OMRON

Contact Linear Displacement Sensor

D5M

For Highly Accurate Measurements of Object Shape, Dimensions and Displacement with Application of Differential Transformer

- Roller-style actuators for large objects, and point-style actuators for small objects
- High repeat accuracy of 10 or 20 μm
- 5 mm or 10 mm sensing range with ±0.5% FS linearity
- Easy installation using either mounting bracket or M18 nut
- 4 to 20 mA analog output proportional to actuator stroke
- IP67 protection, resisting water and oil spray
- User-adjustable offset ±5% FS



Ordering Information_

Note: Sensors and Amplifiers are matched to assure accurate performance. The part numbers below include both a Sensor and an Amplifier.

Sensing range	Actuator type	Mounting	Part number
5 mm (0.197 inch)	Ball plunger	M18	D5M-5B
		Block	D5M-5BB
	Roller plunger	M18	D5M-5R
		Block	D5M-5RB
10 mm (0.394 inch)	Ball plunger	M18	D5M-10B
		Block	D5M-10BB
	Roller plunger	M18	D5M-10R
		Block	D5M-10RB

Application Examples

Harsh environments



Transparent object



Thickness measurement



D5M

Specifications.

RATINGS

Part number		D5M-5	D5M-10		
Measurement range		5 mm (0.197 in.)	10 mm (0.394 in.)		
Mechanical movement range		Approx. 6 mm (0.236 in.)	Approx. 12 mm (0.472 in.)		
Allowable operating speed		0.3 m/s max.	0.3 m/s max.		
Offset adjustment range		±0.25 mm	±0.05 mm		
Operating force		600 gf (8.34 ozinch) max.			
Indicator		Power indicator (Power), Warning (Over)			
Output		4 to 20 mA (max. load impedance: 300 Ω max.)			
Output characteristics	Repeatability	10 μm minimum	20 µm minimum		
Note: See: Output Characteris-					
tics Diagram provided in this section.	Linearity	±0.5% FS max.			

Output Characteristics Diagram



Repeatability The sensor's ability to produce the same output repeatedly under identical conditions.

Linearity Signifies the difference between the ideal straight line and measured value.

- The ideal straight line can be obtained by connecting the output point for 4 mA to that for 20 mA. Refer to L1 and L2 ٠ (provided in outline dimensions).
- Normally, % Full Scale (%FS) is used as a unit for linearity. FS signifies measurement range: 5 mm for D5M-S5 and 10 mm for D5M-S10.

CHARACTERISTICS

Part number		D5M-5	D5M-10		
Power supply voltage		24 VDC ±10%			
Current consumption		100 mA max.			
Ambient temperature	Sensor	-20° to 60°C (-4° to 140°F) with no icing			
	Amplifier	-10° to 55°C (-14° to 131°F) with no icing]		
Ambient humidity	Sensor	35 to 95% RH			
	Amplifier	35 to 85% RH			
Temperature influence	Sensor	±0.3% FS/°C			
	Amplifier	±0.3% FS/°C			
Isolation resistance		100 M Ω min. at 100 VDC between current carrying part and ground			
Dielectric strength		1000 VAC, 50/60 Hz for 1 minute between current carrying part and ground			
Mechanical life		10,000,000 operations minimum			
Vibration resistance	Sensor	10 to 55 Hz, double amplitude 2 mm in the direction of X, Y, Z for 2H each			
	Amplifier	10 to 55 Hz, double amplitude 0.75 mm in the direction of X, Y, Z for 2H each			
Shock resistance	Sensor	500 m/s ² (50G) 3 times each in X, Y, and Z directions			
	Amplifier	200 m/s ² (20G) 3 times each in X, Y, and Z directions			
Cable	·	2 m (6.56 ft.) shielded cable with 3 conductors			
Weight	Sensor	Approx. 200 g (7.05 oz.)	Approx. 300 g (10.58 oz.)		
	Amplifier	Approx. 100 g (3.52 oz.)			
Material	Sensor	Stainless steel			
Amplifier ABS		ABS resin			
Enclosure rating Sensor (only)		IP67			
	Amplifier	-			

OUTPUT CIRCUIT DIAGRAM

Output circuit for amplifier unit



Output characteristics



Nomenclature.

Sensor



Amplifier



Sensor

D 5 M-S 🗆 🗆 🗆	(1) Basic designation	(2) Sensor	(3) Measure	ement range	(4) Actuato	r	(5) Accesso	ry
(1) (2) (3) (4) (5)	DEM	6	Key	Range	Key	Plunger	Key	Mounting
	DOM	5	5	5 (0.20)	R	Roller plunger	Blank	M18 thread
			10	10 (0.39)	В	Ball plunger	В	With block

Amplifier

D 5 M-J 🗌 A	(1) Basic designation	on (2) Amplifier (3) Meas		ent range	(4) Linear output
() ()(-)()	D5M	J	Sensor	Range	Output
			5	5 (0.20)	A = 4 to 20 mA
			10	10 (0.39)	

Operation_

POWER ON AND WARM-UP

Note: To ensure accurate measurement, a warm-up time of 10 minutes is required after the D5M is powered up.

■ INITIALIZE



MEASUREMENT RANGE



Actuator Position

Set the actuator at the L1 position as shown in Measurement Range.

Check Output Current

Use an ammeter between terminals 4 and 5; current should register 4 mA.

Offset Adjustment

Offset adjustment can be set within $\pm 5\%$ FS: 0.8 mA (± 0.25 mm for D5M-S5, and ± 0.5 mm for D5M-S10). To make adjustments, turn the offset adjuster clockwise to increase output.

Avoid Measurement Errors

- Do not allow the D5M's operating force 600 gf-cm (8.34 oz-in) to depress the material being measured.
- Never use the D5M in a strong magnetic field. Errors may occur in sensor accuracy or linearity.
- Do not install in locations having high levels of humidity, dust, extreme temperatures, or vibration.

Note: Refer to other precautions provided in the Precautions Section.

Reference Plane. All D5M measurement ranges are calculated from the Reference Plane.

Refer to the illustrations on this page to identify applicable L1 and L2 measurement settings and the Reference Plane.

- L1 starts the Measurement Range which has an output value of 4 mA.
- L2 ends the Measurement Range which has a maximum output value of 20 mA.

Total Travel (TT) indicates the full range of actuator movement.

Operating Range (OP) indicates the Measurement Range for analog output.

Free Position (FP) indicates the distance from the Reference Plane to a fully extended actuator tip.

Part number	TT	OR	FP	L1	L2
D5M-S5B	6 (0.24)	5 (0.20)	61 (2.40)	60.5 (2.38)	55.5 (2.19)
D5M-S10B	11 (0.43)	10 (0.39)	67 (2.64)	66 (2.60)	56 (2.20)
	L2		rence Plane		



Part number	TT	OR	FP	L1	L2
D5M-S5BB	6 (0.24)	5 (0.20)	61 (2.40)	60.5 (2.38)	55.5 (2.19)
D5M-S10BB	11 (0.43)	10 (0.39)	67 (2.64)	66 (2.60)	56 (2.20)
	L2		ference Plane		

Part number	TT	OR	FP	L1	L2
D5M-S5RB	6 (0.24)	5 (0.20)	66.5 (2.62)	66 (2.60)	61 (2.40)
D5M-S10RB	11 (0.43)	10 (0.39)	72.5 (2.85)	71.5 (2.81)	61.5 (2.42)
	L2 - L1 - FP		Reference Plan	e	

Dimensions

Unit: mm (inch)

D5M-J5/D5M-J10



SENSOR ACTUATORS

D5M-S□B



D5M-S⊡R





D5M-S5BB





D5M-S5RB



D5M-S10B



D5M-S10BB



D5M-S10R



D5M-S10RB



Installation

■ AMPLIFIER INSTALLATION



WIRING SENSOR TO AMPLIFIER



SENSOR INSTALLATION

D5M-S _ _



D5M-S _ _ B



To install the Amplifier on a DIN rail:

- 1. Insert Part A of the Amplifier into the rail as shown.
- 2. Press the Amplifier in Direction B as shown.

To install the Amplifier on a panel:

- 1. Use two mounting screws.
- 2. Refer to the mounting hole locations provided here.
- Do not install in locations having high levels of humidity, dust, extreme temperatures, or vibration.

Note: Refer to other precautions provided in the Precautions Section.

Wiring Precautions

- Do not apply power while connecting Sensor.
- Do not wire the Sensor Cable in the same conduit with high voltage lines or power lines.
- Do not apply excessive winding or twist to cable and do not pull the cable more than is necessary.
- Never attempt to substitute another Sensor or Amplifier for the one included in the matched set. The Sensor and Amplifier have been adjusted as a set (and have the same serial number).

Note: Refer to other precautions provided in the Precautions Section.

Refer to the Measurement Range section for the reference plane and measuring position.

 Install the hex nut; tighten it with 150 to 300 kgf/cm (10.8 to 21.7 lbs-ft) force.

 Install the hex nut; tighten it with 50 to 60 kgf/cm (3.6 to 4.4 lbs-ft) force.

Precautions

Avoid Measurement Errors

- Do not allow the D5M's operating force 600 gf-cm (8.34 oz-in) to depress the material being measured.
- Do not use the sensor as a mechanical stop.

Environment

- Do not install in locations having high levels of humidity, dust, extreme temperatures, or vibration.
- Never use the D5M in a strong magnetic field. Errors may occur in sensor accuracy or linearity.

Replace ONLY as A Set

 Never attempt to substitute another Sensor or Amplifier for the one included in the matched set. To assure accurate performance, the Sensor and Amplifier have been adjusted as a set (and have the same serial number).

Wiring

- Do not wire the Sensor cable in the same conduit with high voltage lines or power lines.
- Do not apply power while connecting Sensor.
- Do not apply excessive winding or twist to cable and do not pull the cable more than is necessary.

Troubleshooting

OPERATION CHECK

Item	Check
Connection to power	Power indicator (green) for Amplifier should be lit.
Load impedance	Load impedance should be less than 300 Ω .
Output	Output should be proportional to plunger stroke.
Measuring position	Red LED is not lit.

SOURCES OF ERROR

Condition	Causes			
Power indicator is not lit.	Power is not connected. Check connection to power cable.			
Output does not change if actuator is pressed.	 Sensor has become disconnected. Check the Sensor connection to the amplifier. 			
	 Sensor cable is broken. Contact your Omron dealer. 			
	Output cable is disconnected.			
	 Check output terminal on the Amplifier. 			
Output does not reach 20 mA.	• Load impedance is too high. Reduce it to less than 300 $\Omega.$			
Output is out of the 4 to 20 mA range.	Sensor has become disconnected.			
	 Check Sensor connection to Amplifier. 			
	 Sensor cable is broken. Contact your Omron dealer. 			

NOTE: DIMENSIONS SHOWN ARE IN MILLIMETERS. To convert millimeters to inches divide by 25.4.



OMRON CANADA, INC. 885 Milner Avenue Scarborough, Ontario M1B 5V8 416-286-6465

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Omron: D5M-5RB