

Features

- High Accuracy
- Reliable
- High Resolution
- Non-Contact
- Sealed to IP67
- High Shock Resistance
- High Vibration Resistance
- 360° Operation

Applications

- Transportation
- Steering angle
 - Articulation angle
 - Boom arm detection
- Industrial
- Solar panels
 - Wind turbines



Description

The R360D rotary position sensor uses magnetoresistive technology to provide enhanced accuracy and repeatable position sensing over a full 360°. This is a non-contacting solution for absolute position sensing of a magnet collar relative to a sensor.

It uses a patented combination of an ASIC (Application Specific Integrated Circuit) and an array of magnetoresistive sensors to reliably determine the position of the magnet collar which is typically attached to a rotating object.

The magnet collar is designed to be fitted onto a 25.4mm shaft. The sensor has a 30mm I.D. and sits around the shaft. A mounting tool fixture (optional accessory) provides repeatable installation.

Order Guide



Rotary sensor
Order Code

H-SPS-R360D-NBMS0101



Magnet Collar
Order Code

H-SPS-MAG-002



Mating Cable Assembly, 2m
Order Code

H-SPS-R360D-CA2U

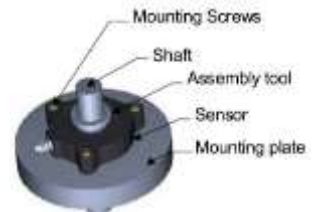


Assembly Tool
Order Code
H-SPS-AUX-AS100-1



Split Assembly Tool
Order Code
H-SPS-AUX-AS100-1

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



Specification

Characteristic	Component	Parameter	Note
Sensing range	Sensor only	360°	
Resolution		0.01°	
Supply voltage		12 to to 30 Vdc	
Output		4-20 mA	
Supply current		90 mA max.	
Linearity: 25 °C TC: 25°C to 85 °C		-0.03 %FS min., 0.030 %FS max. 0.0011 %FS/°C	2, 4, 7
Offset: 25 °C TC: 25°C to 85 °C		-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 TC: 25°C to 85 °C		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 start-up time		130 ms typ	
Termination		M12 connector, male 5 pin	
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] 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	Aluminium with powder coating		
Approvals	CE		
Mounting screws	M5 or UNC 10-24		
Recommended torque	5 N m to 7 N m [44.25 in lb to 61.95 in lb]		
Material	neodymium (sintered NdFeB)		
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).

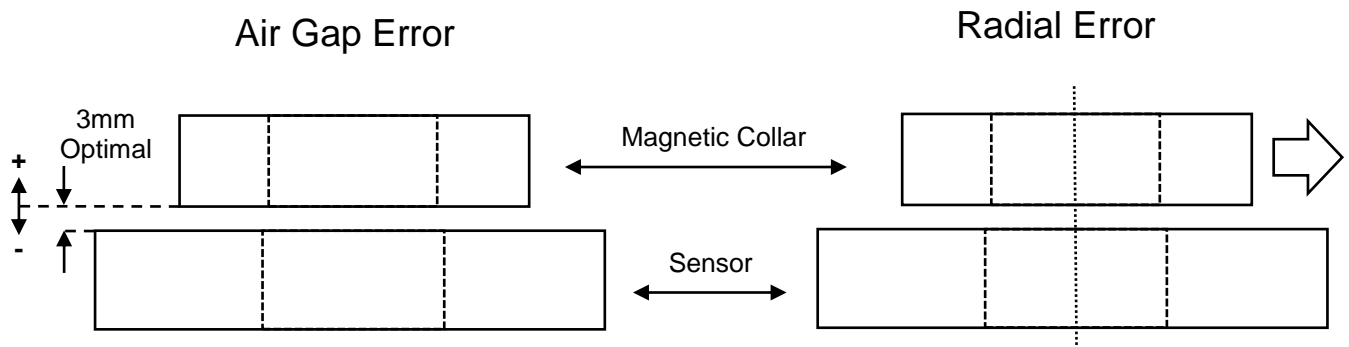
³ Accuracy: Deviations from the ideal output line expressed as a percentage of the full scale signal range (% of 16 mA).

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. 7TC: 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].

Load
Torque
Position
Pressure
Displacement
Instrumentation
Special Custom Designs



With the optimal 3mm air gap and perfect radial alignment the linearity error is 0.03% F.S.
 The table below shows additional linearity error if there is air-gap and/or radial deviation from optimal

% Linearity Error		Radial Error (Distance off centre in mm)									
		0	0.05	0.1	0.25	0.5	0.75	1	1.5	2	2.5
Air Gap Error (Deviation from optimal 3mm air gap)	-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

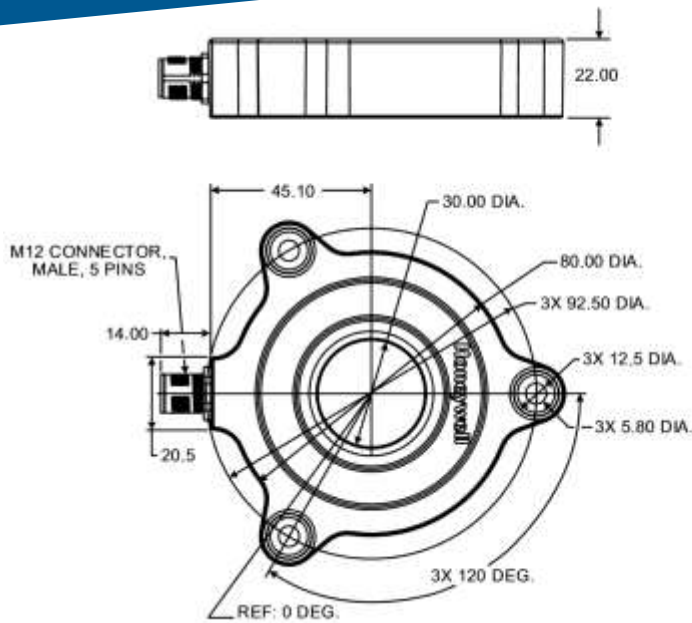
With the optimal 3mm air gap and perfect radial alignment the accuracy error is 0.069% F.S.
 The table below shows the additional accuracy error (in addition to the linearity above) if there is air-gap and/or radial deviation from optimal.

% Accuracy		Radial Error (Distance off-centre in mm)									
		0	0.05	0.1	0.25	0.5	0.75	1	1.5	2	2.5
Air Gap Error (Deviation from optimal 3mm air gap)	-2	0.000	0.006	0.012	0.033	0.076	0.129	0.191	0.263	0.538	0.770
	-1	0.000	0.005	0.011	0.029	0.069	0.118	0.176	0.245	0.509	0.733
	0	0.000	0.004	0.009	0.026	0.061	0.106	0.162	0.226	0.479	0.697
	1	0.000	0.004	0.008	0.022	0.054	0.095	0.147	0.208	0.450	0.660
	2	0.000	0.003	0.006	0.018	0.047	0.084	0.132	0.190	0.420	0.623
	3	0.000	0.002	0.005	0.015	0.039	0.073	0.117	0.171	0.391	0.586

NOTICE – Ferrous Material

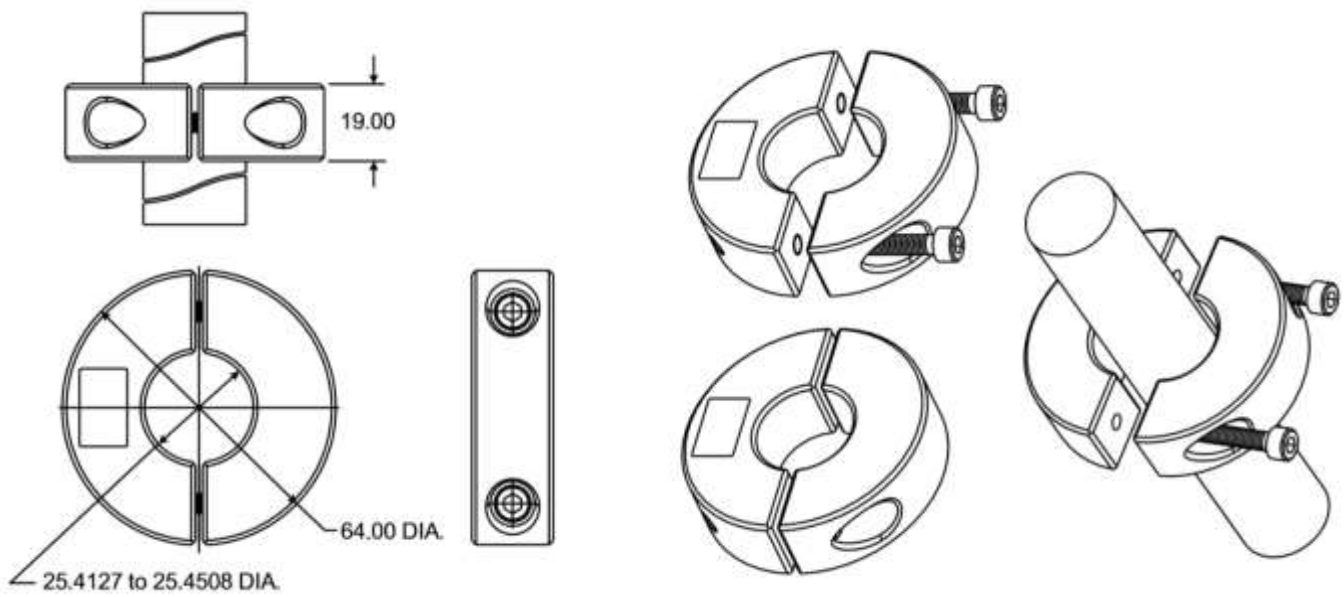
Stationary ferrous material often creates an initial offset upon installation. If the stationary ferrous material never moves in relation to the sensor after the installation, and the environment remains ferrous-free, performance should be repeatable. Ensure the sensor is tested in the application.

Sensor Drawing

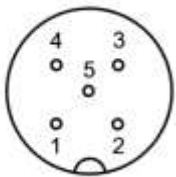


Dimensions in mm

Magnetic Collar Drawing



Connector Pinout

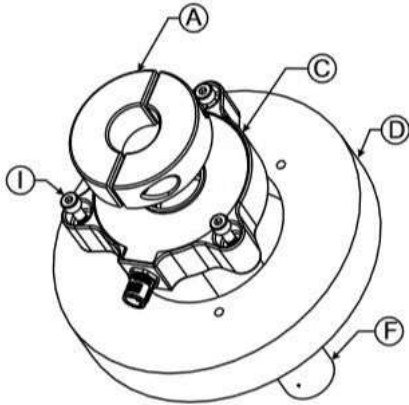


- 1 = Supply voltage (+)
- 2 = Test pin, connect to ground (-)
- 3 = Ground (-)
- 4 = Output (0)
- 5 = Test pin, connect to ground (-)

Load
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Special Custom Designs

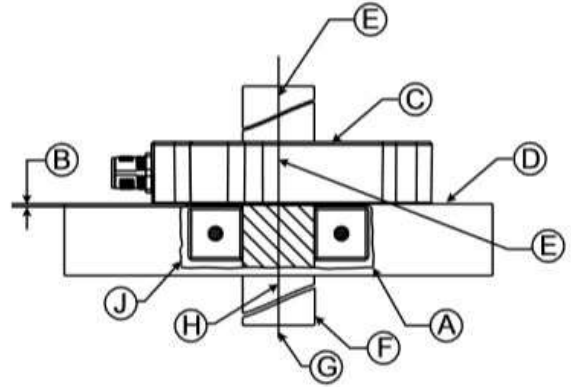
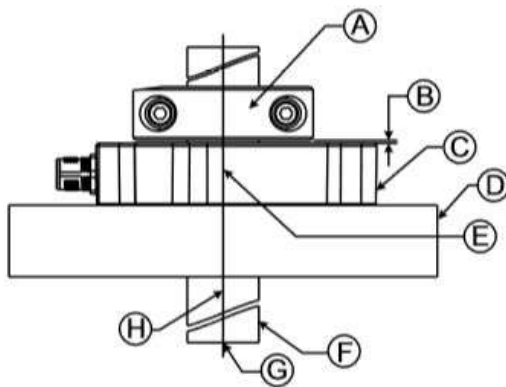
Installation Examples

General

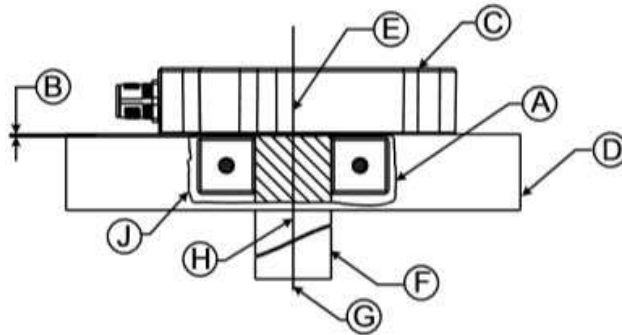


- A = Magnet collar (purchased separately)
- B = Air gap (3.0 mm \pm 2.0 mm [0.118 in \pm 0.079 in] typ.)
- C = Sensor
- D = Mounting plate (customer supplied - provides surface to mount sensor)
- E = Sensor axis
- F = Shaft (customer supplied - provides shaft to attach magnet actuator)
- G = Radial alignment (see Table 1)
- H = Shaft axis
- I = Mounting screws (customer supplied - M5 or UNC 10-24)
- J = Recess

Through Shaft



Blind Shaft



WARNING – PERSONAL INJURY

Do not use these products as safety or emergency stop devices or in any application where the failure of this product could result in damage to equipment, personal injury or death.

MISUSE OF DOCUMENTATION

The information in this data sheet is intended for reference only. Do not use this information as an installation guide. Complete installation, operation and maintenance information is available with each product supplied. Failure to comply with these instructions could result in damage to adjacent equipment, serious personal injury or death.

Due to our policy of on-going development, specifications may change without notice. Any modification may affect some or all of the specifications for our equipment. All dimensions and specifications are nominal.

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