INSTALLATION INSTRUCTIONS FOR THE SMART POSITION SENSOR ROTARY CONFIGURATION

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Issue 3

The SMART Position Sensor, rotary configuration, is a non-contacting sensing solution for absolute position sensing with enhanced accuracy. It senses the position of a magnet relative to the sensor in a range of 0° to 360°.

The SMART Position Sensor, rotary configuration, fits on a 25,4 mm [1 in] shaft. A mounting tool fixture (one piece or two piece, purchased separately) provides repeatable installation.

MOUNTING AND WIRING INFORMATION (See Figures 1, 2, 3, 4.)

1. Locate sensor and magnet collar in the desired position. Ensure that the air gap between sensor and magnet does not exceed that noted in Table 1.
2. Mount sensor on shaft using an assembly tool.
3. Mount magnet collar.
4. Wire sensor according to pinout.

TABLE 1. 360° SPECIFICATIONS (SPS-R360D-NBMS0101)

	Min.	Typ.	Max.	Units
Sensor Charactertistics				
Sensing range	–	360	–	Degree
Supply voltage	12	–	30	Vdc
Supply current	–	–	90	mA
Output type	Current Output			
Output at min. pos	–	4	–	mA
Output at max. pos	–	20	–	mA
Full scale span	–	16	–	mA
Offset (25°C [77°F]) [3,4,5,7]	-0.044	-0.011	0.022	%FS
TCO (>85°C [158°F]) [3,4,5,7]	–	0.0033	–	%FS/°C
Linearity (25°C [77°F]) [2,4,7]	-0.03	–	-0.03	%FS
Linearity (>85°C [158°F]) [2,4,7]	–	0.00011	–	%FS/°C
Sensitivity (25°C [77°F]) [6,7]	44.43	44.45	44.48	µA/Degree
TCS (>85°C [158°F]) [6,7]	–	0.00011	–	%FS/°C
Accuracy [4]	-0.069	–	0.069	%FS
Sensitivity	38.4	40	41.6	mV/Degree
Linearity	± 0.4%			Full scale output
Resolution	0.01			Degree
Reverse polarity	-12	–	-30	V
Startup time	130			mS
Connector				
Termination	M12 connector, male 5-pin			
Operating Environment				
Operating temperature	-40°C to 85°C [-40°F to 185°F]			
Storage temperature	-40°C to 150°C [-40°F to 302°F]			
Air gap	3,0 mm ± 2,0 mm [0.118 in ±0.079 in]			
Ingress protection	IP67, IP69K			
Mechanical shock	50 G half sine wave with 11 ms duration			
Vibration	20 G from 10 Hz to 2000 Hz			
Certification				
Certification/approval	CE, UKCA			
Mounting				
Housing	Aluminium with Powder coating			
Mounting screws	UNC 10-24 or M5			
Mounting torque	5 Nm to 7 Nm [44.25 in-lb to 61.95 in-lb]			
Magnet Actuator				
Magnet	Neodymium Iron Boron			
Field strength	3700			Gauss

[1] Specifications are based on a non-ferrous shaft.
[2] Linearity: Deviations from a best fit straight line through the output, expressed as a percentage of the full scale signal range (% of 16 mA).
[3] Accuracy: Deviations from the ideal output line expressed as a percentage of the full scale signal range (% of 16 mA).
[4] %FS: Error expressed as a percentage of the output span of the sensor (% of 16 mA).
[5] Offset: Deviation from the ideal output at the minimum input condition, expressed as a percentage of the full scale signal range (% of 16 mA).
[6] Sensitivity: The slope of the output signal vs magnet travel, expressed as µA of output per degree of travel.
[7] TC: Temperature coefficient of a given parameter, as a percentage of the full scale signal range (% of 16 mA) per degree of temperature rise from 25°C [77°F]. Stationary ferrous material often creates an initial offset upon installation. If the stationary ferrous material never moves in relation to the sensor after the installation, and the environment remains ferrous-free, performance should be repeatable. Ensure the sensor is tested in the application.

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NOTICE

CONTROLLABLE FACTORS THAT AFFECT ACCURACY: TOLERANCE STACK-UP IN THE APPLICATION

Customers can achieve even better accuracy with Honeywell's SMART Position Sensor, Rotary Configuration, if they control tolerance stack-up in their application's assembled system. This is the accumulation of errors (slightly out-of-round shafts, minor eccentric component rotations, loose linkages and other variations) that, in and of themselves, may be extremely small on their own; however, when added up, can greatly reduce sensor accuracy, causing unsatisfactory sensor performance.

TABLE 2. % LINEARITY

		Radial Error (mm)									
		0	0,05	0,1	0,25	0,5	0,75	1	1,5	2	2,5
Air gap error (mm)	-2	0,005	0,001	0,007	0,027	0,066	0,113	0,166	0,294	0,450	0,635
	-1	0,002	0,003	0,008	0,025	0,060	0,101	0,150	0,269	0,417	0,593
	0	0,000	0,004	0,008	0,023	0,053	0,090	0,135	0,245	0,383	0,550
	1	0,002	0,005	0,009	0,021	0,047	0,079	0,119	0,220	0,350	0,508
	2	0,005	0,007	0,009	0,019	0,040	0,068	0,104	0,196	0,317	0,466
	3	0,007	0,008	0,010	0,017	0,033	0,057	0,088	0,172	0,284	0,424

TABLE 3. % ACCURACY

		Radial Error (mm)									
		0	0,05	0,1	0,25	0,5	0,75	1	1,5	2	2,5
Air gap error (mm)	-2	0	0,006	0,012	0,033	0,076	0,129	0,191	0,263	0,538	0,770
	-1	0	0,005	0,011	0,029	0,069	0,118	0,176	0,245	0,509	0,733
	0	0	0,004	0,009	0,026	0,061	0,106	0,162	0,226	0,479	0,697
	1	0	0,004	0,008	0,022	0,054	0,095	0,147	0,208	0,450	0,660
	2	0	0,003	0,006	0,018	0,047	0,084	0,132	0,190	0,420	0,623
	3	0	0,002	0,005	0,015	0,039	0,073	0,117	0,171	0,391	0,586

Figure 1. Sensor Dimensional Drawings (For reference only: mm [in].)

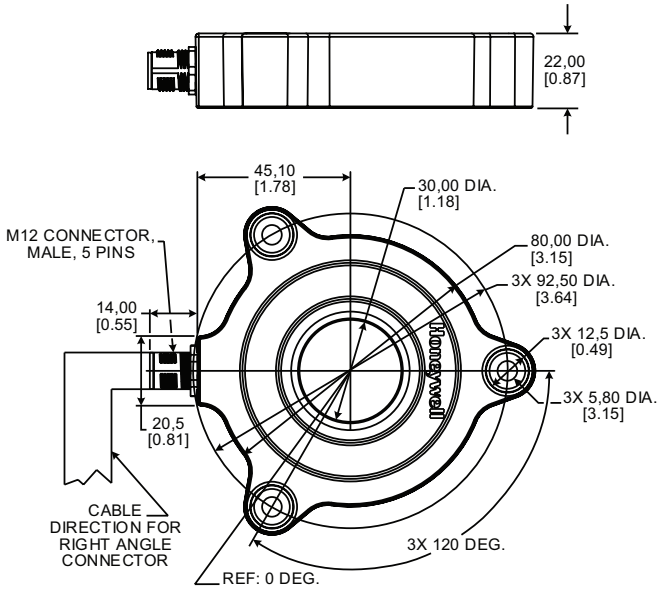
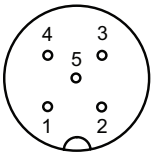


Figure 1. Sensor (continued)

Pinout
1 = Supply voltage (+)
2 = Test pin, connect to ground (-)
3 = Ground (-)
4 = Output (O)
5 = Test pin, connect to ground (-)



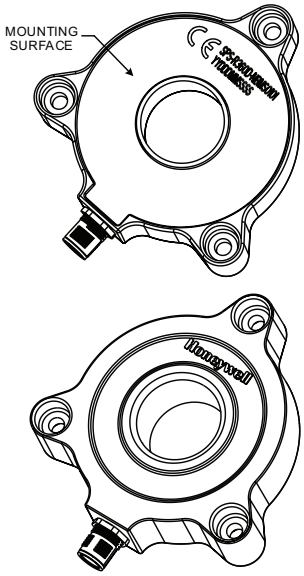
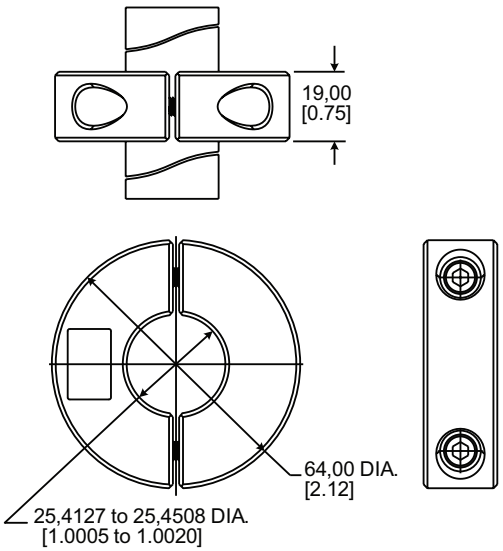
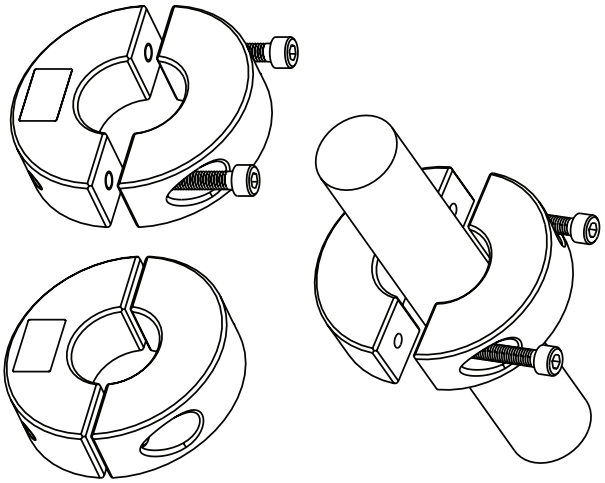


Figure 2. Magnet Collar

Dimensional Drawings (For reference only: mm [in].)



Mounted onn Shaft

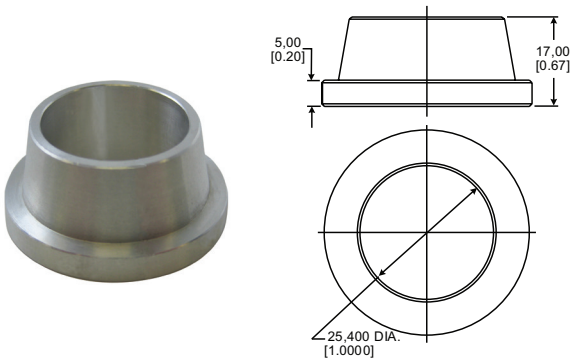


NOTICE

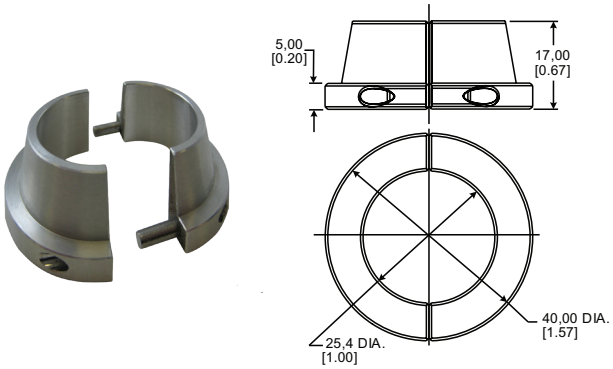
Stationary ferrous material often creates an initial offset upon installation. If the stationary ferrous material never moves in relation to the sensor after the installation, and the environment remains ferrous-free, performance should be repeatable. Ensure the sensor is tested in the application.

Figure 3. Assembly Tools

One Piece (SPS-AUX-AS100-1)



Two Piece (SPS-AUX-AS100-2)



NOTICE

ASSEMBLY TOOL USE

Honeywell recommends using an assembly tool to help align the magnetic axis of rotation to the inside diameter of the sensor.

Assembly Tool Use

1. Place the sensor over the shaft with its epoxy side facing the mating surface of the mounting plate.
2. Loosely assemble the mounting screws in the sensor.
3. Install the assembly tool on the shaft.
4. Push the assembly tool into the rotary sensor to center on the shaft.
5. Tighten the sensor mounting screws while maintaining pressure on the assembly tool.
6. Remove the assembly tool.

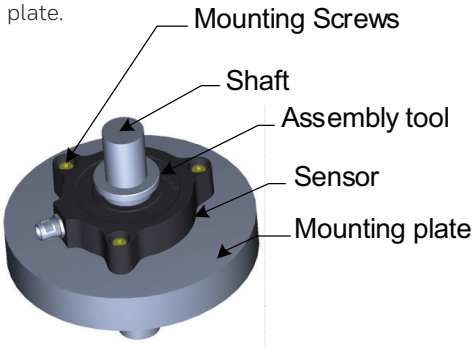
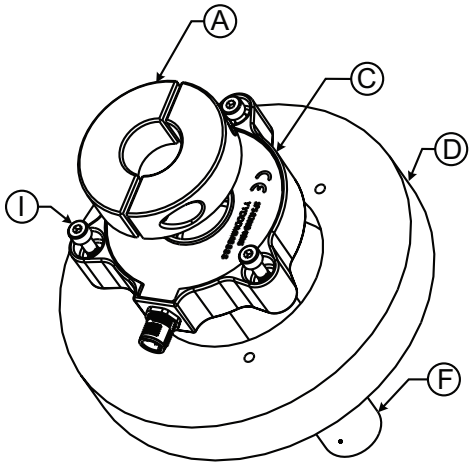
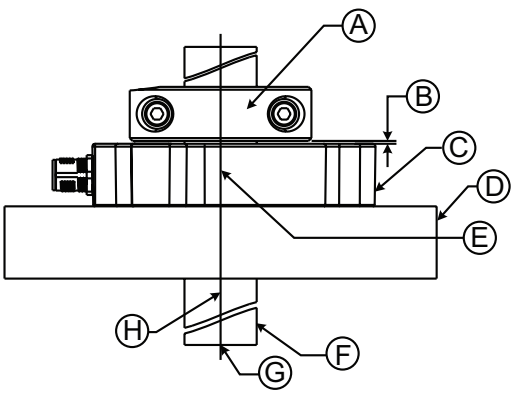


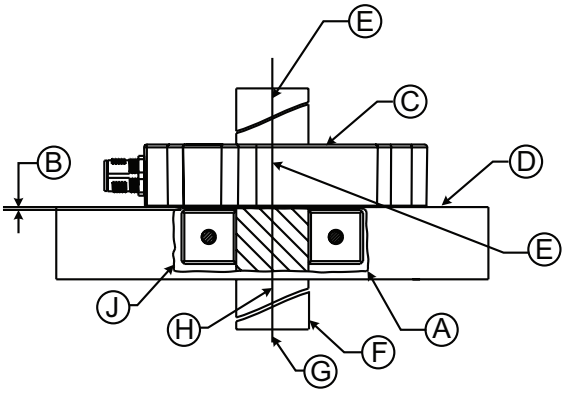
Figure 4. Sensor Mounting Examples

General

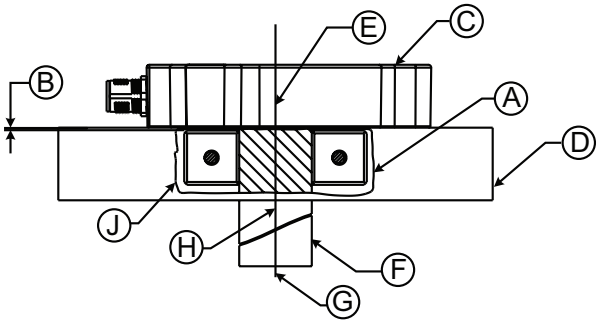


Through Shaft





Blind Shaft



A = Magnet collar (purchased separately)
B = Air gap (3,0 mm ±2,0 mm [0.118 in ±0.079 in] typ.)
C = Sensor
D = Mounting plate (customer supplied - provides surface to mount sensor)
E = Sensor axis
F = Shaft (customer supplied - provides shaft to attach magnet actuator)
G = Radial alignment (see Table 1)
H = Shaft axis
I = Mounting screws (customer supplied - M5 or UNC 10-24)
J = Recess

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