

# **MP-Series Low-Inertia Servo Motor with 100 mm to 165 mm Frame Size**

Catalog Numbers MPL-A310, MPL-A320, MPL-A330, MPL-A420, MPL-A430, MPL-A4530, MPL-A4540, MPL-A4560, MPL-A520, MPL-A540, MPL-A560, MPL-B310, MPL-B320, MPL-B330, MPL-B420, MPL-B430, MPL-B4530, MPL-B4540, MPL-B4560, MPL-B520, MPL-B540, MPL-B560, MPL-B580

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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 [SGL-1.1](#) 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, 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, drive or motor) to alert people that surfaces may reach dangerous temperatures.</p>

## Catalog Number Explanation

**MP L - A 3 10 P - H K 2 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 = 24VDC Brake

### CONNECTORS

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

### SHAFT KEY/SEAL

J = Shaft Key/No Shaft Seal  
K = No Shaft Key/No Shaft Seal

### FEEDBACK

H = 2000 Line Encoder <sup>1</sup>  
M = Multi-turn High Resolution Encoder  
R = 2 Pole Resolver <sup>1</sup>  
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  
L = 4250 rpm  
M = 4500 rpm  
N = 4750 rpm  
P = 5000 rpm  
Q = 5250 rpm  
R = 5500 rpm  
S = 5750 rpm  
T = 6000 rpm

### MAGNET STACK LENGTH (10 = 1.0 INCHES)

### FRAME SIZE (IEC 72-1 FLANGE NUMBER)

1 = 55 mm Small Frame Motors (55...70 mm)  
2 = 70 mm Refer to [page 22](#) for this product manual  
3 = 100 mm  
4 = 115 mm  
45 = 130 mm  
5 = 165 mm  
6 = 215 mm Large Frame Motors (215...300 mm)  
8 = 265 mm Refer to [page 22](#) for this product manual  
9 = 300 mm

Motors in this publication

### VOLTAGE RATING

A = 230 VAC  
B = 460 VAC

### SERIES TYPE

L = Low Inertia

### SERIES

<sup>1</sup> Not available on MPL-x5xxx or larger (>165mm Frame Sizes)

## About the MP-Series 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 meet the demanding requirements of high-performance motion systems.

## Before You Begin

The customer is responsible for inspecting the equipment before accepting the shipment from the freight company. Check the item(s) you receive against your purchase order. Notify the carrier of any shipping damage or missing items immediately.

Store or operate your motor in a clean and dry location within the following environmental conditions.

## Before You Install the Motor

Perform the inspection steps and review the guidelines for shaft seals, couplings and pulleys, and electrical noise prevention.

1. Remove the motor carefully from its shipping container.
2. Visually inspect the motor for any damage.
3. Examine the motor frame, front output shaft, and mounting pilot for any defects.
4. Notify the carrier of any shipping damage immediately.

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**ATTENTION**

Do not attempt to open and modify the motor beyond changing the connector orientation as described on [page 7](#). 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.

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### *Using Shaft Seals*

An additional seal is required on the motor shaft near the motor front bearing, if the shaft is exposed to fluids or significant amounts of fine dust. This includes lubricating oil from a gearbox. An IP66 rating for the motor requires use of a shaft seal and environmentally sealed connectors/cables. The additional seal is not

recommended in applications where the motor shaft area is free of liquids or fine dust and a lower rating will suffice.

- Refer to [Environmental Ratings](#) for a brief description of the IP rating for these MP-Series motors.
- Refer to [Shaft Seal Kits](#) to find the catalog numbers of seal kits available for your motor.
- Refer to Kinetix Motion Control Selection Guide, publication [GMC-SG001](#) to find environmentally sealed connectors and cables compatible with the 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 will cause system instability and may damage the motor shaft. All connections between the system and the servo motor shaft must be rigid to achieve acceptable response from the system. Periodically inspect connections to verify their rigidity.

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

#### **ATTENTION**



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. Damage to the feedback device may result by applying leverage from the motor mounting face to remove devices mounted on the motor shaft.

Do not strike the shaft, couplings, or pulleys with tools during installation or removal. Use a wheel puller applying pressure from 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.

### *Preventing 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.

Avoid the effects of EMI by following these guidelines.

- Physically separate signal lines from motor cabling and power wiring. Do not route signal wires 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 by improving the system level electromagnetic compatibility (EMC).

## Building and Installing Cables

Knowledgeable cable routing and careful cable construction improves system electromagnetic compatibility (EMC).

To build and install cables, perform the following steps.

1. Keep wire lengths as short as physically possible.
2. Route signal cables (encoder, serial, analog) away from motor and power wiring.
3. Separate cables by 0.3 m (1 ft) minimum for every 9 m (30 ft) of parallel run.
4. 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**

High voltage can be present on the shield of a power cable, if the shield is not grounded. Ensure there is a connection to ground for any power cable shield.

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

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## Install the Motor

All 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.

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### 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 these safety procedures could result in personal injury.

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### ATTENTION



Ensure 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.

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## Changing the Orientation of the Connectors

MP-Series motors use two styles of connectors. The connector style is identified by a 2 or a 7 as the connector variable in the motor catalog number. For example, MPx-xxxxx-xx2xxx or MPx-xxxxx-xx7xxx.

- A 2 indicates a circular bayonet connector, facing the shaft.
- A 7 indicates a circular DIN, right angle, rotatable connector.

The sections below describe acceptable methods for rotating the connector orientation for these connector styles.

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### *Reversible Connector Facing the Shaft (MPL-xxxx-xx2xxx)*

This connector housing can be reversed to face down when the motor is installed in a vertical application, or rearward if connector access is restricted in a horizontal application. Perform these steps to remount the connector housing.

1. Remove the three connector housing screws from the motor.
2. Rotate connector housing 180 degrees. If binding of the wire bundles prevents rotation of the connector, you can gain access to the internal motor wiring by following these steps.
  - a. Remove the four screws from the rear cover of the motor.
  - b. Carefully reposition the wires around the perimeter of the motor feedback device located under the rear cover.
  - c. Be sure that the wires are not close to any rotating parts.

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**ATTENTION**

Do not loosen or remove the motor feedback device (encoder) mounting screws while repositioning the connector wires.

Encoder alignment is a critical adjustment that can only be performed in the factory. Misadjustment can render the motor inoperable or degrade motor performance, and voids the motor warranty.

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

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3. Re-install the connector housing and torque the three screws to 0.8...1.0 N•m (7...9 lb•in.) after verifying that gaskets are properly positioned, and that no wires are pinched under the connector housing.

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**ATTENTION**

Exercise caution to prevent damaging the screw holes when reinserting the self-tapping screws holding the connector housing and rear cover.

Excessive force may strip the threads within the screw holes and prevent proper sealing of the motor. Ensure that the specified torque values are not exceeded.

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

- 
4. Re-install the four rear cover screws and torque them to 0.8...1.0 N•m (7...9 lb•in) after ensuring that the rear cover O-ring is properly positioned onto the rear cover circular pilot surface.



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## Rotatable Circular DIN Connector (MPL-xxxx-xx7xxx)

The circular DIN connector housing can be rotated up to 180° in either direction.

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### 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.

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Perform these steps to turn the DIN connectors.

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).

Only apply force to 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.

## Install the Motor

Perform these steps to install the motor.

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### ATTENTION



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

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

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

Refer to [Before You Begin](#) for the operating temperature range. Do not enclose the motor unless forced air is blown across the motor for cooling. A fan blowing air across the motor will improve its performance. Keep other heat producing devices away from the motor.

To obtain the specified motor thermal rating, mount the motor on a surface with heat dissipation equivalent to a 12 x 12 x 0.5 inch aluminum heatsink.

2. Refer to [Motor Load Force Ratings](#) to determine the radial and axial shaft load limitations of your motor.
3. Place the motor with the connector housing pointing downward.
4. Mount and align the motor.

Electronic zero, Index pulse or Stegmann ABS = 0, occurs when the shaft key or dimple is aligned with the connectors.

Refer to [Mounting Dimensions](#) for a visual reference of this alignment.

5. Attach all power, feedback, and brake cables after the motor is mounted, and use a drip loop in the cable to keep liquids away from the connectors.

**ATTENTION**

Outer surfaces of motor can reach high temperatures, 125 °C (275 °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.

Use this procedure to attach the cable connectors.

**ATTENTION**

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

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

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

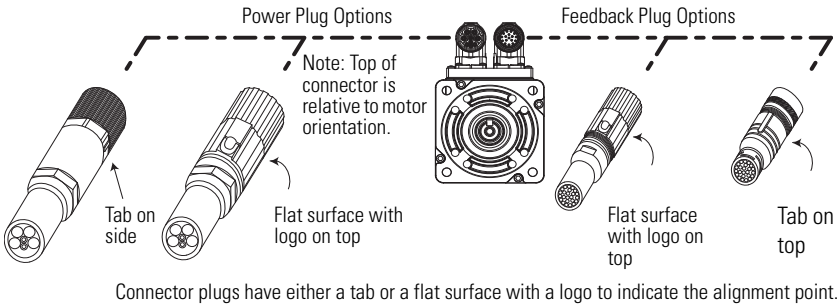
**ATTENTION**

When installing threaded DIN style cable connectors, O-rings are required on the motor connectors. The O-rings provide ingress protection.

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

Flex cables with a threaded DIN style connector have an M4 designation.

- a. Carefully align each cable connector with the respective motor connector as shown in the following diagram. 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.
- b. Hand tighten the knurled collar 5 to 6 turns to fully seat each connector.



If your motor has an ATEX rating for hazardous environments, complete the following step. The catalog number on ATEX motor nameplates ends with H, for example MPL-xxxxx-xxxxH.

### WARNING



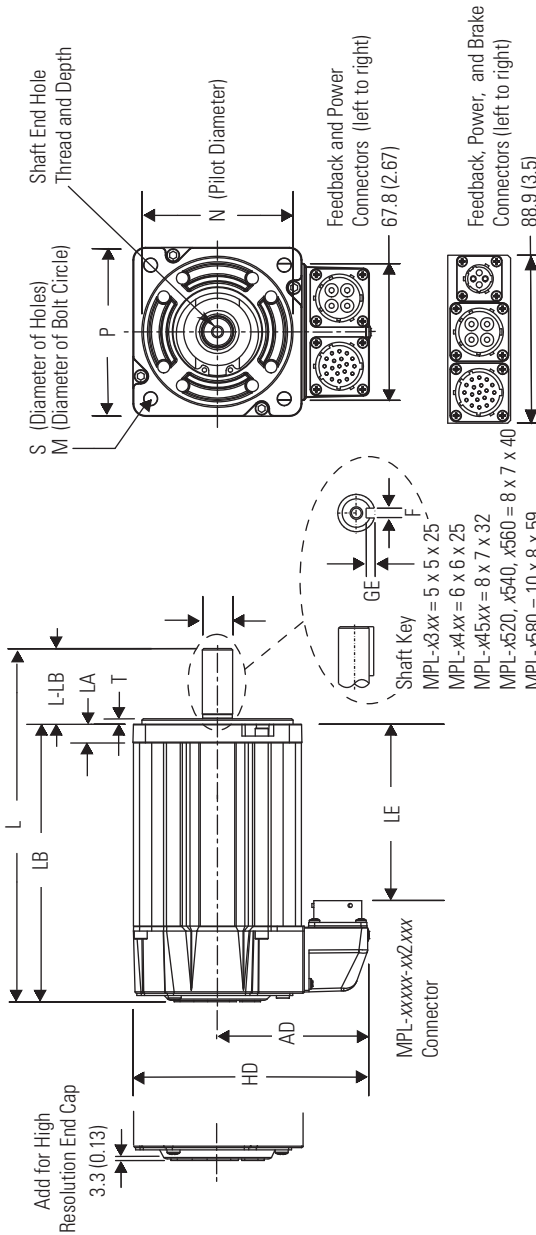
It is mandatory that the motion system monitor the thermal switch signals from a motor requiring an ATEX rating.

The intrinsic safety protection concepts in the ATEX Directive 94/9/EC must be enabled by connecting the thermal switch signals from the motor to the motion control system.

Failure to observe these safety procedures may lead to personal injury or death, damage to the equipment, or economic loss.

6. Verify the continuity and functionality of the thermal switch signals, TS+ and TS-, transmitted through the feedback cable that connects the motor to its controlling drive.

## Dimensions for Bayonet Connectors (MPL-xxxxx-xx2xxx)



Note: Electronic zero (Index pulse or Stegmann ABS = 0) occurs when the shaft key or dimple (not shown) is aligned with the connectors (as shown).

Motor Series MPL-A or MPL-B	AD mm (in.)	D * mm (in.)	HD mm (in.)	L 1,2 mm (in.)	L-LB 3 mm (in.)	LA mm (in.)	LB 1,2 mm (in.)	LD 1 mm (in.)	M mm (in.)	N * mm (in.)	P mm (in.)	S 4 mm (in.)	T mm (in.)	F 5 mm (in.)	GE 6 mm (in.)	End of Shaft Thread and Depth of hole
310				164.7 (6.49)			124.7 (4.91)	70.7 (2.78)								
320	80.9 (3.19)	16.0 (0.629)	125.7 (4.95)	190.1 (7.49)	40.0 (1.58)	9.9 (0.39)	150.1 (5.91)	96.1 (3.78)	100.0 (3.937)	80.0 (3.15)	89.4 (3.52)	7.0 (0.283)	2.87 (0.113)	5.0 (0.20)	3.0 (0.12)	M5 x 0.8-6H x 12.5(0.49)
330				215.5 (8.49)			175.5 (6.91)	121.5 (4.78)								
420	83.9 (3.3)	19.0 (0.748)	132.8 (5.23)	186.5 (7.35)	40.0 (1.575)	10.2 (0.40)	146.5 (5.77)	92.5 (3.64)	115.0 (4.528)	95.0 (3.74)	98.3 (3.87)	10.0 (0.401)	2.87 (0.113)	6.0 (0.24)	3.5 (0.138)	M6 x 1.0-6H x 16(0.63)
430				211.9 (8.345)			171.9 (6.77)	117.9 (4.64)								
4530				225.2 (8.87)			175.2 (6.90)	121.2 (4.77)								
4540	91.5 (3.6)	24.0 (0.945)	148.3 (5.84)	200.6 (9.87)	50.0 (1.97)	12.2 (0.48)	200.6 (7.90)	146.6 (5.77)	130.0 (5.118)	110.0 (4.331)	113.7 (4.48)	10.0 (0.401)	3.38 (0.133)	8.0 (0.31)	4.0 (0.158)	M8 x 1.25-6H x 19(0.75)
4560				304.7 (11.99)			254.7 (10.03)	197.4 (7.77)								
520				233.7 (9.20)			173.7 (6.84)	115.8 (4.56)								
540		28.0 (1.1)		284.5 (11.20)	60.0 (2.38)		224.5 (8.84)	166.9 (6.57)						8.0 (0.31)	4.0 (0.158)	M10 x 1.5-6H x 22(0.87)
560	106.2 (4.18)		178.1 (7.01)	335.3 (13.20)		13.97 (0.55)	275.3 (10.84)	217.7 (8.56)	165.0 (6.496)	130.0 (5.118)	143.5 (5.65)	12.0 (0.481)	3.38 (0.133)			
580 7		32.0 (1.26)		406.1 (15.99)	80.0 (3.15)		326.1 (12.84)	268.5 (10.57)						10.0 (0.39)	5.0 (0.197)	M12 x 1.75-6H x 28(1.10)

1 Motors with brake, add this value to the dimension:

MPL-x310 through -x330: add 34.5 mm (1.36 in.) to L, LB, and LD.

MPL-x420 through -x4560: add 48.5 mm (1.91 in.) to L, LB, and LD.

MPL-x520 through -x580 add 51.6 mm (2.03 in.) to L and LB, and 45.6 mm (1.79 in.) to LD.

2 Motors with high-resolution feedback, add 3.3 mm (0.13 in.) to L and LB.

Refer to Kinetix Motion Control Selection Guide, publication [GMC-SG001](#) for tolerances on these measurements.

3 Tolerance is ±0.7 (±0.028).

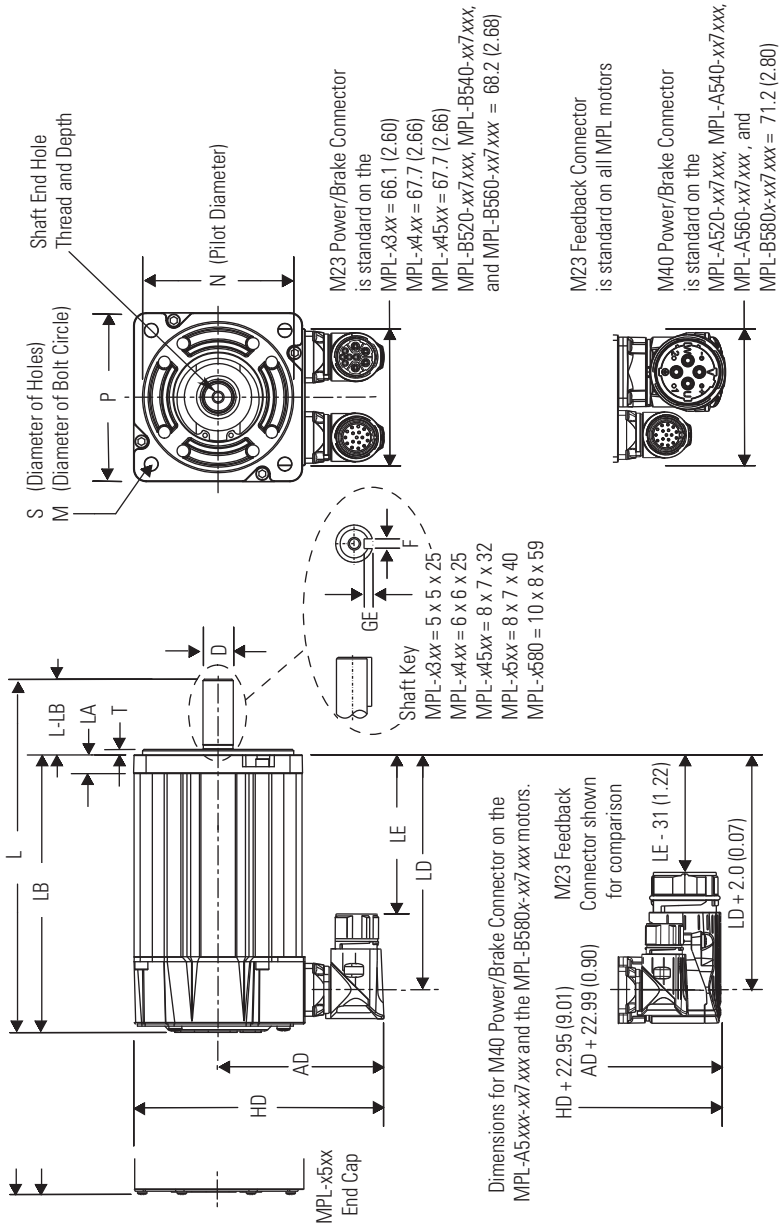
4 x3xx and -x4xx tolerance is +0.36 (±0.0007), x5xx is +0.43 (±0.008).

5 Tolerance is -0.03 (-0.001).

6 Tolerance is +0.1 (+0.004).

7 This motor is only available with 460V windings (MPL-B580)

## Dimensions for Rotatable Circular DIN Connectors (MPL-xxxxx-xx7xxx)



Note: Electronic zero (Index pulse or Stegmann ABS = 0) occurs when the shaft key or dimple (not shown) is aligned with the connectors (as shown).

Motor Series MPL-A or MPL-B	AD mm (in.)	D * mm (in.)	HD mm (in.)	L <sup>1</sup> mm (in.)	L-LB <sup>2</sup> mm (in.)	LA mm (in.)	LB <sup>1</sup> mm (in.)	LD <sup>1</sup> mm (in.)	LE <sup>1</sup> mm (in.)	M mm (in.)	N * mm (in.)	P mm (in.)	S <sup>3</sup> mm (in.)	T mm (in.)	F <sup>4</sup> mm (in.)	GE <sup>5</sup> mm (in.)	End of Shaft Thread and Depth of Hole
310				168.0 (6.62)			128.0 (5.04)	62.0 (2.45)	102.0 (4.03)								
320	87.2 (3.44)	16.0 (0.629)	132.0 (5.20)	193.0 (7.62)	40.0 (1.575)	9.90 (0.39)	153.0 (6.04)	88.0 (3.45)	128.0 (5.03)	100.0 (3.937)	80.0 (3.15)	89.4 (3.52)	7.0 (0.283)	2.74 (0.108)	5.0 (0.20)	3.0 (0.12)	M5 x 0.8-6H x 12.5 (0.49)
330				219.0 (8.62)			179.0 (7.04)	113.0 (4.45)	153.0 (6.03)								
420	90.9 (3.58)	19.0 (0.749)	140.1 (5.52)	190.0 (7.48)	40.0 (1.575)	10.16 (0.40)	150.0 (5.90)	84.0 (3.31)	124.0 (4.89)	115.0 (4.528)	95.0 (3.74)	98.3 (3.87)	10.0 (0.401)		6.0 (0.234)	3.5 (0.138)	M6 x 1.0-6H x 16 (0.63)
430				215.0 (8.48)			175.0 (6.90)	110.0 (4.31)	150.0 (5.89)								
4530				229.0 (9.0)			179.0 (7.03)	113.0 (4.44)	153.0 (6.02)								
4540	98.6 (3.88)	24.0 (0.945)	155.4 (6.12)	254.0 (10.0)	50.0 (1.97)	12.19 (0.48)	204.0 (8.03)	138.0 (5.44)	178.0 (7.02)	130.0 (5.118)	110.0 (4.331)	113.7 (4.48)	10.0 (0.401)	2.74 (0.108)	8.0 (0.31)	4.0 (0.158)	M8 x 1.25 -6H x 19 (0.75)
4560				305 (12.0)			255.0 (10.03)	189.0 (7.44)	229.0 (9.02)								
520				237.0 (9.33)			176.0 (6.92)	109.0 (4.30)	149.0 (5.88)								
540	113.4 (4.47)	28.0 (1.102)	185.2 (7.29)	287.0 (11.30)	60.0 (2.38)	14.0 (0.55)	227.0 (8.92)	162.0 (6.30)	200.0 (7.88)	165.0 (6.496)	130.0 (5.118)	143.5 (5.65)	12.0 (0.481)	3.12 (0.123)	8.0 (0.31)	4.0 (0.158)	M10 x 1.5-6H x 22 (0.87)
560				337.0 (13.27)			277.0 (10.90)	211.0 (8.30)	251.0 (9.88)								
580 <sup>6</sup>	136.4 (5.37)	32.0 (1.259)	208.1 (8.19)	408.0 (16.06)	80.0 (3.15)		328.0 (12.91)	232.0 (9.13)	304.0 (11.95)						10.0 (0.39)	5.0 (0.197)	M12 x 1.75-6H x 28 (1.10)

<sup>1</sup> Motors with brake, add this value to the dimension:

MPL-x310 through -x330: add 35.0 mm (1.37 in.) to L, LB, and LD.

MPL-x420 through -x4560: add 48.0 mm (1.89 in.) to L, LB, and LD.

MPL-x620 through -x660 add 51.0 mm (2.03 in.) to L and LB, and LD.

MPL-B580 add 45.6 mm (1.79 in.) to L and LB, and 52.0 mm (2.05 in.) to LD and LE.

\* Refer to Kinetix Motion Control Selection Guide, publication [GMC-SG001](#) for tolerances on these measurements.

<sup>2</sup> Tolerance for this dimension is ±0.7 (±0.028).

<sup>3</sup> x3xx and x4xxx tolerance is +0.36 (±0.0007), x5xxx is +0.43 (±0.008)

<sup>4</sup> Tolerance for this dimension is -0.03 (-0.001).

<sup>5</sup> Tolerance for this dimension is +0.1 (+0.004).

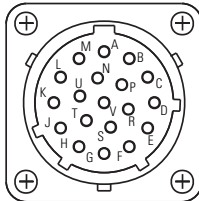
<sup>6</sup> MPL-B580x is available only with 460V windings.

## Connector Data

The table below list the signal descriptions for the feedback, power, and brake connector pins on the MPL-xxxxxx-xx2xxx connector style.

### Feedback Connector

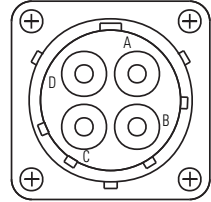
Pin	2000 Line Encoder	2 Pole Resolver	High Resolution Encoder for:		
			MPL-A3xx through -A45xx	MPL-A5xx, and all MPL-B (460V)	
A	AM+	S2	SIN+	SIN+	
B	AM-	S4	SIN-	SIN-	
C	BM+	S1	COS+	COS+	
D	BM-	S3	COS-	COS-	
E	IM+	Reserved	DATA+	DATA+	
F	I-M		DATA-	DATA-	
G	Ground	R1	Reserved	Reserved	
H	ABS	R2			
J	Reserved	Reserved			
K	EPWR_5 V	+5 VDC			
L	ECOM	Reserved	Common	+9 VDC	
M	Reserved		Reserved		Reserved
N					
P					
R	TS+	TS+	TS+	TS+	
S	TS-	TS-	TS-	TS-	
T	S1	Reserved	Reserved	Reserved	
U	S2				
V	S3				



ITT Cannon  
TNM 16-19, 192993-0110

### Power Connector

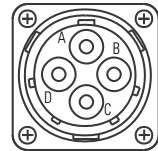
Pin	Signal
A	Phase U
B	Phase V
C	Phase W
D	Ground



ITT Cannon  
TNM 16-4, 192993-0106

### Brake Connector

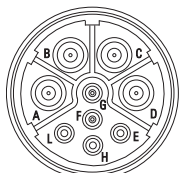
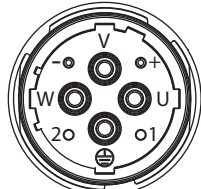
Pin	Signal
A	MBRK+
B	Reserved
C	MBRK-
D	Reserved

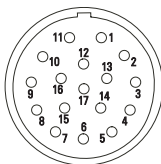


ITT Cannon  
TNM 10-4, 192993-0116



The table below list the signal descriptions for the feedback, power, and brake connector pins on the MPL-xxxx-xx7xxx connector style.

Feedback				Power and Brake	
Pin	High Resolution Encoder MPL-Axxx (230V)	High Resolution Encoder MPL-Bxxx (460V)	Incremental Encoder MPL-A/Bxxxx-Hxxxx	Pin	MPL-Axxx and MPL-Bxxx
1	SIN+	SIN+	AM+	A	Phase U <sup>(2)</sup>
2	SIN-	SIN-	AM-	B	Phase V <sup>(2)</sup>
3	COS+	COS+	BM+	C	Phase W <sup>(2)</sup>
4	COS-	COS-	BM-	D	Ground <sup>(2)</sup>
5	DATA+	DATA+	IM+	E	Reserved <sup>(2)</sup>
6	DATA-	DATA-	IM-	F	MBRK+ <sup>(2)</sup>
7	Reserved	Reserved	Reserved	G	MBRK- <sup>(2)</sup>
8				Reserved <sup>(2)</sup>	
9					L <sup>(1)</sup>
9	EPWR_5V		EPWR_5V		
10	ECOM		ECOM	M23 Connector	
11	Reserved	EPWR_9V	Reserved	 <p>Intercontec P/N BEDC090NN0000005000</p> <p>M40 Connector</p>  <p>Intercontec P/N CEDE271NN00000051000</p>	
12		ECOM			
13	TS+	TS+	S1		
14	TS-	TS-	S2		
15	Reserved	Reserved	S3		
16					
17					



Intercontec P/N  
AEDC113NN00000012000

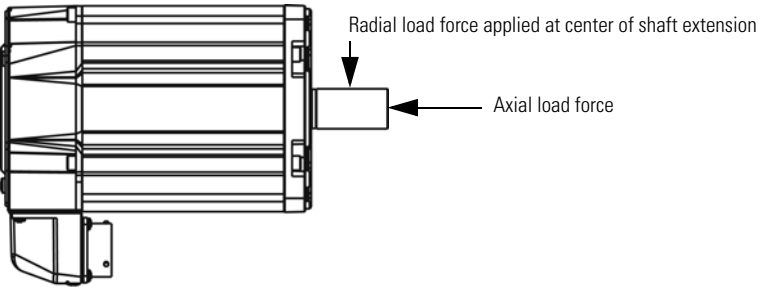
<sup>(1)</sup> M23 (BEDC...) connector has nine pins, and the M40 (CEDE...) connector has eight pins.

<sup>(2)</sup> Power pins A, B, C, and D may be labelled as U, V, W, and GND respectively. Brake pins F and G brake may be labelled as + and - respectively. Reserved pins E and H may be numbered 1 or 2.

## Motor Load Force Ratings

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

### 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	500 rpm		1000 rpm		2000 rpm		3000 rpm		3500 rpm		4000 rpm		5000 rpm	
	kg	(lb)	kg	(lb)	kg	(lb)	kg	(lb)	kg	(lb)	kg	(lb)	kg	(lb)
MPL-A/B310	78	(171)	62	(136)	49	(108)	—	—	40	(89)	—	—	36	(79)
MPL-A/B320	87	(192)	69	(152)	55	(121)	—	—	45	(100)	—	—	40	(89)
MPL-A/B330	—	—	74	(163)	59	(129)	—	—	49	(107)	—	—	43	(95)
MPL-A/B420	—	—	78	(172)	62	(136)	—	—	51	(113)	—	—	45	(100)
MPL-A/B430	106	(234)	84	(186)	67	(148)	—	—	55	(122)	—	—	49	(109)
MPL-A/B4520	—	—	97	(213)	77	(169)	67	(147)	64	(140)	61	(134)	56	(124)
MPL-A/B4530	133	(292)	105	(232)	84	(184)	73	(161)	—	—	66	(146)	—	—
MPL-A/B4540	140	(309)	111	(245)	89	(195)	77	(170)	—	—	—	—	—	—
MPL-A/B4560	151	(332)	119	(263)	95	(209)	83	(183)	—	—	—	—	—	—
MPL-A/B520	—	—	127	(280)	100	(222)	88	(194)	—	—	80	(176)	—	—
MPL-A/B540	—	—	143	(316)	114	(251)	99	(219)	—	—	90	(199)	—	—
MPL-A/B560	—	—	153	(338)	121	(268)	106	(234)	—	—	—	—	—	—
MPL-B580	—	—	153	(338)	121	(268)	106	(234)	—	—	—	—	—	—

*Axial Load Force Ratings (Maximum Radial Load)*

Motor	500 rpm		1000 rpm		2000 rpm		3000 rpm		3500 rpm		4000 rpm		5000 rpm	
	kg	(lb)	kg	(lb)	kg	(lb)	kg	(lb)	kg	(lb)	kg	(lb)	kg	(lb)
MPL-A/B310	30	(66)	23	(50)	16	(36)	—	—	13	(29)	—	—	11	(24)
MPL-A/B320	34	(74)	25	(56)	19	(41)	—	—	15	(32)	—	—	13	(28)
MPL-A/B330	—	—	27	(59)	20	(44)	—	—	16	(35)	—	—	13	(29)
MPL-A/B420	—	—	36	(80)	27	(59)	—	—	21	(47)	—	—	18	(39)
MPL-A/B430	52	(115)	39	(86)	29	(63)	—	—	22	(49)	—	—	19	(42)
MPL-A/B4520	—	—	31	(68)	23	(50)	19	(42)	18	(39)	17	(37)	15	(33)
MPL-A/B4530	45	(100)	34	(74)	25	(55)	21	(46)	—	—	19	(41)	—	—
MPL-A/B4540	49	(107)	36	(80)	27	(59)	22	(49)	—	—	—	—	—	—
MPL-A/B4560	53	(117)	40	(88)	30	(65)	24	(53)	—	—	—	—	—	—
MPL-A/B520	—	—	42	(94)	30	(68)	26	(58)	—	—	22	(50)	—	—
MPL-A/B540	—	—	48	(107)	35	(79)	30	(66)	—	—	26	(58)	—	—
MPL-A/B560	—	—	52	(115)	43	(95)	32	(71)	—	—	—	—	—	—
MPL-B580	—	—	52	(115)	43	(95)	32	(71)	—	—	—	—	—	—

*Axial Load Force Ratings (Zero Radial Load)*

Motor	500 rpm		1000 rpm		2000 rpm		3000 rpm		3500 rpm		4000 rpm		5000 rpm	
	kg	(lb)	kg	(lb)	kg	(lb)	kg	(lb)	kg	(lb)	kg	(lb)	kg	(lb)
MPL-A/B310	49	(109)	36	(80)	27	(59)	—	—	21	(47)	—	—	18	(40)
MPL-A/B320	49	(109)	36	(80)	27	(59)	—	—	21	(47)	—	—	18	(40)
MPL-A/B330	—	—	36	(80)	27	(59)	—	—	21	(47)	—	—	18	(40)
MPL-A/B420	—	—	51	(112)	38	(83)	—	—	30	(65)	—	—	25	(55)
MPL-A/B430	69	(152)	51	(112)	38	(83)	—	—	30	(65)	—	—	25	(55)
MPL-A/B4520	—	—	51	(112)	38	(83)	31	(69)	30	(65)	28	(61)	25	(55)
MPL-A/B4530	69	(152)	51	(112)	38	(83)	31	(69)	—	—	28	(61)	—	—
MPL-A/B4540	69	(152)	51	(112)	38	(83)	31	(69)	—	—	—	—	—	—
MPL-A/B4560	69	(152)	51	(112)	38	(83)	31	(69)	—	—	—	—	—	—
MPL-A/B520	—	—	67	(149)	49	(109)	41	(92)	—	—	36	(81)	—	—
MPL-A/B540	—	—	67	(149)	49	(109)	41	(92)	—	—	36	(81)	—	—
MPL-A/B560	—	—	67	(149)	49	(109)	41	(92)	—	—	—	—	—	—
MPL-B580	—	—	67	(149)	49	(109)	41	(92)	—	—	—	—	—	—

## Environmental Ratings

Attribute	Value
Temperature, operating	0...40 °C (32...104 °F)
Temperature, storage	-30...70 °C (-22...158° F)
Relative humidity, storage	5...95% non-condensing
Atmosphere, storage	non-corrosive
IP Rating <sup>(1)</sup> of motor with optional shaft seal <sup>(2)</sup> installed	IP 66 (dust tight, heavy jet spray)
Motor without a shaft seal, and mounted in this direction. shaft down shaft horizontal shaft up	IP53 IP51 IP50
ATEX rating <sup>(3)</sup>	Group II, Zone 2 (non-mining, normal operating conditions)

<sup>(1)</sup> International Protection Code (IP 66) is roughly equivalent to a NEMA 35 (dust tight, drip tight).

<sup>(2)</sup> An optional shaft seal kit is required to provide the IP66 rating (excludes lower rating for cable connectors). See Additional Resources on [page 22](#) for shaft seal installation instructions.

<sup>(3)</sup> Operational environment according to ATEX directive 94/9/EC. See motor label for specific level of protection markings.

Motor feedback, auxiliary feedback, and I/O connector kits are not provided. Refer to the Kinetix Motion Control Selection Guide, publication [GMC-SG001](#), for connector kit catalog numbers.

## Cables and Connector Kits

Factory manufactured feedback and power cables are available in standard cable lengths. They can provide environmental sealing and shield termination. Contact your nearest Allen-Bradley sales office or refer to your drive's installation manual for a complete listing of available cables.

If you choose to build your own cables, connector kits available for MP-Series Small Frame motors are described in the Kinetix Motion Control Selection Guide, publication [GMC-SG001](#).

## Shaft Seal Kits

Catalog numbers and dimensions for Nitrile shaft seals are shown below.

Motor	Cat. No. <sup>1</sup>	Inside Diameter		Outside Diameter		Width	
		mm	(in.)	mm	(in.)	mm	(in.)
MPL-A310 and -B310	MPL-SSN-A3B3	17	(0.669)	47	(1.850)	7	(0.276)
MPL-A320 and -B320							
MPL-A330 and -B330							
MPL-A420 and -B420	MPL-SSN-A4B4	20	(0.787)	52	(2.047)	7	(0.276)
MPL-A430 and -B430							
MPL-A4520 and -B4520	MPL-SSN-A5B5	25	(0.984)	62	(2.441)	7	(0.276)
MPL-A4530 and -B4530							
MPL-A4540 and -B4540							
MPL-A4560 and -B4560							
MPL-A520, B520, A540, A560 and B560	MPL-SSN-F165	30	(1.181)	72	(2.835)	8	(0.315)
MPL-B580	MPL-SSN-F165-32MM	35	(1.378)	72	(2.835)	8	(0.315)

<sup>1</sup> Nitrile shaft seals require a lubricant to reduce wear. The lubricant is provided with kit.

## Additional Resources

These publications provide additional information about MP-Series motors, drives compatible with these motors, and good installation practices.

Resource	Description
MP-Series Brushless Servo Motor Installation Instructions, publication <a href="#">MP-IN002</a>	Information on installing, large frame ( $\geq 215$ mm) MP-Series low-inertia motors
MP-Series Brushless Servo Motor Installation Instructions, publication <a href="#">MP-IN006</a>	Information on installing, small frame ( $\leq 75$ mm) MP-Series low-inertia motors
Ultra5000 IPD Installation Instructions, publication <a href="#">2098-IN001</a>	Information on installing, configuring, startup, and troubleshooting a servo drive system with an MP-Series motor and an Ultra5000 drive.
Ultra3000 DSD Installation Instructions, publication <a href="#">2098-IN003</a>	Information on installing, configuring, startup, and troubleshooting a servo drive system with an MP-Series motor and 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 an MP-Series motor and 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 an MP-Series motor and a Kinetix 6000 drive
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-RM001</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:**

# 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 in order to complete the return process.
Outside United States	Please contact your local Rockwell Automation representative for the return procedure.

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