

## Installation Instructions for the SMART Position Sensor, Rotary Configuration

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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. Specifications<sup>1</sup>**

Characteristic	Component	Parameter	Note
Sensing range	sensor only	360°	–
Resolution		0.01°	–
Supply voltage		12 Vdc to 30 Vdc	–
Output		4 mA to 20 mA	–
Supply current		90 mA max.	–
Linearity: 25 °C [77 °F] TC: ≥85 °C [158 °F]		-0.03 %FS min., 0.030 %FS max. 0.0011 %FS/°C	2, 4, 7
Offset: 25 °C [77 °F] TC: ≥85 °C [158 °F]		-0.044 %FS min., -0.011 %FS typ., 0.022 %FS max. 0.0033 %FS/°C	3, 4, 5, 7
Accuracy		-0.069 %FS min., 0.069 %FS max.	4
Sensitivity: 25 °C [77 °F] TC: ≥85 °C [158 °F]		44.43 µA/° min., 44.43 µA/° typ., 44.48 µA/° max. 80 ppm/°C	6, 7
Reverse polarity		-12 Vdc to -30 Vdc	–
Initial startup time		130 ms typ.	–
Termination		M12 connector, male 5 pin	–
Operating temperature		sensor and magnet collar	-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] typ.		–
Sealing	IP67, IP69K		–
Shock	50 G half sine wave with 11 ms duration		–
Vibration	20 G from 10 Hz to 2000 Hz		–
Housing material	aluminum with powder coating		–
Approvals	CE		–
Mounting: screws recommended torque	M5 or UNC 10-24 5 N m to 7 N m [44.25 in lb to 61.95 in lb]		–
Material	magnet only		neodymium (sintered NdFeB)
Strength		3700 Gauss	–

#### Notes:

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].

## 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)

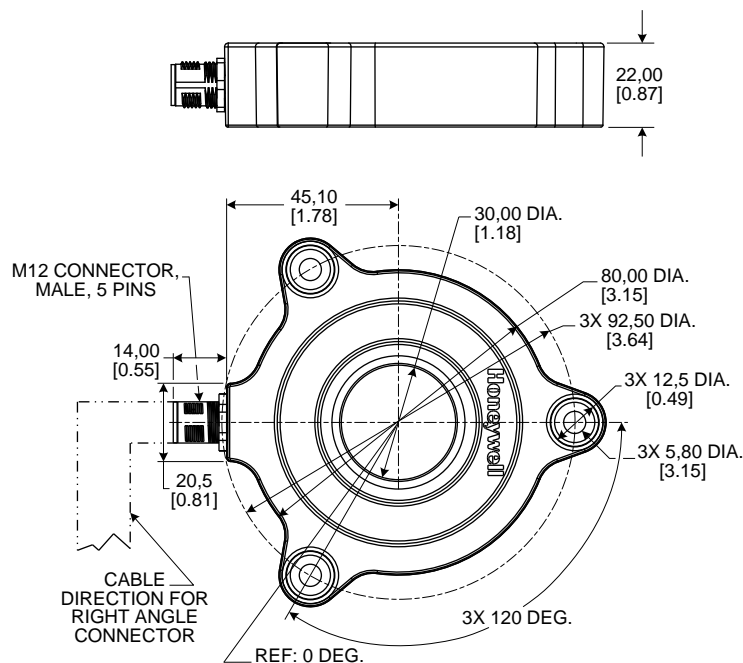


Figure 1. Sensor (continued)

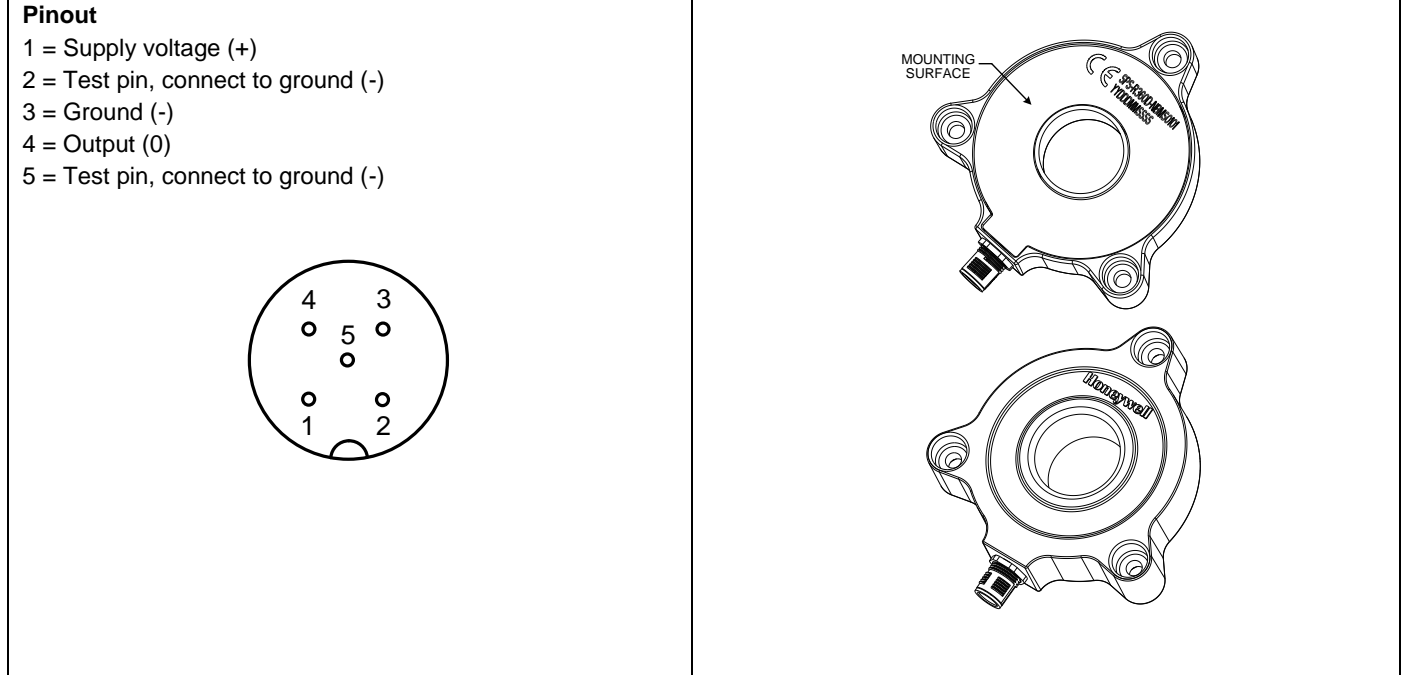
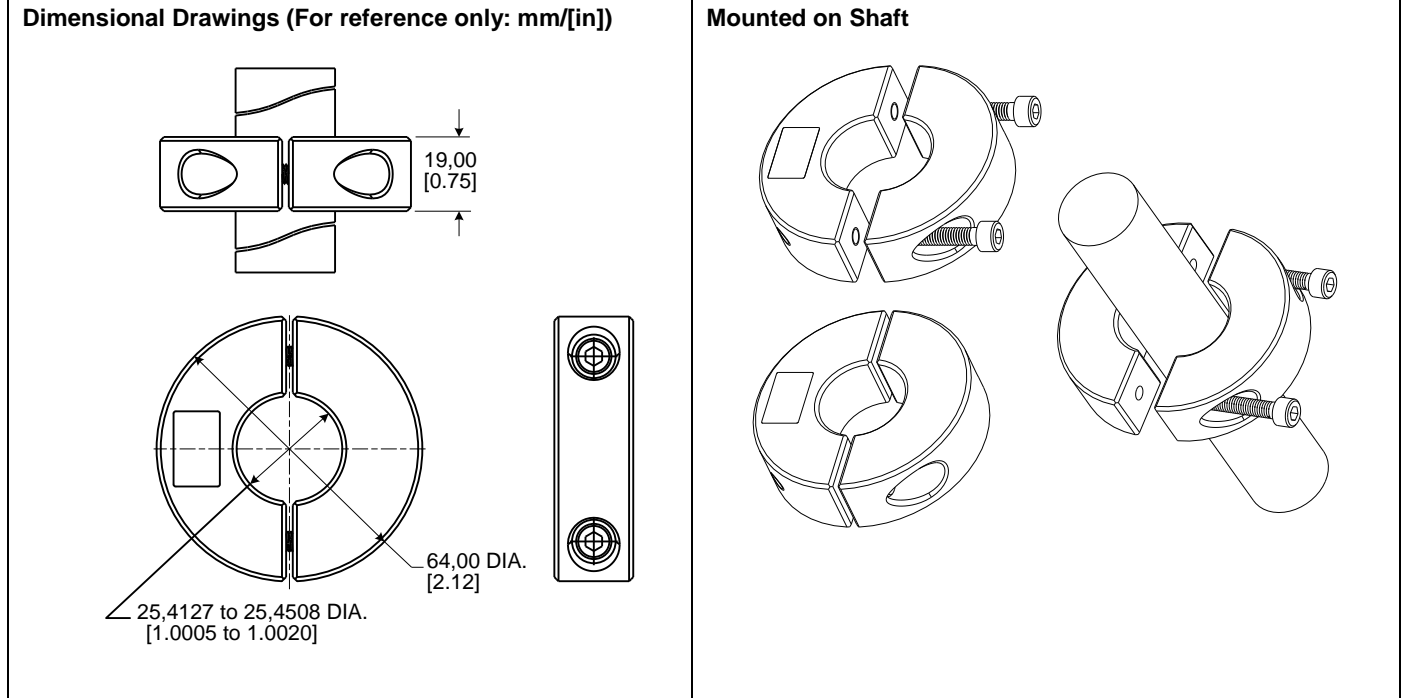


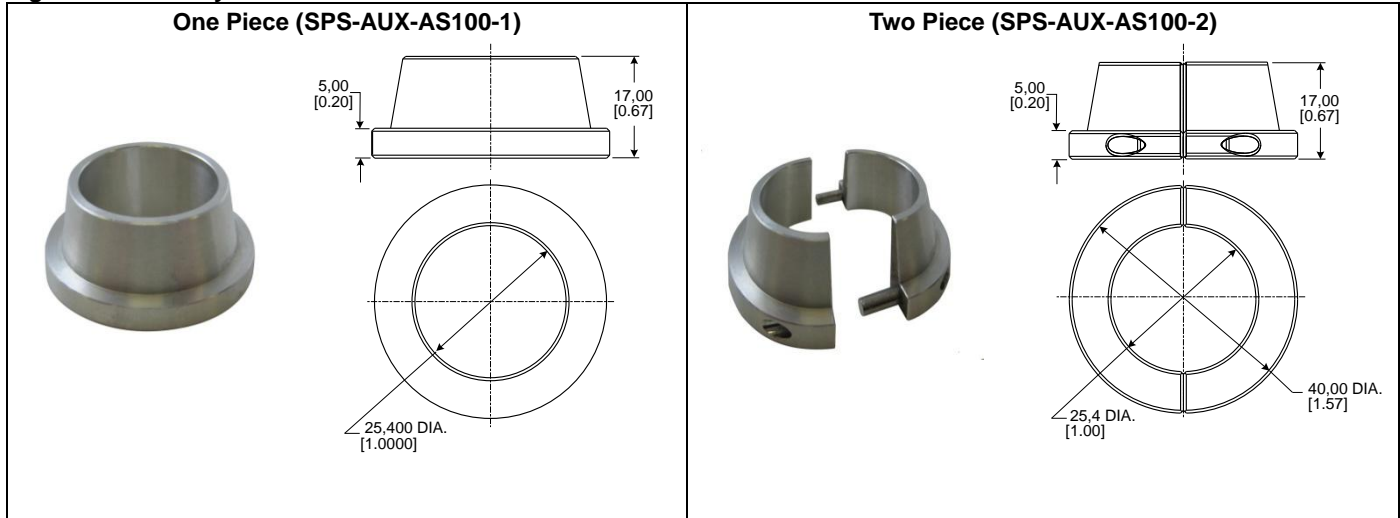
Figure 2. Magnet Collar



## 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



## 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 sensor to center on the shaft.
5. Tighten the sensor mounting screws while maintaining pressure on the assembly tool.
6. Remove the assembly tool.

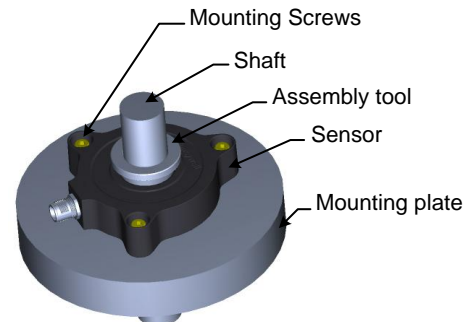
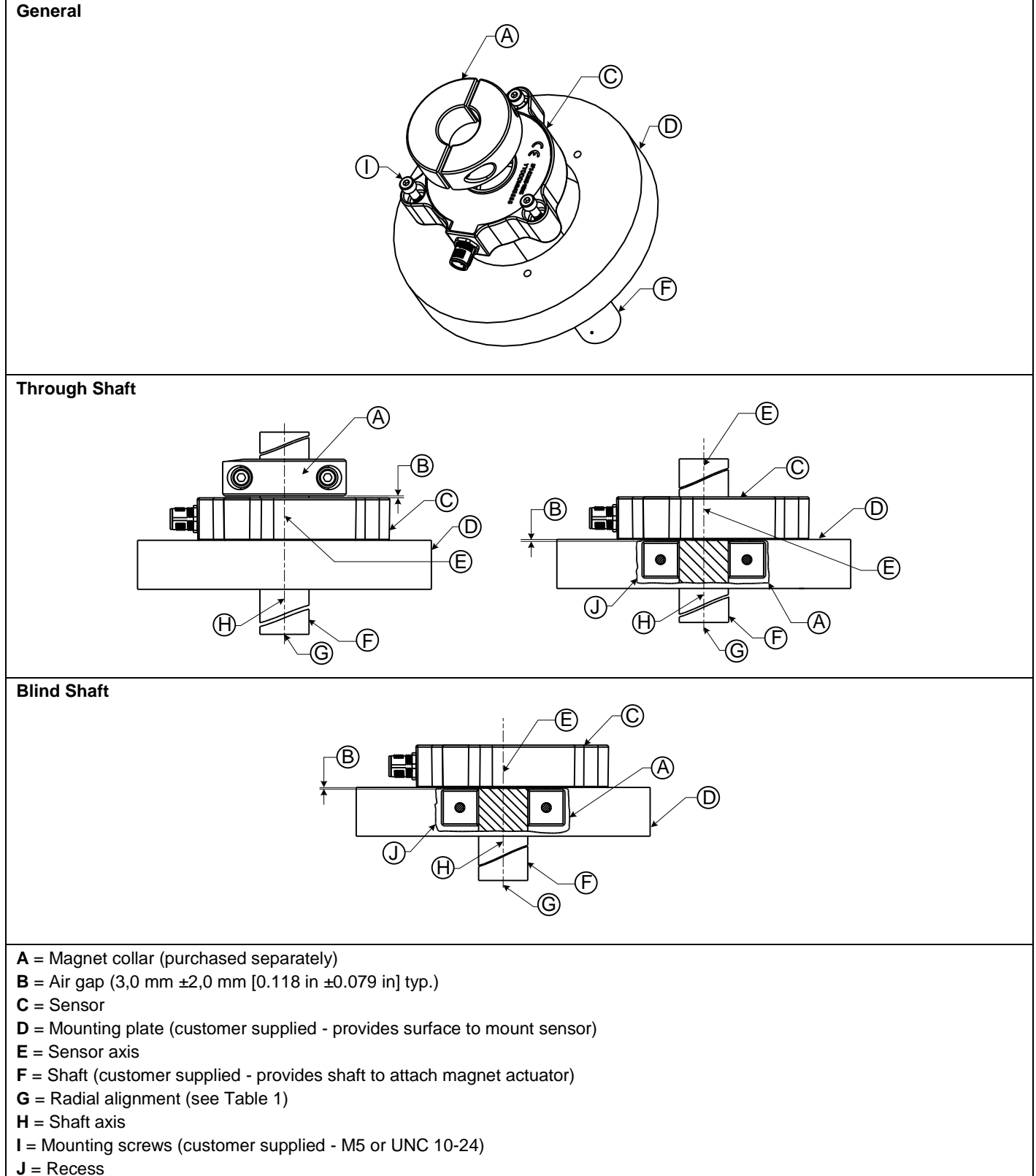


Figure 4. Sensor Mounting Examples



## **WARNING**

### **PERSONAL INJURY**

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

**Failure to comply with these instructions could result in death or serious injury.**

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