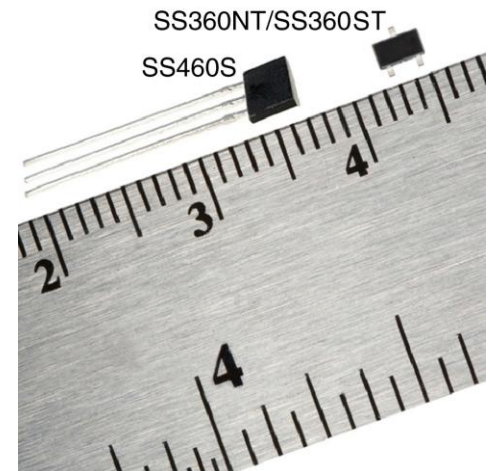




## SS360NT/SS360ST/SS460S

### High Sensitivity Bipolar Latching Digital Hall-Effect Sensor ICs

#### DESCRIPTION

The SS360NT/SS360ST/SS460S High Sensitivity Bipolar Latching Digital Hall-Effect Sensor ICs are small, sensitive and versatile devices that are operated by the magnetic field from a permanent magnet or an electromagnet. They are designed to respond to alternating North and South poles. The SS360NT is turned ON by a North pole while the SS360ST and SS460S are turned ON by a South pole.

The SS360NT/SS360ST/SS460S offers reliable switching points with a high magnetic sensitivity of 30 G typical (55 G maximum). This sensor IC does not use chopper stabilization on the Hall element, providing a clean output signal and a faster latch response time when compared to competitive high sensitivity Hall-effect bipolar latching sensor ICs which do use chopper stabilization.

These products offer reverse polarity protection, deliver a stable output over a -40 °C to 150 °C [-40 °F to 302 °F] temperature range, and can accept any dc supply voltage from 3 Vdc to 24 Vdc.

For brushless dc motor manufacturers that need latching sensors with reliable, consistent performance for more efficient and smaller designs, Honeywell's new family of High Sensitivity Hall-Effect Bipolar Latching Sensor ICs responds to low magnetic fields and offers consistent repeatability while delivering faster response times to a change in magnetic field for better motor efficiency.

These Hall-effect devices are available in two package styles: the SS360NT and SS360ST in the miniature SOT-23 surface mount package and the SS460S in the leaded, flat TO-92-style package.

The SS360NT and SS360ST are available on tape and reel (3000 units per reel). The SS460S is available in a bulk package (1000 units per bag).

#### FEATURES AND BENEFITS

- **Fastest response time in its class:** Provides more efficiency in commutating a brushless dc motor
- **No chopper stabilization:** Results in a clean output signal
- **High sensitivity:** Operates from only 30 Gauss typical, at 25°C [77 °F] and 55 Gauss maximum over the full -40 °C to 150 °C [-40 °F to 302 °F] temperature range, allowing for the use of smaller, magnets or a wider air gap
- **Bipolar latching magnetics:** Makes these products well-suited for accurate speed sensing and RPM (revolutions per minute) measurement
- **Sub-miniature, SOT-23 surface mount package (SS360NT/SS360ST) supplied on tape and reel:** Allows for compact design with automated component placement
- **Small, leaded, flat TO-92-style package (SS460S):** Allows for a compact PC board layout
- **Wide operating voltage range of 3 Vdc to 24 Vdc:** Allows for potential use in a wide range of applications
- **Built-in reverse voltage:** Enhances the protection of the sensor and the circuits
- **Durable design:** Allows operation up to 150 °C [302 °F]
- RoHS-compliant material meets Directive 2002/95

# SS360NT/SS360ST/SS460S

## POTENTIAL APPLICATIONS

### Industrial/Commercial

- Brushless dc motor commutation
- Flow-rate sensing for appliances
- Speed and RPM sensing
- Tachometer, counter pickup
- Motor and fan control
- Robotics control

### Transportation

- Speed and RPM sensing
- Tachometer, counter pickup
- Motor and fan control
- Electronic window lift
- Convertible roof position

### Medical

- Medical equipment using electric motors

**Table 1. SS360NT/SS360ST/SS460S Performance Specifications (At 3 Vdc to 24 Vdc supply, 20 mA load,  $T_A = -40\text{ }^{\circ}\text{C}$  to  $150\text{ }^{\circ}\text{C}$  [ $-40\text{ }^{\circ}\text{F}$  to  $302\text{ }^{\circ}\text{F}$ ] except where otherwise specified.)**

| Characteristic            | Condition                                                                                                                         | Min.            | Typ. | Max.      | Unit                                      |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-----------------|------|-----------|-------------------------------------------|
| Supply voltage            | $-40\text{ }^{\circ}\text{C}$ to $150\text{ }^{\circ}\text{C}$ [ $-40\text{ }^{\circ}\text{F}$ to $302\text{ }^{\circ}\text{F}$ ] | 3               | —    | 24        | Vdc                                       |
| Supply current            | $V_{\text{supply}} = 3\text{ V}$ at $25\text{ }^{\circ}\text{C}$ [ $77\text{ }^{\circ}\text{F}$ ]                                 | —               | 3.5  | 6         | mA                                        |
|                           | —                                                                                                                                 | —               | —    | 8         |                                           |
| $V_{\text{sat}}$          | Gauss $>55$                                                                                                                       | —               | —    | 0.6       | V                                         |
| Output leakage current    | Gauss $>55$                                                                                                                       | —               | —    | 10        | $\mu\text{A}$                             |
| Rise/fall time            | $V_{\text{supply}} = 12\text{ V}$ at $25\text{ }^{\circ}\text{C}$ [ $77\text{ }^{\circ}\text{F}$ ]                                | —               | —    | 1.5       | $\mu\text{s}$                             |
| Thermal resistance:       |                                                                                                                                   |                 |      |           |                                           |
| SS460S (flat TO-92-style) | —                                                                                                                                 | —               | 233  | —         | $^{\circ}\text{C}/\text{W}$               |
| SS360NT/SS360ST (SOT-23)  | —                                                                                                                                 | —               | 303  | —         |                                           |
| Operate                   | $-40\text{ }^{\circ}\text{C}$ to $125\text{ }^{\circ}\text{C}$ [ $-40\text{ }^{\circ}\text{F}$ to $257\text{ }^{\circ}\text{F}$ ] | 5               | 30   | 55        | Gauss                                     |
| Release                   | $-40\text{ }^{\circ}\text{C}$ to $125\text{ }^{\circ}\text{C}$ [ $-40\text{ }^{\circ}\text{F}$ to $257\text{ }^{\circ}\text{F}$ ] | -55             | -30  | -5        | Gauss                                     |
| Differential              | $-40\text{ }^{\circ}\text{C}$ to $125\text{ }^{\circ}\text{C}$ [ $-40\text{ }^{\circ}\text{F}$ to $257\text{ }^{\circ}\text{F}$ ] | 40              | 60   | 80        | Gauss                                     |
| Operating temperature     | $V_{\text{supply}} = 3\text{ Vdc}$ to $24\text{ Vdc}$                                                                             | $-40$ [ $-40$ ] | —    | 150 [302] | $^{\circ}\text{C}$ [ $^{\circ}\text{F}$ ] |
| Storage temperature       | —                                                                                                                                 | $-40$ [ $-40$ ] | —    | 165 [329] | $^{\circ}\text{C}$ [ $^{\circ}\text{F}$ ] |

## NOTICE

Bipolar Hall-effect sensor ICs may have an initial output in either the ON or OFF state if powered up with an applied magnetic field in the differential zone (applied magnetic field  $>B_{\text{rp}}$  and  $<B_{\text{op}}$ ). Honeywell recommends allowing 10  $\mu\text{s}$  for output voltage to stabilize after supply voltage has reached its final rated value.

## NOTICE

The magnetic field strength (Gauss) required to cause the switch to change state (operate and release) will be as specified in the magnetic characteristics. To test the switch against the specified magnetic characteristics, the switch must be placed in a uniform magnetic field.



**Table 2. SS360NT/SS360ST/SS460S Absolute Maximum Ratings<sup>1</sup>**

| Characteristic         | Min.  | Typ. | Max.     | Unit  |
|------------------------|-------|------|----------|-------|
| Supply voltage         | -26.0 | —    | 26.0     | V     |
| Applied output voltage | -0.5  | —    | 26.0     | V     |
| Output current         | —     | —    | 20       | mA    |
| Magnetic flux          | —     | —    | no limit | Gauss |

**Note 1:** Absolute maximum ratings are the extreme limits that the device will withstand without damage to the device. However, the electrical and mechanical characteristics are not guaranteed as the maximum limits (above recommended operating conditions) are approached, nor will the device necessarily operate at absolute maximum ratings.

# High Sensitivity Bipolar Latching, Digital Hall-Effect Sensor ICs

Figure 1. Sensor IC Block Diagram

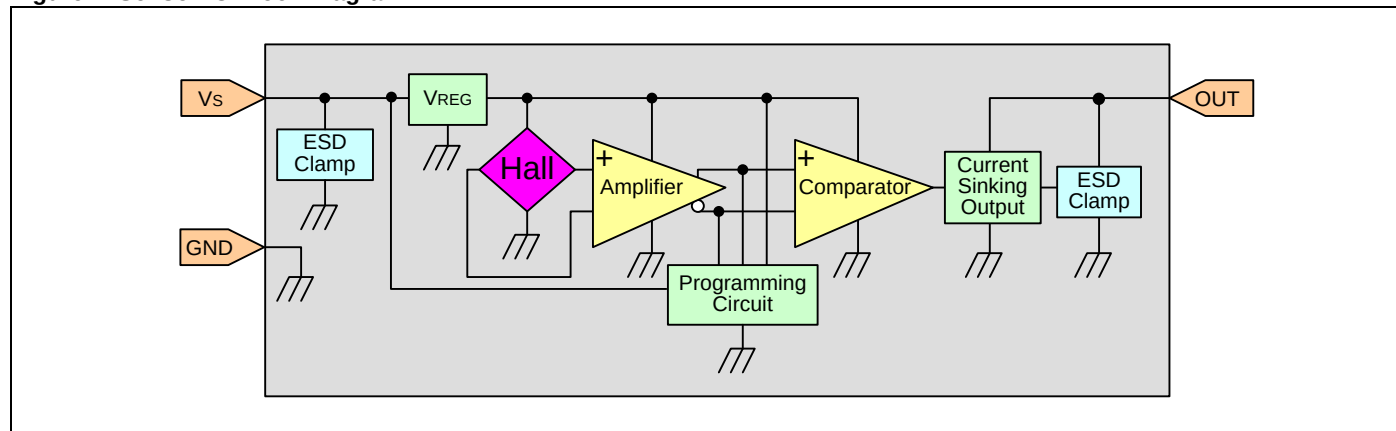


Figure 2. Typical Magnetic Characteristics vs Ambient Temperature at Supply Voltages

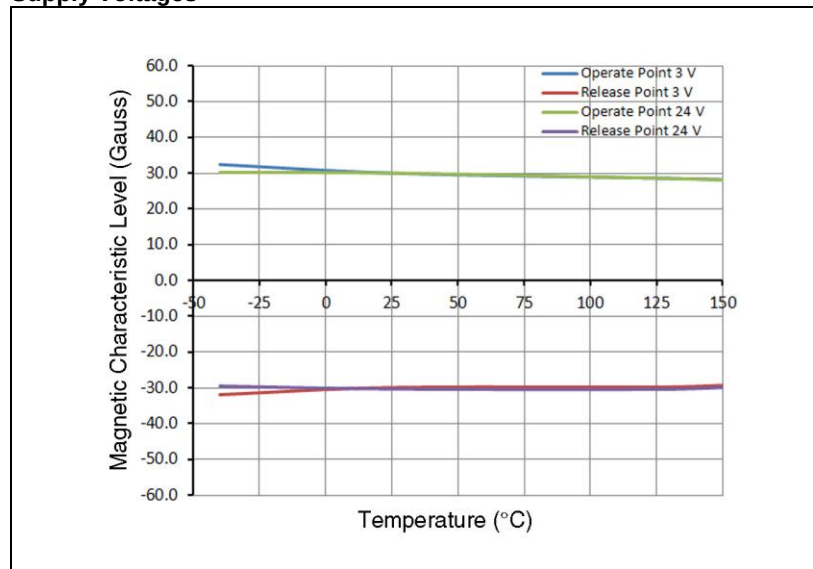


Figure 3. SS360NT and SS360ST Rated Supply Voltage vs Temperature

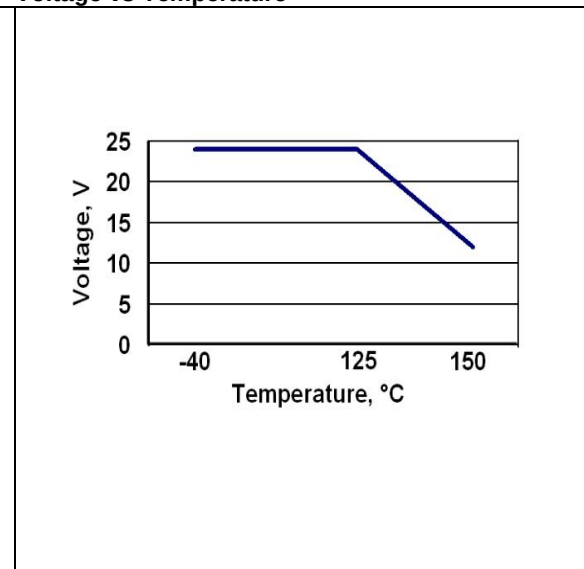
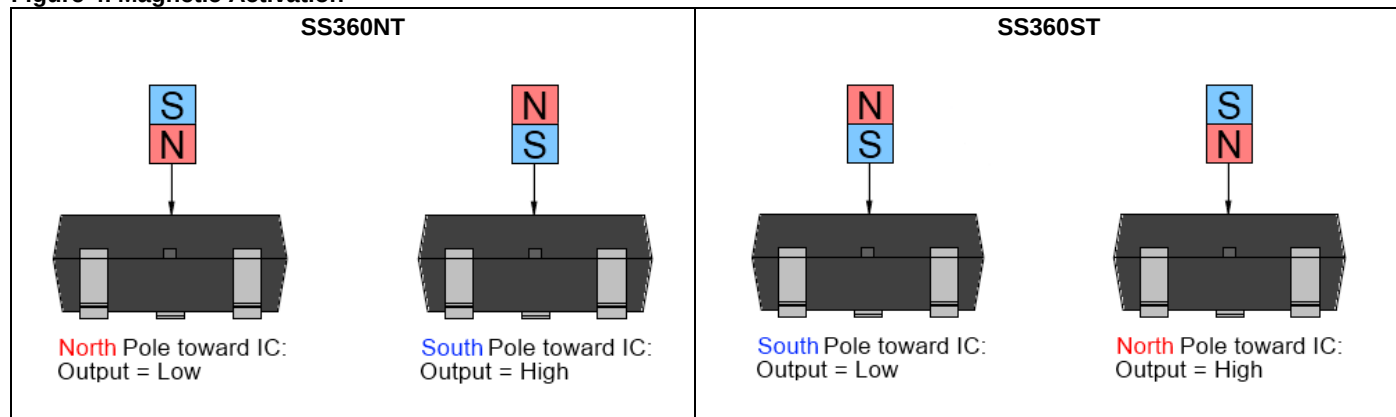


Figure 4. Magnetic Activation



# SS360NT/SS360ST/SS460S

Figure 5. SS360NT/SS360ST Mounting and Tape/Reel Dimensions (For reference only. mm/[in].)

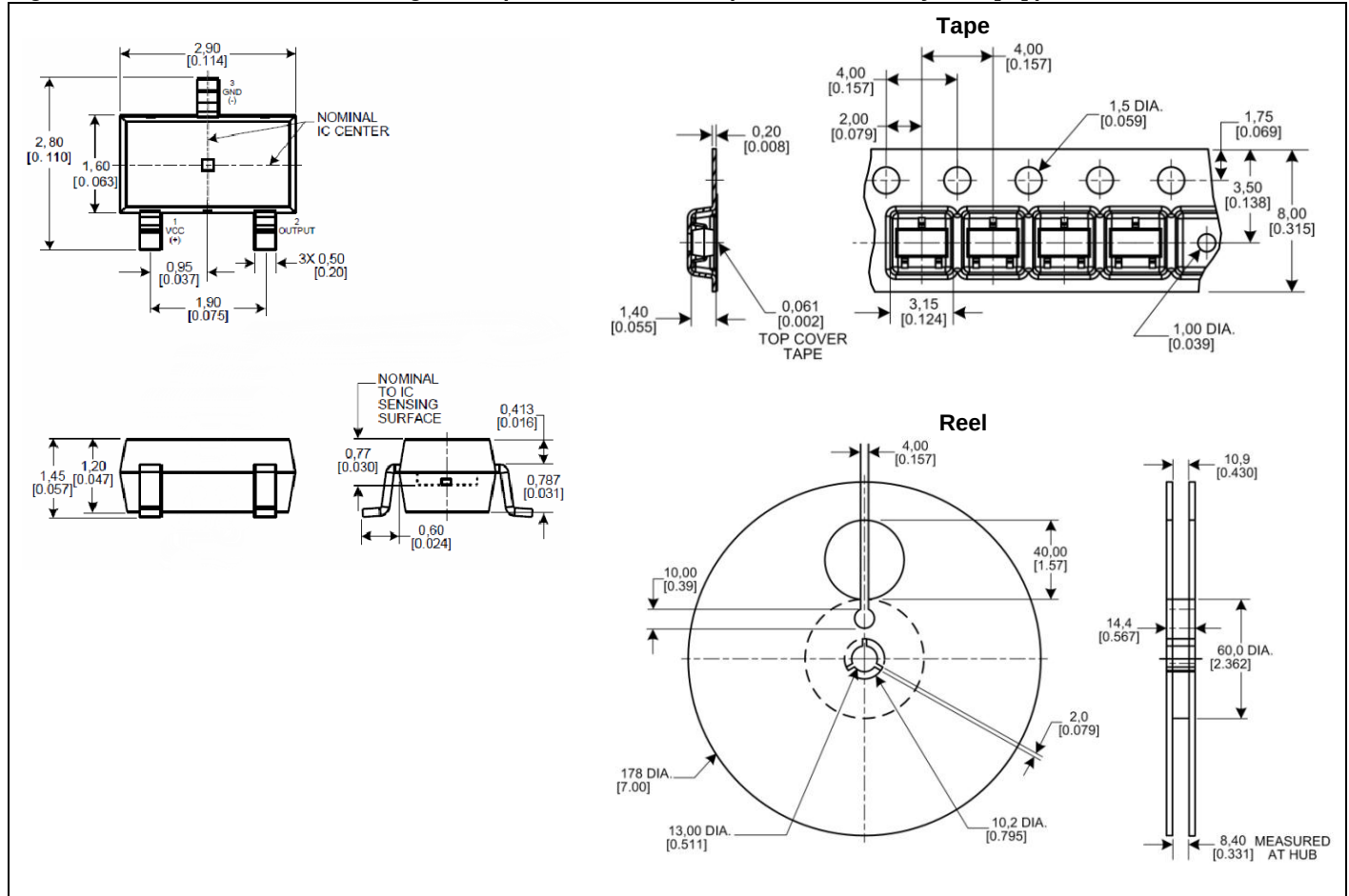
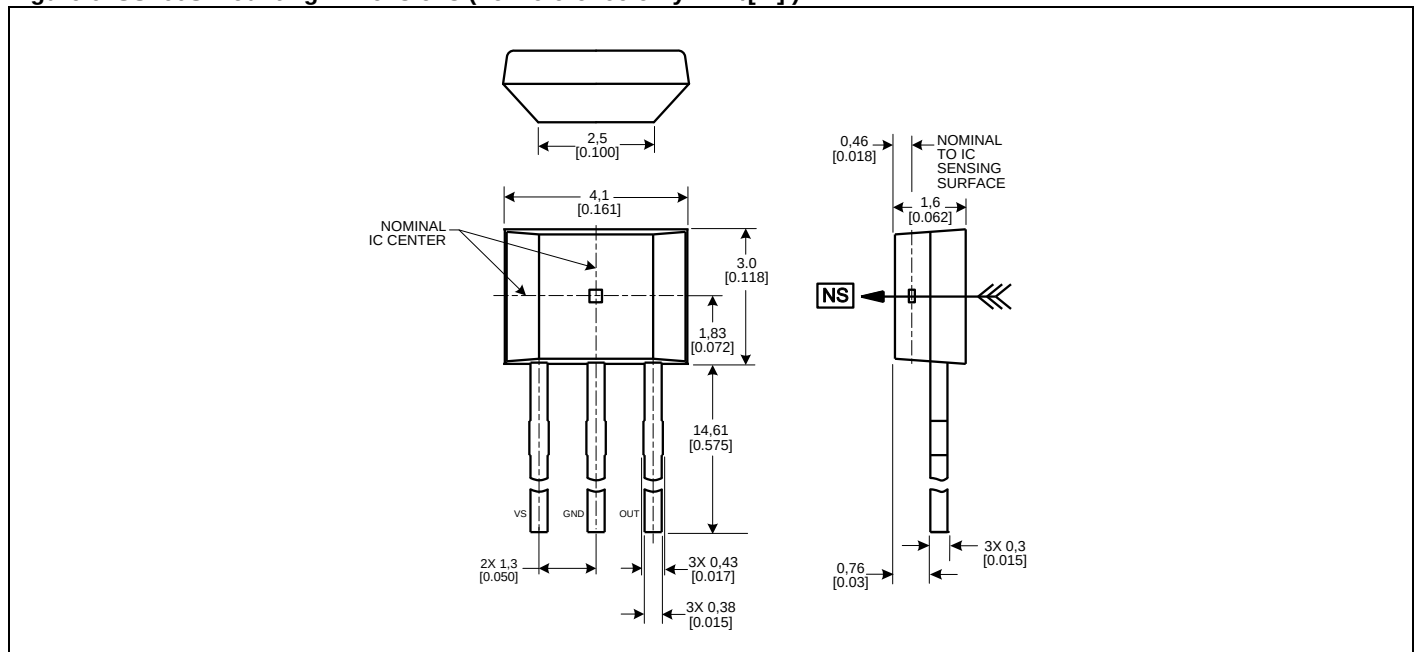


Figure 6. SS460S Mounting Dimensions (For reference only. mm/[in].)



## Order Guide

| Catalog Listing | Description                                                                                                                                           |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| SS360NT         | High sensitivity bipolar latching, digital Hall-effect sensor IC, North pole activated, SOT-23 package, tape and reel packaging (3000 units per reel) |
| SS360ST         | High sensitivity bipolar latching, digital Hall-effect sensor IC, South pole activated, SOT-23 package, tape and reel packaging (3000 units per reel) |
| SS460S          | High sensitivity bipolar latching, digital Hall-effect sensor IC, South pole activated, flat TO-92-style package, bulk packaging (1000 units per bag) |

### **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.**

#### **WARRANTY/REMEDY**

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.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

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.

### **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.**

#### **SALES AND SERVICE**

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

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**Internet:** [www.honeywell.com/sensing](http://www.honeywell.com/sensing)

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# Honeywell

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