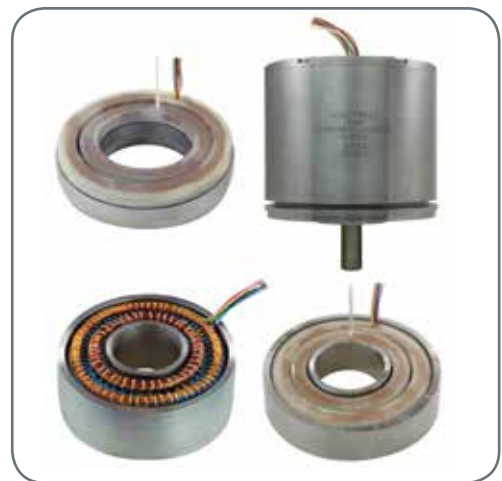


# Honeywell Hawk™ Resolvers

## 3-Inch Series

Multiple Configurations



# Honeywell Hawk™ Resolvers

For manufacturers who need an accurate, reliable, repeatable and durable rotary and angle absolute position sensor for potential use in defense, aerospace, medical and industrial applications. Honeywell Hawk™ Resolvers provide 360° non-contact, angular position sensing and enhanced accuracy ( $\pm 7$  arcmin) for precise motion control.

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°.

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

## Features

- Single and dual speed operation: 1 and/or 16 magnetic pole pairs
- \* Multiple configurations: Pancake (bare and simple housed), fully housed and configurations with rotary transformers
- \* Operating temperature range: -50.8 °C to 93.3 °C [-60 °F to 200 °F]
- Accuracy:
  - $\pm 420$  arcsec (1X)
  - \*  $\pm 25$  arcsec (16X)
- \* Excitation frequency range: 800 Hz to 5000 Hz
- \* Excitation voltage range: 3 V to 15 V
- Transformation ratio: 0.25 or 1.0
- \* Shock: 50 g, 11 ms
- \* Vibration: 15 g, 10 Hz to 2000 Hz
- Non-contact magnetic technology
- Endurance testing: To MIL-hdbk-218 (6.2) (1200 hr at 1150 rpm)
- Meets multiple military/aerospace specifications: DO-160D, MIL-STD-202G, MIL-STD-810G, MIL-STD-81963B, MIL-STD-461F; complies with space outgassing requirement SP-R0022

## Options

- \* Custom trim
- \* Custom hub/housing
- Custom connections including custom lead wire, cable, connector on unit or connector on cable
- \* Custom redundant brushless version (two independent resolvers within the same housing)
- \* Titanium housing
- \* Transformer for 360°+ rotation (continuous)

## Honeywell Value

- \* **Product delivery:** Honeywell's use of the same components for all standard configurations results in its ability to manufacture production-quality standard devices in 12 weeks versus 20-22 weeks many competitors offer
- **Customizable:** Honeywell's manufacturing process and the variety of features available allow customers to customize the product to meet their application accuracy and size requirements

- **Global support:** Honeywell's worldwide presence 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:** Honeywell has more than 30 years' experience providing accurate, reliable, and durable resolvers

## Potential 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

\*Competitive Differentiator

# Honeywell Hawk™ Resolvers

**Table 1. Operating Specifications (At 25 °C [77 °F].)**

Characteristic	Parameter
Speed	1X; 1X and 16X
Excitation voltage range	3 V to 15 V
Excitation frequency range	800 Hz to 5000 Hz
Input current	20 mA to 40 mA
Input power	0.03 W to 0.09 W
Electrical load	100 kOhm min.
Phase shift: 1X 16X	10° 20° to 25°
Accuracy: 1X 16X	±420 arcsec (1800 arcsec in dual speed variants) ±25 arcsec (3 V to 15 V and 800 Hz to 2500 Hz)
Angular range	360°+
Transformation ratio: 1X 16X	1.0 0.25
Operating temperature range	-50.8 °C to 93.3 °C [-60 °F to 200 °F]

**Table 2. Mechanical Specifications (At 25 °C [77 °F].)**

Characteristic	Parameter
Mounting concentricity	<0.0005 in
Primary winding	rotor
Friction torque	2.5 oz in
Shaft runout	<0.0015 TIR <sup>1</sup>
Shaft radial play	≤0.0006 in with 4 oz load
Shaft end play	≤0.0005 in with 8 oz load
Weight: D27B14XGABNTB, S27B14XGABNYG D30D12XGASNTB D30H04XGAG4TB D30P12XGASNTB	0.44 lb max. 1.6 lb max. 3.5 lb max. 0.8 lb max.

<sup>1</sup>TIR stands for Total Indicator Runout.

**Table 3. Environmental Specifications**

Characteristic	Parameter
Vibration	MIL-S-81963B, Section 3.7.1, 15 g, 10 Hz to 2000 Hz, 4 hr each on 3 axes
Shock	MIL-S-81963B, Section 3.7.2, 50 g, 11 ms duration, 3 axes, 2 directions, 5 impacts each axis/direction, 30 total
Storage temperature	MIL-STD-810G, 501.5 and 502.5, -50.8 °C to 93.3 °C
Humidity cycle	MIL-STD-202 G Condition 106
Thermal cycle	RTCA/DO-160D Section 5, -50.8 °C to 93.3 °C extreme temperatures 10 °C per minute transition
Sealing (fully housed)	IP64 NEMA
EMC	MIL-STD-461 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

# Honeywell Hawk™ Resolvers

Figure 1. Nomenclature

For example, a **D27B14XGABNTB** catalog listing defines a Honeywell Hawk™ 3-Inch Series Resolvers, dual speed (1X and 16X ), 2.75 in OD, 1.4 in ID, pancake bare configuration, 7 V, 2500 Hz, leadwire, bare mounting type, no bolt pattern, 0.25 transformation ratio, ±25 arcsec accuracy, stainless steel hub and housing.

<b>D</b> Speed	<b>27</b> Outside Diameter (Pancake Configuration only)	<b>B</b> Configuration	<b>14</b> Inside Diameter (ID) (includes shaft OD)	<b>X</b> Voltage	<b>G</b> Frequency	<b>A</b> Connection	<b>B</b> Mounting Type	<b>N</b> Bolt Pattern (flanged housing/hub only)	<b>T</b> Transformation Ratio (V <sub>out</sub> /V <sub>in</sub> )	<b>B</b> Accuracy over 360°	<b>X</b> Housing Material	<b>xxx</b> Customer Specified
<b>D</b> Dual speed (1X and 16X)	<b>27</b> 2.75 in	<b>B</b> Pancake: bare Pancake: simple housed; no transformer, not redundant	<b>12</b> 1.2 in	<b>T</b> 5 V	<b>A</b> 400 Hz	<b>A</b> Leadwire	<b>B</b> Bare	<b>4</b> Four bolts equally spaced	<b>T</b> 0.25 (dual speed, 1X and 16X)	<b>A</b> ±20 arcsec (16X or dual speed)	<b>Blank</b> Stainless steel	
<b>M</b> Multi speed (16X)	<b>30</b> 3.00 in	<b>P</b> Pancake: simple housed; no transformer, not redundant	<b>14</b> 1.4 in	<b>X</b> 7 V	<b>B</b> 800 Hz	<b>B</b> Connector on unit	<b>F</b> Flange	<b>6</b> Six bolts equally spaced	<b>X</b> 0.45 (single speed, 1X)	<b>B</b> ±25 arcsec (16X or dual speed)	<b>T</b> Titanium	
<b>S</b> Single speed (1X)		<b>D</b> Pancake: simple housed; transformer		<b>Y</b> 10 V	<b>E</b> 1000 Hz	<b>C</b> Customer specified	<b>G</b> Series 11 NEMA servo-mount enclosure	<b>N</b> None	<b>Y</b> 1.0 (single speed, 1X)	<b>C</b> ±30 arcsec (16X or dual speed)		
		<b>E</b> Pancake: simple housed; no transformer, redundant		<b>Z</b> 26 V	<b>F</b> 2000 Hz	<b>D</b> Connector on cable	<b>S</b> Sleeve	<b>C</b> Customer specified		<b>D</b> ±40 arcsec (16X or dual speed)		
		<b>F</b> Pancake: simple housed; transformer, redundant		<b>C</b> Customer specified	<b>G</b> 2500 Hz		<b>C</b> Customer specified			<b>E</b> ±60 arcsec (16X or dual speed)		
		<b>G</b> Fully housed: no transformer, not redundant		<b>H</b> 5000 Hz						<b>F</b> ±240 arcsec (16X or dual speed)		
		<b>H</b> Fully housed: transformer, 360°+ mechanical, not redundant		<b>C</b> Customer specified						<b>G</b> ±420 arcsec		
		<b>K</b> Fully housed: transformer, 360°+ mechanical, redundant								<b>H</b> Customer specified		

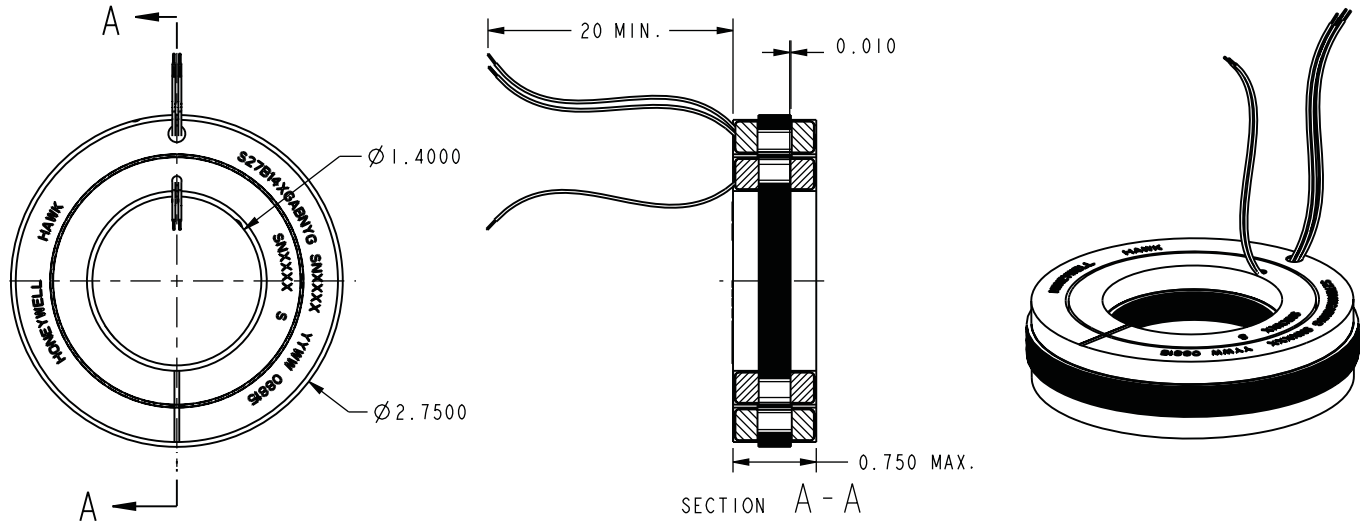
Table 4. Order Guide

Catalog Listing	Description	
D27B14XGABNTB	Hawk 3-Inch Series Resolvers, dual speed (1X and 16X ), 2.75 in OD, 1.4 in ID, pancake bare configuration, 7 V, 2500 Hz, leadwire, bare mounting type, no bolt pattern, 0.25 transformation ratio, ±25 arcsec accuracy, stainless steel hub and housing	
S27B14XGABNYG	Hawk 3-Inch Series Resolvers, single speed (1X), 2.75 in OD, 1.4 in ID, pancake bare configuration, 7 V, 2500 Hz, leadwire, bare mounting type, no bolt pattern, 1.0 transformation ratio, ±420 arcsec accuracy, stainless steel hub and housing	
D30D12XGASNTB	Hawk 3-Inch Series Resolvers, dual speed (1X and 16X), 3.00 in OD, 1.2 in ID, pancake simple housed with transformer, 7 V, 2500 Hz, leadwire, no bolt pattern, sleeve mounting type, 0.25 transformation ratio, ±25 arcsec accuracy, stainless steel hub and housing	
D30H04XGAG4TB	Hawk 3-Inch Series Resolvers, dual speed (1X and 16X), 3.00 in OD fully housed with transformer, 0.3745 in shaft OD, 7 V, 2500 Hz, leadwire, Series 11 NEMA servo-mount enclosure mounting type, no bolt pattern, 0.25 transformation ratio, ±25 arcsec accuracy, stainless steel housing	
D30P12XGASNTB	Hawk 3-Inch Series Resolvers, dual speed (1X and 16X), 3.00 in OD, 1.2 in ID, pancake simple housed, 7 V, 2500 Hz, leadwire, sleeve mounting type, no bolt pattern, 0.25 transformation ratio, ±25 arcsec accuracy, stainless steel hub and housing	

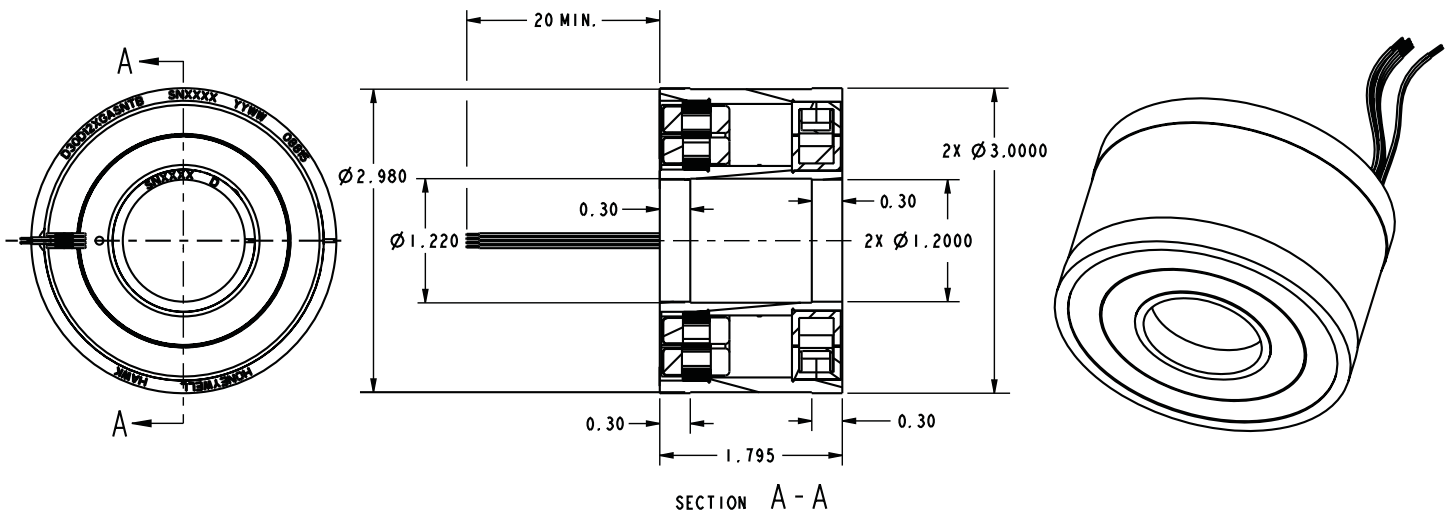
# 3-Inch Series, Multiple Configurations

Figure 2. Mounting Dimensions (For reference only: in.)

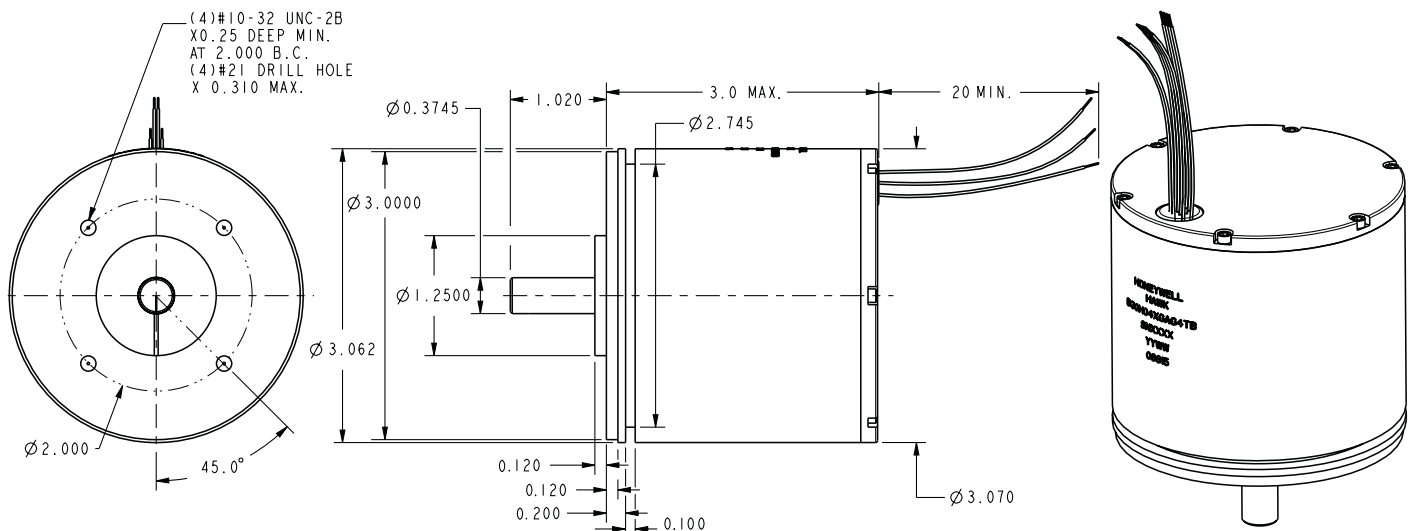
## S27B14XGABNYG, D27B14XGABNTB



## D30D12XGASNTB



## D30H04XGAG4TB



# Honeywell Hawk™ Resolvers

Figure 2. Mounting Dimensions (continued)

## D30P12XGASNTB

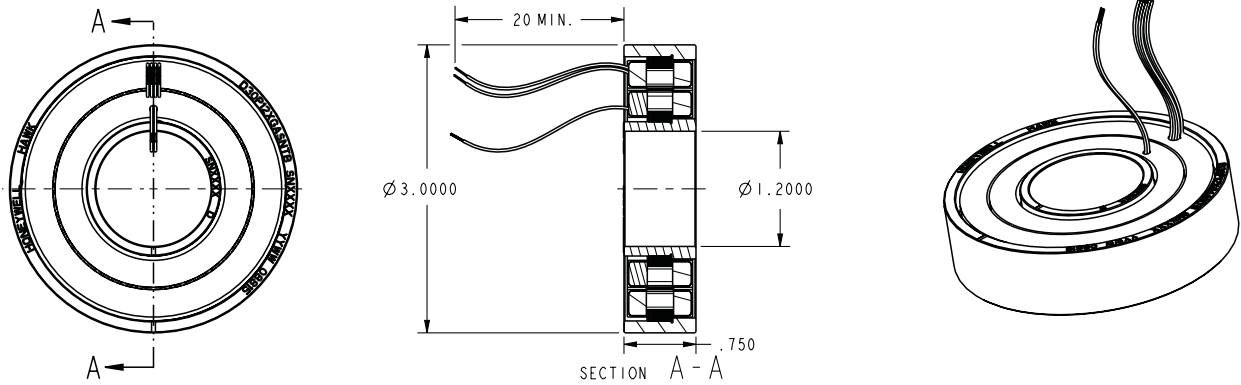
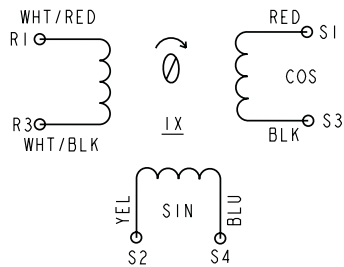


Figure 3. Electrical Schematics (Positive Direction of Rotation Clockwise, Viewed from Shaft End) and Phase Equations

## S27B14XGABNYG

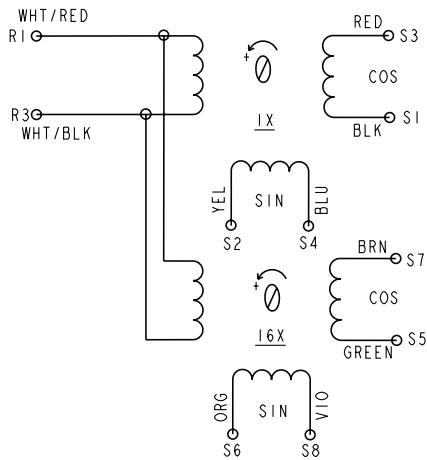


### 1X

$$ES1 - S3 = KERI - R3 \cos \theta$$

$$ES2 - S4 = KERI - R3 \sin \theta$$

## D27B14XGABNTB, D30P12XGASNTB



### 1X

$$ES1 - S3 = KERI - R3 \cos \theta$$

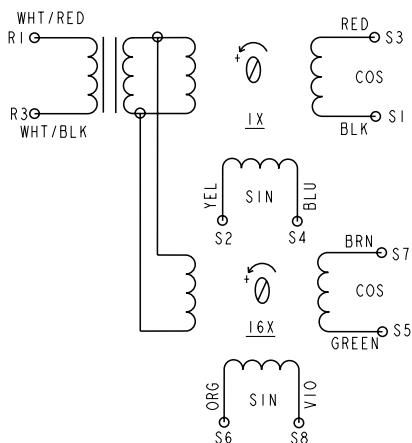
$$ES2 - S4 = KERI - R3 \sin \theta$$

### 16X

$$ES5 - S7 = KERI - R3 \cos 16\theta$$

$$ES6 - S8 = KERI - R3 \sin 16\theta$$

## D30D12XGASNTB, D30H04XGAG4TB



### 1X

$$ES1 - S3 = KERI - R3 \cos \theta$$

$$ES2 - S4 = KERI - R3 \sin \theta$$

### 16X

$$ES5 - S7 = KERI - R3 \cos 16\theta$$

$$ES6 - S8 = KERI - R3 \sin 16\theta$$

## ADDITIONAL INFORMATION

The following associated literature is available at [sensing.honeywell.com](http://sensing.honeywell.com):

- Product line guide
- Product part listing/nomenclature tree
- Product range guide
- Application information
- Product installation instructions

### ⚠ 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 datasheet 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.**

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Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

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Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

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