

# POSITION SENSORS

Product Range Guide



**Honeywell**



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# MAGNETIC SENSORS ANISOTROPIC MAGNETO- RESISTIVE SENSOR ICs

With a built-in magnetoresistive bridge integrated on silicon and encapsulated in a plastic package, Anisotropic Magnetoresistive (AMR) sensor ICs feature an integrated circuit that responds to low fields at large distances.



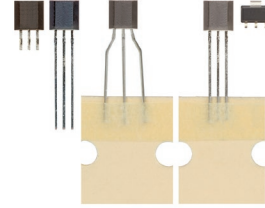
	NANOPOWER SERIES	STANDARD POWER SERIES
Description	omnipolar AMR sensor IC	omnipolar AMR sensor IC
Magnetic actuation type	omnipolar	omnipolar
Package style and packaging†	SOT-23, pocket tape and reel	<ul style="list-style-type: none"> <li>• <b>SM351RT, SM353RT:</b> SOT-23, pocket tape and reel</li> <li>• <b>SM451RT, SM453RT:</b> flat TO-92-style, straight standard leads, bag</li> </ul>
Supply voltage range	1.65 Vdc to 5.5 Vdc	3 Vdc to 24 Vdc
Supply current	<ul style="list-style-type: none"> <li>• <b>SM351LT:</b> 360 nA typ.</li> <li>• <b>SM353LT:</b> 310 nA typ.</li> </ul>	8 mA max.
Output type	<ul style="list-style-type: none"> <li>• <b>low:</b> 0.03 V typ.</li> <li>• <b>high:</b> Vs -0.03 V typ.</li> </ul>	digital sinking
Operating temperature range	-40°C to 85°C [-40°F to 185°F]	-40°C to 85°C [-40°F to 185°F]
Features	<p><b>high sensitivity:</b></p> <ul style="list-style-type: none"> <li>• <b>SM351LT:</b> 7 Gauss typ., 11 Gauss max.</li> <li>• <b>SM353LT:</b> 14 Gauss typ., 20 Gauss max.</li> </ul> <p>designed to accommodate applications with large air gaps, small magnetic fields and low power requirements</p>	<ul style="list-style-type: none"> <li>• <b>ultra-high sensitivity: SM351RT, SM451R:</b> 7 Gauss typ., 11 Gauss max.</li> <li>• <b>very high sensitivity: SM353RT, SM453R:</b> 14 Gauss typ., 20 Gauss max.</li> </ul>

**\*Dimensions:**

- **SOT-23:** 2,90 mm x 2,80 mm x 1,40 mm [0.11 in x 0.11 in x 0.055 in]
- **2-Pin SIP, wide leads:** 5,13 mm x 3,60 mm x 1,57 mm [0.20 in x 0.14 in x 0.06 in] (does not include leads)
- **4-Pin SIP:** 5,13 mm x 3,60 mm x 1,57 mm [0.20 in x 0.14 in x 0.06 in] (does not include leads)
- **Flat TO-92-style:** 4,06 mm x 3,0 mm x 1,57 mm [0.12 in x 0.16 in x 0.06 in] (does not include leads)
- **VF-401 flat TO-92-style:** 4,06 mm x 3,00 mm x 1,57 mm [0.12 in x 0.16 in x 0.06 in] (does not include leads)
- **U-Pack:** 4,5 mm x 4,5 mm x 1,57 mm [0.18 in x 0.18 in x 0.06 in] (does not include leads)
- **SOT-89B:** 4,5 mm x 4,2 mm x 1,3 mm [0.18 in x 0.17 in x 0.06 in]
- **SOIC-8:** 6,0 mm x 4,9 mm x 1,4 mm [0.24 in x 0.19 in x 0.06 in]

# MAGNETIC SENSORS ANISOTROPIC MAGNETO- RESISTIVE SENSOR ICs

Potential applications include laptops, material handling equipment, pneumatic cylinders, and battery-powered equipment such as hand-held scanners, computers, and water/gas/electricity meters.



	<b>VF401</b>	<b>2SS52M SERIES</b>
<b>Description</b>	2-wire AMR fine pitch ring magnet sensor IC	omnipolar AMR digital sensor IC
<b>Magnetic actuation type</b>	differential bridge	omnipolar
<b>Package style and packaging*</b>	VF-401 flat TO-92-style, bag	<b>U-pack:</b> <ul style="list-style-type: none"> <li>• <b>2SS52M-S:</b> Surface mount, bag</li> <li>• <b>2SS52M:</b> Straight standard leads, bag</li> <li>• <b>2SS52M-T2:</b> Formed leads, ammopack tape-in-box</li> <li>• <b>2SS52M-T3:</b> Straight standard leads, ammopack tape-in-box</li> </ul> <b>2SS52MT:</b> SOT-89B, pocket tape and reel
<b>Supply voltage range</b>	4.5 Vdc to 16 Vdc	3.8 Vdc to 30 Vdc
<b>Supply current</b>	<ul style="list-style-type: none"> <li>• <b>operate:</b> 16.8 mA max.</li> <li>• <b>release:</b> 8.4 mA max.</li> </ul>	11 mA max.
<b>Output type</b>	digital sourcing	digital sinking
<b>Operating temperature range</b>	-40°C to 150°C [-40°F to 302°F]	-40°C to 150°C [-40°F to 302°F]
<b>Features</b>	wide speed capability, output pattern independent of gap between target and sensor, improved insensitivity to run-out, tilt, and twist, reverse polarity protection	omnipolar magnetics, sinking output, low Gauss operation (25 G max.), operating speed of 0 kHz to over 100 kHz

\*See dimensions on page 3.

# MAGNETIC SENSORS ANISOTROPIC MAGNETO- RESISTIVE SENSOR ICs

Honeywell's unique solution utilizes the Anisotropic MagnetoResistive (AMR) bridge in saturation, which provides a more stable output response when the system has vibration, sudden air gap changes, or target runout without requiring complex magnitude compensation algorithms.

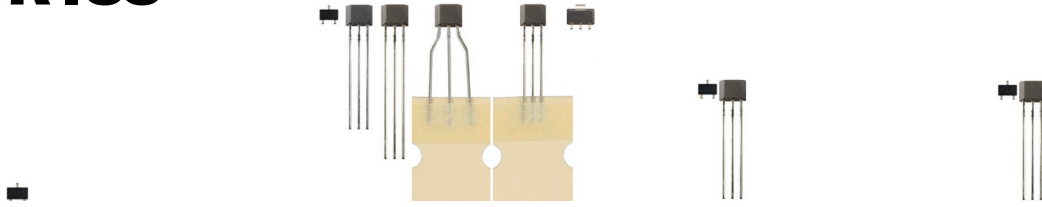


	<b>VM721V1 (VM SERIES)</b>	<b>VM721D1 (VM SERIES)</b>	<b>VM821Q1 (VM SERIES)</b>
<b>Description</b>	anisotropic magnetoResistive speed sensor IC	anisotropic magnetoResistive speed and direction sensor IC	anisotropic magnetoResistive speed and direction or position sensor IC
<b>Target</b>	ring magnet encoder	ring magnet encoder	ring magnet encoder
<b>Output type</b>	2-pin current output	2-pin pulse width modulated (PWM) current output	4-pin quadrature voltage outputs
<b>Package style and packaging*</b>	2-pin SIP with wide leads, bag	2-pin SIP with wide leads, bag	4-pin SIP, bag
<b>Sensitivity (max. airgap, max. temp.)</b>	±30 Gauss	±30 Gauss	±30 Gauss
<b>Supply voltage range</b>	<ul style="list-style-type: none"> <li>• <b>-40°C to 110°C [-40°F to 230°F]:</b> 4.0 V to 24 V</li> <li>• <b>150°C [302°F]:</b> 4.0 V to 9 V</li> </ul>	<ul style="list-style-type: none"> <li>• <b>-40°C to 110°C [-40°F to 230°F]:</b> 4.0 V to 24 V</li> <li>• <b>150°C [302°F]:</b> 4.0 V to 9 V</li> </ul>	4.0 V to 24 V
<b>Supply current</b>	<ul style="list-style-type: none"> <li>• <b>high:</b> 14 mA typ.</li> <li>• <b>low:</b> 6.95 mA typ.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>high:</b> 14 mA typ.</li> <li>• <b>low:</b> 6.95 mA typ.</li> </ul>	20 mA max.
<b>Operating temperature range</b>	-40°C to 150°C [-40°F to 302°F]	-40°C to 150°C [-40°F to 302°F]	-40°C to 150°C [-40°F to 302°F]
<b>Features</b>	ESD protected: JEDEC JS-002-2014; ISO26262 ASIL-B(D) conforming; AEC-Q100H Grade 0 qualified	ESD protected: JEDEC JS-002-2014; ISO26262 ASIL-B(D) conforming; AEC-Q100H Grade 0 qualified	ESD protected: JEDEC JS-002-2014, short circuit protected

\*See dimensions on page 3.

# MAGNETIC SENSORS HALL-EFFECT DIGITAL SENSOR ICs

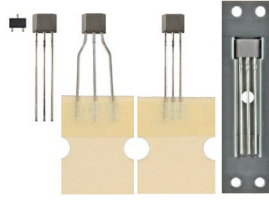
Constructed from a thin sheet of conductive material with output connections perpendicular to the direction of current flow. Include bipolar, latching, omnipolar, or unipolar magnetics in a variety of package styles. Energy-efficient micropower versions for potential applications with low power requirements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



DIGITAL	SL353	SS30AT, SS40A, SS40-L, SS40-T2, SS40-T3, SS50AT	SS311PT, SS411P	SS340RT, SS440R SERIES
Description	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
Magnetic actuation type	omnipolar	bipolar	bipolar	unipolar
Package style and packaging*	SOT-23, pocket tape and reel	<ul style="list-style-type: none"> <li>SS30AT: SOT-23, pocket tape and reel</li> <li>SS40A: flat TO-92-style, straight standard leads, bag</li> <li>SS41-L: flat TO-92-style, straight long leads, bag</li> <li>SS40A-T2: flat TO-92-style, formed leads, ammpack tape-in-box</li> <li>SS40A-T3: flat TO-92-style, straight standard leads, ammpack tape-in-box</li> <li>SS50AT: SOT-89B, pocket tape and reel</li> </ul>	<ul style="list-style-type: none"> <li>SS311PT: SOT-23, pocket tape and reel</li> <li>SS411P: flat TO-92-style, straight standard leads, bag</li> </ul>	<ul style="list-style-type: none"> <li>SS340RT: SOT-23, pocket tape and reel</li> <li>SS440R: flat TO-92-style, straight standard leads, bag</li> </ul>
Supply voltage	2.2 Vdc to 5.5 Vdc	4.5 Vdc to 24 Vdc	2.7 Vdc to 7 Vdc	<ul style="list-style-type: none"> <li>SS340RT &gt;125°C [257°F]: 3 Vdc to 12 Vdc</li> <li>all others: 3 Vdc to 18 Vdc</li> </ul>
Supply current	<ul style="list-style-type: none"> <li>SL353LT: 1.8 mA typ. at 2.8 Vdc</li> <li>SL353HT: 0.33 mA typ. at 2.8 Vdc</li> </ul>	10 mA max.	14 mA max.	8 mA
Operating temperature range	-40°C to 85°C [-40°F to 185°F]	<ul style="list-style-type: none"> <li>SS40A: -40°C to 125°C [-40°F to 257°F]</li> <li>SS30AT, SS50AT: -40°C to 125°C [-40°F to 257°F]</li> </ul>	-40°C to 150°C [-40°F to 302°F]	<ul style="list-style-type: none"> <li>SS340RT (3 Vdc to 24 Vdc): -40°C to 125°C [-40°F to 257°F]</li> <li>SS340RT (3 Vdc to 12 Vdc), SS440R (3 Vdc to 24 Vdc): -40°C to 150°C [-40°F to 302°F]</li> </ul>
Features	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)

\*See dimensions on page 3.





SS345PT, SS445P	SS351AT, SS451A, SS551AT	SS360NT, S360ST, SS360ST-10K, SS460S, SS460S-T2, SS460S-T3, SS460-LP	VF360NT, VF360ST, VF460S	SS360PT, SS460P, SS460P-T2	Description
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 Hall-effect digital sensor IC with built-in pull-up resistor	Description
unipolar	omnipolar	latching	latching	latching	Magnetic actuation type
<ul style="list-style-type: none"> <li>• <b>SS345PT:</b> SOT-23, pocket tape and reel</li> <li>• <b>SS445P:</b> flat TO-92-style, straight standard leads, bag</li> </ul>	<ul style="list-style-type: none"> <li>• <b>SS351AT:</b> SOT-23, pocket tape and reel</li> <li>• <b>SS451A:</b> flat TO-92-style, straight standard leads, bag</li> <li>• <b>SS551AT:</b> SOT-89B, pocket tape and reel</li> </ul>	<ul style="list-style-type: none"> <li>• <b>SS360NT, SS360ST, SS360ST-10K:</b> SOT-23, pocket tape and reel</li> <li>• <b>SS460S:</b> flat TO-92-style, straight standard leads (bulk)</li> <li>• <b>SS460S-T2:</b> Flat TO-92-style, formed leads, ammpack tape-in-box</li> <li>• <b>SS460-LP:</b> Flat TO-92-style, straight long leads, pocket tape and reel</li> </ul>	<ul style="list-style-type: none"> <li>• <b>VF360NT, VF360ST:</b> SOT-23, pocket tape and reel</li> <li>• <b>VF460S:</b> flat TO-92-style, straight standard leads, bag</li> </ul>	<ul style="list-style-type: none"> <li>• <b>SS360PT:</b> SOT-23, pocket tape and reel</li> <li>• <b>SS460P:</b> flat TO-92-style, straight standard leads, bag</li> <li>• <b>SS460P-T2:</b> flat TO-92-style, formed leads, ammpack tape-in-box</li> </ul>	Package style and packaging*
2.7 Vdc to 7.0 Vdc	<ul style="list-style-type: none"> <li>• <b>SS351AT, SS551AT</b> (-40°C to 125°C [-40°F to 257°F]): 3 Vdc to 24 Vdc</li> <li>• <b>SS351AT</b> (150°C [302°F]): 3 Vdc to 12 Vdc</li> <li>• <b>SS451A</b> (-40°C to 150°C [-40°F to 302°F]): 3 Vdc to 24 Vdc</li> </ul>	3 Vdc to 24 Vdc	3 Vdc to 24 Vdc	3 Vdc to 24 Vdc	Supply voltage
14 mA	<ul style="list-style-type: none"> <li>• <b>3 V:</b> 5 mA max. at 25°C [77°F]</li> <li>• <b>5 V:</b> 6 mA max. at 25°C [77°F]</li> </ul>	8 mA max.	8 mA	10 mA	Supply current
-40°C to 150°C [-40°F to 302°F]	-40°C to 150°C [-40°F to 302°F]	-40°C to 125°C [-40°F to 257°F]	-40°C to 150°C [-40°F to 302°F]	-40°C to 125°C [-40°F to 257°F]	Operating temperature range
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]	Features

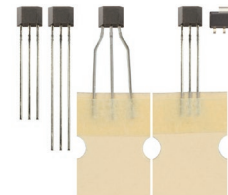
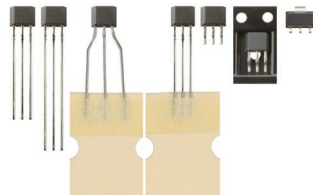
# MAGNETIC SENSORS HALL-EFFECT DIGITAL AND LINEAR SENSOR ICs

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



DIGITAL	SS361CT, S461C	SS361RT, SS461R
Description	high sensitivity, latching Hall-effect digital sensor IC	low-cost Hall-effect digital sensor IC
Magnetic actuation type	latching	latching
Package style and packaging*	<ul style="list-style-type: none"> <li>SS361CT: SOT-23, pocket tape and reel</li> <li>SS461C: flat TO-92-style, straight standard leads, bag</li> </ul>	<ul style="list-style-type: none"> <li>SS361RT: SOT-23, pocket tape and reel</li> <li>SS461R: flat TO-92-style, straight standard leads, bag</li> </ul>
Supply voltage	4 Vdc to 24 Vdc	<ul style="list-style-type: none"> <li>SS361RT &gt;125°C [257°F]: 3 Vdc to 12 Vdc</li> <li>all others: 3 Vdc to 18 Vdc</li> </ul>
Supply current	6 mA max.	8 mA
Operating temperature range	-40°C to 125°C [-40°F to 257°F]	<ul style="list-style-type: none"> <li>SS361RT (3 V to 12 V), SS461R: -40°C to 150°C [-40°F to 302°F]</li> <li>SS361RT (3 V to 18 V): -40°C to 125°C [-40°F to 257°F]</li> </ul>
Features	enhanced sensitivity, built-in reverse voltage capability	enhanced sensitivity, built-in reverse polarity protection, robust design

\*See dimensions on page 3.



DIGITAL	SS400 SERIES, SS500 SERIES	SS41, SS41-L, SS41-T2, SS41-T3, SS51T
Description	unipolar/bipolar/latching Hall-effect digital sensor IC	bipolar Hall-effect digital sensor IC
Magnetic actuation type	unipolar, bipolar, latching	bipolar
Package style and packaging*	<p><b>SS400 Series:</b> flat TO-92-style</p> <ul style="list-style-type: none"> <li>SS4XX: straight standard leads, bag</li> <li>SS4XX-L: straight long leads, bag</li> <li>SS4XX-T2: formed leads, ammopack tape-in-box</li> <li>SS4XX-T3: straight standard leads, ammopack tape-in-box</li> <li>SS4XX-S: surface mount, bag</li> <li>SS4XX-SP: surface mount, pocket tape and reel</li> </ul> <p><b>SS500 Series:</b> SOT-89B, pocket tape and reel</p>	<ul style="list-style-type: none"> <li>SS41: flat TO-92-style, straight standard leads, bag</li> <li>SS41-L: flat TO-92-style, straight long leads, bag</li> <li>SS41-T2: flat TO-92-style, formed leads, ammopack tape-in-box</li> <li>SS41-T3: flat TO-92-style, straight standard leads, ammopack tape-in-box</li> <li>SS51T: SOT-89B, pocket tape and reel</li> </ul>
Supply voltage	3.8 Vdc to 30 Vdc (inclusive)	4.5 Vdc to 24 Vdc
Supply current	<ul style="list-style-type: none"> <li>SS400: 10 mA</li> <li>SS500: 8.7 mA at 5 Vdc</li> </ul>	15 mA max.
Operating temperature range	-40°C to 150°C [-40°F to 302°F]	-40°C to 150°C [-40°F to 302°F]
Features	multiple operate/release points available	high output current, reverse polarity protection

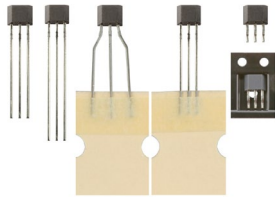
\*See dimensions on page 3.





DIGITAL	SS41K6	VF526DT
Description	high voltage and ESD protection bipolar Hall-effect digital sensor IC	latching dual Hall-effect digital sensor IC with speed and direction outputs
Magnetic actuation type	bipolar	latching
Package style and packaging*	flat TO-92-style, straight standard leads, bag	SOT-89B (pocket tape and reel)
Supply voltage	4.5 Vdc to 60 Vdc	3.4 Vdc to 24 Vdc
Supply current	10 mA max	14 mA max.
Output type	-	digital sinking
Operating temperature range	-40°C to 150°C [-40°F to 302°F]	-40°C to 125°C [-40°F to 257°F]
Features	ESD protected +16 kV HBM, enhanced Vsupply	latching magnetics, sinking output, tape and reel available

\*See dimensions on page 3.

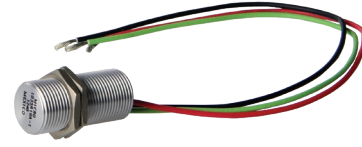
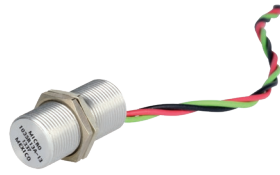


LINEAR AND ANGLE	SS490 SERIES (LINEAR)	SS39ET, SS49E, S59ET (LINEAR)	APS00B (ANGLE)
Description	Hall-effect linear sensor IC	Hall-effect linear sensor IC	high resolution magnetic displacement sensor IC
Magnetic actuation type	linear	linear	analog, saturated mode
Package style and packaging*	<b>Flat TO-92-style:</b> <ul style="list-style-type: none"> <li>SS4XX: straight standard leads, bag</li> <li>SS4XX-L: straight long leads, bag</li> <li>SS4XX-T2: formed leads, ammpack tape-in-box</li> <li>SS4XX-T3: straight standard leads, ammpack tape-in-box</li> <li>SS4XX-S: surface mount, bag</li> <li>SS4XX-SP: surface mount, pocket tape and reel</li> </ul>	<ul style="list-style-type: none"> <li>SS39ET: SOT-23, pocket tape and reel</li> <li>SS49E: flat TO-92-style, straight standard leads, bag</li> <li>SS59ET: SOT-89B, pocket tape and reel</li> </ul>	SOIC-8
Supply voltage	4.5 Vdc to 10.5 Vdc	2.7 Vdc to 6.5 Vdc	1 Vdc to 12 Vdc
Supply current	10 mA	10 mA max.	7 mA max.
Output type	ratiometric sinking or sourcing	ratiometric sourcing	sin(2Θ), cos(2Θ)
Operating temperature range	-40°C to 150°C [-40°F to 302°F]	-40°C to 100°C [-40°F to 212°F]	-40°C to 150°C [-40°F to 302°F]
Features	linear magnetics, ratiometric sourcing output, positive temperature coefficient, different package styles	linear magnetics, ratiometric sourcing output, low voltage operation, different package styles	dual analog voltages respond to changes in magnetic field angle; sine and cosine output; accurate to 0,102 mm [0.004 in]

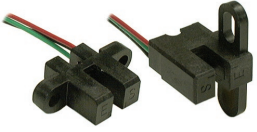
\*See dimensions on page 3.

# MAGNETIC SENSORS VALUE-ADDED HALL-EFFECT SENSORS

Consist of Hall-effect or anisotropic 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.



	<b>103SR SERIES (DIGITAL)</b>	<b>103SR SERIES (LINEAR)</b>
<b>Description</b>	Hall-effect digital position sensor	Hall-effect linear position sensor
<b>Package material and style</b>	aluminum threaded barrel	aluminum threaded barrel
<b>Magnetic actuation type</b>	unipolar, bipolar, latching	linear
<b>Operation</b>	proximity to external magnet	proximity to external magnet
<b>Supply voltage range</b>	4.5 Vdc to 24 Vdc	4.5 Vdc to 10.5 Vdc
<b>Supply current</b>	4 mA to 10 mA (inclusive)	7 mA
<b>Output type</b>	digital sinking	ratiometric sinking/sourcing
<b>Operating temperature range</b>	-40°C to 100°C [-40°F to 212°F]	-40°C to 100°C [-40°F to 212°F]
<b>Dimensions</b>	Ø11,9 mm x 25,4 mm [Ø15/32-2 x 1.0 in]	Ø11,9 mm x 25,4 mm [Ø15/32-2 x 1.0 in]
<b>Features</b>	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



SR16 SERIES, SR17 SERIES	SR3 SERIES	SR4 SERIES	
low-cost Hall-effect vane sensor	Hall-effect digital position sensor	magnetoresistive digital position sensor	<b>Description</b>
<ul style="list-style-type: none"> <li>• <b>SR16 Series:</b> plastic dual tower with variety of terminations</li> <li>• <b>SR17 Series:</b> plastic side-mount wire exit</li> </ul>	plastic threaded barrel	plastic threaded barrel	<b>Package material and style</b>
–	unipolar, bipolar	omnipolar	<b>Magnetic actuation type</b>
ferrous metal actuator	proximity to external magnet	proximity to external magnet	<b>Operation</b>
3.8 Vdc to 30 Vdc	4.5 Vdc to 24 Vdc	3.8 Vdc to 30 Vdc	<b>Supply voltage range</b>
10 mA max.	10 mA	11 mA	<b>Supply current</b>
digital sinking	digital sinking	digital sinking	<b>Output type</b>
-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]	<b>Operating temperature range</b>
24,6 mm x 12,4 mm [0.97 in x 0.49 in]	Ø12,4 mm x 25,4 mm [Ø0.49 in x 1.0 in]	19,0 mm H x 25,4 mm [0.75 in H x 1.0 in]	<b>Dimensions</b>
sinking output, non-contact position sensing, environmentally sealed, three terminations	NEMA 3, 3R, 3S, 4, 4X, 12, and 13; unipolar and bipolar magnetics, sinking output; frequencies exceeding 100 Hz	NEMA 3, 3R, 3S, 4, 4X, 12, and 13; omnipolar magnetics, sinking output	<b>Features</b>

# 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.



## SPS SERIES (LINEAR)

Description	measures linear movement of a magnet attached to a moving object
Configuration	linear
Sensing range	<ul style="list-style-type: none"> <li>• <b>35 mm:</b> 0 mm to 35 mm [0 in to 1.38 in]</li> <li>• <b>75 mm:</b> 0 mm to 75 mm [0 in to 2.95 in]</li> <li>• <b>225 mm:</b> 0 mm to 225 mm [0 in to 8.86 in]</li> </ul>
Actuator sensing location on arc	-
Resolution	<ul style="list-style-type: none"> <li>• <b>35 mm analog:</b> 0,04 mm [0.0016 in]</li> <li>• <b>75 mm analog:</b> 0,05 mm [0.002 in]</li> <li>• <b>225 mm analog:</b> 0,14 mm [0.0055 in]</li> <li>• <b>225 mm digital:</b> 0,0035 mm [0.000137 in]</li> </ul>
Supply voltage	<ul style="list-style-type: none"> <li>• <b>35 mm:</b> 4.75 Vdc to 5.25 Vdc</li> <li>• <b>all other versions:</b> 6 Vdc to 24 Vdc</li> </ul>
Supply current	<ul style="list-style-type: none"> <li>• <b>35 mm analog:</b> 20 mA max.</li> <li>• <b>75 mm analog:</b> 32 mA max.</li> <li>• <b>225 mm analog:</b> 34 mA max.</li> <li>• <b>225 mm digital:</b> 88 mA max.</li> </ul>
Output	<ul style="list-style-type: none"> <li>• <b>35 mm analog:</b> 0.55 Vdc to 4.15 Vdc</li> <li>• <b>75 mm and 225 mm analog:</b> 0 Vdc to 5 Vdc</li> <li>• <b>225 mm digital:</b> RS232 type</li> </ul>
Air gap	<ul style="list-style-type: none"> <li>• <b>35 mm analog:</b> 8,5 mm ±1,0 mm [0.334 in ±0.039 in]</li> <li>• <b>all other versions:</b> 3,0 mm ±2,5 mm [0.118 in ±0.098 in]</li> </ul>
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	<ul style="list-style-type: none"> <li>• <b>35 mm analog:</b> TYCO Super Seal 282087-1 integral connector</li> <li>• <b>all other versions:</b> 18 AWG flying leads</li> </ul>
Sealing	IP67, IP69K
Housing material	thermoplastic
Approvals	CE
Dimensions (L x W x H)	<ul style="list-style-type: none"> <li>• <b>35 mm:</b> 85 mm x 31,95 mm x 35,5 mm [3.35 in x 1.26 in x 1.40 in]</li> <li>• <b>75 mm:</b> 145 mm x 18,0 mm x 28,2 mm [5.7 in x 7.1 in x 1.11 in]</li> <li>• <b>225 mm:</b> 287,3 mm x 18,0 mm x 28,2 mm [11.3 in x 0.71 in x 1.11 in]</li> </ul>
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 SERIES (ARC)

## SPS SERIES (ROTARY)

measures angular movement of a magnet attached to a moving object

measures rotary movement of a magnet attached to a moving object

arc

rotary

- **100°:** 0° to 100°
- **180°:** 0° to 180°

0° to 360°

- **100°:** inside or outside
- **180°:** inside

-

- **100° inside and outside:** 0.06°
- **180° inside:** 0.11°

0.01°

- **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

12 mA to 30 mA

- **100° inside:** 45 mA max.
- **100° outside:** 30 mA max.
- **180° inside:** 45 mA max.

90 mA max.

0.5 Vdc to 4.5 Vdc

4 mA to 20 mA

- **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]

3,0 mm ±2,0 mm [0.118 in ±0.079 in]

-40°C to 85°C [-40°F to 185°F]

-40°C to 85°C [-40°F to 185°F]

-40°C to 150°C [-40°F to 302°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

M12 connector (male 5-pin)

IP67, IP69K

IP67, IP69K

thermoplastic

aluminum with powder coating

CE

CE

- **100°:** 183 mm x 86 mm x 31 mm [7.20 in x 3.39 in x 1.22 in]
- **180°:** 222 mm x 107 mm x 31 mm [8.74 in x 4.21 in x 1.22 in]

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

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.



## TARS SERIES

<b>Description</b>	6 degrees of freedom, 6-D motion variant
<b>Angular rate range</b>	-245 deg/s to +245 deg/s
<b>Supply voltage</b>	<ul style="list-style-type: none"> <li>• TARS-LCASS: 4.5 V to 5.5 V</li> <li>• TARS-HCASS: 9 V to 36 V</li> </ul>
<b>Supply current</b>	100 mA max.
<b>Startup time</b>	500 ms min. to 2000 ms max.
<b>Output type</b>	SAEJ1939 CAN 29
<b>Operating temperature range</b>	-40°C to 85°C [-40°F to 185°F]
<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
<b>Housing material</b>	PBT thermoplastic
<b>Approvals/testing/qualifications</b>	EMI/EMC, ESD, mechanical and thermal shock, random vibration, humidity, salt spray, chemical compatibility, automotive grade
<b>Dimensions (diameter x height)</b>	Ø138 mm x 28 mm [Ø5.433 in x 1.102 in]
<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; may be pre-configured at the Honeywell factory for immediate installation out of the box or be delivered with customizable firmware that allows manufacturers to use a single part number across vehicles and applications; may be customized to best meet application needs using the TARS Configurator Tool (TCT) software to change selected parameters such as broadcast rate, orientation, and filter settings.

# 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 off-shore equipment.



	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-effect	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>	<ul style="list-style-type: none"> <li>• 1 mm to 1,99 mm [0.039 in to 0.0783 in]</li> <li>• 5 mm to 10 mm [0.197 in to 0.394 in]</li> </ul>	2 mm to 2,99 mm [0.079 in to 0.118 in]	1,78 mm to 3,3 mm [0.07 in to 0.130 in]
<b>Operating temperature 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>	<ul style="list-style-type: none"> <li>• normally open</li> <li>• current sinking</li> </ul>	<ul style="list-style-type: none"> <li>• normally open/closed</li> <li>• current sinking</li> </ul>	<ul style="list-style-type: none"> <li>• normally open/closed</li> <li>• current sinking</li> </ul>
<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>	<b>sensing face:</b> 5/8 in x 63,5 mm L [2.5 in L]	<b>sensing face:</b> 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 off-shore equipment.



	<b>922AA2Y-A6P0Z722A</b>	<b>922FS2-A6N-Z735A</b>	<b>932AB2W</b>	<b>932AA3W</b>	<b>ZS-00341</b>
<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 at 85°C to 100 mA at 100°C	≤120 mA
<b>Load current</b>	250 mA	250 mA	ceramic	ceramic	stainless steel
<b>Gd</b>	3,6 mm [0.142 in]	2,8 mm [0.11 in]	6,8 mm [0.268 in]	8,5 mm [0.335 in]	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 0.1965 in]	<ul style="list-style-type: none"> <li>• <b>ZS-00341-01:</b> ≥0,8 mm [0.03 in]</li> <li>• <b>ZS-00341-02:</b> ≥21,84 mm [0.86 in]</li> </ul>
<b>Operating temperature 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 51 mm [2.01 in]	12 mm [0.47 in] 50 mm L [1.97 in]	M12 x 1 77 mm L [3.03 in L]	M18 x 1 80 mm L [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



# POSITION SENSORS AEROSPACE PROXIMITY SENSORS

General Aerospace Proximity Sensors (GAPS) and Harsh Aerospace Proximity Sensors (HAPS) both incorporate Honeywell's patented Integrated Health Monitoring functionality, however, they have technical differences that allow them to be used in various aerospace applications. GAPS can be used in less harsh areas of application with some differences of electrical and environmental characteristics when compared to HAPS. Whilst, HAPS Aerospace Proximity Sensors are configurable, non-contact, hermetically-sealed devices designed to sense the presence or absence of a target in harsh-duty aircraft applications.



	<b>GENERAL AEROSPACE PROXIMITY SENSOR (GAPS)</b>	<b>HARSH APPLICATION PROXIMITY SENSOR (HAPS)</b>
<b>Description</b>	configurable one piece 5/8 in proximity sensor	configurable one piece 5/8 in proximity sensor
<b>Technology</b>	FAVCO with integral health monitoring option	FAVCO with integral health monitoring option
<b>Target (typ.)</b>	SS 17-4PH rectangular target with dimensions 25 mm x 18 mm x 3 mm [0.98 in x 0.71 in x 0.12 in]	SS 17-4PH rectangular target with dimensions 25 mm x 18 mm x 3 mm [0.98 in x 0.71 in x 0.12 in]
<b>Connector/leads</b>	<ul style="list-style-type: none"> <li>• D38999/25YA98PN</li> <li>• D38999/25YA98PA</li> <li>• EN2997Y10803MN</li> </ul>	<ul style="list-style-type: none"> <li>• D38999/25YA98PA</li> <li>• M83723/90Y1005N</li> <li>• M83723/90Y10057</li> <li>• Pigtail</li> </ul>
<b>Form factor</b>	<ul style="list-style-type: none"> <li>• inline, cylindrical, threaded</li> <li>• right angle, cylindrical, threaded</li> <li>• inline, cylindrical, flanged</li> <li>• right angle, cylindrical, flanged</li> </ul>	<ul style="list-style-type: none"> <li>• inline, cylindrical, threaded</li> <li>• right angle, cylindrical, threaded</li> <li>• inline, cylindrical, flanged</li> <li>• right angle, cylindrical, flanged</li> </ul>
<b>Supply voltage</b>	12 Vdc to 32 Vdc (input)	12 Vdc to 28 Vdc
<b>Supply current</b>	<10 mA	<10 mA
<b>Sensing face</b>	Inconel®	Inconel®
<b>Housing material</b>	stainless steel	stainless steel
<b>Guaranteed actuation distance</b>	see Figure 3 in datasheet for curve	see Figure3 in datasheet for curve
<b>Operating temperature range</b>	-55°C to 115°C [-67°F to 239°F]	-55°C to 115°C [-67°F to 239°F]
<b>Output type</b>	see datasheet	see datasheet
<b>Internal Health Monitoring</b>	available	available
<b>Short circuit protection</b>	available	available
<b>Reverse polarity protection</b>	available	available
<b>MTBF</b>	500,000 flight hours	500,000 flight hours
<b>Approvals</b>	DO-160	DO-160
<b>Measurements</b>	see datasheet	see datasheet
<b>Features</b>	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	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

# 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.



	RTY SERIES	RTP SERIES
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°)
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>
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>
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>
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
Sealing	IP69K	IP69K
Operating temperature range	-40°C to 125°C [40°F to 257°F]	-40°C to 125°C [40°F to 257°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 [2.35 in L x 1.70 in W x 0.70 in H]
Features	magnetically biased, Hall-effect 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 IC senses rotary movement of the actuator over a set operating range; activated by a separate magnet (available bare or housed)

# POTENTIOMETERS 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. Provide high power dissipation and improved resistance temperature coefficient.



	MKV SERIES	SENSORCUBE SERIES
Description	conductive plastic element	sealed construction
Rotational life	10 million cycles	10 million cycles
Element type	conductive plastic	conductive plastic
Power rating	1 W	1 W
Terminal type	turret	turret
Resistance range	500 Ohm to 20 kOhm	1 kOhm to 10 kOhm
Bushing type	no bushing, standard	standard
Electrical taper	linear	linear
Dimensions	<ul style="list-style-type: none"> <li>body: Ø22,23 mm [Ø 0.875 in]</li> <li>bushing: 6,35 mm [0.25 in] x 32 NEF-2A</li> </ul>	<ul style="list-style-type: none"> <li>body: Ø18,92 mm [Ø 0.745 in]</li> <li>bushing: 9,53 mm [0.375 in] x 32 NEF-2A</li> </ul>
Features	linearity 0.5% or less, servo and bushing mounting, custom electrical travels	linearity 2% or less, sealed construction, custom electrical travels

## FOR MORE INFORMATION

Honeywell Sensing and Internet of Things services its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or the nearest Authorized Distributor, visit [sensing.honeywell.com](http://sensing.honeywell.com) or call:

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Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship during the applicable warranty period. 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 that Honeywell, in its sole discretion, finds defective.

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While Honeywell may provide application assistance personally, through our literature and the Honeywell web site, it is buyer's sole responsibility to determine the suitability of the product in the application.

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[70B1N056S202W](#) [70B8N056F502W](#) [70J8N048S104U](#) [70L1N040P103W](#) [70L1N048P103X](#) [70L1N048S103W](#) [GA2L040S102UC](#)  
[GA2L040S103UC](#) [GS1G044P103UA](#) [GS1N048P103UA](#) [GS1T032S103UA](#) [A43-1500](#) [A43-20K](#) [A47-200K](#) [A4720K](#) [RA20LASD251A](#)  
[132-2-0-202](#) [RK14K1220-F25-C0-A103](#) [RK14K1220F25C0C104](#) [RK14K1220-F25-C1-B103](#) [14910FAGJSX10102KA](#)  
[14910FBGLFY00103KA](#) [14910AABHSX10103KA](#) [14910FAGJSX10104KA](#) [152-01031](#) [C0342008 5K](#) [P270-109A](#) [J97589](#) [23M728](#)  
[248BBHS0XB25104MA](#) [RV170F-10-15R1-B500K-0021](#) [RV8NAYSB104A](#) [917523A](#) [A43-40](#) [A43-750](#) [A43S-5](#) [A47-15K](#) [A4750K](#)  
[SPPG048S103U](#) [SPPG056P103U](#) [SWE-10](#) [GA2G040F103BA](#)