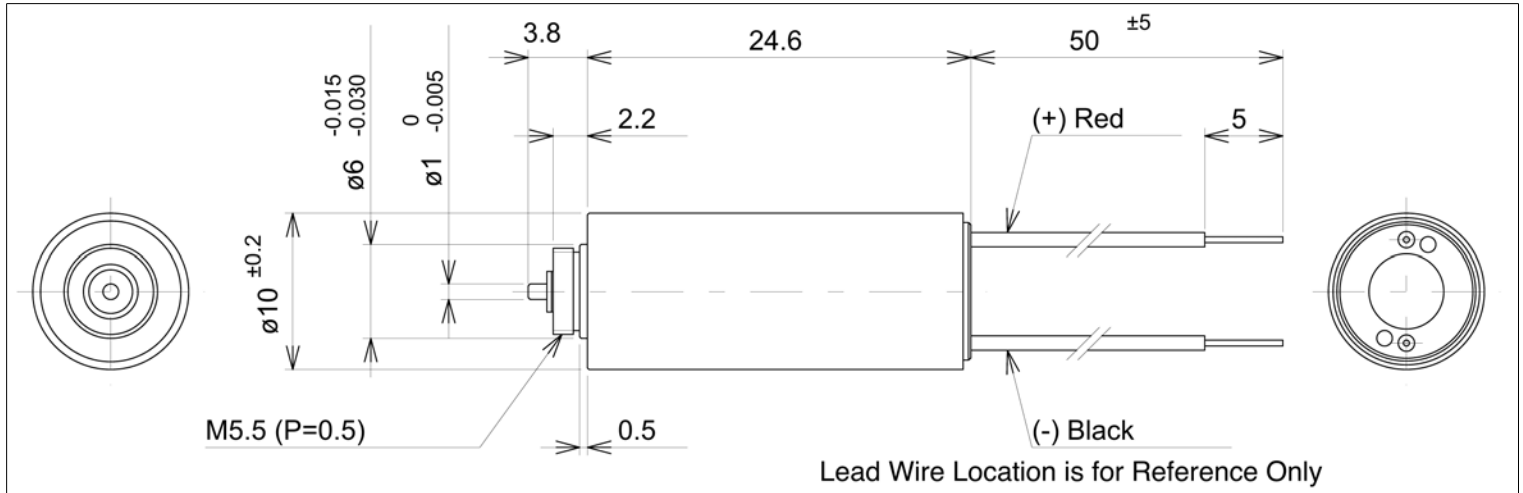


# Coreless DC Motor - 10 mm Ø x 25

C10P03SX010 0.96 Watts Peak Power



Global Motion Products



Not to Scale - Dimensions in millimeters (mm)

Nominal Voltage	3.0 Volts	3.0 Volts	3.0 Volts
No-Load Speed	12,750 rpm	12,750 rpm	12,750 rpm
Stall Torque	2.9 mNm	30.0 gcm	0.41 oz-in
No-Load Current	0.020 Amps	0.020 Amps	0.020 Amps
Peak Output Power	0.96 Watts	0.96 Watts	0.96 Watts

Torque Constant	2.21 mNm/A	22.57 gcm/A	0.31 oz-in/A
Terminal Resistance	2.27 Ohms	2.27 Ohms	2.27 Ohms
Back-EMF Constant	0.23 V/krpm	0.23 V/krpm	0.23 V/krpm
Inductance	0.026 mH	0.026 mH	0.026 mH
Rotor Inertia	0.108 kg-m <sup>2</sup> x10 <sup>-7</sup>	0.108 gm cm <sup>2</sup>	0.015 x10 <sup>-4</sup> oz in sec <sup>2</sup>

Mechanical Time Constant	5.0 msec	5.0 msec	5.0 msec
Slope of Speed/Torque Curve	4,359.7 rpm/mNm	425.0 rpm/gcm	30,786.1 rpm/oz-in
Speed Constant	4,315 rpm/Volt	4,315 rpm/Volt	4,315 rpm/Volt
Motor Constant	1.47 mNm/√Watt	14.98 gcm/√Watt	0.21 oz-in/√Watt

Ratings below are at 60°C. At room temperature the ratings would be considerably higher.

Rated Power @ 10,250 rpm	0.82 Watts	0.82 Watts	0.82 Watts
Rated Torque @ 10,250 rpm	0.6 mNm	5.6 gcm	0.08 oz-in
Rated Current @ 10,250 rpm	0.270 Amps	0.270 Amps	0.270 Amps

Part Number: How to Order C10P03SX010 Characteristics - Specifications at 22 °C

Radial Load Rating	Radial Play	Max Temperature	65 °C
Radial Load Distance	Thrust Play ≤ 0.300 mm	Min Temperature	-10 °C
Axial Load	Magnet Type NdFeB	Max Winding Temp	120 °C
Press Fit Force - Max	Bearing Type Sleeve Bearings	Mass	10.7 grams
Gearbox Options	10 mm Diameter Exact Ratio Metal Planetary Gearbox		
Encoder Options	Integrated 3 to 24 Volt 10 mm diameter 2 channel 10 mA incremental 12 lines/track encoder		
Options - Other	3 Volt to 12 Volt windings. Wire leads and connectors.		

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Commutation Type: Manufactured under a  
 Precious Metal Certified ISO 9001:2008  
 Quality System

RoHS Compliant

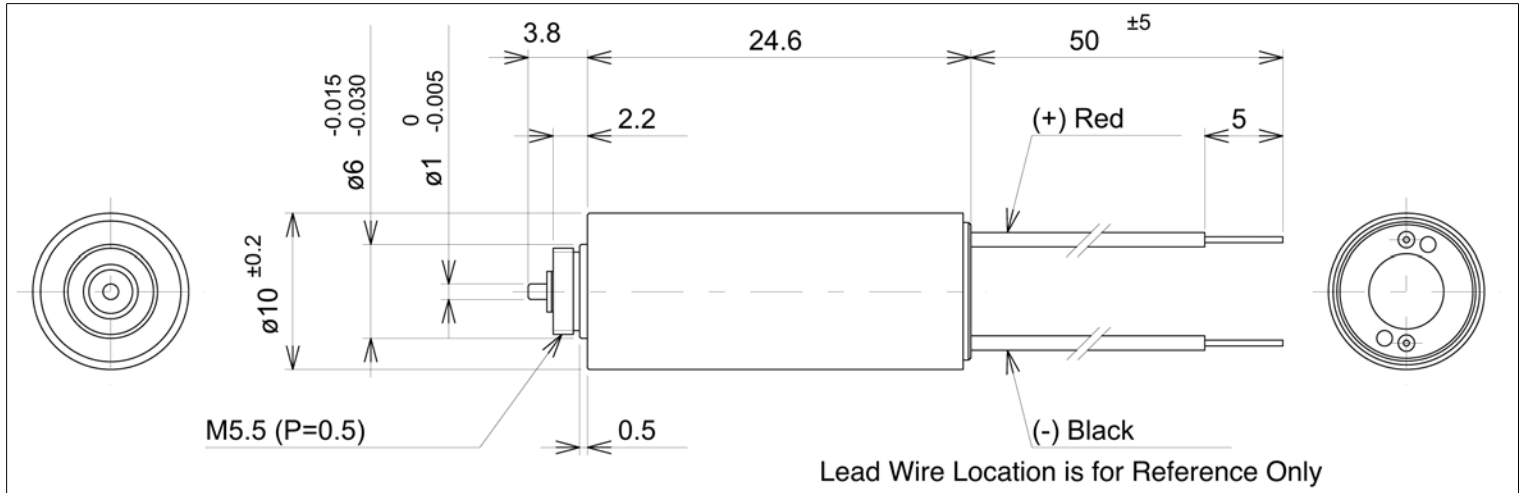
Specifications Subject to change without

# Coreless DC Motor - 10 mm Ø x 25

C10P03SX000 **0.78 Watts Peak Power**



Global Motion Products



Not to Scale - Dimensions in millimeters (mm)

Nominal Voltage	3.0 Volts	3.0 Volts	3.0 Volts
No-Load Speed	11,300 rpm	11,300 rpm	11,300 rpm
Stall Torque	2.7 mNm	27.0 gcm	0.38 oz-in
No-Load Current	0.020 Amps	0.020 Amps	0.020 Amps
Peak Output Power	0.78 Watts	0.78 Watts	0.78 Watts

Torque Constant	2.49 mNm/A	25.37 gcm/A	0.35 oz-in/A
Terminal Resistance	2.78 Ohms	2.78 Ohms	2.78 Ohms
Back-EMF Constant	0.26 V/krpm	0.26 V/krpm	0.26 V/krpm
Inductance	0.029 mH	0.029 mH	0.029 mH
Rotor Inertia	0.103 kg-m <sup>2</sup> x10 <sup>-7</sup>	0.103 gm cm <sup>2</sup>	0.015 x10 <sup>-4</sup> oz in sec <sup>2</sup>

Mechanical Time Constant	4.6 msec	4.6 msec	4.6 msec
Slope of Speed/Torque Curve	4,208.4 rpm/mNm	418.5 rpm/gcm	29,717.5 rpm/oz-in
Speed Constant	3,838 rpm/Volt	3,838 rpm/Volt	3,838 rpm/Volt
Motor Constant	1.49 mNm/√Watt	15.22 gcm/√Watt	0.21 oz-in/√Watt

Ratings below are at 60°C. At room temperature the ratings would be considerably higher.

Rated Power @	9,100 rpm	0.67 Watts	0.67 Watts	0.67 Watts
Rated Torque @	9,100 rpm	0.6 mNm	6.6 gcm	0.09 oz-in
Rated Current @	9,100 rpm	0.280 Amps	0.280 Amps	0.280 Amps

Part Number: How to Order C10P03SX000 Characteristics - Specifications at 22 °C

Radial Load Rating	Radial Play	Max Temperature	65 °C
Radial Load Distance	Thrust Play ≤ 0.300 mm	Min Temperature	-10 °C
Axial Load	Magnet Type NdFeB	Max Winding Temp	120 °C
Press Fit Force - Max	Bearing Type Sleeve Bearings	Mass	10.7 grams
Gearbox Options	10 mm Diameter Exact Ratio Metal Planetary Gearbox		
Encoder Options	Integrated 3 to 24 Volt 10 mm diameter 2 channel 10 mA incremental 12 lines/track encoder		
Options - Other	3 Volt to 12 Volt windings. Wire leads and connectors.		

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Commutation Type: **Manufactured under a Certified ISO 9001:2008 Quality System**  
 Precious Metal

**RoHS Compliant**

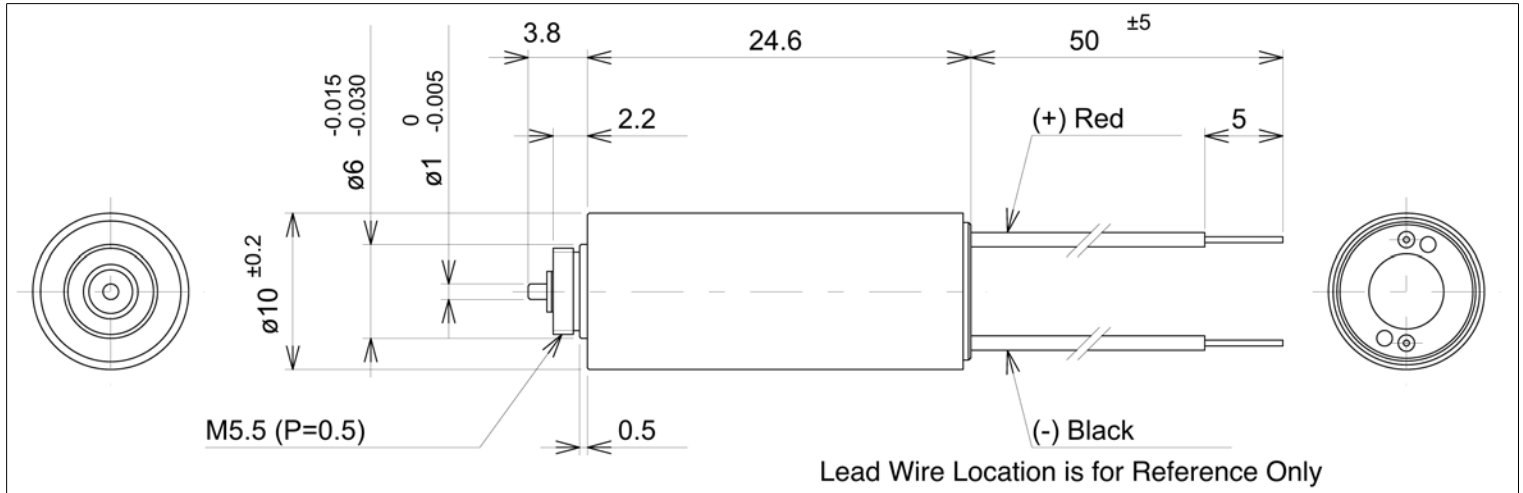
Specifications Subject to change without

# Coreless DC Motor - 10 mm Ø x 25

C10P05SX010 1.20 Watts Peak Power



Global Motion Products



Not to Scale - Dimensions in millimeters (mm)

Nominal Voltage	4.5 Volts	4.5 Volts	4.5 Volts
No-Load Speed	13,900 rpm	13,900 rpm	13,900 rpm
Stall Torque	3.4 mNm	35.0 gcm	0.48 oz-in
No-Load Current	0.040 Amps	0.040 Amps	0.040 Amps
Peak Output Power	1.20 Watts	1.20 Watts	1.20 Watts

Torque Constant	2.98 mNm/A	30.42 gcm/A	0.42 oz-in/A
Terminal Resistance	3.93 Ohms	3.93 Ohms	3.93 Ohms
Back-EMF Constant	0.31 V/krpm	0.31 V/krpm	0.31 V/krpm
Inductance	0.045 mH	0.045 mH	0.045 mH
Rotor Inertia	0.104 kg-m <sup>2</sup> x10 <sup>-7</sup>	0.104 gm cm <sup>2</sup>	0.015 x10 <sup>-4</sup> oz in sec <sup>2</sup>

Mechanical Time Constant	4.6 msec	4.6 msec	4.6 msec
Slope of Speed/Torque Curve	4,068.8 rpm/mNm	397.1 rpm/gcm	28,732.2 rpm/oz-in
Speed Constant	3,201 rpm/Volt	3,201 rpm/Volt	3,201 rpm/Volt
Motor Constant	1.50 mNm/√Watt	15.35 gcm/√Watt	0.21 oz-in/√Watt

Ratings below are at 60°C. At room temperature the ratings would be considerably higher.

Rated Power @	11,200 rpm	0.95 Watts	0.95 Watts	0.95 Watts
Rated Torque @	11,200 rpm	0.8 mNm	8.2 gcm	0.11 oz-in
Rated Current @	11,200 rpm	0.310 Amps	0.310 Amps	0.310 Amps

Part Number: How to Order C10P05SX010 Characteristics - Specifications at 22 °C

Radial Load Rating	Radial Play	Max Temperature	65 °C
Radial Load Distance	Thrust Play ≤ 0.300 mm	Min Temperature	-10 °C
Axial Load	Magnet Type NdFeB	Max Winding Temp	120 °C
Press Fit Force - Max	Bearing Type Sleeve Bearings	Mass	10.7 grams
Gearbox Options	10 mm Diameter Exact Ratio Metal Planetary Gearbox		
Encoder Options	Integrated 3 to 24 Volt 10 mm diameter 2 channel 10 mA incremental 12 lines/track encoder		
Options - Other	3 Volt to 12 Volt windings. Wire leads and connectors.		

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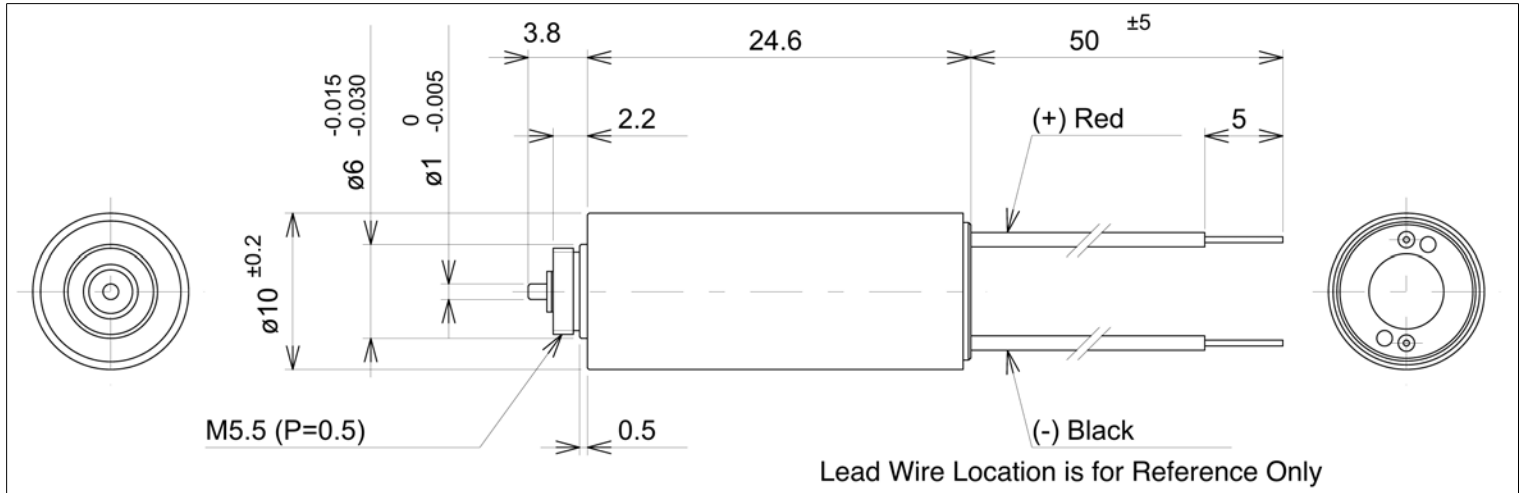
Specifications Subject to change without

# Coreless DC Motor - 10 mm Ø x 25

C10P05SX000 0.91 Watts Peak Power



Global Motion Products



Not to Scale - Dimensions in millimeters (mm)

Nominal Voltage	4.5 Volts	4.5 Volts	4.5 Volts
No-Load Speed	11,500 rpm	11,500 rpm	11,500 rpm
Stall Torque	3.1 mNm	32.0 gcm	0.44 oz-in
No-Load Current	0.020 Amps	0.020 Amps	0.020 Amps
Peak Output Power	0.91 Watts	0.91 Watts	0.91 Watts

Torque Constant	3.65 mNm/A	37.21 gcm/A	0.52 oz-in/A
Terminal Resistance	5.28 Ohms	5.28 Ohms	5.28 Ohms
Back-EMF Constant	0.38 V/krpm	0.38 V/krpm	0.38 V/krpm
Inductance	0.100 mH	0.100 mH	0.100 mH
Rotor Inertia	0.109 kg-m <sup>2</sup> x10 <sup>-7</sup>	0.109 gm cm <sup>2</sup>	0.015 x10 <sup>-4</sup> oz in sec <sup>2</sup>

Mechanical Time Constant	4.3 msec	4.3 msec	4.3 msec
Slope of Speed/Torque Curve	3,697.8 rpm/mNm	359.4 rpm/gcm	26,112.3 rpm/oz-in
Speed Constant	2,617 rpm/Volt	2,617 rpm/Volt	2,617 rpm/Volt
Motor Constant	1.59 mNm/√Watt	16.19 gcm/√Watt	0.22 oz-in/√Watt

Ratings below are at 60°C. At room temperature the ratings would be considerably higher.

Rated Power @ 9,300 rpm	792.00 Watts	792.00 Watts	792.00 Watts
Rated Torque @ 9,300 rpm	0.7 mNm	7.4 gcm	0.10 oz-in
Rated Current @ 9,300 rpm	0.220 Amps	0.220 Amps	0.220 Amps

Part Number: How to Order C10P05SX000 Characteristics - Specifications at 22 °C

Radial Load Rating	Radial Play	Max Temperature	65 °C
Radial Load Distance	Thrust Play ≤ 0.300 mm	Min Temperature	-10 °C
Axial Load	Magnet Type NdFeB	Max Winding Temp	120 °C
Press Fit Force - Max	Bearing Type Sleeve Bearings	Mass	10.7 grams
Gearbox Options	10 mm Diameter Exact Ratio Metal Planetary Gearbox		
Encoder Options	Integrated 3 to 24 Volt 10 mm diameter 2 channel 10 mA incremental 12 lines/track encoder		
Options - Other	3 Volt to 12 Volt windings. Wire leads and connectors.		

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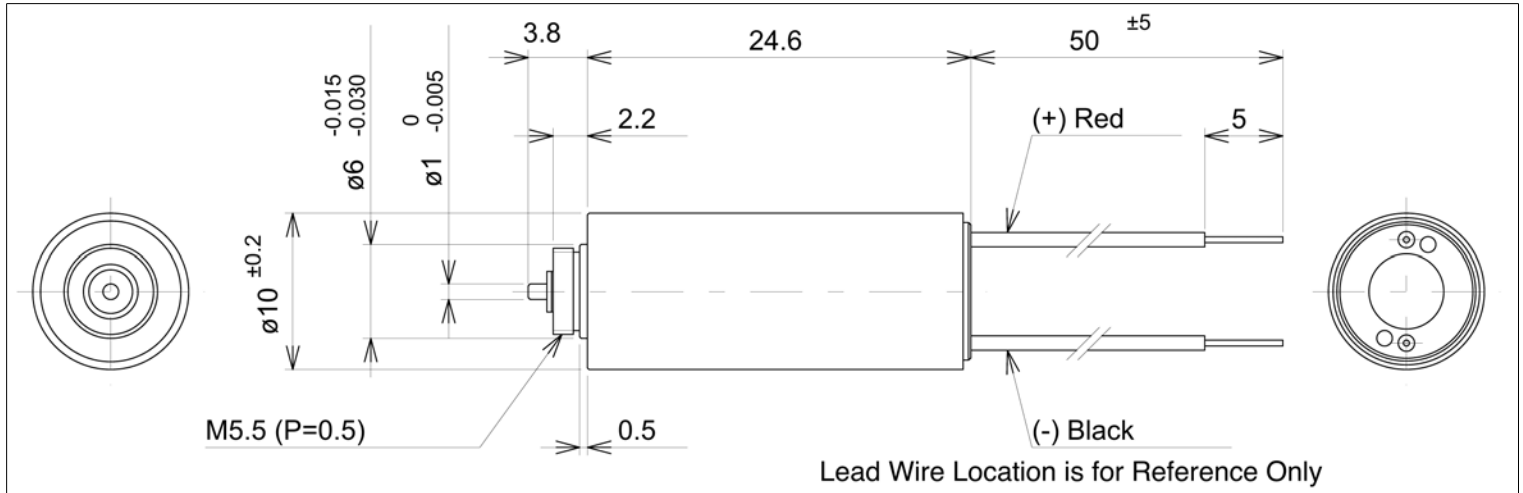
Specifications Subject to change without

# Coreless DC Motor - 10 mm Ø x 25

C10P06SX000 1.06 Watts Peak Power



Global Motion Products



Not to Scale - Dimensions in millimeters (mm)

Nominal Voltage	6.0 Volts	6.0 Volts	6.0 Volts
No-Load Speed	11,700 rpm	11,700 rpm	11,700 rpm
Stall Torque	3.5 mNm	36.0 gcm	0.50 oz-in
No-Load Current	0.013 Amps	0.013 Amps	0.013 Amps
Peak Output Power	1.06 Watts	1.06 Watts	1.06 Watts

Torque Constant	4.81 mNm/A	49.03 gcm/A	0.68 oz-in/A
Terminal Resistance	8.18 Ohms	8.18 Ohms	8.18 Ohms
Back-EMF Constant	0.50 V/krpm	0.50 V/krpm	0.50 V/krpm
Inductance	0.100 mH	0.100 mH	0.100 mH
Rotor Inertia	0.112 kg-m <sup>2</sup> x10 <sup>-7</sup>	0.112 gm cm <sup>2</sup>	0.016 x10 <sup>-4</sup> oz in sec <sup>2</sup>

Mechanical Time Constant	4.0 msec	4.0 msec	4.0 msec
Slope of Speed/Torque Curve	3,317.6 rpm/mNm	325.0 rpm/gcm	23,427.1 rpm/oz-in
Speed Constant	1,986 rpm/Volt	1,986 rpm/Volt	1,986 rpm/Volt
Motor Constant	1.68 mNm/√Watt	17.14 gcm/√Watt	0.24 oz-in/√Watt

Ratings below are at 60°C. At room temperature the ratings would be considerably higher.

Rated Power @	9,450 rpm	0.92 Watts	0.92 Watts	0.92 Watts
Rated Torque @	9,450 rpm	0.8 mNm	8.7 gcm	0.12 oz-in
Rated Current @	9,450 rpm	0.190 Amps	0.190 Amps	0.190 Amps

Part Number: How to Order C10P06SX000 Characteristics - Specifications at 22 °C

Radial Load Rating	Radial Play	Max Temperature	65 °C
Radial Load Distance	Thrust Play ≤ 0.300 mm	Min Temperature	-10 °C
Axial Load	Magnet Type NdFeB	Max Winding Temp	120 °C
Press Fit Force - Max	Bearing Type Sleeve Bearings	Mass	10.7 grams
Gearbox Options	10 mm Diameter Exact Ratio Metal Planetary Gearbox		
Encoder Options	Integrated 3 to 24 Volt 10 mm diameter 2 channel 10 mA incremental 12 lines/track encoder		
Options - Other	3 Volt to 12 Volt windings. Wire leads and connectors.		

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Commutation Type: Manufactured under a  
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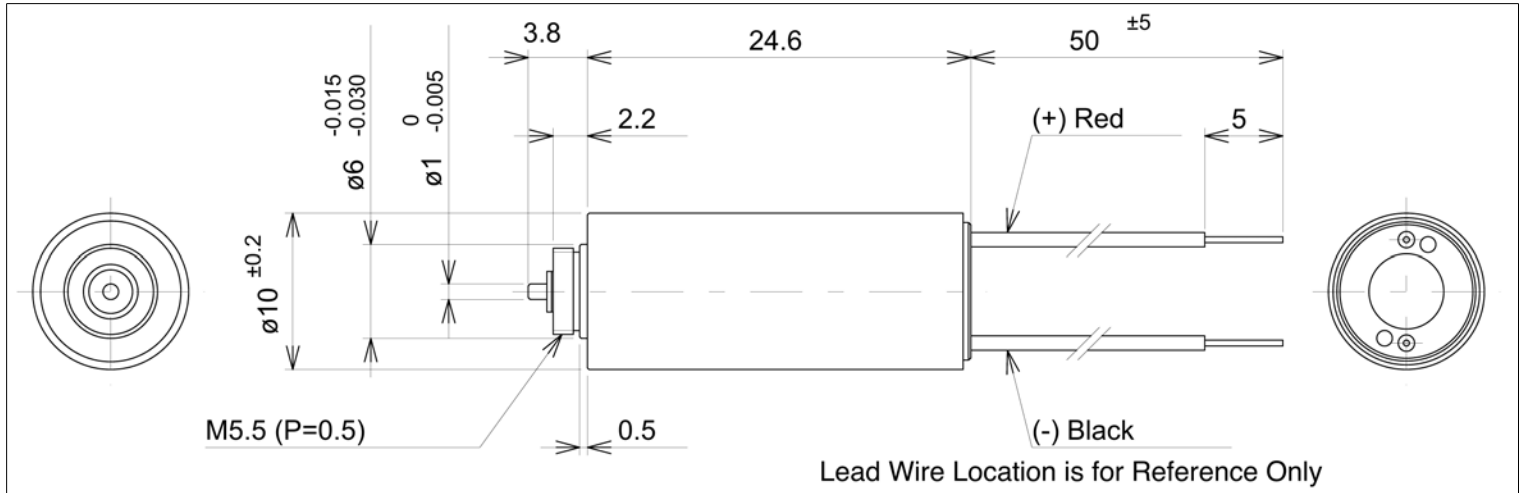
Specifications Subject to change without

# Coreless DC Motor - 10 mm Ø x 25

C10P06SX010 0.69 Watts Peak Power



Global Motion Products



Not to Scale - Dimensions in millimeters (mm)

Nominal Voltage	6.0 Volts	6.0 Volts	6.0 Volts
No-Load Speed	9,800 rpm	9,800 rpm	9,800 rpm
Stall Torque	2.8 mNm	28.0 gcm	0.39 oz-in
No-Load Current	0.013 Amps	0.013 Amps	0.013 Amps
Peak Output Power	0.69 Watts	0.69 Watts	0.69 Watts

Torque Constant	5.69 mNm/A	57.98 gcm/A	0.81 oz-in/A
Terminal Resistance	12.40 Ohms	12.40 Ohms	12.40 Ohms
Back-EMF Constant	0.60 V/krpm	0.60 V/krpm	0.60 V/krpm
Inductance	0.200 mH	0.200 mH	0.200 mH
Rotor Inertia	0.109 kg-m <sup>2</sup> x10 <sup>-7</sup>	0.109 gm cm <sup>2</sup>	0.015 x10 <sup>-4</sup> oz in sec <sup>2</sup>

Mechanical Time Constant	4.2 msec	4.2 msec	4.2 msec
Slope of Speed/Torque Curve	3,562.3 rpm/mNm	350.0 rpm/gcm	25,155.6 rpm/oz-in
Speed Constant	1,680 rpm/Volt	1,680 rpm/Volt	1,680 rpm/Volt
Motor Constant	1.61 mNm/√Watt	16.46 gcm/√Watt	0.23 oz-in/√Watt

Ratings below are at 60°C. At room temperature the ratings would be considerably higher.

Rated Power @	7,900 rpm	0.65 Watts	0.65 Watts	0.65 Watts
Rated Torque @	7,900 rpm	0.7 mNm	6.8 gcm	0.09 oz-in
Rated Current @	7,900 rpm	0.130 Amps	0.130 Amps	0.130 Amps

Part Number: How to Order C10P06SX010 Characteristics - Specifications at 22 °C

Radial Load Rating	Radial Play	Max Temperature	65 °C
Radial Load Distance	Thrust Play ≤ 0.300 mm	Min Temperature	-10 °C
Axial Load	Magnet Type NdFeB	Max Winding Temp	120 °C
Press Fit Force - Max	Bearing Type Sleeve Bearings	Mass	10.7 grams
Gearbox Options	10 mm Diameter Exact Ratio Metal Planetary Gearbox		
Encoder Options	Integrated 3 to 24 Volt 10 mm diameter 2 channel 10 mA incremental 12 lines/track encoder		
Options - Other	3 Volt to 12 Volt windings. Wire leads and connectors.		

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Commutation Type: Manufactured under a  
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 Quality System

RoHS Compliant

Specifications Subject to change without

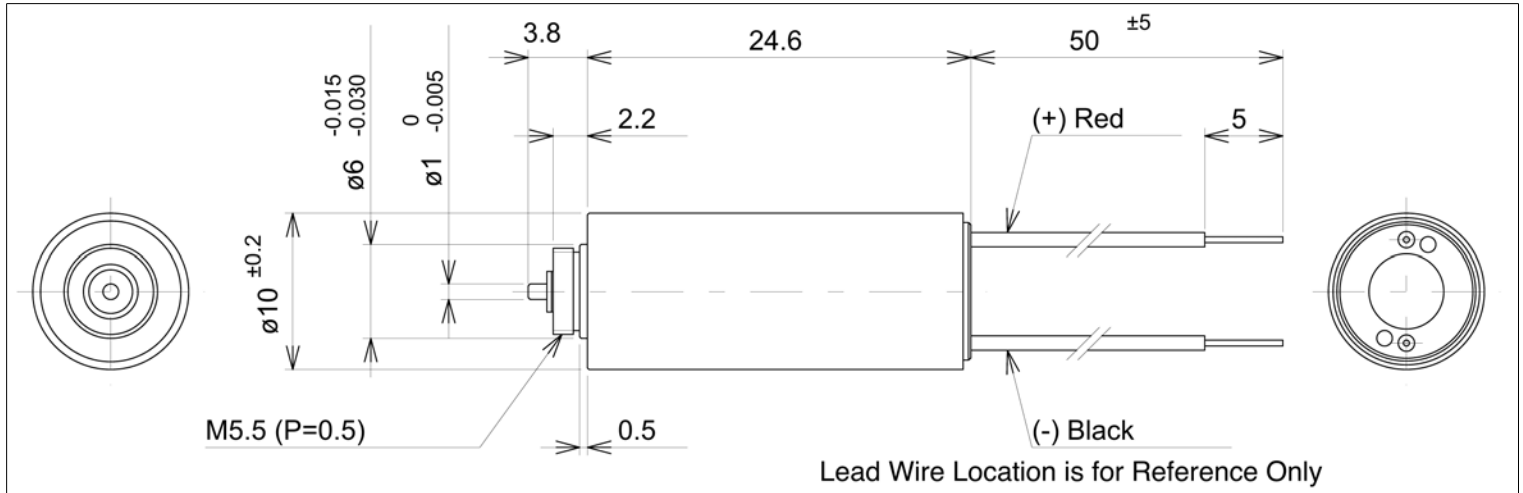


# Coreless DC Motor - 10 mm Ø x 25

C10P09SX000 0.97 Watts Peak Power



Global Motion Products



Not to Scale - Dimensions in millimeters (mm)

Nominal Voltage	9.0 Volts	9.0 Volts	9.0 Volts
No-Load Speed	12,300 rpm	12,300 rpm	12,300 rpm
Stall Torque	3.1 mNm	32.0 gcm	0.44 oz-in
No-Load Current	0.013 Amps	0.013 Amps	0.013 Amps
Peak Output Power	0.97 Watts	0.97 Watts	0.97 Watts

Torque Constant	6.78 mNm/A	69.17 gcm/A	0.96 oz-in/A
Terminal Resistance	19.70 Ohms	19.70 Ohms	19.70 Ohms
Back-EMF Constant	0.71 V/krpm	0.71 V/krpm	0.71 V/krpm
Inductance	0.300 mH	0.300 mH	0.300 mH
Rotor Inertia	0.102 kg-m <sup>2</sup> x10 <sup>-7</sup>	0.102 gm cm <sup>2</sup>	0.014 x10 <sup>-4</sup> oz in sec <sup>2</sup>

Mechanical Time Constant	4.4 msec	4.4 msec	4.4 msec
Slope of Speed/Torque Curve	3,969.0 rpm/mNm	384.4 rpm/gcm	28,027.4 rpm/oz-in
Speed Constant	1,408 rpm/Volt	1,408 rpm/Volt	1,408 rpm/Volt
Motor Constant	1.53 mNm/√Watt	15.58 gcm/√Watt	0.22 oz-in/√Watt

Ratings below are at 60°C. At room temperature the ratings would be considerably higher.

Rated Power @ 9,700 rpm	0.85 Watts	0.85 Watts	0.85 Watts
Rated Torque @ 9,700 rpm	0.8 mNm	8.1 gcm	0.11 oz-in
Rated Current @ 9,700 rpm	0.130 Amps	0.130 Amps	0.130 Amps

Part Number: How to Order C10P09SX000 Characteristics - Specifications at 22 °C

Radial Load Rating	Radial Play	Max Temperature	65 °C
Radial Load Distance	Thrust Play ≤ 0.300 mm	Min Temperature	-10 °C
Axial Load	Magnet Type NdFeB	Max Winding Temp	120 °C
Press Fit Force - Max	Bearing Type Sleeve Bearings	Mass	10.7 grams
Gearbox Options	10 mm Diameter Exact Ratio Metal Planetary Gearbox		
Encoder Options	Integrated 3 to 24 Volt 10 mm diameter 2 channel 10 mA incremental 12 lines/track encoder		
Options - Other	3 Volt to 12 Volt windings. Wire leads and connectors.		

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Commutation Type: **Manufactured under a Certified ISO 9001:2008 Quality System**  
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**RoHS Compliant**

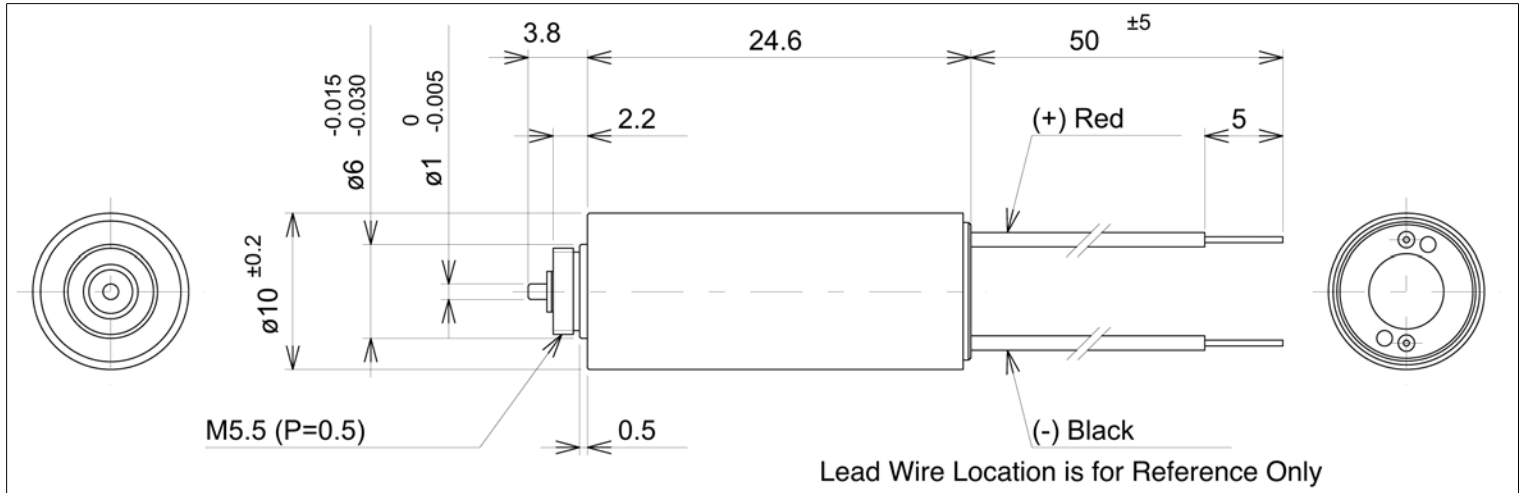
Specifications Subject to change without

# Coreless DC Motor - 10 mm Ø x 25

C10P12SX000 1.00 Watts Peak Power



Global Motion Products



Not to Scale - Dimensions in millimeters (mm)

Nominal Voltage	12.0 Volts	12.0 Volts	12.0 Volts
No-Load Speed	12,850 rpm	12,850 rpm	12,850 rpm
Stall Torque	3.1 mNm	31.0 gcm	0.44 oz-in
No-Load Current	0.013 Amps	0.013 Amps	0.013 Amps
Peak Output Power	1.00 Watts	1.00 Watts	1.00 Watts

Torque Constant	8.59 mNm/A	87.56 gcm/A	1.22 oz-in/A
Terminal Resistance	33.40 Ohms	33.40 Ohms	33.40 Ohms
Back-EMF Constant	0.90 V/krpm	0.90 V/krpm	0.90 V/krpm
Inductance	0.400 mH	0.400 mH	0.400 mH
Rotor Inertia	0.097 kg-m <sup>2</sup> x10 <sup>-7</sup>	0.097 gm cm <sup>2</sup>	0.014 x10 <sup>-4</sup> oz in sec <sup>2</sup>

Mechanical Time Constant	4.4 msec	4.4 msec	4.4 msec
Slope of Speed/Torque Curve	4,165.3 rpm/mNm	414.5 rpm/gcm	29,413.2 rpm/oz-in
Speed Constant	1,112 rpm/Volt	1,112 rpm/Volt	1,112 rpm/Volt
Motor Constant	1.49 mNm/√Watt	15.15 gcm/√Watt	0.21 oz-in/√Watt

Ratings below are at 60°C. At room temperature the ratings would be considerably higher.

Rated Power @ 10,400 rpm	0.98 Watts	0.98 Watts	0.98 Watts
Rated Torque @ 10,400 rpm	0.7 mNm	7.6 gcm	0.11 oz-in
Rated Current @ 10,400 rpm	0.100 Amps	0.100 Amps	0.100 Amps

Part Number: How to Order C10P12SX000 Characteristics - Specifications at 22 °C

Radial Load Rating	Radial Play	Max Temperature	65 °C
Radial Load Distance	Thrust Play ≤ 0.300 mm	Min Temperature	-10 °C
Axial Load	Magnet Type NdFeB	Max Winding Temp	120 °C
Press Fit Force - Max	Bearing Type Sleeve Bearings	Mass	7.4 grams

Gearbox Options 10 mm Diameter Exact Ratio Metal Planetary Gearbox  
 Encoder Options Integrated 3 to 24 Volt 10 mm diameter 2 channel 10 mA incremental 12 lines/track encoder  
 Options - Other 2.4 Volt to 6 Volt windings. Wire leads and connectors.

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Commutation Type: Manufactured under a  
 Precious Metal Certified ISO 9001:2008  
 Quality System

RoHS Compliant

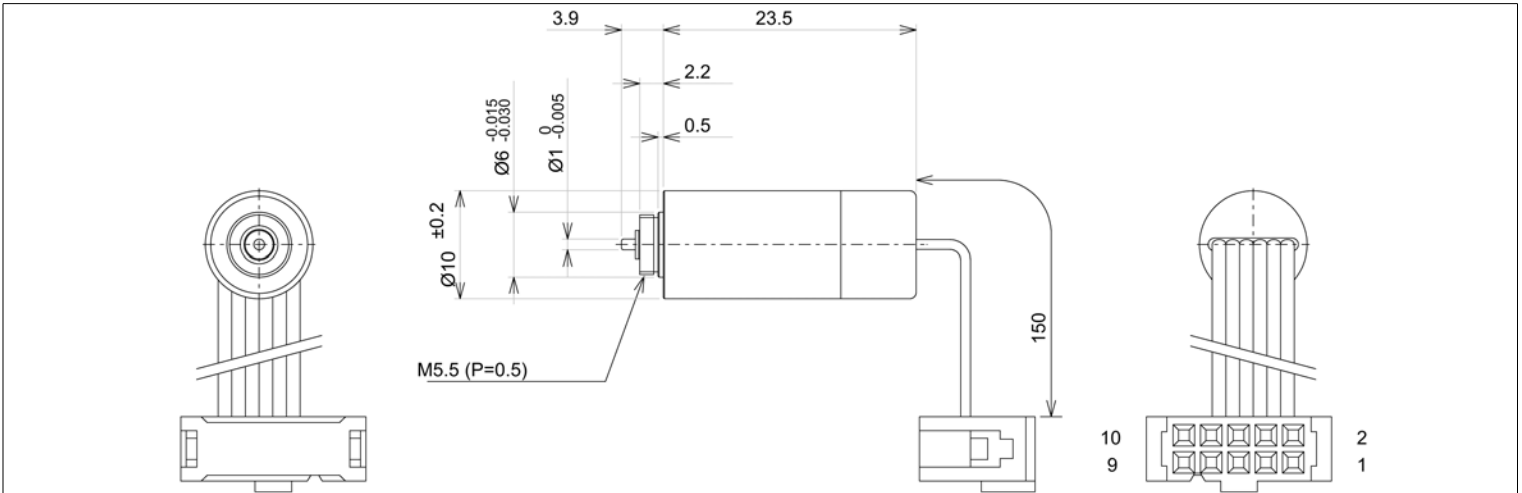
A - January 2012

Specifications Subject to change without



# 10 mm Ø Encoder - 2 Channel

Series EM10 Integrated 3 to 24 Volts ≤ 10 mA



Not to Scale - Dimensions in millimeters (mm)

**Encoder Output Signals**  
2 Channels  
10 mm Ø  
Integrated  
Hall Effect Encoder

Channel A

Channel B

Supply Voltage - Max	24.00 Volt
Supply Voltage - Min	3.00 Volt
Supply Current - Max	≤ 10 mAmp
Output Current - Max	≤ 10 mAmp
Max Temp - Operating	60°C
Min Temp - Operating	-10°C
Relative Humidity - Operating	20% to 85%

Above Drawing is for encoder mounted to 10 mm diameter x 17 mm long Coreless dc motor.  
Encoder is compatible with 10 mm diameter x 17 mm and x 25 mm long Coreless dc motors.  
Length increase for integrated encoder is less than 6.5 mm.

Counts per Track per Rev.  
12

Maximum Frequency Response  
20 kHz

**Pinout Details**

Connector Pin Number	Function
1	Motor +
2	Vcc
3	Channel A
4	Channel B
5	Ground
6	Motor -

**Connector Details**

Manufacturer: 3M  
Socket: 3448-7910LP  
Flat Band Cable: 28 AWG

**This Encoder Is Only Available Mounted To A Global Motion Products Coreless DC Motor. It Is Not Sold Separately.**

This low current, low Voltage encoder utilized a Hall effect Integrated Circuit. It can be attached to a range of 10 mm diameter coreless dc micromotors with optional planetary gearboxes.

Magneto-resistive 3 channel encoders are available for 13, 16, and 17 mm diameter coreless dc motors. They feature complementary outputs, line drivers, and resolutions up to 512 lines per channel. 2 channel integrated optical encoders are also available for 16 mm to 24 mm diameter coreless dc motors.

Characteristics and Specifications at 22°C

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