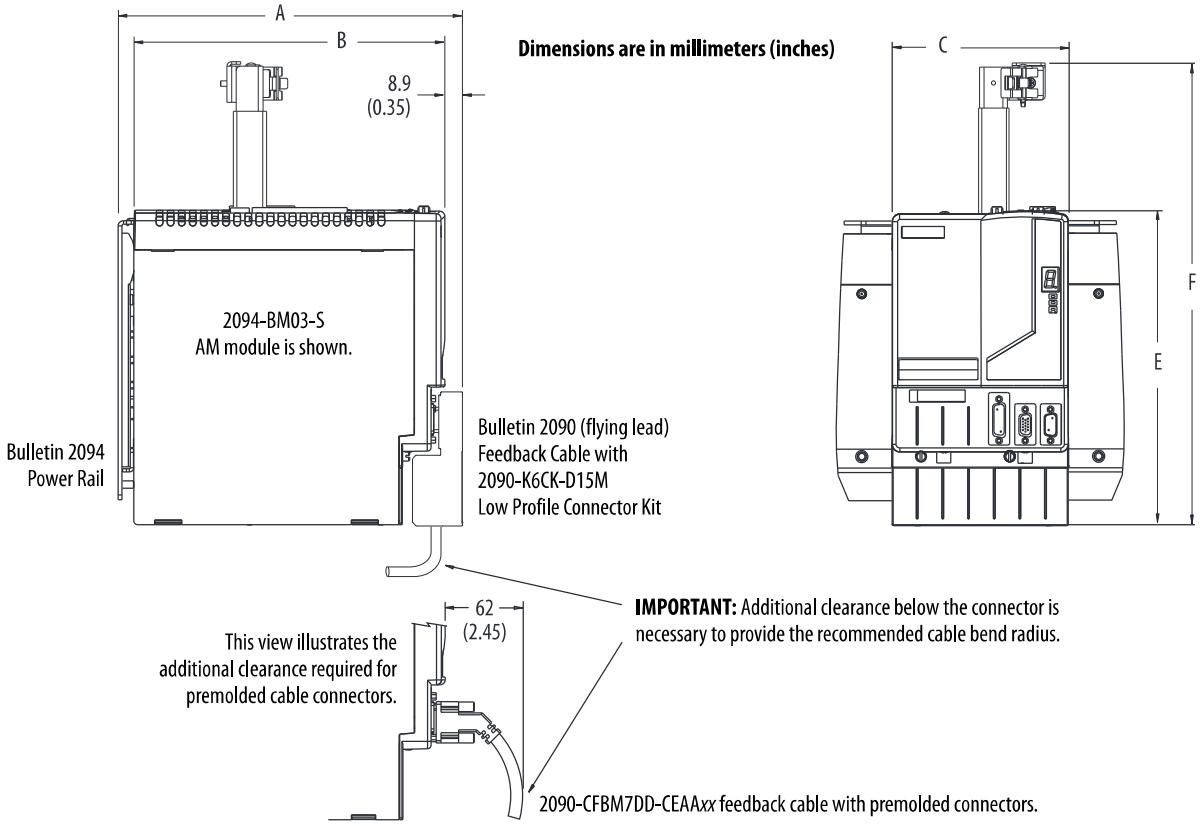
**AM Module Dimensions**

| 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 | | | | | | |



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**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 | | | | | | |



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## 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)<br>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 EN 61800-3:2004: Adjustable Speed Electrical Power Drive Systems - Part 3; EMC requirements and specific test methods. |
| | European Union 2006/95/EC Low Voltage Directive compliant with:<br>• EN 61800-5-1:2007 - Adjustable speed electrical power drive systems.<br>• EN 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 EN ISO 13849; up to SIL CL3 according to IEC 61508, EN 61800-5-2, and EN 62061 when used as described in the Kinetix Safe Torque-off Feature Safety Reference Manual, publication GMC-RM002. |
| C-Tick | Australian Radio Communications Act, compliant with:<br>• Radio Communications Act: 1992<br>• Radio Communications (Electromagnetic Compatibility) Standard: 1998<br>• Radio Communications (Compliance Labelling - Incidental Emissions) Notice: 1998<br>• AS/NZS CISPR 11: 2002 (Group 2, Class A) |
| KC | Korean Registration of Broadcasting and Communications Equipment, compliant with:<br>• Article 58-2 of Radio Waves Act, Clause 3<br>• Registration number: KCC-REM-RAA-2094 |

(1) When product is marked, refer to http://www.ab.com for Declarations of Conformity Certificates.
(2) UL has not evaluated the safe torque-off option in these products.



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