

# **MP-Series Low Inertia Servo Motor with 215 mm or Larger Frame Size**

Catalog Numbers MPL-B640, MPL-B660, MPL-B680,  
MPL-B860, MPL-B880, MPL-B960, MPL-B980

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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](#), is available from your local Rockwell Automation sales office or online at <http://literature.rockwellautomation.com>) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.





In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

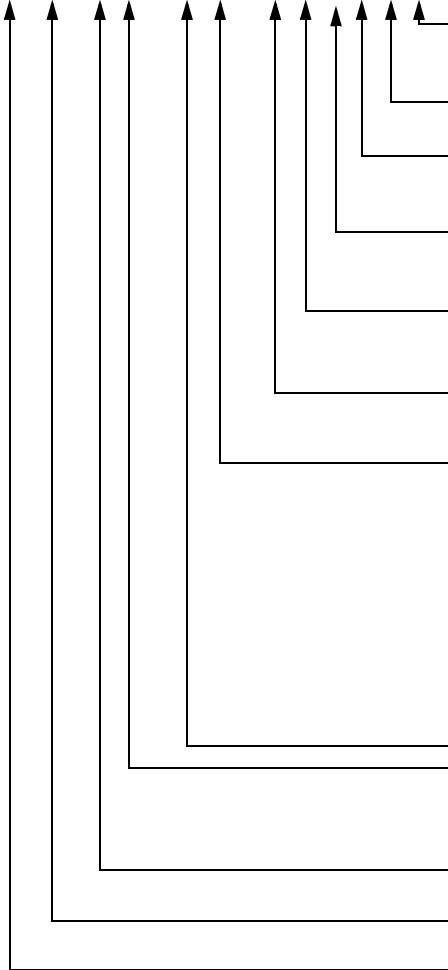
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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

<p><b>WARNING</b></p> 	<p>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.</p>
<p><b>IMPORTANT</b></p>	<p>Identifies information that is critical for successful application and understanding of the product.</p>
<p><b>ATTENTION</b></p> 	<p>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.</p>
<p><b>SHOCK HAZARD</b></p> 	<p>Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.</p>
<p><b>BURN HAZARD</b></p> 	<p>Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.</p>

## Catalog Number Explanation

**MP L - B 6 80 F - M J 7 2 A A**



**FACTORY DESIGNATED OPTIONS**

- A = Standard
- H = ATEX Protection Rating of Group II, Zone 2

**MOUNTING FLANGE**

- A = IEC Metric

**BRAKE**

- 2 = No Brake
- 4 = 24V DC Brake

**CONNECTORS**

- 2 = Bayonet, Right Angle, 180° Rotatable
- 7 = Circular DIN, Right Angle, 180° Rotatable

**ENCLOSURE/SHAFT KEY/SHAFT SEAL**

- J = Shaft Key
- K = No Shaft Key

**FEEDBACK**

- M = Multi-turn High Resolution Encoder
- S = Single-turn High Resolution Encoder

**RATED SPEED**

- A = 500 rpm
- B = 1000 rpm
- C = 1500 rpm
- D = 2000 rpm
- E = 2500 rpm
- F = 3000 rpm
- G = 3250 rpm
- H = 3500 rpm
- J = 3750 rpm
- K = 4000 rpm

**MAGNET STACK LENGTH (80 = 8.0 in.)**

**FRAME SIZE (IEC 72-1 flange number)**

- 6 = 215 mm
- 8 = 265 mm
- 9 = 300 mm

**VOLTAGE RATING**

- B = 460 V AC

**SERIES TYPE**

- L = Low-inertia

**SERIES**

- MP = MP-Series

## About the MP-Series Low Inertia Motors

MP-Series low-inertia motors feature single-turn or multi-turn high resolution encoders, and are available with 24V DC brakes. These compact brushless servo motors combine the characteristics of the MP-Series low-inertia motors with unique features designed for food and beverage applications.

## 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, shaft, mounting pilot, and encoder for damage.
3. Notify the carrier of any shipping damage immediately.

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### ATTENTION



Do not attempt to open or modify this motor beyond changing the connector orientation as described in [Change Connector Orientation](#).

Only an authorized Allen-Bradley repair center shall service this item. Refer to Rockwell Automation Support for assistance to locate the nearest repair center.

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

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## Prolonging Motor Life

Thoughtful design and proper maintenance can increase the life of a servo motor. Follow these guidelines to maximize the life of a servo motor within a food processing environment.

- Always provide a drip loop in each cable to carry liquids away from the connection to the motor.
- If design requirements permit, provide shields that protect the motor housing, shaft, seals and their junctions from contamination by foreign matter or fluids.
- Replace the shaft seal at or before its expected lifetime of 12-months. Refer to [Shaft Seals](#) for more information on shaft seals.
- Inspect the motor and seals for damage or wear on a regular basis. If damage or excessive wear is observed, replace the item.

- The brake option on this servo motor is a spring-set holding brake that releases when voltage is applied to the brake coil. A separate power source is required to disengage the brake. This power source can be applied by a servo motor controller or manual operator control.

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

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**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 a four step process: first - command the servo drive to 0 rpm, second - verify the motor is at 0 rpm, third - engage the brake; and fourth - disable the drive.

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

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## Using Shaft Seals

A 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 requires the use of shaft seals, connectors, and cables that provide an environmental seal equal to or exceeding the rating.

- Refer to [Specifications](#) for a brief description of the IP ratings.
- Refer to [Shaft Seals](#) to find the catalog numbers of seal kits for your motor.
- Refer to the Kinetix Motion Control Selection Guide, publication [GMC-SG001](#), to find environmentally sealed connectors and cables that are compatible with MP-Series motors.

## Using Couplings and Pulleys

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 causes system instability and can damage the motor shaft. All connections between the system and the servo motor shaft must be rigid to achieve an acceptable response from the system. Periodically inspect connections to verify their rigidity.

When mounting couplings or pulleys to the motor shaft, make sure that the connections are properly aligned and that axial and radial loads are within the specifications of the motor. Refer to [Shaft Seals](#) for guidelines to achieve 20,000 hours of motor bearing life.

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### ATTENTION



Damage may occur to the motor bearings and the feedback device if sharp impact is applied to the shaft during installation of couplings and pulleys. Damage to the feedback device may result from applying leverage to the motor mounting face when removing devices mounted on the motor shaft.

Do not strike the shaft, couplings, or pulleys with tools during installation or removal. Use a wheel puller to apply pressure from the user end of the shaft to remove any device from the motor shaft.

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

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A shaft key provides a rigid mechanical connection with the potential for self-alignment when the key is properly installed. These sections provide additional information:

- Refer to [Product Dimensions](#) for information about the key and shaft keyway.
- Refer to [Shaft Key](#) for recommendations on how to remove and install a shaft key.

## Preventing Electrical Noise

ElectroMagnetic Interference (EMI), commonly called electrical noise, can reduce motor performance. Effective techniques to counter EMI include filtering the AC power, use of shielded cables, separating signal cables from power wiring, and practicing good grounding techniques.

Follow these guidelines to avoid the effects of EMI:

- Isolate the power transformers or install line filters on all AC input power lines.
- Physically separate signal cables from motor cabling and power wiring. Do not route signal cables with motor and power wires, or over the vent openings of servo drives.
- 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.

Refer to System Design for Control of Electrical Noise Reference Manual, publication [GMC-RM001](#), for additional information on reducing the effects of EMI.

## Install the Motor

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

### 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 which could be thrown from the shaft.

Failure to observe safety precautions could result in personal injury.

### ATTENTION



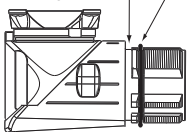

Make sure that cables are installed and restrained to prevent uneven tension or flexing at the cable connections.

Excessive and uneven lateral force on the cable can result in the environmental seal opening and closing as the cable flexes.

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

## Verify Connector O-ring and Backshell Seal

An O-ring on the feedback connector, and a backshell seal on the feedback and power/brake connectors are necessary to achieve the maximum environmental rating. Verify the seal and O-rings are installed as described.

Location	Verify
<p data-bbox="109 1117 267 1162">Groove Reserved For Quick-lock Plug</p> 	<ul style="list-style-type: none"> <li data-bbox="543 1141 939 1214">• An O-ring is mounted on the external surface of the feedback connector and the power/brake connector.</li> <li data-bbox="543 1227 939 1273">• The O-ring is undamaged, not twisted, and rests in the groove near the rear of the connector.</li> </ul>
 <p data-bbox="301 1385 469 1471">Backshell Seal Inside Feedback and Power/Brake Connector Housing</p>	<ul style="list-style-type: none"> <li data-bbox="543 1341 948 1438">• A backshell seal covers the joint inside the feedback and power/brake housings. It seals the joint between the backshell and the housing of the connector.</li> <li data-bbox="543 1451 939 1497">• The backshell seal is undamaged, and it is fully seated against the face of the backshell.</li> </ul>



## Change Connector Orientation

You may rotate the connector housings up to 180 degrees.

- The M23 feedback connector and the M40 power/brake connector are fully rotatable as installed.
- The M58 power/brake connector, on MPL-B8:xx and MPL-B9:xx motors with higher current requirements, must be physically removed and repositioned in 90° increments.

This lets you to rotate the connector into a position that best protects the connection from possible environmental contaminants while providing cable access.

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**ATTENTION**

Connectors are designed to be rotated into a fixed position during motor installation, and remain in that position without further adjustment. Strictly limit the applied forces and the number of times the connector is rotated to make sure that connectors meet the appropriate International Protection (IP) rating as outlined in [Specifications](#).

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

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**IMPORTANT**

Do not use tools, such as pliers or vise-grips, to assist you in rotating an M23 feedback or M40 power/brake connector.

Only apply force to the connector. Do not apply force to or pull on the cable.

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### *Rotating the M23 Feedback or M40 Power/Brake Circular DIN Connector*

Follow these steps to rotate an M23 feedback or a M40 power/brake connector.

1. Mount and fully seat a mating cable on either the feedback or power/brake connector.
2. Grasp the mated connector and cable plug and slowly rotate them to the outside of the motor.

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**ATTENTION**

Apply force only to the motor connector and cable plug. Do not apply force to the cable extending from the cable plug. No tools, for example pliers or vise-grips, should be used to assist with the rotation of the connector.

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

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### *Rotating the M58 Power/Brake Circular DIN Connector*

Follow these steps to rotate a M58 power/brake DIN connector.

1. Remove the four 10-32 x 5/8 locking screws from the connector housing.
2. Rotate the connector housing 90 or 180 degrees.

If binding of the wire bundles prevents rotation of the connector, you can gain access to the internal motor wiring as described in the following steps.

- a. Remove the four screws from the rear cover of the motor.
  - b. Reposition the wires with care around the perimeter of the motor feedback device under the rear cover.
  - c. Verify that wires are not close to any rotating parts, and then replace the rear cover.
  - d. While replacing the rear cover, verify that the gaskets are properly positioned and that all wires are positioned correctly.
3. Torque the locking screws to 6.8 N•m (60 lb•in).

## Build and Route Cables

Knowledgeable cable routing and careful cable construction improves system performance.

Install cables as described in these guidelines.

- Keep wire lengths as short as physically possible.

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**WARNING**

Do not tightly gather or coil the excess length of a power cable. Heat is generated within a cable whenever power is applied. Always position a power cable so it may freely dissipate any heat.

A power cable should not be coiled, except for temporary use when building or testing a machine. If you temporarily coil a power cable, you must also derate the cable to meet local code or follow a authoritative directive, such as Engineering Section 310.15(C) of the NEC Handbook.

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

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- Route noise sensitive wiring (encoder, serial, I/O) away from input power and motor power wiring.
- Separate cables by 0.3 m (1 ft) minimum for every 9 m (30 ft) of parallel run.
- Ground both ends of the encoder cable shield and twist the signal wire pairs to prevent electromagnetic interference (EMI) from other equipment.

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**ATTENTION**

If any shield on a power cable is not grounded, high voltage can be present on that shield.

Make sure there is a connection to ground for all shield wires inside a power cable, and for the overall power cable shield.

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

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## Ground Shielded Signal Wires within a Power Cable

Always connect the shield on any signal wire pair routed inside a power cable to the overall machine ground.

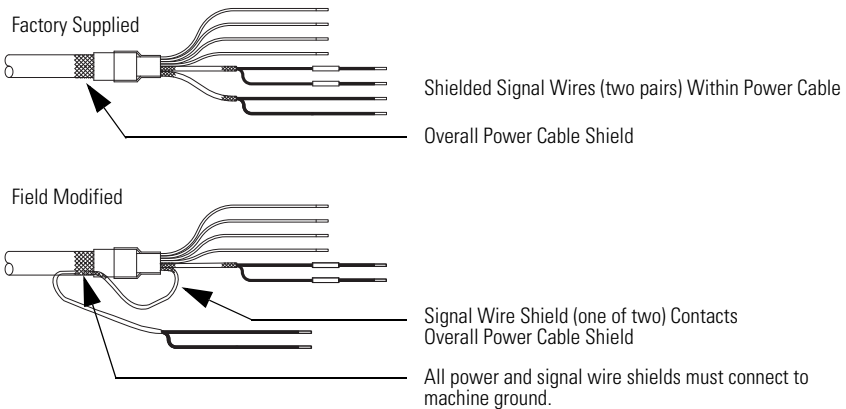
### ATTENTION



If any shield on a power cable is not grounded, high voltage can be present on that shield. Make sure there is a connection to ground for all shield wires inside a power cable, and for the overall power cable shield. Failure to observe safety precautions could result in personal injury or damage to equipment.

If you are installing a 2090-XXNPMF-xxSxx or 2090-CPBM4DF-xxAFxx power with brake cable loop the signal wire pairs to the overall cable shield as shown in the diagram. Then clamp all the shields together in the power cable (chassis) ground connection on the drive.

### Grounding of Signal Wire Shields in a Power Cable



2090-XXNPMF-xxSxx (shown) contains two signal wire pairs. 2090-CPBM4DF-xxAFxx contains one signal wire pair.

The diagram shows one of the two signal wires in the correct position. Connect both signal wire shields and the overall power cable shield to machine ground.

The signal wire pairs within a power cable often carry a 24V DC brake signal, but also can carry logic signals. Grounding the shield that surrounds the signal wires dissipates an induced voltage and reduces the effects of EMI.

## Mount the Motor

Follow these steps to mount the motor on a machine.

1. Provide sufficient clearance, heatsink mass, and air flow for the motor so it stays within the operating temperature range of 0...40 °C (32...104 °F).

Do not enclose the motor unless cooling air is forced across the motor, and keep other heat producing devices away from the motor. Heatsink requirements are listed in a footnote to the [Specifications](#) table.

### ATTENTION



Outer surfaces of a motor can reach high temperatures, 125 °C (275 °F) during operation.

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

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

2. Verify the axial and radial shaft loads of your application do not exceed those listed in the [Motor Load Force Ratings](#).
3. Position the motor on the machine with its connectors pointing downward.
4. Insert and hand-tighten the fasteners in each of the four mounting holes in the motor faceplate.

The mounting hole diameter is specified in the [Product Dimensions](#) table.

5. Align the motor on the machine using the mounting pilot hole to verify the correct alignment.
6. Tighten the fasteners within the recommended torque range.

Cat. No.	Torque Range
MPL-B6xx, and MPL-B8xx	8...20 N•m (70...180 lb•in)
MPL-B9xx	17...45 N•m (150...400 lb•in)

7. Rotate the shaft for electrical phasing and encoder alignment.

The index pulse occurs on a single-turn encoder when the shaft key is aligned with the connectors. Refer to [Product Dimensions](#) for a visual reference of this alignment.

## Attach Motor Cables

Follow these steps to attach the feedback and power/brake cables after the motor is mounted.

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**ATTENTION**



Make sure that cables are installed and restrained to prevent uneven tension or flexing at the motor-to-cable connections.

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

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

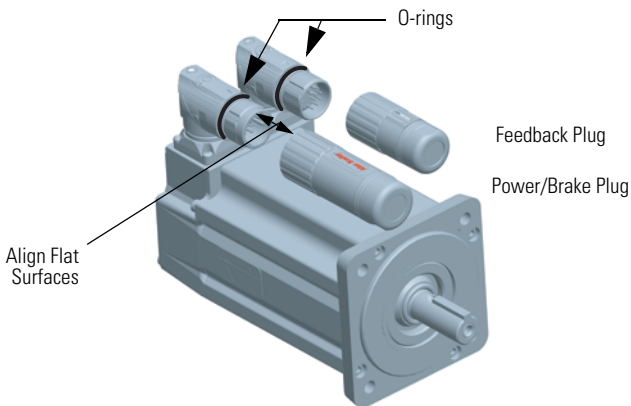
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1. Form a drip loop in the cable before attaching it.

A drip loop creates a low spot in the cable. Gravity causes any liquid to flow to the low spot and away from the connectors, thereby reducing the potential for any liquid to enter the connector.

2. If you use a cable with a quick-lock plug, remove the O-ring on the feedback connector.

The O-ring on the connector dampens the effects of vibration at the cable-to-motor connection and creates a more secure connection for a cable with a threaded plug. O-rings interior to the cable plug provide complete environmental sealing for a cable with a quick-lock plug or a cable with a threaded plug.



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**IMPORTANT**

Cables requiring O-rings include power cable 2090-XXNPMF-xxSxx or 2090-CPxM4DF-xxAFxx, and feedback cable 2090-XXNFMF-Sxx or 2090-CFBM4DF-CDAFxx.

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- Carefully align the flat surface on the feedback or the power/brake cable plug (shown in the diagram) with the flat surface on the motor connector.

**IMPORTANT**

The motor orientation shown is used to clearly show the alignment marker on each cable socket.

The recommended motor orientation when installed positions the connectors at the bottom of the motor.

- Hand tighten the collar on the plug to fully seat it on the connector.
  - Threaded plug requires five to six revolutions.
  - Quick-lock plug requires approximately one-quarter of a revolution.

**TIP**

A threaded plug leaves a small opening, approximately 1...4 mm (0.04...0.16 in.), between the connector and the plug when fully seated.

Do not apply excessive force when mating the cable plug with the motor connector. If the plug and connector do not go together with light hand force, realign the flat surfaces and try again.

**ATTENTION**

Keyed connectors and cable plugs must properly align and be 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 a plug.

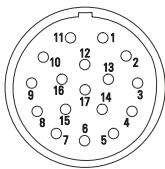
Failure to observe safety precautions could result in damage to the motor and cable, and their components.

## Connector Data

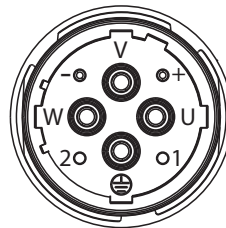
These tables identify the pinouts for the feedback, and the power with brake connectors.

M23 Feedback Connector	
Pin	MPL-B6xx, MPL-B8xx, and MPL-B9xx
1	Sin+
2	Sin-
3	Cos+
4	Cos-
5	Data+
6	Data-
7	Reserved
8	
9	
10	
11	+9V DC
12	Common
13	TS+
14	TS-
15	Reserved
16	
17	

M40 or M58 Power with Brake Connector	
Pin	MPL-B6xx, MPL-B8xx, and MPL-B9xx
U	Phase U
V	Phase V
W	Phase W
⊕	Ground
+	BR+
-	BR-
1	Reserved
2	



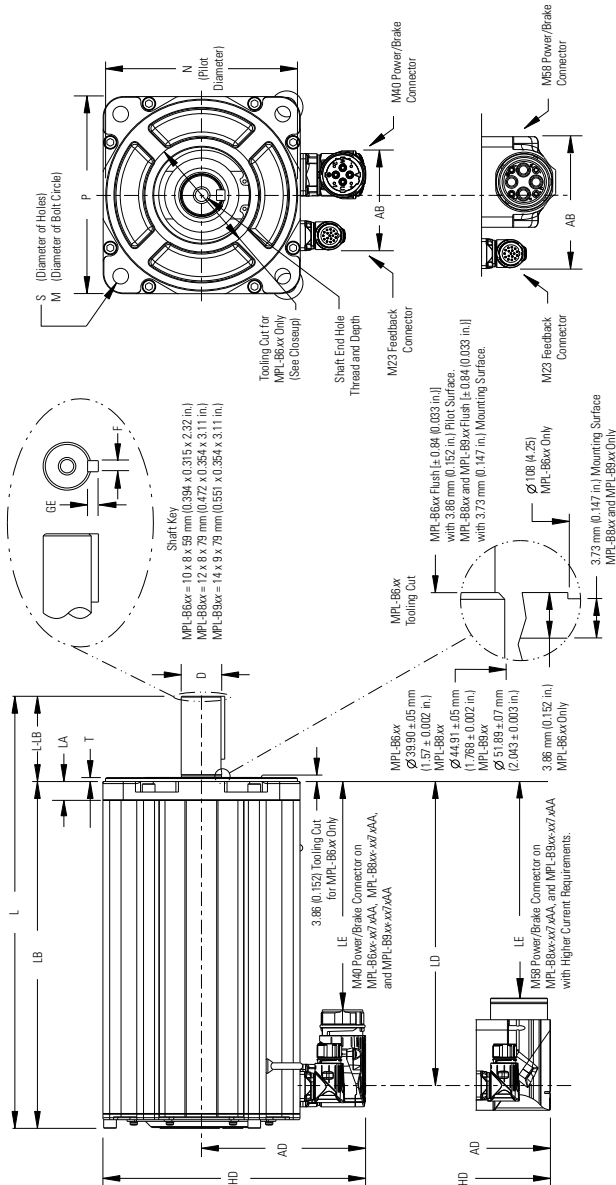
Intercontec P/N  
AEDC227NN00000012000



Intercontec P/N  
CEDE271NN00000051000 (M40)  
DEWC61MT03000001000 (M58)



## Product Dimensions



The dimensions in the table are for non-brake motors with a single-turn or multi-turn encoder. Footnotes provide tolerances for the common dimensions, and the additional dimensions for the brake motors.

Motor Series	AB mm (in.)	AD mm (in.)	D <sup>(3)</sup> mm (in.)	F <sup>(4)</sup> mm (in.)	GE <sup>(5)</sup> mm (in.)	HD mm (in.)	L <sup>(7), (8)</sup> mm (in.)	L-LB <sup>(8)</sup> mm (in.)	LA mm (in.)
MPL-B									
640	93.8 (3.69)	154.0 (6.06)	38.002 (1.4961)	10.0 (0.3937)	5.20 (0.205)	246.5 (9.70)	303.8 (11.96)	80.0 (3.150)	17.8 (0.70)
660						354.6 (13.96)			
680						405.4 (15.96)			
860	127.0 <sup>(1)</sup> (5.0)	189.5 <sup>(2)</sup> (7.46)	42.002 (1.6536)	12.0 (0.4724)		307.1 <sup>(6)</sup> (12.09)	394.4 (15.531)	110.0 (4.331)	20.3 (0.80)
880							445.2 (17.531)		
960	131.2 <sup>(1)</sup> (5.16)	205.35 <sup>(2)</sup> (8.09)	48.002 (1.8899)	14.0 (0.5512)	5.70 (0.224)	338.8 <sup>(6)</sup> (16.18)	403.3 (15.881)		22.9 (0.90)
980							454.1 (17.881)		

- (1) These measurements are for a MPL-Bxxx motor with an M58 power/brake connector. On a MPL-B8xx motor with an M40 power/brake connector the measurement is 93.6 mm (3.68 in.). On a MPL-B9xx motor with an M40 power/brake connector the measurement is 93.8 mm (3.69 in.).
- (2) These measurements are for a MPL-Bxxx motor with an M58 power/brake connector. On a MPL-B8xx motor with an M40 power/brake connector the measurement is 179.0 mm (7.05 in.). On a MPL-B9xx motor with an M40 power/brake connector the measurement is 205.35 mm (8.08 in.).
- (3) Tolerance for this dimension is +0.016 mm (+0.0006 in.).
- (4) Tolerance for this dimension is: MPL-B6xx -0.036 mm (-0.0014 in.);MPL-B8xx -0.043 mm (-0.0016 in.); and MPL-B9xx -0.43 mm (-0.0017 in.).
- (5) Tolerance for the dimension is MPL-B6xx -0.2 mm (-0.008 in.) MPL-B8xx -0.2 mm (-0.008 in.); MPL-B9xx -0.2 mm (-0.007 in.).
- (6) These measurements are for a MPL-Bxxx motor with an M58 power/brake connector. On a MPL-B8xx motor with an M40 power/brake connector the measurement is 296.5 mm (11.67 in.). On a MPL-B9xx motor with an M40 power/brake connector the measurement is 328.2 <sup>(6)</sup> mm (12.92 in.).
- (7) If ordering an MPL-xxxx motor with a brake add: 108.0 mm (4.25 in.) to the MPL-B6xx dimension, 107.9 mm (4.26 in.) to the MPL-B8xx dimension; and 127.0 mm (5.0 in.) to the MPL-B9xx dimension.
- (8) Tolerance for this dimension is ±0.7 mm (±0.028 in.).

These motors are designed to metric dimensions. Inch dimensions are mathematical conversions.

<b>LB (1)</b> mm (in.)	<b>LD (1)</b> mm (in.)	<b>LE (1)</b> mm (in.)	<b>M</b> mm (in.)	<b>N (2)</b> mm (in.)	<b>P</b> mm (in.)	<b>S (3)</b> mm (in.)	<b>T</b> mm (in.)	<b>Shaft End Threaded Hole</b> mm (in.)
223.8 (8.81)	183.6 (7.23)	112.5 (3.15)	215.0 (8.465)	180.0 (7.0867)	184.9 (7.28)	14.50 (0.579)	3.73 (0.147)	M12 x 1.75- 6H thread depth 28 (1.10)
274.6 (10.81)	234.4 (9.23)	163.3 (6.43)						
325.4 (12.81)	285.2 (11.23)	214.1 (8.43)						
284.4 (17.45)	242.6 (9.55)	171.4 (6.75)	265.0 (10.433)	230.0 (9.0551)	230.0 (9.25)		3.86 (0.152)	M16 x 2- 6H thread depth 36 (1.42)
335.2 (13.20)	293.4 (11.55)	222.2 (8.75)						
293.3 (11.55)	248.9 (9.80)	177.9 (7.0)	300.0 (11.811)	250.0 (9.8426)	266.7 (10.50)	18.50 (0.738)	4.88 (0.192)	M16 x 2- 6H thread depth 36 (1.42)
344.1 (13.55)	299.7 (11.80)	228.7 (9.0)						

(1) For motors with a brake, for example MPL-Bxxx-xxx4AA, add to MPL-B6xx dimensions LB, LD, and LE: 108.0 mm (4.25 in.); to MPL-B8xx dimensions LB, LD, and LE: 107.9 mm (4.26 in.); and to MPL-B9xx dimensions LB, LD 127.0 mm (5.0 in.).

(2) Tolerance for the dimension is MPL-B6xx +0.014, -0.011 mm, (+0.0005, -0.0005 in.); MPL-B8xx +0.016, -0.013 mm, (+0.0006, -0.0005 in.); MPL-B9xx +0.016, -0.013 mm, (+0.0005, -0.0006 in.).

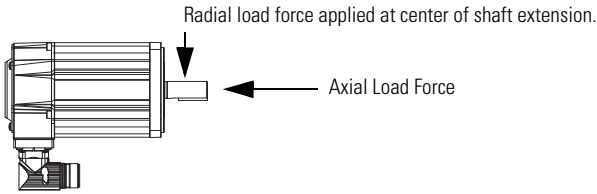
(3) Tolerance for the dimension is MPL-B6xx +0.43 mm ( $\pm 0.008$  in.); MPL-B8xx and MPL-B9xx +0.52 mm ( $\pm 0.010$  in.).

## Motor Load Force Ratings

Motors are capable of operating with a sustained shaft load. The load force locations are shown in the figure and maximum values are in the tables.

Loads are measured in kilograms; pounds are mathematical conversions.

### Load Forces on Shaft



The following tables represent 20,000 hour  $L_{10}$  bearing fatigue life at various loads and speeds. This 20,000 hour life does not account for possible application-specific life reduction that can occur due to bearing grease contamination from external sources.

### Radial Load Force Ratings

Motor	500 rpm kg (lb)	1000 rpm kg (lb)	1500 rpm kg (lb)	2000 rpm kg (lb)	3000 rpm kg (lb)
MPL-B640	253 (557)	200 (442)	—	159 (351)	139 (307)
MPL-B660	275 (607)	219 (482)	—	173 (382)	151 (334)
MPL-B680	291 (641)	230 (508)	—	183 (404)	160 (353)
MPL-B860	347 (764)	275 (607)	—	219 (481)	—
MPL-B880	367 (810)	292 (643)	—	231 (510)	—
MPL-B960	466 (1028)	370 (816)	323 (713)	—	—
MPL-B980	494 (1089)	392 (864)	352 (775)	—	—

**Axial Load Force Ratings (Maximum Radial Load)**

<b>Motor</b>	<b>500 rpm</b> kg (lb)	<b>1000 rpm</b> kg (lb)	<b>1500 rpm</b> kg (lb)	<b>2000 rpm</b> kg (lb)	<b>3000 rpm</b> kg (lb)
MPL-B640	89 (197)	66 (146)	—	48 (107)	41 (90)
MPL-B660	98 (217)	72 (159)	—	54 (118)	45 (99)
MPL-B680	104 (230)	77 (169)	—	57 (125)	47 (104)
MPL-B860	145 (320)	107 (237)	—	79 (175)	—
MPL-B880	153 (338)	113 (250)	—	84 (185)	—
MPL-B960	142 (314)	105 (232)	88 (194)	—	—
MPL-B980	153 (338)	113 (249)	94 (207)	—	—

**Axial Load Force Ratings (Zero Radial Load)**

<b>Motor</b>	<b>500 rpm</b> kg (lb)	<b>1000 rpm</b> kg (lb)	<b>1500 rpm</b> kg (lb)	<b>2000 rpm</b> kg (lb)	<b>3000 rpm</b> kg (lb)
MPL-B640	136 (300)	99 (219)	—	74 (163)	62 (137)
MPL-B660	136 (300)	99 (219)	—	74 (163)	62 (137)
MPL-B680	136 (300)	99 (219)	—	74 (163)	62 (137)
MPL-B860	201 (443)	147 (323)	—	110 (242)	—
MPL-B880	201 (443)	147 (323)	—	110 (242)	—
MPL-B960	215 (473)	159 (350)	133 (293)	—	—
MPL-B980	215 (473)	159 (350)	133 (293)	—	—

## Accessory Kits

Factory available accessories for MP-Series low-inertia motors are described below.

### Motor Cables

Factory manufactured feedback and power cables are available in standard cable lengths. They provide environmental sealing up to and including an IP66 rating and proper shield termination. For a complete listing of available cables refer to your drive manual, contact your nearest Rockwell Automation sales office, or access the information from the references in [Additional Resources](#).

Refer to the Kinetix Motion Control Selection Guide, publication [GMC-SG001](#), for information on feedback, power, and brake cables or connector kits.

### Shaft Seals

A shaft seal provides a barrier to moisture and particle entering the motor bearings.

Catalog numbers and dimensions for replacement Nitrile shaft seals are listed in the table.

Motor	Cat. No.	Inside Diameter	Outside Diameter	Width
		mm (in.)	mm (in.)	mm (in.)
MPL-B640, MPL-B660, MPL-B680	MPL-SST-A6B6	40 (1.57)	90 (3.54)	8 (0.315)
MPL-B860, MPL-B880	MPL-SST-A8B8	45 (1.77)	75 (2.95)	8 (0.315)
MPL-B960, MPL-B980	MPL-SST-A9B9	52 (2.05)	72 (2.83)	8 (0.315)

#### IMPORTANT

Shaft seals must be lubricated. Lubricant is supplied with shaft seal kits.

Refer to the Shaft-seal Kit Installation Instructions, publication [2090-IN012](#), for instructions on how to install a shaft seal.

## Shaft Key

Shaft keys are constructed of steel. The specified tolerance provides an interference fit (slightly larger than the opening) for a secure and rigid connection.

### ATTENTION

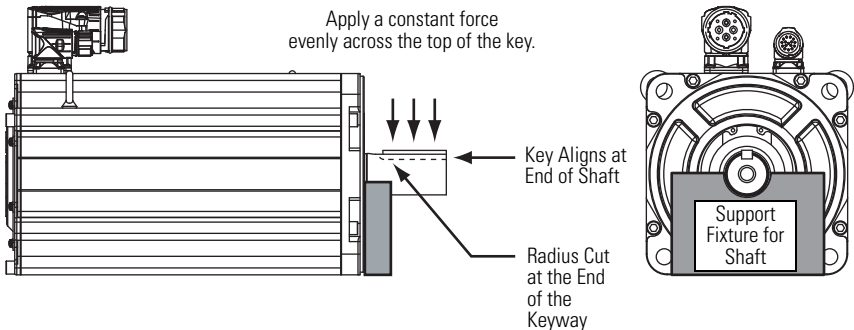


Damage can occur to the motor bearings and the feedback device if sharp impacts applied to the shaft during installation of couplings and pulleys, or a shaft key. Damage to the feedback device can result by applying leverage from the motor mounting face to remove devices mounted on the motor shaft.

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

Follow these steps to install a shaft key.

1. Remove the shaft key, if present, using one of these methods:
  - Lift the key by grasping it with a plier or similar tool.
  - Lever the key with a flat blade screwdriver inserted between the key and the bottom of the slot.
2. Install a shaft key by performing this procedure.
  - a. Verify the replacement key matches the keyway in the shaft and the mating mechanical connection (coupling or pulley).
  - b. Align the front of the key with the front of the motor shaft. This prevents interference with the key by the end-of-cut radius.
  - c. Support the underside of the shaft with a fixture, and use a device to apply a controlled force that presses the key into the keyway.



# Specifications

## MP-Series Low Inertia Servo Motors

Attribute	Value
Temperature, operating	0...40 °C (32...104 °F) <sup>(3)</sup>
Temperature, storage	-30...70 °C (-22...158 °F)
Relative humidity, storage	5...95% noncondensing
Atmosphere, storage	noncorrosive
IP Rating <sup>(1)</sup> Motor with a shaft seal <sup>(2)</sup>  Motor without a shaft seal, and mounted in this direction:  <ul style="list-style-type: none"> <li>• shaft down</li> <li>• shaft horizontal</li> <li>• shaft up</li> </ul>	IP66 - dust tight, powerful water jets <sup>(4)</sup>     <ul style="list-style-type: none"> <li>• IP53 - dust tight, powerful water jets</li> <li>• IP51 - dust tight, water dripping vertically</li> <li>• IP50 - dust tight, no protection from water</li> </ul>

<sup>(1)</sup> The motors are dual rated with International Protection Codes (IP Ratings) for environmental protection. The motor rating excludes any reduction in the rating resulting from cables or their plugs with a lower rating.

<sup>(2)</sup> Refer to [Shaft Seals](#) for the recommended replacement interval and installation instructions.

<sup>(3)</sup> To obtain this thermal rating, mount MP-B6xx motors on a surface with heat dissipation equivalent to a 304.8 x 304.8 x 12.7 mm (12 x 12 x 0.5 in.) aluminum heatsink, or MP-B8xx and MP-B9xx motors on a surface with heat dissipation equivalent to a 533 x 533 x 25.4 mm (21 x 21 x 1 in.) aluminum heatsink.

<sup>(4)</sup> International Protection Code (IP66) is roughly equivalent to a NEMA 35 (dust tight, drip tight).



## Additional Resources

These documents contain additional information concerning related Rockwell Automation products.

Resource	Description
MP-Series Brushless Servo Motor Installation Instructions, publication <a href="#">MP-IN001</a> , or <a href="#">MP-IN006</a>	Information on installing, small frame (<75 mm), or medium frame (100...165 mm) MP-Series low-inertia motors.
Ultra5000 IPD Installation Manual, publication <a href="#">2098-IN001</a>	Information on installing, configuring, startup, and troubleshooting a servo drive system with an Ultra5000 drive.
Ultra3000 DSD Installation Manual, publication <a href="#">2098-IN003</a>	Information on installing, configuring, startup, and troubleshooting a servo drive system with an Ultra3000 drive.
Kinetix 2000 Multi-axis Servo Drive User Manual, publication <a href="#">2093-UM001</a>	Information on installing, configuring, startup, and troubleshooting a servo drive system with a Kinetix 2000 drive.
Kinetix 6000 Multi-axis Servo Drives User Manual, publication <a href="#">2094-UM001</a>	Information on installing, configuring, startup, and troubleshooting a servo drive system with a Kinetix 6000 drive.
Shaft-seal Kit Installation Instructions, publication <a href="#">2090-IN012</a>	Information on selecting and installing a shaft seal on a servo motor.
Allen-Bradley Industrial Automation Glossary, publication <a href="#">AG-7.1</a>	A glossary of industrial automation terms and abbreviations.
System Design for Control of Electrical Noise Reference Manual, publication <a href="#">GMC-BM001</a>	Information, examples, and techniques designed to minimize system failures caused by electrical noise.
Kinetix Motion Control Selection Guide, publication <a href="#">GMC-SG001</a>	Specifications, motor/servo-drive system combinations, and accessories for Kinetix motion control products.

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

**Notes:**

**Notes:**

# Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products. At <http://support.rockwellautomation.com>, you can find technical manuals, a knowledge base of FAQs, technical and application notes, sample code and links to software service packs, and a MySupport feature that you can customize to make the best use of these tools.

For an additional level of technical phone support for installation, configuration and troubleshooting, we offer TechConnect support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit <http://support.rockwellautomation.com>.

## Installation Assistance

If you experience a problem within the first 24 hours of installation, please review the information that's contained in this manual. You can also contact a special Customer Support number for initial help in getting your product up and running.

United States	1.440.646.3434 Monday – Friday, 8 a.m. – 5 p.m. EST
Outside United States	Please contact your local Rockwell Automation representative for any technical support issues.

## New Product Satisfaction Return

Rockwell Automation tests all of its products to ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned, follow these procedures.

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

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[www.rockwellautomation.com](http://www.rockwellautomation.com)

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Publication MP-IN002C-EN-P - April 2009

PN-42681

Supersedes Publication MP-IN002B-EN-P — June 2002

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