

MP-Series Low-inertia Brushless Servo Motors with 75 mm or Smaller Frame Sizes

Catalog Numbers MPL-A1510, MPL-A1520, MPL-A1530, MPL-A210, MPL-A220, MPL-A230, MPL-B1510, MPL-B1520, MPL-B1530, MPL-B210, MPL-B220, MPL-B230

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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://www.rockwellautomation.com/literature>, 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.

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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.



ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you 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.

IMPORTANT

Identifies information that is critical for successful application and understanding of the product.

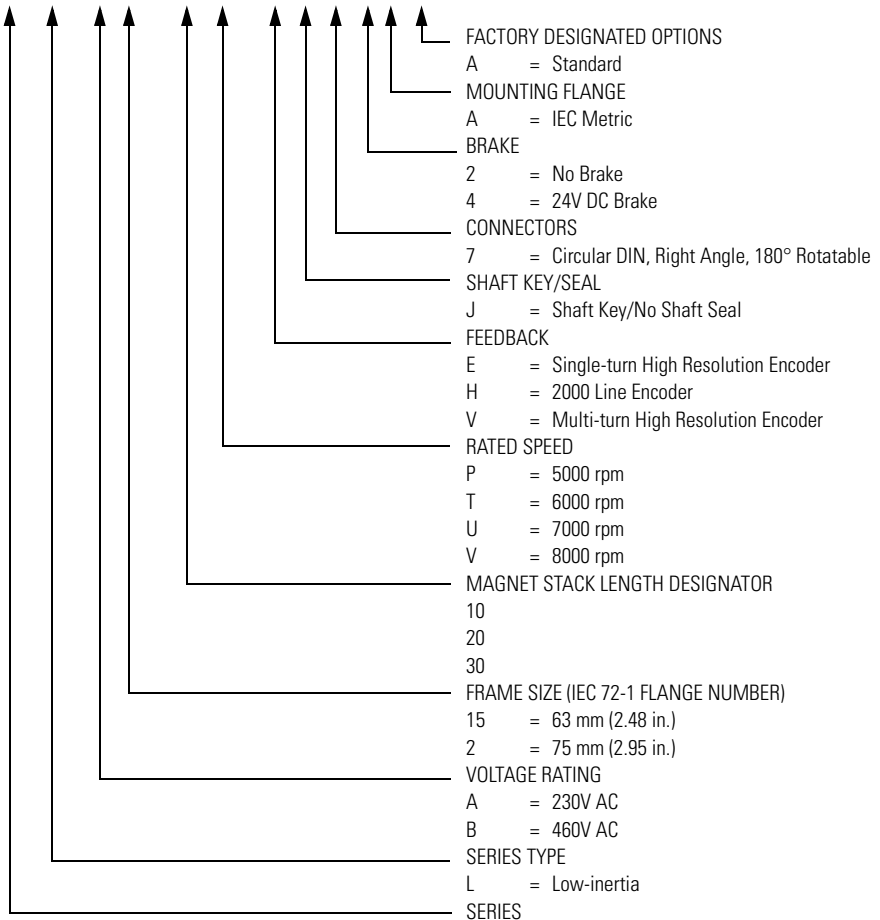
About This Publication

This publication provides installation instructions for the MP-Series low-inertia (Bulletin MPL) motors with a frame size of 75 mm (2.95 in.) or smaller.

Use this document if you are responsible for installing these Allen-Bradley motor products. Please read all instructions before installing this motor.

Catalog Number Explanation

MP L - B 2 10 V - E J 7 2 A A



Before You Begin

Remove all packing material, wedges, and braces from within and around the item. After unpacking, verify the nameplate catalog number against the purchase order.

1. Remove the motor carefully from its shipping container.
2. Visually inspect the motor frame, mounting pilot, and connectors for damage.
3. Notify the carrier of any shipping damage immediately.
4. Retain the cardboard cover and protective paper sleeving from the mounting end of the motor.



ATTENTION: Do not attempt to open and modify the motor.

Modifications that can be performed in the field are described in this manual. Other changes should not be attempted.

Only a qualified Allen-Bradley employee can service this type of motor.

Failure to observe these safety procedures could result in personal injury or damage to equipment.

Installation and Maintenance Guidelines

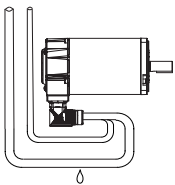
The guidelines in this section provide you with general information about installing servo motors. Instructions specific to MPL servo motor installation follow this section.

To Prolong Motor Life

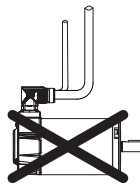
Thoughtful design and proper maintenance can increase the life of a servo motor. The following are guidelines to maximize the life of a servo motor.

- Always install the motor with any cable entry point positioned underneath the motor housing, and provide a drip loop in each cable. A drip loop is a downward bend in the cable that lets water gather and drip off the cable rather than continue to flow along the cable. These two installation practices greatly reduce the potential for moisture related problems, and are depicted in the illustration.

Recommended Connector Orientation for Drip Loop



Cable enters beneath the motor, and drip loop is formed.



Motor is positioned so cable enters from above.

Cable lacks drip loop.

- Avoid installing the motor with the shaft pointing upward, even if shaft seal is installed. This orientation increases the risk of contaminant ingress.

- Bearing contamination will shorten the life of a motor. The probability of this occurring can be significantly reduced by installing a shaft seal. Ingress Protection Codes (IP Ratings) for various mounting orientations are described in the Specifications section.
 - A shaft seal is recommended whenever the motor shaft is exposed to moisture and other fluids, including lubricating oil from a gearbox, or significant amounts of fine dust.
 - A shaft seal may be unnecessary if the motor shaft area is free of liquids or fine dust and a lower IP rating will suffice.
- The brake on these motors are a permanent magnet-type holding brake. The brake releases when voltage is applied. A separate 24V DC power source must be connected with proper polarity to disengage the brake. This power source may be applied by a servo motor controller, in addition to manual operator control.

If system main power fails, holding brakes can withstand occasional use as stopping brakes. However, this is potentially damaging to the system, increases brake wear, and reduces brake life.

IMPORTANT

Holding brakes are not designed to stop rotation of the motor shaft, nor are they intended to be used as a safety device. They are designed to hold a motor shaft at 0 rpm for up to the rated brake holding torque.

The recommended method of preventing motor shaft rotation is first, command the servo drive to 0 rpm, second, verify the motor is at 0 rpm, third, engage the brake, and finally, disable the drive.

Disabling the drive also removes the potential for brake wear caused by a badly tuned servo system oscillating the shaft.

Mount the Motor

All MPL motors include a mounting pilot for aligning the motor on a machine. Preferred fasteners are stainless steel. The installation must comply with all local regulations and use of equipment and installation practices that promote electromagnetic compatibility and safety.



ATTENTION: Unmounted motors, disconnected mechanical couplings, loose shaft keys, and disconnected cables are dangerous if power is applied.

Disassembled equipment should be appropriately identified (tagged-out) and access to electrical power restricted (locked-out).

Before applying power to the motor, remove the shaft key and other mechanical couplings that could be thrown from the shaft.

Failure to observe these safety procedures could result in personal injury.

The dimensions and dimensional symbols for the different frame sizes and stack lengths in the MPL motors are referenced in the MP-Series Low-inertia Servo Motors Dimensions drawing and tables.

Mechanical Connections

Mechanical connections to the motor shaft, such as couplings and pulleys, require a torsionally rigid coupling or a reinforced timing belt. The high dynamic performance of servo motors can cause couplings, pulleys, or belts to loosen or slip over time. A loose or slipping connection will cause system instability and may damage the motor shaft. All connections between the machine and the motor shaft must be rigid to achieve acceptable system response. Periodically inspect connections to verify their rigidity.



ATTENTION: Do not strike the shaft, key, couplings, or pulleys with tools during installation or removal.

Damage may occur to the motor bearings and the feedback device if sharp impact to the shaft is applied during installation of couplings and pulleys, or a shaft key. Damage to the feedback device also may result by applying leverage from the faceplate to remove devices mounted on the motor shaft.

Apply a constant pressure, with a wheel puller for example, to the user end of the shaft to remove a friction fit or a stuck device.

Failure to observe these safety procedures could result in damage to the motor and its components.

When mounting couplings or pulleys to the shaft, verify that the connections are properly aligned and that axial and radial loads are within the specifications of the motor.

Refer to [Load Force Capacities on page 16](#) for guidelines on how to achieve 20,000 hours of motor bearing life.

A shaft key provides a rigid mechanical connection with the potential for self-alignment, but the key must be properly installed in the keyway. Refer to [MP-Series Low-inertia Servo Motors Dimensions on page 13](#) for dimensional information about the key and shaft keyway.

Instructions for removing or installing a shaft key are provided in Shaft Key Removal and Installation on page [17](#).

Connector Orientation

The housings for the feedback and power and brake connectors can be rotated once up to 180 degrees. This allows either connector to face down if the motor is installed in a vertical application, rearward if connector access is restricted in a horizontal application, or to the side of the motor.



ATTENTION: Connectors are designed to be rotated into a fixed position during installation of the motor, and remain in that position without further adjustment. Strictly limit the applied forces and the number of times the connector is rotated to be sure that connectors meet the requirements of IP66.

Failure to observe these safety procedures could result in damage to the motor and its components.

Rotate the connectors as follows.

1. Mount and fully seat a mating cable on the connector.
2. Grasp both connectors by their housings and slowly rotate them to the outside of the motor.

If necessary, repeat this step for each connector (feedback or power/brake).

Apply force to only the connectors; do not apply force to the cable. No tools (for example, pliers and vise-grips) should be used to assist with the rotation of the connector.

Interconnect Cables

Knowledgeable cable routing improves system electromagnetic compatibility (EMC). Refer to [Shield the Power Cable on page 8](#) for suggested grounding techniques.

To install cables properly, observe these guidelines.

- Do not connect feedback cable or power and brake cable while power is applied.



ATTENTION: Do not connect or disconnect the motor feedback cable, or the power and brake cable while power is applied to them.

Inadvertent pin connections may result in unexpected motion or result in irreversible damage to the components.

- Keep wire lengths as short as physically possible.
- Separate cables by 0.3 m (1 ft) minimum for every 9 m (30 ft) of parallel run.
- Route signal cables that transmit encoder, serial, or analog data at low voltages away from the motor and power wiring.
- Ground both ends of the cable shield and twist the signal wire pairs to prevent electromagnetic interference from other equipment.



ATTENTION: High voltage can be present on the shields of a power cable if the shields are not grounded.

Verify there is a connection to ground for all shields in the power cable.

Failure to observe these safety procedures could result in personal injury or damage to equipment.

Electrical Noise

Electromagnetic interference (EMI), commonly called noise, may adversely impact motor performance by inducing stray signals. Effective techniques to counter EMI include filtering the AC power, shielding and separating signal carrying lines, and practicing good grounding techniques. Effective AC power filtering can be achieved by using isolated AC power transformers or properly installed AC line filters.

To reduce EMI, observe these guidelines:

- Physically separate signal lines from motor cabling and power wiring. Do not route signal wires with motor and power wires, and do not route signal wires over the vent openings of servo drives or other electrical power sources.
- Ground all equipment using a single-point parallel ground system that employs ground bus bars or large straps. If necessary, use additional electrical noise reduction techniques to reduce EMI in noisy environments.

Shield the Power Cable

Shield the power cable as follows.

1. Verify the separate signal wire shield connects to the overall chassis ground by looping back each of the signal wire pairs as shown in the diagram.
2. Clamp all three shields together at the power cable (chassis) ground connection on the drive.



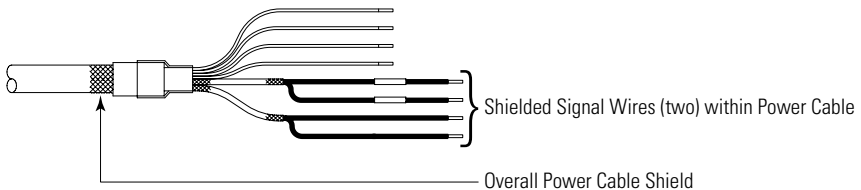
ATTENTION: High voltage can be present on the shields of a power cable, if the shields are not grounded.

Verify there is a connection to ground for all shields in the power cable.

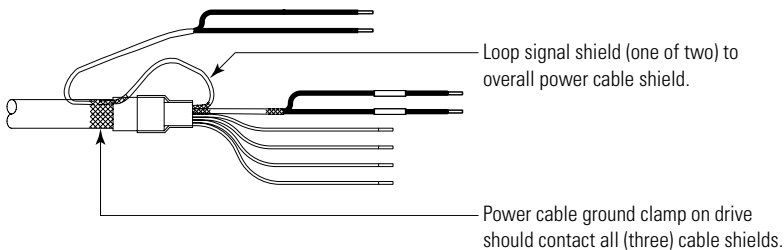
Failure to observe these safety procedures could result in personal injury or damage to equipment.

Power Cable Shielding

Cable is factory supplied as follows.



Cable can be field modified as follows.

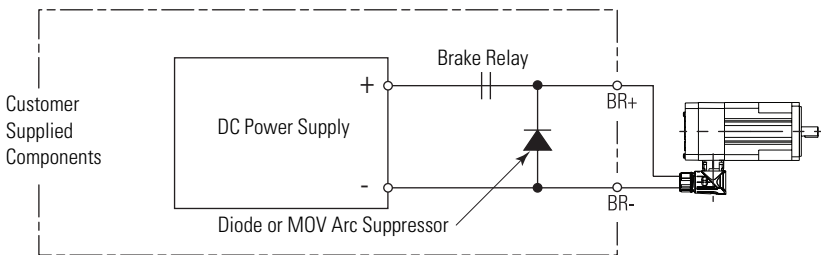


Brake Control and Power Regulation

The DC power source for a permanent magnet brake, such as that on the MP-Series servo motor with 75 mm (2.95 in.) or smaller frame, requires a DC power supply with low ripple voltage.

A motor brake requires relay contacts to open and remove power to the brake coil. Removing power causes the brake to mechanically engage, but it also may cause electrical arcing to occur at the contacts until the residual brake power sufficiently dissipates. A customer supplied diode is recommended to prevent electrical arcing at the brake relay contacts. Substituting a metal oxide varistor (MOV) for the diode can reduce the time to mechanically engage the brake. The following diagram shows typical customer supplied components for brake control, including an arc suppressing diode or MOV.

Arc Suppression in the Motor Brake Circuit



The Kinetix 6000 and Kinetix 7000 drives from Rockwell Automation have a brake control relay that includes a MOV arc suppressor. Customer supplied arc suppression is not required in this case, unless power consumption by the brake requires an external brake relay.

Shaft Seals

An optional shaft seal may be installed on the motor shaft to protect the front bearing from fluids or fine dust that could contaminate the motor bearing and reduce its lifetime. An IP66 rating for the motor depends on the usage of shaft seals and environmentally sealed connectors/cables.

- Refer to [Specifications on page 19](#) for brief descriptions of IP ratings.
- Refer to the Kinetix Motion Control Selection Guide, publication GMC-SG001, publication [GMC-SG001](#), to find the catalog numbers of seal kits available for your motor.

Install the MPL Motors

Follow these steps to install an MPL motor.



ATTENTION: Do not strike the shaft, couplings, or pulleys with tools during installation or removal.

Damage may occur to the motor bearings and the feedback device if sharp impact to the shaft is applied during installation of couplings and pulleys.

Failure to observe these safety procedures could result in damage to the motor and its components.

1. Allow sufficient clearances in the area of the motor for it to stay within its specified operating temperature range.

Refer to [Specifications on page 19](#) for the operating temperature range.

Do not install the motor in an area with restricted airflow. Keep other heat producing devices away from the motor.

To obtain the specified motor thermal rating, mount the motor so the heat dissipation is at a minimum equivalent to the following surface.

For Motor	Aluminum Heatsink Dimensions, Approx.
MPL-x15xx	203.2 x 203.2 x 6.35 mm (8 x 8 x 0.25 in.)
MPL-x2xx	254.0 x 254.0 x 6.35 mm (10 x 10 x 0.25 in.)



ATTENTION: Outer surfaces of the motor can reach high temperatures, 125 °C (257 °F), during motor operation.

Take precautions to prevent accidental contact with hot surfaces. Consider motor surface temperature when selecting motor mating connections and cables.

Failure to observe these safety procedures could result in personal injury or damage to equipment.

2. Position the motor with the cable connections beneath the motor.

Refer to [Recommended Connector Orientation for Drip Loop on page 4](#) for a visual reference of correct motor and cable positioning.

3. Properly mount and align the motor.

- All MPL motors include a mounting pilot for aligning the motor on a machine.
- The index pulse occurs on a 2000-line encoder when the shaft key is aligned with the connectors.
- Make sure belt loading is within the motor limits, and all belts and pulleys are properly aligned.
- Follow manufacturer recommendations for gearboxes, pulleys, or other motor accessories.

4. Form a drip loop in the cables directly before each cable attaches to the motor. Refer to [Recommended Connector Orientation for Drip Loop on page 4](#) for a visual example.



ATTENTION: Be sure that cables are installed and restrained to prevent uneven tension or flexing at the cable connectors.

Excessive and uneven lateral force at the cable connectors may result in the connector's environmental seal opening and closing as the cable flexes.

Failure to observe these safety procedures could result in damage to the motor and its components.

5. Attach the feedback and the combination power and brake cables to the motor.



ATTENTION: Do not connect or disconnect the motor feedback cable, or the power and brake cable while power is applied to them.

Inadvertent pin connections may result in unexpected motion or result in irreversible damage to the components.

- a. Carefully align each cable connector with the respective motor connector as shown in [Motor Connector Alignment on page 12](#).
 - b. Do not apply excessive force when mating the cable and motor connectors. If the connectors do not go together with light hand force, realign and try again.
6. Hand-tighten each collar as follows.
 - One-quarter turn for a SpeedTec connector
 - Five to six turns for a threaded connector



ATTENTION: Keyed connectors must be properly aligned and hand-tightened the recommended number of turns.

Improper alignment is indicated by the need for excessive force, such as the use of tools, to fully seat connectors.

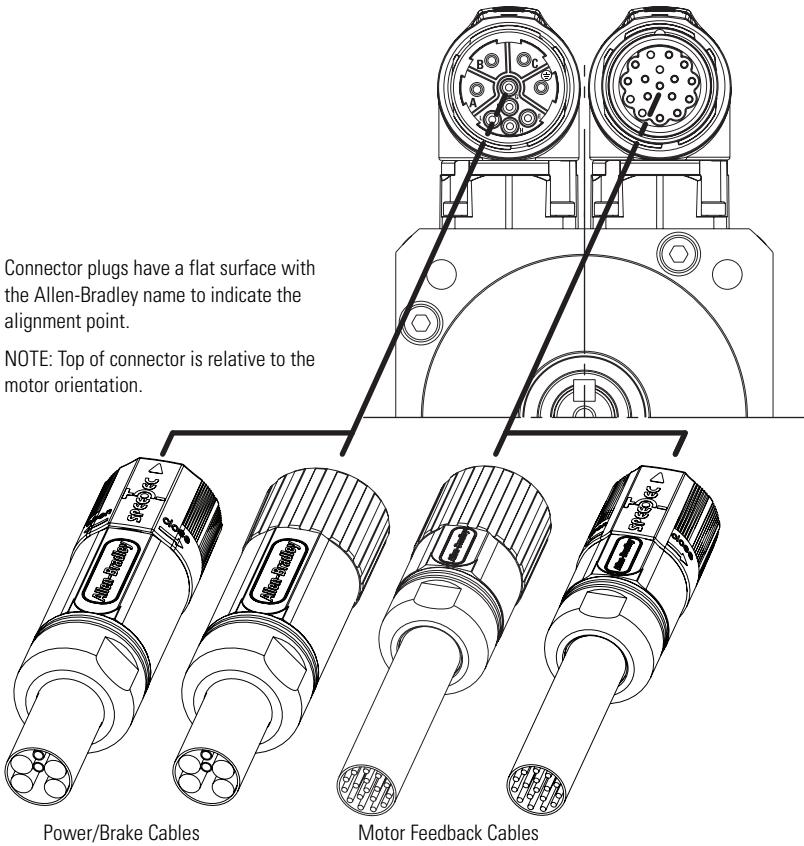
Connectors must be fully tightened for connector seals to be effective.

Failure to observe these safety procedures could result in damage to the motor, cables, and connector components.

Motor Connector Alignment

Connector plugs have a flat surface with the Allen-Bradley name to indicate the alignment point.

NOTE: Top of connector is relative to the motor orientation.



Power/Brake Cables

Motor Feedback Cables

Threaded (M4) Cable Plug Cat. No.	SpeedTec (M7) Cable Plug Cat. No.
2090-xxNPMF-xxSxx	2090-CPxM7DF-xxAAxx
2090-xxNFMF-Sxx	2090-CFBM7Dx-CEAAxx
2090-CPxM4DF-16AFxx	2090-CPxM7DF-xxAFxx, 2090-CPBM7E7-xxAFxx
2090-CFBM4DF-CDAFxx	2090-CFBM7DF-CDAFxx, 2090-CFBM7E7-CDAFxx

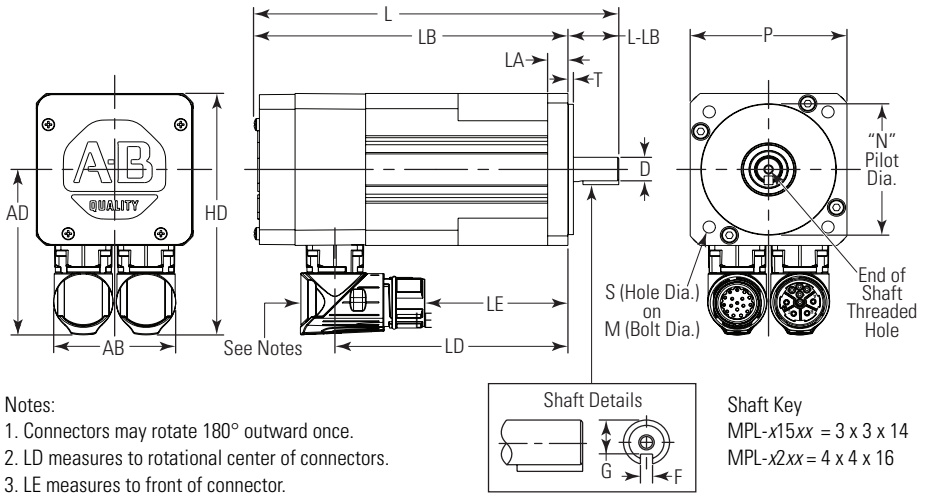


ATTENTION: When installing threaded (M4) cable plugs, O-rings are required on threaded DIN (M4) motor connectors for vibration protection.

Remove the O-ring from the SpeedTec DIN motor connector when installing SpeedTec (M7) cable plugs.

Motors equipped with SpeedTec DIN connectors are fully compatible with threaded (M4) cable plugs. Motors equipped with threaded DIN (M4) connectors are compatible only with threaded (M4) cable plugs.

MP-Series Low-inertia Servo Motors Dimensions



MPL motors are designed to metric dimensions. Inch dimensions are mathematical conversions from millimeters. Untoleranced dimensions are for reference.

The dimensions in the table are for non-brake motors. Footnotes provide the additional dimensions for the brake option and tolerances for dimensions.

MP-Series Low-inertia Servo Motors Dimensions, Approx.

MPL-A or MPL-B	AB	AD	D ⁽¹⁾	HD	L ^{(2), (3)}	L-LB ⁽²⁾	LA	LB ⁽³⁾	LD ⁽³⁾	LE ⁽³⁾
	mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)
1510	53.9 (2.12)	68.9 (2.71)	9.0 (0.3543)	96.4 (3.80)	133.2 (5.25)	19.7 (0.776)	9.0 (0.35)	113.5 (4.47)	78.5 (3.09)	37.8 (1.49)
1520					146.2 (5.76)			126.5 (4.98)	91.3 (3.60)	50.9 (2.00)
1530					171.6 (6.76)			151.9 (5.98)	116.3 (4.58)	76.7 (2.98)
210	53.9 (2.12)	76.2 (3.00)	11.0 (0.4331)	111.2 (4.38)	137.3 (5.40)	22.7 (0.894)	9.0 (0.35)	114.6 (4.51)	78.6 (3.09)	38.4 (1.51)
220					162.8 (6.41)			140.1 (5.52)	104.1 (4.10)	63.9 (2.52)
230					188.3 (7.41)			165.6 (6.52)	129.6 (5.10)	89.4 (3.52)

(1) Tolerance for this dimension is: MPL-x15xx +0.007, -0.002 (+0.0003, -0.0001), and MPL-x2xx +0.008, -0.003 (+0.0003, -0.0001).

(2) Tolerance for this dimension is ±0.7 (±0.028).

(3) If ordering an MPL-x15xx motor with brake, add 36.1 mm (1.421 in.) to L and LB, and 33.4 mm (1.32 in.) to LD and LE.

If ordering an MPL-x2xx motor with brake, add 39.0 mm (1.535 in.) to L and LB, and 24.7 mm (0.97 in.) to LD and LE.

MP-Series Low-inertia Servo Motors Dimensions, Approx.

MPL-A or MPL-B	M mm (in.)	N ⁽¹⁾ mm (in.)	P mm (in.)	S ⁽²⁾ mm (in.)	T mm (in.)	F ⁽³⁾ mm (in.)	G ⁽⁴⁾ mm (in.)	End of Shaft ⁽⁵⁾
1510	63.0 (2.480)	40.0 (1.575)	55 (2.17)	5.8 (0.228)	2.5 (0.098)	3.0 (0.118)	7.2 (0.283)	M3 x 0.5 - 6H x 9.0 (0.35)
1520								
1530								
210	75.0 (2.953)	60.0 (2.362)	70.0 (2.76)		2.5 (0.098)	4.0 (0.157)	8.5 (0.335)	M4 x 0.7 - 6H x 10.0 (0.39)
220								
230								

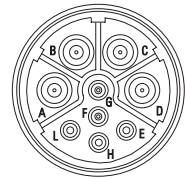
- (1) Tolerance for this dimension is: MPL-x15xx +0.011, -0.005 (+0.0004, -0.0002); and MPL-x2xx +0.012, -0.007 (+0.0005, -0.0003).
- (2) Tolerance for this dimension is: MPL-x15xx and MPL-x2xx +0.3, -0.0 (+0.012, -0.0).
- (3) Tolerance for this dimension is: MPL-x15xx -0.004, -0.029 (-0.00016, -0.00114); and MPL-x2xx +0.0, -0.03 (+0.0, -0.0012).
- (4) Tolerance for this dimension is: +0.0, -0.1 (+0.0, -0.0004).
- (5) Metric (M) threading dimensions include major diameter (mm) X thread pitch - tolerance class X thread depth in mm and (in.).

Motor Connectors

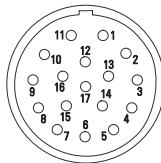
The tables below contain connector pin descriptions for the feedback and the combined power and brake connectors.

Feedback			
Pin	High Resolution Encoder MPL-Axxx (230V)	High Resolution Encoder MPL-Bxxx (460V)	Incremental Encoder MPL-A/Bxxxx-Hxxxx
1	Sin+	Sin+	AM+
2	Sin-	Sin-	AM-
3	Cos+	Cos+	BM+
4	Cos-	Cos-	BM-
5	Data+	Data+	IM+
6	Data-	Data-	IM-
7	Reserved	Reserved	Reserved
8			
9			
9	EPWR 5V		EPWR 5V
10	ECOM		ECOM
11	Reserved	EPWR 9V	Reserved
12		ECOM	
13	TS+	TS+	TS+
14	TS-	TS-	TS-
15	Reserved	Reserved	S1
16			S2
17			S3

Power and Brake	
Pin	MPL-Axxx and MPL-Bxxx
A	Phase U ⁽¹⁾
B	Phase V ⁽¹⁾
C	Phase W ⁽¹⁾
D	Ground
E	Reserved
F	MBR+
G	MBR-
H	Reserved
L	



Intercontec P/N
BEDC091NN0000021700



Intercontec P/N
AEDC13NN00000222000

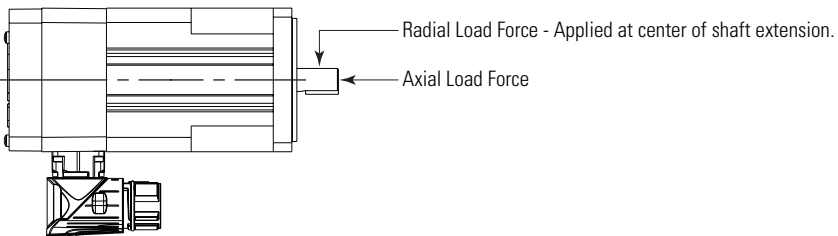
(1) The U, V, and W power phases may be labelled as R, S, and T respectively.

Load Force Capacities

Motors are capable of operating with a sustained shaft load. The location of the radial and axial load force is shown in the figure, and maximum values are listed.

Loads are measured in pounds. Kilograms are mathematical conversions.

Load Forces on Shaft



The following tables represent 20,000 hour L10-bearing fatigue life at various loads and speeds. This 20,000 hour life does not account for possible application-specific life reduction that may occur due to bearing grease contamination from external sources.

Radial Load Force Ratings

Motor	1000 rpm		2000 rpm		3500 rpm		4000 rpm		at Max Speed		
	kg	(lb)	kg	(lb)	kg	(lb)	kg	(lb)	kg	(lb)	rpm
MPL-A/B1510	24	(53)	19	(42)	—	—	15	(33)	12	(26)	8000
MPL-A/B1520	25	(55)	20	(44)	—	—	16	(35)	14	(31)	7000
MPL-A/B1530	28	(62)	22	(49)	—	—	18	(40)	15	(33)	7000
MPL-A/B210	24	(53)	19	(42)	—	—	15	(33)	12	(26)	8000
MPL-A/B220	27	(60)	21	(46)	18	(40)	—	—	15	(33)	6000
MPL-A/B230	29	(64)	23	(51)	19	(42)	—	—	17	(37)	5000

Axial Load Force Ratings with Maximum Radial Load

Motor	1000 rpm		2000 rpm		3500 rpm		4000 rpm		at Max Speed		
	kg	(lb)	kg	(lb)	kg	(lb)	kg	(lb)	kg	(lb)	rpm
MPL-A/B1510	15	(33)	10	(22)	—	—	7	(15)	5	(11)	8000
MPL-A/B1520	14	(31)	10	(22)	—	—	6	(13)	4	(9)	7000
MPL-A/B1530	13	(29)	9	(20)	—	—	6	(13)	4	(9)	7000
MPL-A/B210	15	(33)	10	(22)	—	—	7	(15)	5	(11)	8000
MPL-A/B220	14	(31)	9	(20)	7	(15)	—	—	5	(11)	6000
MPL-A/B230	13	(29)	9	(20)	6	(13)	—	—	5	(11)	5000

Axial Load Force Ratings with Zero Radial Load

Motor	1000 rpm		2000 rpm		3500 rpm		4000 rpm		at Max Speed		
	kg	(lb)	kg	(lb)	kg	(lb)	kg	(lb)	kg	(lb)	rpm
MPL-A/B1510	24	(53)	17	(37)	—	—	12	(26)	8	(18)	8000
MPL-A/B1520	24	(53)	17	(37)	—	—	12	(26)	9	(20)	7000
MPL-A/B1530	24	(53)	17	(37)	—	—	12	(26)	9	(20)	7000
MPL-A/B210	24	(53)	17	(37)	—	—	12	(26)	8	(18)	8000
MPL-A/B220	24	(53)	17	(37)	13	(29)	—	—	10	(22)	6000
MPL-A/B230	24	(53)	17	(37)	13	(29)	—	—	10	(22)	5000

Troubleshooting and Maintenance

Standard troubleshooting and maintenance for this motor includes the following activities.



ATTENTION: Do not strike the shaft, key, couplings, or pulleys with tools during installation or removal of any device.

Damage may occur to the motor bearings and the feedback device if sharp impact to the shaft is applied during installation of couplings and pulleys, or a shaft key. Damage to the feedback device also may result by applying leverage from the faceplate to remove devices mounted on the motor shaft.

Apply a constant pressure, with a wheel puller, to the user end of the shaft to remove any friction fit or stuck device from the motor shaft.

Failure to observe these safety procedures could result in damage to the motor and its components.

Shaft Key Removal and Installation

Shaft keys are toleranced for an interference fit (slightly larger than the opening) to provide a secure and rigid fit for the mating connection.

To Remove a Shaft Key

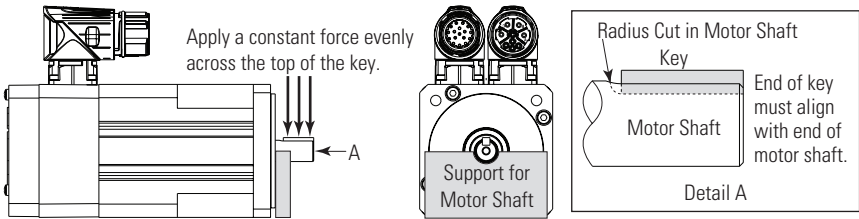
Lift the key by grasping it with a plier or similar tool, or lever the key with a flat-blade screwdriver inserted between the key and the slot.

To Install a Shaft Key

1. Verify the replacement key matches the keyway in the shaft and the mating mechanical connection (for example, a coupling or pulley) before proceeding.

2. Support the motor shaft to prevent movement and to avoid motor bearing damage.
3. Align the front of the key with the front of the motor shaft. This prevents a radiused end-of-cut at the motor end of the keyway from interfering with correct seating of the key.
4. Apply a constant force across the exposed surface of the key with a controlled press device (for example, a screw clamp) to push the key into the shaft.

Shaft Key Installation



Motor Cables and Accessory Kits

Accessories available from the factory include motor cables and shaft seals.

Motor Cables

Factory manufactured feedback and power cables are available in standard cable lengths. They provide the sealing needed to achieve environmental ratings and shield termination.

Refer to the Kinetix Motion Control Selection Guide, publication [GMC-SG001](#), for the catalog numbers of cables appropriate for these motors.

Shaft Seals

Shaft seals provide environmental sealing of MPL motors. Shaft seals provide an additional barrier to moisture and particle intrusion to the motor bearings. Motors are shipped without a shaft seal, but this option is easily installed or replaced in the field.

MPL shaft seals have a Nitrile contact surface. Shaft seals require a lubricant provided in the kit.

Shaft Seal Dimensions, Approx.

Motor	Catalog No.	Inside Diameter	Outside Diameter	Width
MPL-x15xx or MPL-x2xx	MPL-SSN-F63/F75	12.0 mm (0.47 in.)	24.0 mm (0.95 in.)	7.0 mm (0.28 in.)

Refer to the Shaft Seal Installation Instructions, publication 2090-IN012, publication [2090-IN012](#), for detailed installation instructions.

Specifications

Always store a motor in a clean and dry location within these environmental conditions. Appropriate mounting, cabling, and a shaft seal may be required to attain a specific IP rating. Exterior surfaces of the MP-Series small frame servo motors are made from these materials.

MP-Series Low-inertia Motors with 75 mm or Smaller Frame Size

Attribute	Value
Temperature, Operating	0...40 °C (32...104 °F)
Temperature, Storage	-30...70 °C (-22...158 °F)
Relative Humidity	5...95% noncondensing
Atmosphere	Noncorrosive
Shock	20 g peak, 6 ms duration
Vibration	2.5 g, 30...2000 Hz
Ingress Protection Codes ^{(1) (2)}	
IP50	Motor without a shaft seal, mounted in the shaft up direction
IP51	Motor without a shaft seal, mounted in the shaft horizontal direction
IP53	Motor without a shaft seal, mounted in the shaft down direction
IP66 ⁽³⁾	Motor with an optional shaft seal
Material by Location	
Housing	Aluminum
Shaft	39NiCrMo3 or 1144 steel (respectively per UNI7845 or ASTM-A311 Class B)
Shaft Key	Carbon steel

(1) IP ratings are determined using Rockwell Automation cables to connect to the motor.

(2) IP rating applies to a motor mounted as described.

(3) This rating is for dust tightness and powerful water jets ejecting water, not cleaning agents.

Additional Resources

For additional information about motors and compatible Rockwell Automation drives, refer to these publications.

Resource	Description
MPL-Series Brushless Motor Installation Instructions, publications MP-IN001 , MP-IN002 , MP-IN003 , MP-IN004 , and MP-IN005	Provides information on installing MP-Series motors and connecting the appropriate cables.
Ultra3000 Digital Servo Drives Installation Instructions, publication 2098-IN003	Provides information for designing, installing, and wiring an Ultra3000 Digital Servo Drive.
Ultra5000 Intelligent Positioning Drives Installation Instructions, publication 2098-IN001	Provides information for designing, installing, programming, and troubleshooting the Ultra5000 Intelligent Positioning Drive.
Kinetix 6000 Integrated Axis Modules and Axis Modules Installation Instructions, publication 2094-IN001	Provides information for mounting, powering, and controlling the Kinetix 6000 integrated axis module (IAM) and up to seven axis modules (AM) on a Bulletin 2094 power rail.
1394 SERCOS Drive Installation Instructions, publication 1394-IN002	Provides information for designing, installing, and wiring a 1394 SERCOS interface multi-axis motion control system.
Shaft Seal Installation Instructions, publication 2090-IN012	Provides information for installing shaft-seal kits for MP-Series low-inertia motors, TL-Series motors, and F-Series motors.
Rockwell Automation Industrial Automation Glossary, publication AG-7.1	Provides a glossary of industrial automation terms and abbreviations.
System Design for Control of Electrical Noise Reference Manual, GMC-RM001	Provides an overview of the practices that minimize the possibility of noise-related failures and that comply with noise regulations.
Kinetix Motion Control Selection Guide, publication GMC-SG001	Provides an overview of Allen-Bradley motion controls and systems including information about Kinetix and other motors.

These publications are available from your local Rockwell Automation office. At the website <http://www.rockwellautomation.com/literature> you may download an electronic version of these publications.

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