

Honeywell

A close-up photograph of a smiling pilot in a cockpit. The pilot is wearing a white shirt, a striped tie, and a dark suit jacket. A coiled black cable runs from the bottom left towards the center of the frame, crossing over the pilot's shoulder. The background shows the interior of a cockpit with various controls and a window.

Product Range Guide  
**Position Sensors**

# For innovation that's well apart, there's only Honeywell

With more than 50,000 products ranging from snap-action, limit, toggle, and pressure switches to position, speed, pressure, and airflow sensors, Honeywell has one of the broadest sensing and switching portfolios.

Honeywell sensor, switch, and control components are tailored to exact specifications for stronger performance, longer productivity, and increased safety. Enhanced accuracy and durability are built into every part, improving output and endurance. For our customers, this can reduce expenditures and operational costs. Our global footprint and channels help to competitively price such components for your chosen application and provide immediate technical support.

While Honeywell's switch and sensor solutions are suitable for a wide array of basic and complex applications, our custom-engineered solutions offer enhanced precision, repeatability, and ruggedness. We offer domain knowledge and technology resources, along with a close working relationship, to develop and deliver cost-effective, individually tailored solutions.

Whether clean-slate development or simple modifications to an existing design are needed, our expertly engineered solutions help to meet the most stringent requirements with world-class product designs, technology integration, and customer-specific manufacturing.

Global service, sourcing, and manufacturing. Industry-leading engineers. Value-added assemblies and solutions. A one-stop, full-service, globally competitive supplier.



## Table of Contents

|   |       |
|---|-------|
| Magnetoresistive Sensor ICs.....                            | 3     |
| Hall-effect Digital Sensor ICs .....                        | 4-5   |
| Hall-effect Digital and Linear Sensor ICs.....              | 6-7   |
| Value-Added Hall-effect Sensors .....                       | 8-9   |
| Linear Potentiometric Sensors.....                          | 10-11 |
| SMART Position Sensors.....                                 | 12-13 |
| Inertial Measurement Units.....                             | 14    |
| Proximity Sensors.....                                      | 15-16 |
| Proximity Sensors: Integral Health Monitoring .....         | 17    |
| Encoders.....   | 18    |
| Non-Contact Hall-effect Sensors .....                       | 19    |
| Cermet, Wirewound, & Conductive Plastic Potentiometers..... | 20-21 |

# Magnetic Sensors | Magnetoresistive Sensor ICs

With a built-in magnetoresistive bridge integrated on silicon and encapsulated in a plastic package, magnetoresistive sensor ICs feature an integrated circuit that responds to low fields at large distances. Potential applications include laptops, material handling equipment, pneumatic cylinders, and battery-powered equipment including hand-held scanners, computers, and water/gas/electricity meters.



|                                    | <b>Nanopower Series</b>  | <b>Standard Power Series</b>   | <b>2SS52M Series</b>   | <b>VF401</b>  | <b>APS00B</b>  |
|------------------------------------|--|--|--|---|--|
| <b>Description</b>                 | omnipolar MR sensor IC   | omnipolar MR sensor IC   | omnipolar MR digital sensor IC   | 2-wire MR fine pitch ring magnet sensor IC  | high resolution magnetic displacement sensor IC  |
| <b>Magnetic actuation type</b>     | omnipolar  | omnipolar  | omnipolar  | differential bridge   | analog, saturated mode   |
| <b>Package style<sup>1</sup></b>   | SOT-23   | SM351RT,<br>SM353RT:<br>SOT-23<br>SM451RT,<br>SM453RT:<br>Flat TO-92-style   | SS52MT:<br>SOT-89B<br><b>all others:</b><br>leaded U-Pack in bulk or ammopack                                  | VF-401<br>flat TO-92-style  | SOIC-8   |
| <b>Supply voltage range</b>        | 1.65 Vdc to 5.5 Vdc  | 3 Vdc to 24 Vdc  | 3.8 Vdc to 30 Vdc  | 4.5 Vdc to 16 Vdc   | 1 Vdc to 12 Vdc  |
| <b>Supply current</b>              | SM351LT:<br>360 nA typ.<br>SM353LT:<br>310 nA typ.   | 8 mA max.  | 11 mA max.   | <b>operate:</b><br>16.8 mA max.<br><b>release:</b><br>8.4 mA max.   | 7 mA max.  |
| <b>Output type</b>                 | low: 0.03 V typ.<br>high: Vs -0.03 V typ.  | digital sinking  | digital sinking  | digital sourcing  | sin(2Θ), cos(2Θ)   |
| <b>Operating temperature range</b> | -40°C to 85°C<br>[-40°F to 185°F]  | -40°C to 85°C<br>[-40°F to 185°F]  | -40°C to 150°C<br>[-40°F to 302°F]   | -40°C to 150°C<br>[-40°F to 302°F]  | -40°C to 150°C<br>[-40°F to 302°F]   |
| <b>Features</b>                    | high sensitivity:<br>7 Gauss typ.,<br>11 Gauss max.<br>(SM351LT),<br>14 Gauss typ.,<br>20 Gauss max.<br>(SM353LT);<br>designed to accommodate applications with large air gaps, small magnetic fields and low power requirements | ultra-high sensitivity: 7 Gauss typ., 11 G Gauss max. (SM351RT, SM451R); very high sensitivity: 14 Gauss typ., 20 Gauss max. (SM353RT, SM453R) | omnipolar magnetics, sinking output, low Gauss operation (25 G max.), operating speed of 0 kHz to over 100 kHz | wide speed capability, output pattern independent of gap between target and sensor, improved insensitivity to run-out, tilt, and twist, reverse polarity protection | dual analog voltages respond to changes in magnetic field angle; sine and cosine output; accurate to 0.102 mm [0.004 in] |

<sup>1</sup>**Dimensions:**

- **SOT-23:** 2.8 mm x 2.9 mm [0.11 in x 0.11 in]
- **Flat TO-92-style:** 3.0 mm x 4.0 mm [0.12 in x 0.16 in] (leads not included)
- **VF-401 flat TO-92-style:** 3.0 mm x 4.06 mm [0.12 in x 0.16 in] (leads not included)
- **SOT-89B:** 4.2 mm x 4.5 mm [0.16 in x 0.18 in]
- **U-Pack:** 4.5 mm x 4.5 mm [0.18 in x 0.18 in] (leads not included)
- **SOIC-8:** 4.9 mm x 6.0 mm [0.19 in x 0.24 in]

# Magnetic Sensors | Hall-effect Digital Sensor ICs

Constructed from a thin sheet of conductive material with output connections perpendicular to the direction of current flow. Include bipolar, latching, omnipolar, or unipolar magnetics in a variety of package styles. Energy-efficient micropower versions for potential applications with low power requirements and/or battery operation.

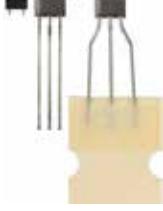
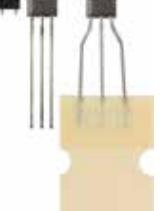


| Digital                            | SL353   | SS30AT,<br>SS40A,<br>SS50AT  | SS311PT,<br>SS411P  | SS340RT,<br>SS440R<br>Series   |
|------------------------------------|---|--|---|--|
| <b>Description</b>                 | micropower omnipolar Hall-effect digital sensor IC                                  | low-cost bipolar Hall-effect digital sensor IC   | low-cost bipolar Hall-effect digital sensor IC with built-in pull-up resistor           | low-cost unipolar Hall-effect digital sensor IC  |
| <b>Magnetic actuation type</b>     | omnipolar   | bipolar  | bipolar   | unipolar   |
| <b>Package style<sup>1</sup></b>   | SOT-23 (pocket tape and reel)   | <b>SS30AT:</b> SOT-23 (pocket tape and reel)<br><b>SS40A:</b> flat TO-92-style (bulk)<br><b>SS50AT:</b> SOT-89B (pocket tape and reel) | <b>SS311PT:</b> SOT-23 (pocket tape and reel)<br><b>SS411P:</b> flat TO-92-style (bulk) | <b>SS340RT:</b> SOT-23 (pocket tape and reel)<br><b>SS440R:</b> flat TO-92-style   |
| <b>Supply voltage</b>              | 2.2 Vdc to 5.5 Vdc  | 4.5 Vdc to 24 Vdc  | 2.7 Vdc to 7 Vdc  | <b>SS340RT</b> >125°C<br><b>[247°F]:</b> 3 Vdc to 12 Vdc<br><b>all others:</b> 3 Vdc to 18 Vdc   |
| <b>Supply current</b>              | <b>SL353LT:</b> 1.8 m typ. at 2.8 Vdc<br><b>SL353HT:</b> 0.33 mA typ. at 2.8 Vdc    | 10 mA max.   | 14 mA max.  | 8 mA   |
| <b>Operating temperature range</b> | -40°C to 85°C<br>[-40°F to 185°F]   | <b>SS40A:</b> -40°C to 125°C<br>[-40°F to 257°F]<br><b>SS30AT, SS50AT:</b> -40°C to 125°C<br>[-40°F to 257°F]                          | -40°C to 150°C<br>[-40°F to 302°F]  | <b>SS340RT (3 Vdc to 24 Vdc):</b> -40°C to 125°C<br>[-40°F to 257°F]<br><b>SS340RT (3 Vdc to 12 Vdc), SS440R (3 Vdc to 24 Vdc):</b> -40°C to 150°C<br>[-40°C to 302°F] |
| <b>Features</b>                    | low supply voltage combined with very low average current reduces power consumption | high output current and speed capability, reverse polarity protection  | built-in pull-up resistor, low voltage, enhanced sensitivity                            | simple activation from a North pole (SS340RT) or South pole (SS440R), multiple magnetic sensitivities (high, medium, and low)  |

<sup>1</sup>Dimensions:

- **SOT-23:** 2.8 mm x 2.9 mm [0.11 in x 0.11 in]
- **Flat TO-92-style:** 3.0 mm x 4.0 mm [0.12 in x 0.16 in] (leads not included)
- **SOT-89B:** 4.2 mm x 4.5 mm [0.16 in x 0.18 in]



|   |   |  |   |  |
|---|---|--|---|--|
|         |    |   |                                   |   |
| <b>SS345PT, SS445P</b>  | <b>SS351AT, SS451A, SS551AT</b>   | <b>SS360NT, SS360ST, SS360ST-10K, SS460S, SS460S-T2</b>  | <b>VF360NT, VF360ST, VF460S</b>   | <b>SS360PT, SS460P, SS460P-T2</b>  |
| unipolar Hall-effect digital sensor IC with built-in pull-up resistor                   | low-cost omnipolar Hall-effect digital sensor IC  | high sensitivity, latching Hall-effect digital sensor IC   | high sensitivity, latching Hall-effect digital sensor IC  | high sensitivity latching digital Hall-effect sensor IC with built-in pull-up resistor   |
| unipolar  | omnipolar   | latching   | latching  | latching   |
| <b>SS345PT:</b> SOT-23 (pocket tape and reel)<br><b>SS445P:</b> flat TO-92-style (bulk) | <b>SS351AT:</b> SOT-23 (pocket tape and reel)<br><b>SS451A:</b> flat TO-92-style (bulk)<br><b>SS551AT:</b> SOT-89B (pocket tape and reel)   | <b>SS360NT, SS360ST, SS360ST-10K:</b> SOT-23 (pocket tape and reel)<br><b>SS460S:</b> flat TO-92-style (bulk)<br><b>SS460S-T2:</b> flat TO-92-style, formed leads (ammopack) | <b>VF360NT, VF360ST:</b> SOT-23 (pocket tape and reel)<br><b>VF460S:</b> flat TO-92-style (bulk)                    | <b>SS360PT:</b> SOT-23 (pocket tape and reel)<br><b>SS460P:</b> flat TO-92-style (bulk)<br><b>SS460P-T2:</b> flat TO-92-style, formed leads (ammopack) |
| 2.7 Vdc to 7.0 Vdc  | <b>SS351AT, SS551AT</b> (-40°C to 125°C [-40°F to 257°F]): 3 Vdc to 24 Vdc<br><b>SS351AT (150°C [302°F]):</b> 3 Vdc to 12 Vdc<br><b>SS451A (-40°C to 150°C [-40°F to 302°F]):</b> 3 Vdc to 24 Vdc | 3 Vdc to 24 Vdc  | 3 Vdc to 24 Vdc   | 3 Vdc to 24 Vdc  |
| 14 mA   | <b>3 V:</b> 5 mA max. at 25°C [77°F]<br><b>5 V:</b> 6 mA max. at 25°C [77°F]  | 8 mA max.  | 8 mA  | 10 mA  |
| -40°C to 150°C<br>[-40°F to 302°F]  | -40°C to 150°C<br>[-40°F to 302°F]  | -40°C to 125°C<br>[-40°F to 257°F]   | -40°C to 150°C<br>[-40°F to 302°F]  | -40°C to 125°C<br>[-40°F to 257°F]   |
| simple activation from a North pole (SS345PT) or a South pole (SS445P)                  | built-in reverse polarity protection, typical operating point of 85 G at 25°C [77°F]  | fastest response time in its class, no chopper stabilization   | qualified to the AEC-Q100 standard for potential use in automotive applications, fastest response time in its class | fastest response time in its class, no chopper stabilization, operates from only 30 Gauss typical, at 25°C [77°F]                                      |

# Magnetic Sensors | Hall-effect Digital and Linear Sensor ICs

Potential applications are many, including closure detection; presence-absence, metering, and displacement sensing in laptops, drug carts and and battery-powered equipment including hand-held scanners, computers, and water/gas/electricity meters; and speed and RPM sensing in brushless dc motors.



| Digital                            | <b>SS361CT,<br/>SS461C</b>  | <b>SS361RT,<br/>SS461R</b>  | <b>SS400<br/>Series,<br/>SS500<br/>Series</b>   | <b>SS41,<br/>SS51T</b>   |
|------------------------------------|---|---|---|--|
| <b>Description</b>                 | high sensitivity, latching Hall-effect digital sensor IC                                | low-cost Hall-effect digital sensor IC  | unipolar/bipolar/latching Hall-effect digital sensor IC                               | bipolar Hall-effect digital sensor IC  |
| <b>Magnetic actuation type</b>     | latching  | latching  | unipolar, bipolar, latching   | bipolar  |
| <b>Package style<sup>1</sup></b>   | <b>SS361CT:</b> SOT-23 (pocket tape and reel)<br><b>SS461C:</b> flat TO-92-style (bulk) | <b>SS361RT:</b> SOT-23 (pocket tape and reel)<br><b>SS461R:</b> flat TO-92-style (bulk)   | <b>SS400:</b> flat TO-92-style (bulk)<br><b>SS500:</b> SOT-89B (pocket tape and reel) | <b>SS41:</b> flat TO-92-style (bulk)<br><b>SS51T:</b> SOT-89B (pocket tape and reel) |
| <b>Supply voltage</b>              | 4 Vdc to 24 Vdc   | <b>SS361RT</b> > 125°C [247°F]; 3 Vdc to 12 Vdc<br><b>all others:</b> 3 Vdc to 18 Vdc   | 3.8 Vdc to 30 Vdc (inclusive)   | 4.5 Vdc to 24 Vdc  |
| <b>Supply current</b>              | 6 mA max.   | 8 mA  | <b>SS400:</b> 10 mA<br><b>SS500:</b> 8.7 mA at 5 Vdc                                  | 15 mA max.   |
| <b>Operating temperature range</b> | -40°C to 125°C [-40°F to 257°F]   | <b>SS361RT (3 V to 12 V), SS461R:</b> 40°C to 150°C [-40°F to 302°F]<br><b>SS361RT (3 V to 18 V):</b> -40°C to 125°C [-40°F to 257°F] | -40°C to 150°C [-40°F to 302°F]   | -40°C to 150°C [-40°F to 302°F]  |
| <b>Features</b>                    | enhanced sensitivity, built-in reverse voltage capability                               | enhanced sensitivity, built-in reverse polarity protection, robust design   | multiple operate/release points available   | high output current, reverse polarity protection                                     |

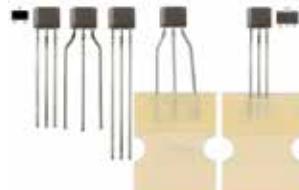
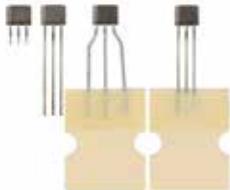
## <sup>1</sup>Dimensions

- **SOT-23:** 2.8 mm x 2.9 mm [0.11 in x 0.11 in]
- **Flat TO-92-style:** 3.0 mm x 4.0 mm [0.12 in x 0.16 in] (leads not included)
- **SOT-89B:** 4.2 mm x 4.5 mm [0.16 in x 0.18 in]





| Digital                     | VF526DT  |
|-----------------------------|--|
| Description                 | latching dual Hall-effect digital sensor IC with speed and direction outputs |
| Magnetic actuation type     | latching   |
| Package style <sup>1</sup>  | SOT-89B (pocket tape and reel)   |
| Supply voltage              | 3.4 Vdc to 24 Vdc  |
| Supply current              | 14 mA max.   |
| Output type                 | digital sinking  |
| Operating temperature range | -40°C to 125°C [-40°F to 257°F]  |
| Features                    | latching magnetics, sinking output, tape and reel available                  |



| Linear                     | SS490 Series  | SS39ET, SS49E, SS49E-F, SS49E-L, SS49E-T2, SS49E-T3, SS59ET  |
|----------------------------|---|--|
| Description                | Hall-effect linear sensor IC  | Hall-effect linear sensor IC   |
| Magnetic actuation type    | linear  | linear   |
| Package style <sup>1</sup> | flat TO-92-style, surface mount (pocket tape and reel)<br>flat TO-92-style, standard straight leads (bulk)<br>flat TO-92-style, formed leads (ammopack)<br>flat TO-92-style, standard straight leads (ammopack) | SS39ET: SOT-23 (pocket tape and reel)<br>SS49E: flat TO-92-style, standard straight leads (bulk)<br>SS49E-F: flat TO-92-style, formed leads (bulk)<br>SS49E-L: flat TO-92-style, long straight leads (bulk)<br>SS49E-T2: flat TO-92-style, formed leads (ammopack)<br>SS49E-T3: flat TO-92-style, standard straight leads (ammopack)<br>SS59ET: SOT-89B (pocket tape and reel) |
| Supply voltage             | 4.5 Vdc to 10.5 Vdc   | 2.7 Vdc to 6.5 Vdc   |
| Supply current             | 10 mA   | 10 mA max.   |
| Output type                | ratiometric sinking or sourcing   | ratiometric sourcing   |
| Operating temp. range      | -40°C to 150°C [-40°F to 302°F]   | -40°C to 100°C [-40°F to 212°F]  |
| Features                   | linear magnetics, ratiometric sourcing output, positive temperature coefficient, different package styles   | linear magnetics, ratiometric sourcing output, low voltage operation, different package styles   |

Dimensions:

- **4-Pin SIP:** 3,6 mm x 5,1 mm [0.14 in x 0.20 in]
- **SOT-89B:** 4,2 mm x 4,5 mm [0.16 in x 0.18 in]
- **Flat TO-92-style:** 3,0 mm x 4,0 mm [0.12 in x 0.16 in] (leads not included)

# Magnetic Sensors | Value-Added Hall-effect Sensors

Consist of Hall-effect or magnetoresistive sensor ICs packaged in a variety of housings. Include vane sensors and digital position sensors. Potential applications include position and RPM sensing, cam and crankshaft speed and position, transmissions, tachometers, traction control, and sprocket speed.



| Series                      | 103SR (digital)  | 103SR (linear)   |
|-----------------------------|--|--|
| Description                 | Hall-effect digital position sensor  | Hall-effect linear position sensor   |
| Package material and style  | aluminum threaded barrel   | aluminum threaded barrel   |
| Magnetic actuation type     | unipolar, bipolar, latching  | linear   |
| Operation                   | proximity to external magnet   | proximity to external magnet   |
| Supply voltage range        | 4.5 Vdc to 24 Vdc  | 4.5 Vdc to 10.5 Vdc  |
| Supply current              | 4 mA to 10 mA (inclusive)  | 7 mA   |
| Output type                 | digital sinking  | ratiometric sinking/sourcing   |
| Operating temperature range | -40°C to 100°C [-40°F to 212°F]  | -40°C to 100°C [-40°F to 212°F]  |
| Dimensions                  | Ø11.9 mm x 25.4 mm<br>[15/32-2 x 1.0 in]   | Ø11.9 x 25.4 mm<br>[15/32-2 x 1.0 in]  |
| Features                    | unipolar, bipolar, and latching magnetics; sinking or sourcing output, aluminum housing, color-coded jacketed cable, adjustable mounting | linear magnetics, ratiometric sinking/sourcing output, aluminum housing, color-coded jacketed cable, adjustable mounting |





| <b>SR16/SR17</b>  | <b>SR3</b>  | <b>SR4</b>   |
|---|---|--|
| low-cost Hall-effect vane sensor  | Hall-effect digital position sensor   | magnetoresistive digital position sensor                                 |
| <b>SR16:</b> plastic dual tower with variety of terminations<br><b>SR17:</b> plastic side-mount wire exit | plastic threaded barrel   | plastic threaded barrel  |
| -   | unipolar, bipolar   | omnipolar  |
| ferrous metal actuator  | proximity to external magnet  | proximity to external magnet   |
| 3.8 Vdc to 30 Vdc   | 4.5 Vdc to 24 Vdc   | 3.8 Vdc to 30 Vdc  |
| 10 mA max.  | 10 mA   | 11 mA  |
| digital sinking   | digital sinking   | digital sinking  |
| -20°C to 85°C [-4°F to 185°F]   | -40°C to 85°C [-40°F to 185°F]  | -40°C to 85°C [-40°F to 185°F]   |
| 24,6 mm x 12,4 mm<br>[0.97 in x 0.49 in]  | Ø12,4 mm x 25,4 mm<br>[0.49 in x 1.0 in]  | 19,0 mm H x 25,4 mm<br>[0.75 in H x 1.0 in]                              |
| sinking output, non-contact position sensing,<br>environmentally sealed, three terminations               | NEMA 3, 3R, 3S, 4, 4X, 12 and 13; unipolar and bipolar<br>magnetics, sinking output; frequencies exceeding 100 Hz | NEMA 3, 3R, 3S, 4, 4X, 12 and 13; omnipolar magnetics,<br>sinking output |

# Position Sensors | Linear Potentiometric Sensors

Include potentiometer sensors for linear position or displacement measurement with extended life PTFE bearings and precious metal multi-finger contact wipers. Potential applications include robotic control, marine steering, in-tank sensing, injection molding, and printing.



| Series                             | AQLT  | AQMLT   | LFII  |
|------------------------------------|---|---|---|
| <b>Description</b>                 | shaftless, waterproof linear position transducer  | shaftless, waterproof linear position transducer, metric specifications   | vibration-resistant, plunger-driven linear transducer   |
| <b>Operating temperature range</b> | -40°C to 80°C<br>[-40°F to 176°F]   | -40°C to 80°C<br>[-40°F to 176°F]   | -65°C to 105°C<br>[-85°F to 221°F]  |
| <b>Supply voltage</b>              | 30 Vdc max.   | 30 Vdc max.   | 30 Vdc max.   |
| <b>Linearity</b>                   | ±1 %  | ±1 %  | ±1 %  |
| <b>Starting force (max.)</b>       | 56,7 g max. [2 oz max.]   | 28,35 g max. [1 oz max.]  | standard: 0,45 kg [1 lb]<br>LFIIW: 2,27 kg [5 lb] (water resistant)   |
| <b>Backlash</b>                    | -   | -   | 0,025 mm [0.001 in] max.  |
| <b>Total resistance</b>            | 6K Ohm to 38K Ohm   | 750 Ohm to 18K Ohm  | 5000 Ohm  |
| <b>Measurement range</b>           | 127 mm to 965 mm<br>[5 in to 38 in]   | 12,7 mm to 304,8 mm<br>[0.5 in to 12 in]  | 152 mm to 1219 mm<br>[6 in to 48 in]  |
| <b>Shaft</b>                       | -   | -   | Ø6,35 mm [0.25 in]  |
| <b>Total mechanical travel</b>     | 154,94 mm to 967,74 mm<br>[6.1 in to 38.1 in]   | 15,24 mm to 307,34 mm<br>[0.6 in to 12.1 in]  | 154,6 mm to 1221,4 mm<br>[6.09 in to 48.09 in]  |
| <b>Electrical travel</b>           | 152,4 mm to 965,2 mm<br>[6 in to 38 in]   | 12,7 mm to 304,8 mm<br>[0.5 in to 12 in]  | 152,4 mm to 1219,2 mm<br>[6 in to 48 in]  |
| <b>Housing length</b>              | electrical travel + 54,87 mm<br>[2.16 in]   | electrical travel + 38,1 mm<br>[1.5 in]   | electrical travel + 81,02 mm<br>[3.19 in]   |
| <b>Vibration</b>                   | 20 g/0,75 mm (rms)<br>5 Hz to 2 kHz   | 20 g/0,75 mm (rms)<br>5 Hz to 2 kHz   | 20 g/0,75 mm (rms) 5 Hz to 2 kHz (for vibration levels up to 50 g rms and higher, additional housing clamps are required) |
| <b>Shock</b>                       | 50 g 11 ms half sine  | 50 g 11 ms half sine  | 50 g 11 ms half sine  |
| <b>Expected operating life</b>     | one billion dither operations   | one billion dither operations   | one billion dither operations   |
| <b>Resistance tolerance</b>        | ±20 %   | ±20 %   | ±20 %   |
| <b>Insulation resistance</b>       | 500 mOhm at 500 Vdc   | 500 mOhm at 500 Vdc   | 1000 mOhm at 500 Vdc  |
| <b>Dielectric strength</b>         | 250 Vrms  | 250 Vrms  | 1000 Vrms   |
| <b>Termination</b>                 | cable   | cable   | connector, binder series 681  |
| <b>Features</b>                    | 12,7 mm [0.5 in] body diameter, multiple finger-wiper design, anodized extruded aluminum housing, precious metal contact, sealed construction | 9,53 mm [0.375 in] body diameter, multiple finger-wiper design, anodized extruded aluminum housing, precious metal contact, sealed construction | vibration-dampened element, precious metal wipers, stainless steel shaft, enhanced dc level output                        |





| SLF  | LT   | MLT  | DR   |
|--|--|--|--|
| short stroke version of the LFII   | plunger-driven linear transducer   | plunger-driven linear transducer, metric specifications  | DuraStar rodless, space-saving side actuator   |
| -65°C to 105°C [-85°F to 221°F]  | -40°C to 80°C [-40°F to 176°F]   | -40°C to 80°C [-40°F to 176°F]   | -65°C to 105°C [-85°F to 221°F]  |
| 40 Vdc max.  | 30 Vdc max.  | 30 Vdc max.  | 75 Vdc max.  |
| ±1 % or ±0.1 %   | ±1 %   | ±1 %   | 0.1 % from 1 % to 100 % of theoretical electrical travel   |
| standard: 1 lb<br>water resistant: 5 lb  | standard: 28,35 g max. [1 oz max.]<br>water resistant: 12 oz max.  | 28,35 g max. [1 oz max.]   | 0,45 kg [1.0 lb]   |
| 0,025 mm [0.001 in] max.   | 0,00508 mm [0.0002 in] max.  | 0,0127 mm [0.0005 in] max.   | 0,025 mm [0.001 in] max.   |
| 1500 Ohm to 9000 Ohm   | 1000 Ohm to 10000 Ohm  | 750 Ohm to 9000 Ohm  | 2000 Ohm to 10000 Ohm  |
| 25 mm to 152 mm [1 in to 6 in]   | 25 mm to 254 mm [1 in to 10 in]  | 13 mm to 152 mm [0.5 in to 6 in]   | 102 mm to 1270 mm [4 in to 50 in]  |
| Ø6,35 mm [0.25 in]   | Ø3,18 mm [0.125 in]  | Ø3,18 mm [0.125 in]  | M5 x 0.8   |
| 30,5 mm to 166,2 mm<br>[1.2 in to 6.15 in]   | 26,7 mm to 255,3 mm<br>[1.05 in to 10.05 in]   | 13,97 mm to 153,67 mm<br>[0.55 in to 6.05 in]  | 106 mm to 1275 mm<br>[4.2 in to 50.2 in]   |
| 25,4 mm to 152,4 mm [1 in to 6 in]   | 25,4 mm to 254 mm [1 in to 10 in]  | 12,7 mm to 152,4 mm [0.5 in to 6 in]   | 101,6 mm to 1270 mm [4 in to 50 in]  |
| electrical travel + 77,5 mm [3.05 in]  | electrical travel + 38,10 mm [1.50 in]   | electrical travel + 30,48 mm [1.2 in]  | 250 mm to 1418 mm [9.84 in to 55.83 in]  |
| 20 g/0,75 mm (rms) 5 Hz to 2 kHz   | 20 g/0,75 mm (rms) 5 Hz to 2 kHz   | 20 g/0,75 mm (rms) 5 Hz to 2 kHz   | 20 g/0,75 mm (rms) 5 Hz to 2 kHz   |
| 50 g 11 ms half sine   | 50 g 11 ms half sine   | 50 g 11 ms half sine   | 50 g 11 ms half sine   |
| one billion dither operations  | one billion dither operations  | one billion dither operations  | one billion dither operations  |
| ±20 %  | ±20 %  | ±20 %  | ±20 %  |
| -  | 500 mOhm @ 500 Vdc   | 500 mOhm @ 500 Vdc   | 1000 mOhm @ 500 Vdc  |
| -  | 1000 V rms   | 1000 V rms   | 1000 V rms   |
| connector, binder series 681   | cable  | cable  | Hirschmann GDM   |
| precious metal wipers, 2,06 mm [0.081 in]<br>thick housing with 6 mm [0.25 in] shaft,<br>high level dc output, enhanced performance<br>bearings, shaft seals | 12,7 mm [0.5 in] diameter, dual-wiper<br>design, stainless steel shaft, anodized<br>extruded aluminum housing, precious metal<br>contact, shaft seals for spray-or-hose-down<br>environments | 9,53 mm [0.375 in] diameter, dual-<br>wiper design, stainless steel shaft, internal<br>spring-loaded ball joint, anodized extruded<br>aluminum housing, precious metal contact,<br>infinite resolution | vibration-dampened element, extended side<br>bearing, precious metal wipers, high dc level<br>output, enhanced performance bearings,<br>NEMA 4 sealing |

# Position Sensors | SMART Position Sensors

SMART Position Sensors are some of the most durable and adaptable position devices. These sensors use a patented combination to provide absolute position sensing with enhanced speed and accuracy. Their simple, non-contact design eliminates mechanical failure mechanisms, reduces wear and tear, improves reliability and durability, enhances operation efficiency and safety, and minimizes downtime.



| Series                           | SPS Linear   |
|----------------------------------|--|
| Description                      | measures linear movement of a magnet attached to a moving object   |
| Configuration                    | linear   |
| Sensing range                    | <b>35 mm:</b> 0 mm to 35 mm [0 in to 1.38 in]; <b>75 mm:</b> 0 mm to 75 mm [0 in to 2.95 in]<br><b>225 mm:</b> 0 mm to 225 mm [0 in to 8.86 in]  |
| Actuator sensing location on arc | —  |
| Resolution                       | <b>35 mm analog:</b> 0,04 mm [0.0016 in]; <b>75 mm analog:</b> 0,05 mm [0.002 in]<br><b>225 mm analog:</b> 0,14 mm [0.0055 in]; <b>225 mm digital:</b> 0,0035 mm [0.000137 in]   |
| Supply voltage                   | <b>35 mm:</b> 4.75 Vdc to 5.25 Vdc<br><b>all other versions:</b> 6 Vdc to 24 Vdc   |
| Supply current                   | <b>35 mm analog:</b> 20 mA max.; <b>75 mm analog:</b> 32 mA max.<br><b>225 mm analog:</b> 34 mA max.; <b>225 mm digital:</b> 88 mA max.  |
| Output                           | <b>35 mm analog:</b> 0.55 Vdc to 4.15 Vdc<br><b>75 mm and 225 mm analog:</b> 0 Vdc to 5 Vdc<br><b>225 mm digital:</b> RS232 type   |
| Air gap                          | <b>35 mm analog:</b> $8.5 \pm 1.0$ mm [ $0.334 \pm 0.039$ in]<br><b>all other versions:</b> $3.0 \text{ mm} \pm 2.5 \text{ mm}$ [ $0.118 \text{ in} \pm 0.098 \text{ in}$ ]  |
| Operating temperature range      | -40°C to 125°C [-40°F to 257°F]  |
| Storage temperature range        | -40°C to 150°C [-40°F to 302°F]  |
| Termination                      | <b>35 mm analog:</b> TYCO Super Seal 282087-1 integral connector<br><b>all other versions:</b> 18 AWG flying leads   |
| Sealing                          | IP67, IP69K  |
| Housing material                 | thermoplastic  |
| Approvals                        | CE   |
| Dimensions                       | <b>35 mm:</b> 85 mm L x 31,95 mm W x 35,5 mm H [3.35 in x 1.26 in x 1.40 in]<br><b>75 mm:</b> 145 mm L x 18,0 mm W x 28,2 mm H [5.7 in x 0.71 in x 1.1 in]<br><b>225 mm:</b> 287,3 mm L x 18,0 mm W x 28,2 mm H [11.3 in x 0.71 in x 1.1 in] |

**Potential applications** valve position, material handling, plastic molding, wafer handling, CNC machines, passenger bus level position, truck-mounted crane outrigger position, heavy equipment attachment identification, engine transmissions (35 mm only), marine motors, and aircraft actuators



### SPS Arc

measures angular movement of a magnet attached to a moving object

arc

**100°: 0° to 100°**

**180°: 0° to 180°**

**100°: inside or outside**

**180°: inside**

**100° inside and outside: 0.06°**

**180° inside: 0.11°**

**100° inside: 6 Vdc to 24 Vdc, 18 Vdc to 40 Vdc**

**100° outside: 5 Vdc**

**180° inside: 6 Vdc to 24 Vdc, 18 Vdc to 40 Vdc**

**100° inside: 45 mA max.**

**100° outside: 30 mA max.**

**180° inside: 45 mA max.**

0.5 Vdc to 4.5 Vdc

**100° inside: 7.8 mm ±2,5 mm [0.307 in ±0.098 in]**

**100° outside: 9.2 mm ±2,5 mm [0.36 in ±0.098 in]**

**180° inside: 8,5 mm ±2,5 mm [0.338 in ±0.098 in]**

-40°C to 85°C [-40°F to 185°F]

-40°C to 150°C [-40°F to 302°F]

**100° inside: 4-pin M12 connector, 18 AWG flying leads**

**100° outside: Ampseal 16 connector**

**180° inside: 4-pin M12 connector**

IP67, IP69K

thermoplastic

CE

**100°: 183 mm L x 86 mm W x 31 mm H [7.20 in x 3.39 in x 1.22 in]**

**180°: 222 mm L x 107 mm W x 31 mm H [8.74 in x 4.21 in x 1.22 in]**

aerial work lift platform, front end loader and digger/excavator boom position, scissor lift position, refuse truck lift and automatic reach arm position, mobile crane steering, timber harvester/processor equipment cutter arm angle, on-board loader weighing system position, telescoping conveyor elevation, power generation contact angle, rail-road crossing arms position, remote weapon systems elevation, chassis suspension systems position height, military vehicle door position, ground-based solar panels elevation and azimuth, ground-based satellite dish elevation and azimuth, robotically-assisted surgery equipment position, patient bed elevation

### SPS Rotary

measures rotary movement of a magnet attached to a moving object

rotary

**0° to 360°**

-

0.01°

12 mA to 30 mA

90 mA max.

4 mA to 20 mA

3,0 ±2,0 mm [0.118 ±0.079 in]

-40°C to 85°C [-40°F to 185°F]

-40°C to 150°C [-40°F to 302°F]

M12 connector (male 5-pin)

IP67, IP69K

aluminum with powder coating

CE

113,5 mm x 106,5 mm x 22,0 mm [4.46 in x 4.19 in x 0.87 in]

steering angle, articulation angle, boom arm detection, solar panels, wind turbines.

# Position Sensors | Inertial Measurement Units (IMU)

High-end position sensors with sensitive multi-axis motion control. IMUs measure the motion of the equipment onto which they are attached and deliver the data to the equipment's control module, allowing the operator to focus on other equipment functions, enabling more precise control than can be achieved by using only the human eye, thus increasing safety, stability and productivity.



|   | <b>TARS IMU Series</b>   | <b>6DF Series</b>   |
|---|--|---|
| <b>Description</b>                      | 6 degrees of freedom, 6-D motion variant   | 6 degrees of freedom, 6-D motion variant  |
| <b>Angular rate range</b>               | -245 deg/sec to +245 deg/sec   | -75 deg/sec to +75 deg/sec  |
| <b>Supply voltage</b>                   | 4.5 V to 5.5 V or 9 V to 36 V  | 7 V to 32 V   |
| <b>Supply current</b>                   | 100 mA max.  | 350 mA max.   |
| <b>Startup time</b>                     | 500 mSec min to 2000 mSec max.   | 700 ms typ.   |
| <b>Output type</b>                      | SAEJ1939 CAN 29  | SAEJ1939 CAN 29   |
| <b>Operating temperature range</b>      | -40°C to 85°C [-40°F to 185°F]   | -40°C to 85°C [-40°F to 185°F]  |
| <b>Accelerometer</b>                    | -  | 2 g, 6 g  |
| <b>Accelerometer range</b>              | -78.48 m/s <sup>2</sup> to +78.48 m/s <sup>2</sup>   | -   |
| <b>Accelerometer resolution</b>         | 0.01 m/s <sup>2</sup>  | -   |
| <b>Sealing</b>                          | IP67 & IP69K certified   | IP67, IP69K   |
| <b>Housing material</b>                 | PBT thermoplastic  | aluminum  |
| <b>Approvals/testing/qualifications</b> | EMI/EMC, ESD, mechanical and thermal shock, random vibration, humidity, salt spray, chemical compatibility, automotive grade   | EMI/EMC, ESD, mechanical and thermal shock, random vibration, humidity, salt spray, chemical compatibility, automotive grade  |
| <b>Dimensions</b>                       | Ø138 mm x 28 mm H<br>[Ø5.43 in x 1.10 in H]  | 130 mm L x 96.3 mm W x 66.0 mm H<br>[5.12 in L x 3.80 mm W x 2.60 mm H]   |
| <b>Features</b>                         | high performance IMU; reports vehicle angular rate, acceleration and inclination (6 degrees of freedom); advanced filtering of raw sensor data; improves positioning accuracy; optional metal guard for added protection; supports 5 V and 9 V to 36 V vehicle power systems | designed to Six Sigma standards; industry-leading durability, accuracy, voltage input flexibility, application expertise, customization, and temperature performance; eases integration; automotive-grade qualified, long term stability, no calibration needed |

# Position Sensors | Proximity Sensors

Designed to meet demanding temperature, vibration, shock, and EMI/EMP interference specifications. Multiple potential applications are found in aerospace, ordnance, marine, and offshore equipment.



| Series                               | 100 FW  | 200 FW  | 300 FW  |
|--------------------------------------|---|---|---|
| <b>Description</b>                   | one-piece 5/8 in proximity sensor   | one-piece 5/8 in proximity sensor   | two-piece proximity sensor                                      |
| <b>Technology</b>                    | ECKO  | hall  | ECKO  |
| <b>Target material</b>               | all metals  | magnet  | ferrous metals  |
| <b>Load current</b>                  | 120 mA, 50 mA lamp  | 100 mA, 50 mA lamp  | 750 mA  |
| <b>Supply current</b>                | 20 mA max. at 25°C  | 20 mA max. at 25°C  | 65 mA max.  |
| <b>Sensing face</b>                  | shielded, unshielded  | shielded  | shielded  |
| <b>Housing material</b>              | stainless steel   | stainless steel   | stainless steel   |
| <b>Guaranteed actuation distance</b> | 1 mm to 1,99 mm [0.039 in to 0.0783 in], 5 mm to 10 mm [0.197 in to 0.394 in]   | 2 mm to 2,99 mm [0.0787 in to 0.1177 in]  | 1,78 mm to 3,3 mm [0.07 in to 0.130 in]                         |
| <b>Operating temp. range</b>         | -55°C to 125°C [-67°F to 257°F]   | -54°C to 100°C [-65.2°F to 212°F]   | -77°C to 125°C [-106.6°F to 257°F]                              |
| <b>Supply voltage</b>                | 18 Vdc to 32 Vdc  | 18 Vdc to 32 Vdc  | 18 Vdc to 32 Vdc  |
| <b>Output type</b>                   | normally open, current sinking  | normally open/closed, current sinking   | normally open/closed, current sinking                           |
| <b>Approvals</b>                     | FM Class 1, Division 2, Groups A, B, C, D   | FM Class 1, Division 2, Groups A, B, C, D   | MIL-STD-810B  |
| <b>Dimensions</b>                    | sensing face: 5/8 in x 63,5 mm L [2.5 in L]   | sensing face: 5/8 in x 63,5 mm L [2.5 in L]   | Ø 11,2 mm x 31,8 mm L [Ø 0.44 in x 1.25 in L]                   |
| <b>Features</b>                      | all metal sensing, shielded three-wire dc sinking (NPN), high level of electronics protection, lead wire or connector termination | Hall-effect, magnetic field sensitive; high-frequency switching, shielded three-wire dc sinking (NPN); high level of electronics protection | ferrous metal sensing, two-piece construction, reverse polarity |

# Position Sensors | Proximity Sensors

Designed to meet demanding temperature, vibration, shock, and EMI/EMP interference specifications. Multiple potential applications are found in aerospace, ordnance, marine, and offshore equipment.



| Series                               | 922AA2Y-A6P-OZ722A  | 922FS2-A6N-Z735A   | 932AB2W   | 932AA3W  | ZS-00341   |
|--------------------------------------|---|--|---|--|--|
| <b>Description</b>                   | one-piece 15/32 in proximity sensor   | one-piece 12 mm proximity sensor   | one-piece M12 proximity sensor  | one-piece M18 proximity sensor   | one-piece underwater proximity sensor  |
| <b>Dimension</b>                     | 11,7 mm [0.46 in]   | 12 mm [0.47 in]  | –   | –  | –  |
| <b>Operating frequency</b>           | 2000 Hz   | 2000 Hz  | 200 mA  | ≤200 mA to 85°C to 100 mA at 100°C   | ≤120 mA  |
| <b>Load current</b>                  | 250 mA  | 250 mA   | ceramic   | ceramic  | stainless steel  |
| <b>Gd (mm)</b>                       | 3,6   | 2,8  | 6,8   | 8,5  | stainless steel  |
| <b>Guaranteed actuation distance</b> | 2 mm to 2,99 mm [0.0787 in to 0.1177 in]  | 1 mm to 1,99 mm [0.039 in to 0.0783 in]  | 3 mm to 3,99 mm [0.118 in to 0.157 in]  | 4 mm to 4,99 mm [0.1574 in to 0.19646 in]  | ZS-00341-01: ≥0.8 mm; ZS-00341-02: ≥21.84 mm   |
| <b>Operating temp. range</b>         | -55°C to 85°C [-67°F to 185°F]  | -55°C to 85°C [-67°F to 185°F]   | -40°C to 100°C [-40°F to 212°F]   | -40°C to 100°C [-40°F to 212°F]  | -55°C to 90°C [-67°F to 194°F]   |
| <b>Shock</b>                         | 6 g 11 ms ABD 0007  | 6 g 11 ms ABD 0007   | 100 g 6 ms  | 100 g 6 ms   | 6 g 11 ms  |
| <b>Supply voltage</b>                | 14 Vdc to 32.5 Vdc  | 14 Vdc to 32.5 Vdc   | 20 Vdc to 33 Vdc  | 20 Vdc to 33 Vdc   | 14 Vdc to 32.5 Vdc   |
| <b>BITE</b>                          | no  | no   | no  | no   | no   |
| <b>Short circuit</b>                 | yes   | yes  | yes   | yes  | yes  |
| <b>Pressure proof</b>                | no  | yes  | no  | no   | yes  |
| <b>Reverse polarity</b>              | no  | no   | yes   | yes  | yes  |
| <b>Insulation resistance</b>         | –   | –  | >50 mOhm at 500 Vdc   | >50 mOhm at 500 Vdc  | –  |
| <b>Output type</b>                   | normally open, current sourcing   | normally open, current sourcing  | normally open, current sourcing   | normally open, current sourcing  | normally open, current sourcing  |
| <b>Dimensions</b>                    | 15/32 in<br>51 mm<br>L [2.01 in]  | 12 mm<br>50 mm<br>L [1.97 in]  | M12 x 1<br>77 mm L<br>[3.03 in L]   | M18 x 1<br>80 mm L<br>[3.15 in L]  | Ø23 mm x 64 mm L [0.91 in x 2.52 in L]   |
| <b>Features</b>                      | stainless steel, high frequency switching, high level of electronics protection, lead wire or connector termination | stainless steel, high pressure capability (>350 bar), high level of electronics protection, lead wire or connector termination | stainless steel, high level of electronics protection, high frequency switching, lead wire or connector termination | Hall-effect, magnetic field sensitive, stainless steel, high level of electronics protection, high frequency switching | ferrous metal sensing, high level sealing by overmolding, enhanced performance sealed and shielded cable |



# Proximity Sensors | Integral Health Monitoring (IHM)

Designed specifically to meet the increased indirect lightning, EMI, and vibration requirements of today's modern aircraft, IHM series proximity sensors are the first choice for your most demanding applications.

Potential applications include landing gear, thrust reverser, door monitoring, and flight controls. Other options available include a true hermetic cable exit and a unique continuous health monitoring function.



| Series                               | IHM  | IHM - 2 State <sup>1</sup>   | IHM - 3 State <sup>1</sup>   |
|--------------------------------------|--|--|--|
| <b>Description</b>                   | one piece 5/8 in proximity sensor  | one piece 5/8 in proximity sensor  | one piece 5/8 in proximity sensor  |
| <b>Technology</b>                    | integral health monitoring   | enhanced ECKO <sup>1</sup>   | enhanced ECKO with health monitoring option <sup>1</sup>   |
| <b>Target material</b>               | stainless steel  | stainless steel  | stainless steel  |
| <b>Load current</b>                  | –  | up to 250 mA depending on model  | 4 mA to 20 mA current loop standard <sup>1</sup>   |
| <b>Supply current</b>                | <10 mA   | 15 mA max., <6 mA typ.   | 4 mA typ. (does not include load current)  |
| <b>Sensing face</b>                  | Inconel®   | shielded   | shielded   |
| <b>Housing material</b>              | stainless steel  | hermetic - stainless steel   | hermetic - stainless steel   |
| <b>Guaranteed actuation distance</b> | 5 mm max.  | to 4 mm  | to 4 mm  |
| <b>Operating temperature range</b>   | -55°C to 115°C<br>[-67°F to 239°F]   | -55°C to 125°C<br>[-67°F to 257°F]   | -55°C to 125°C<br>[-67°F to 257°F]   |
| <b>Supply voltage</b>                | 12 Vdc to 28 Vdc   | 18 Vdc to 32 Vdc or 11 Vdc to 18 Vdc standard  | 15 Vdc to 32 Vdc standard  |
| <b>Output type</b>                   | current sinking;<br>open collector output, NC;<br>open collector output, NO  | normally open/closed, current sinking (NPN)  | current loop   |
| <b>BIT diagnostics</b>               | optional third output state to indicate the health of the sensor   | available (non standard)   | health monitoring (3-state output) standard;<br>disabled as option <sup>1</sup>  |
| <b>Short circuit</b>                 | yes  | yes  | yes  |
| <b>Pressure proof</b>                | yes  | custom option <sup>2</sup>   | custom option <sup>2</sup>   |
| <b>Reverse polarity</b>              | yes  | yes  | yes  |
| <b>MTBF (hours)</b>                  | >1,000,000 flight hours  | –  | –  |
| <b>Approvals</b>                     | RTCA/DO-160  | DO-254, DO-160 <sup>1</sup>  | DO-254, DO-160 <sup>1</sup>  |
| <b>Dimensions</b>                    | dependent on body style  | 5/8 in diameter x ~2 in length (depends on model)  | 5/8 in diameter x ~2 in length (depends on model)  |
| <b>Features</b>                      | platform approach; industry-leading indirect lightning and dielectric ruggedness; superior vibration ruggedness; fully hermetic package; integral health monitoring capability; non-contact design; supplier stability | hermetic, all metal package; high degree of vibration, EMI, and lightning protection; lead wire or connector termination, range of configurable features, preferred device for onboard aircraft applications | integrated health monitoring; hermetic, all metal package; high degree of vibration, EMI, and lightning protection; lead wire or connector termination, range of configurable features, preferred device for onboard aircraft applications |

<sup>1</sup> Broad range of features available; specifications may vary with feature combinations - contact technical support.

<sup>2</sup> Contact technical support for details.

# Rotary Position Sensors | Encoders

Mechanical versions with 2-bit and 4-bit gray code outputs for potential use in incremental and absolute electrical reference applications. Optical versions are manually operated, rotary devices. Available with PC terminals or cable leads. Potential applications include controls for audio and lighting, level, frequency, temperature, time, and position sensing.



| Series               | 510E   | 600  |
|----------------------|--|--|
| Type                 | mechanical   | optical  |
| Pulse per revolution | 16, 9, 6, 4  | 128  |
| Output               | 2- or 4-bit gray code  | quadrature square wave   |
| Rotational life      | 100k cycles  | 10 million rotation, min.  |
| Operating speed      | 50 rpm max.  | 300 rpm max.   |
| Terminals            | pc pins  | pc type B-66, pc type C-24, cable, cable/connector   |
| Dimensions           | body: 21,08 mm x [0.83 in] square<br>bushing: Ø9,52 mm [0.375 in] x 32 UNEF-2A         | body: Ø34,93 mm [1.375 in]<br>bushing: Ø9,52 mm [0.375 in] x 32 NEF-2A                     |
| Features             | eliminates need for A/D converters, positive detent feel, continuous electrical travel | eliminates need for A/D converter, cable and printed circuit terms, outputs TTL compatible |



# Rotary Position Sensors | Non-Contact Hall-effect Sensors

Respond to the presence or to the interruption of a magnetic field, using a solid-state Hall-effect IC to sense rotary movement of the actuator shaft and then producing a proportional output. The IC, circuitry and magnets are galvanized with an integral connector – more than a match for the most unforgiving conditions.



| Series                | RTY   | RTP   | HRS   |
|-----------------------|---|---|---|
| Sensing range         | 50° (±25°), 60° (±30°), 70° (±35°), 90° (±45°), 120° (±60°), 180° (±90°), 270° (±135°), 360° (±180°)  | 50° (±25°), 60° (±30°), 70° (±35°), 90° (±45°), 120° (±60°), 180° (±90°), 270° (±135°), 350° (±175°), 360° (±180°)  | 90° ±2°, 180° ±2°   |
| Input voltage         | <ul style="list-style-type: none"> <li><b>low voltage:</b> 5 Vdc ±0.5 Vdc</li> <li><b>high voltage:</b> 10 Vdc to 30 Vdc</li> </ul>   | <ul style="list-style-type: none"> <li><b>low voltage:</b> 5 Vdc ±0.5 Vdc</li> <li><b>high voltage:</b> 10 Vdc to 30 Vdc</li> </ul>   | 5 Vdc ±10 %   |
| Output                | <ul style="list-style-type: none"> <li><b>low voltage:</b> 0.5 V to 4.5 V ratiometric (standard); 4.5 V to 0.5 V ratiometric (inverted)</li> <li><b>high voltage:</b> 0.5 V to 4.5 V ratiometric (standard); 4.5 V to 0.5 V ratiometric (inverted)</li> </ul>   | <ul style="list-style-type: none"> <li><b>low voltage:</b> 0.5 V to 4.5 V ratiometric (standard); 4.5 V to 0.5 V ratiometric (inverted)</li> <li><b>high voltage:</b> 0.5 V to 4.5 V ratiometric (standard); 4.5 V to 0.5 V ratiometric (inverted)</li> </ul>   | 5 % to 95 % of applied Vdd, approx. (ratiometric)   |
| Input current         | <ul style="list-style-type: none"> <li><b>low voltage:</b> 20 mA max.; during output to ground short, 25 mA max.</li> <li><b>high voltage:</b> 32 mA max.; during output to ground short, 47 mA max</li> </ul>  | <ul style="list-style-type: none"> <li><b>low voltage:</b> 20 mA max.; during output to ground short, 25 mA max.</li> <li><b>high voltage:</b> 32 mA max.; during output to ground short, 47 mA max.</li> </ul>   | 5 mA typ.   |
| EMI/EMC               | <ul style="list-style-type: none"> <li><b>EMI radiated immunity:</b> 100 V/m from 200 MHz to 1000 MHz per ISO11452-2</li> <li><b>EMI conducted immunity:</b> <ul style="list-style-type: none"> <li>- low voltage: 100 mA BCI per ISO11452-4 from 1 MHz to 200 MHz</li> <li>- high voltage: 100 mA BCI per ISO11452-4 from 1 MHz to 400 MHz</li> </ul> </li> <li><b>EMC:</b> exceeds CE requirements</li> </ul> | <ul style="list-style-type: none"> <li><b>EMI radiated immunity:</b> 100 V/m from 200 MHz to 1000 MHz per ISO11452-2</li> <li><b>EMI conducted immunity:</b> <ul style="list-style-type: none"> <li>- low voltage: 100 mA BCI per ISO11452-4 from 1 MHz to 200 MHz</li> <li>- high voltage: 100 mA BCI per ISO11452-4 from 1 MHz to 400 MHz</li> </ul> </li> <li><b>EMC:</b> exceeds CE requirements</li> </ul> | -   |
| Life                  | 35 M cycles   | infinite  | 10 M cycles   |
| Sealing               | IP69K   | IP69K   | -   |
| Operating temp. range | -40°C to 125°C [-40°F to 257°F]   | -40°C to 125°C [-40°F to 257°F]   | -40°C to 85°C [-40°F to 185°F]  |
| Dimensions            | 55 mm L x 43 mm W x 41 mm H [2.17 in L x 1.69 in W x 1.61 in H]   | 59,6 mm L x 43,3 mm W x 17,8 mm H [2.24 in L x 1.70 in W x 0.70 in H]   | body: Ø27,43 mm x 13,20 mm [1.080 in x 0.52 in]<br>bushing: Ø9,52 mm [0.375 in] x 32 NEF-2A |
| Features              | magnetically biased, Hall-effect integrated circuit (IC) senses rotary movement of the actuator over a set operating range; activated by integral shaft (available with or without lever)   | magnetically biased, Hall-effect integrated circuit (IC) senses rotary movement of the actuator over a set operating range; activated by a separate magnet (available bare or housed)   | maximum ESD sensitivity of ±7 kV  |

# Potentiometers | Cermet, Wirewound, and Conductive Plastic

Compact and rugged thick-film devices, these potentiometers are stable over a range of operating temperatures and available in a variety of resistance values. Provides high power dissipation and improved resistance temperature coefficient.



| Series           | 309, 409  | 389  | 308, 408  |
|------------------|---|--|---|
| Type             | 309: compact modular housing<br>409: sealed for board washing   | multiple sections available  | 308: compact modular house<br>408: sealed for board washing             |
| Rotational life  | 25K cycles  | 25K cycles   | 50k cycles  |
| Element type     | cermet  | cermet   | conductive plastic  |
| Power rating     | 1 W   | 1 W  | 0.5 W   |
| Terminal type    | PC, solder hook   | PC, solder hook  | pc, solder hook   |
| Resistance range | 100 Ohm to 5 mOhm   | linear: 5 Ohm to 5 mOhm;<br>tapered: 100 Ohm to 2 mOhm                           | 308: 100 Ohm to 1 mOhm;<br>408: 500 Ohm to 10 kOhm                      |
| Bushing type     | standard  | standard   | standard, locking   |
| Electrical taper | linear, tapered   | linear, tapered  | CW audio, linear  |
| Dimensions       | body: 12,7 mm [0.5 in] square;<br>bushing: 6,35 mm [0.25 in] x 32 NEF-2A<br>standard; 9,53 mm [0.375 in] x 32 NEF-2A optional | 6,35 mm [0.25 in] x 32NEF-2A<br>standard; 9,53 mm [0.375 in] x 32NEF-2A optional | body: 12,7 mm [0.5 in] square<br>bushing: 6,35 mm [0.25 in] x 32 NEF-2A |
| Features         | modular package; enhanced performance   | stackable; rotary, push-pull, and momentary options                              | nickel-plated brass shaft and bushings                                  |



| Series           | 578  | 590  |
|------------------|--|--|
| Type             | variable resistor technology   | multiple sections available  |
| Rotational life  | 2.5M cycles  | 50k cycles   |
| Element type     | conductive plastic   | conductive plastic   |
| Power rating     | 0.5 W  | 0.5 W  |
| Terminal type    | pc   | pc, solder hook  |
| Resistance range | 1 kOhm to 10 kOhm  | 100 Ohm to 1 MOhm  |
| Bushing type     | standard   | standard   |
| Electrical taper | linear   | linear   |
| Dimensions       | body: Ø22,86 mm [Ø 0.90 in]<br>bushing: 9,52 mm D & L [0.375 in D & L]         | body: 12,7 mm [0.50 in] square<br>bushing: 6,35 mm D & L [0.25 in D & L] |
| Features         | low mounting profile, quiet electrical output, precision control, pc terminals | linear taper, pc terminals, brass shaft and bushings                     |

**380, RV4, 485, 53C, 385 381****388****392, RV6**

380: original version

RV4: military version of 380

485: custom version of 380

53C: cost-effective version of 380

385: custom version of 53C

tested to 25k cycles

conductive plastic

2 W

solder lug, pc pin, fast-on, custom

100 Ohm to 5 MOhm, inclusive

standard, high torque, custom

log, reverse log, linear

body: Ø27,79 mm x 14,30 mm [1.094 in x 0.583 in]

bushing: 9,53 mm [0.375 in] x 32 NEF-2A

cost-effective, wide range of resistance values

metal case and nickel-plated shaft

25k cycles

conductive plastic

1 W

solder lug

100 Ohm to 5 MOhm

standard, locking

CW audio, linear

body: Ø15,88 mm [0.625 in]  
bushing: 6,35 mm [0.25 in] x 32 NEF-2A

solder lug terminals; nickel-plated brass shaft and bushings

multiple sections available

50k cycles

conductive plastic

0.5 W

pc, solder hook

linear: 100 Ohm to 5 MOhm;  
tapered: 500 Ohm to 2 MOhm

standard

linear

body: 12,7 mm [0.5 in] square  
bushing: 6,35 mm [0.25 in] x 32 NEF-2A

stackable; up to six modules; single, dual-concentric, or trimmer configurations

392: original version

RV6: military version of 392

50k cycles

conductive plastic

0.5 W

solder hook, pc pin, custom

100 Ohm to 5 MOhm, inclusive

threaded metal with/without metal panel seal: standard, split locking; unthreaded plastic: standard, trimmer, custom

log, reverse log, linear

body: Ø12,7 mm x 11,51 mm [0.50 in x 0.453 in]  
bushing: 6,35 mm [0.25 in] x 32 NEF-2A

wave solderable, PCB washable, cost-effective, wide range of resistance values, small package size

**MKV****SensorCube****640**

conductive plastic element

10 million cycles

conductive plastic

1 W

turret

500 Ohm to 20 kOhm

no bushing, standard

linear

body: Ø22,23 mm [0.875 in]  
bushing: 6,35 mm [0.25 in] x 32 NEF-2A

linearity 0.5 % or less, servo and bushing mounting, custom electrical travels

sealed construction

10 million cycles

conductive plastic

1 W

turret

1 kOhm to 10 kOhm

standard

linear

body: Ø18,92 mm [0.745 in]  
bushing: 9,53 mm [0.375 in] x 32 NEF-2A

linearity 2 % or less, sealed construction, custom electrical travels

thru-shaft

&gt;1 million full cycles

conductive plastic

0.5 W, max.

lead wires

1 kOhm to 1 MOhm

none

linear, quadrature

38,1 mm W x 45,72 mm L  
[1.5 in W x 1.8 in L]

reinforced, low-profile housing, dust sealed with splash- or moisture-sealed options, long rotational life

## **Warranty/Remedy**

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| Asia Pacific | +65 6355-2828       |
| Europe       | +44 (0) 1698 481481 |
| USA/Canada   | +1-800-537-6945     |

## **Honeywell Sensing and Internet of Things**

9680 Old Bailes Road  
Fort Mill, SC 29707  
[www.honeywell.com](http://www.honeywell.com)

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