HONEYWELL HAWK™ RESOLVERS 1-INCH SERIES

000699
Issue 5

Fully-housed Configuration



DESCRIPTION

Resolvers convert mechanical shaft position to an electrical signal which represents the actual shaft angle. They are variable transformers in which the stator has two phase windings mechanically displaced by 90°. The output consists of two sine waves that are phase shifted by 90°. They provide non-contact measurement for 360° sensing, enhanced accuracy, resolution, and repeatability under severe environmental conditions.

Resolvers are generally chosen over electronic sensors (i.e., optical encoders, potentiometers, magnetic encoders/ sensors) because they do not use electronics, so they are not susceptible to performance fluctuations in harsh environments. Resolvers are inherently radiation hardened and offer durable EMC (Electromagnetic Compatibility) performance.

The Honeywell Hawk™ 1-Inch Series Resolvers are durable, reliable, non-contact, absolute position sensors with an operating temperature range from -50.8°C to 93.3°C [-60°F to 200°F] that allows for potential use in defense and aerospace applications.

Manufacturing Process Reduces Lead Time and Allows Customization

Honeywell uses the same components for all standard configurations of its Hawk™ 1-Inch Series Resolvers, increasing production speed and reducing lead time. This results in Honeywell's ability to manufacture production-quality standard devices in 12 weeks versus 20-22 weeks many competitors offer. Additionally, the Honeywell manufacturing process and the variety of product features allow customers to customize the resolver to meet their specific application accuracy and size requirements.

Global Support and Engineering Expertise

Honeywell's global presence offers customers timely product and application support. Many resolver competitors offer support only in their local manufacturing area, or limited support outside of their manufacturing area.

With over 30 years of experience providing accurate, reliable, and durable resolvers for the aerospace and defense industries, Honeywell is your one-stop, full-service, globally-competitive answer to your resolver needs.

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PORTFOLIO

The Honeywell Hawk™ Resolver is part of a comprehensive line of aerospace sensors, switches, and value-added solutions. To view the complete Honeywell product offering, click here.

OPTIONS

- Custom trim
- Connections include custom lead wire, cable, connector on unit or connector on cable
- Custom redundant brushless version (two independent resolvers within the same housing) to provide reliable back-up/fail-safe in critical applications
- Titanium housing provides enhanced durability and enhanced resistance to corrosion; lightweight
- Transformer for 360°+ rotation (continuous)

Honeywell

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APPLICATIONS

DEFENSE

- **Electro-optical systems (i.e., systems that transfer information from the optical system to the firing mechanism):** Provides absolute position feedback of the azimuth and/or elevation angular planes for precise ordnance delivery
- **Fire control systems (i.e., weapon systems on military vehicles or vessels):** Provides absolute position feedback of the azimuth and/or elevation angular planes for precise ordnance delivery
- **Gimbals position feedback (i.e., communication pedestals positioned on top of military vehicles):** Provides absolute position feedback of the azimuth and/or elevation angular planes for a continuous communication stream
- **Infrared systems (i.e., military vehicle infrared systems):** Accurately aims the infrared system at the target

AEROSPACE

- **Space vehicle solar panels:** Accurately positions the equipment for maximum performance
- **Space vehicle antennae:** Accurately positions the equipment for maximum performance

MEDICAL

- **Oncology equipment:** Provides precision feedback of oncology systems to assist in positioning during examinations

INDUSTRIAL

- **CNC/precision tooling:** Provides angular position feedback of attachments

FEATURES

DEFENSE

- **Fully housed configuration** with bearing/shaft
- **Small outer diameter of 1 inch** allows for use in size-restricted applications
- **Single speed operation** (1 magnetic pole pair) allows for cost-effective angle resolution over a 360°+ range
- **Excitation frequency range of 2000 Hz to 5000 Hz** provides a wide variety of choices with which to power the device
- **Transformation ratio of 0.45 or 1.0** offers customers two choices, increasing flexibility within the application
- **Accuracy of ±420 arcsec** enables precise motion control of weapon systems and space positioning devices
- **Non-contact magnetic technology** eliminates mechanical contact, reducing wear and improving reliability and durability by enhancing operation in harsh environments (performance is not affected by sand, dust or water)
- **Meets multiple military/aerospace specifications:** DO-160D, MIL-STD-202H, MIL-STD-810H, & MIL-STD-461G, MIL-STD-81963B; complies with space outgassing requirement SP-R0022

VALUE PROPOSITION

- **Shock specification of 50 g, 11 ms** allows for use in harsh military and aerospace applications
- **Vibration specification of 15 g, 10 Hz to 2000 Hz** allows for use in harsh military and aerospace applications
- **Enhanced reliability and durability** when compared with potentiometers due to the Hawk™ Resolvers' ability to resolve an absolute angle using magnetic principles so that performance is not impacted by media (i.e., sand, dust, water), its ability to operate in many harsh environments, its non-contact design, the lack of electronics, and the use of space-qualified materials
- **Operating temperature range of -50.8°C to 93.3°C [-60°F to 200°F]** allows for use in harsh environments and meets standard military and space application requirements
- **Excitation voltage range of 2 V to 15 V** allows customers to standardize on a resolver that meets their excitation voltage needs, simplifying sourcing and delivery, and saving time
- **Product delivery up to 1.5 times faster** than many competitive products due to Honeywell's use of the same components for all standard configurations of Hawk™ Resolvers, increasing production speed and reducing lead time. This results in Honeywell's ability to manufacture production-quality standard devices in 12 weeks vs. 20 to 22 weeks
- **Customization** due to the Honeywell manufacturing process and the variety of features that allow customers to customize Hawk™ Resolvers to meet their application accuracy/size requirements
- **Global support** due to Honeywell worldwide presence which offers customers immediate product and application support; many resolver competitors offer either support only in their local manufacturing area, or limited support outside of their manufacturing area
- **Engineering expertise** due to Honeywell 30+ years' experience providing accurate, reliable, and durable resolvers for the aerospace and defense industries

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TABLE 1. OPERATING CHARACTERISTICS (AT 25°C [77°F])	
Characteristic	**Parameter**
Speed	1X
Excitation voltage range	2 V to 15 V
Excitation frequency range	2000 Hz to 5000 Hz
Input current	160 mA max.
Input power	1.30 W max.
Electrical load	30 kOhm min.
Phase shift	40° max.
Accuracy	±420 arcsec
Angular range	360°+
Transformation ratio	0.45 or 1.0
Operating temp. range	-50.8°C to 93.3°C [-60°F to 200°F]

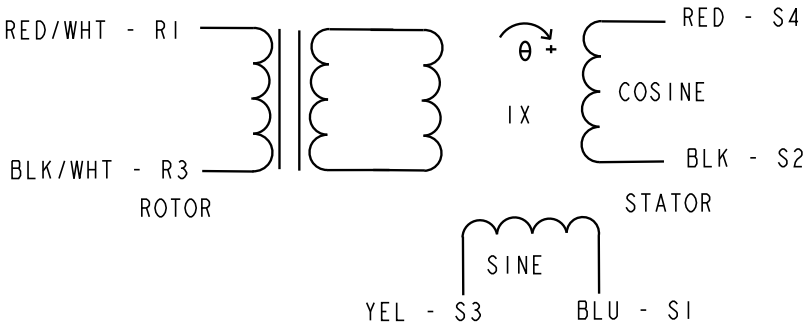
TABLE 2. MECHANICAL CHARACTERISTICS (AT 25°C [77°F].)	
Characteristic	**Parameter**
Mounting concentricity	<0.0005 in
Primary winding	rotor
Friction torque	≤0.5 oz in
Shaft runout	≤0.0015 TIR1
Shaft radial play	≤0.0006 in with 4 oz load
Shaft end play	≤0.0005 in with 8 oz load
Weight	<5 oz

Note 1: TIR stands for Total Indicator Runout.

TABLE 3. ENVIRONMENTAL CHARACTERISTICS	
Characteristic	**Parameter**
Vibration	MIL-DTL-81963C, Section 3.7.1, 15 g, 10 Hz to 2000 Hz, 4 hr each on 3 axes
Shock	MIL-DTL-81963C, Section 3.7.2, 50 g, 11 ms duration, 3 axes, 2 directions, 5 impacts each axis/direction, 30 total
Storage temp.	MIL-STD-810H, 501.5 and 502.5, -50.8°C to 93.3°C
Humidity cycle	MIL-STD-202H Condition 106
Thermal cycle	RTCA/DO-160D Section 5, -50.8°C to 93.3°C extreme temperatures, 10°C per minute transition
Sealing	IP64 NEMA
EMC	MIL-STD-461G RS-101, RE-101, RE-102
Outgassing	SP-R0022 (NASA outgassing requirements)
Endurance	MIL-HDBK-218 (6.2): 1200 hr at 1150 rpm
Material: housing shaft	 416 stainless steel 303 stainless steel

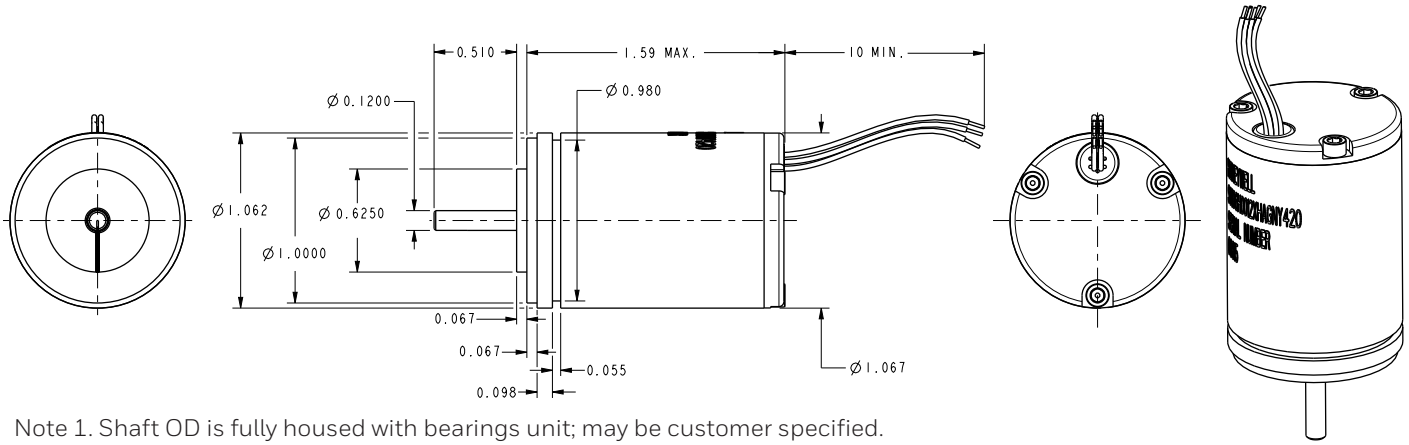
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Figure 1. Electrical Schematic (Positive Direction of Rotation Clockwise, Viewed from Shaft End) and Phase Equations



E (S3 - S1) = K x E(R1 - R3)SIN θ
E (S4 - S2) = K x E(R1 - R3)COS θ

Figure 2. Mounting Dimensions for Fully Housed Resolver with Bearing/Shaft (For reference only. in.)[1]



Note 1. Shaft OD is fully housed with bearings unit; may be customer specified.

TABLE 4. ORDER GUIDE

Catalog Listing	Description
S10H01XHAGNYG	Honeywell Hawk™ 1-Inch Series Resolvers, single speed, 1.0 in OD, fully housed with transformer, 0.1 in inside diameter, 7 V, 5000 Hz, leadwire, series 11 NEMA servo-mount enclosure, no bolt pattern, 1.0 transformation ratio, ±420 arcsec accuracy, stainless steel housing
S10H01XHAGNXG	Honeywell Hawk™ 1-Inch Series Resolvers, single speed, 1.0 in OD, fully housed with transformer, 0.1 in inside diameter, 7 V, 5000 Hz, leadwire, series 11 NEMA servo-mount enclosure, no bolt pattern, 0.45 transformation ratio, ±420 arcsec accuracy, stainless steel housing

⚠ 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.

⚠ WARNING
MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

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

For more information

Honeywell Sensing Solutions services its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing, or the nearest Authorized Distributor, visit automation.honeywell.com/hss or call:

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