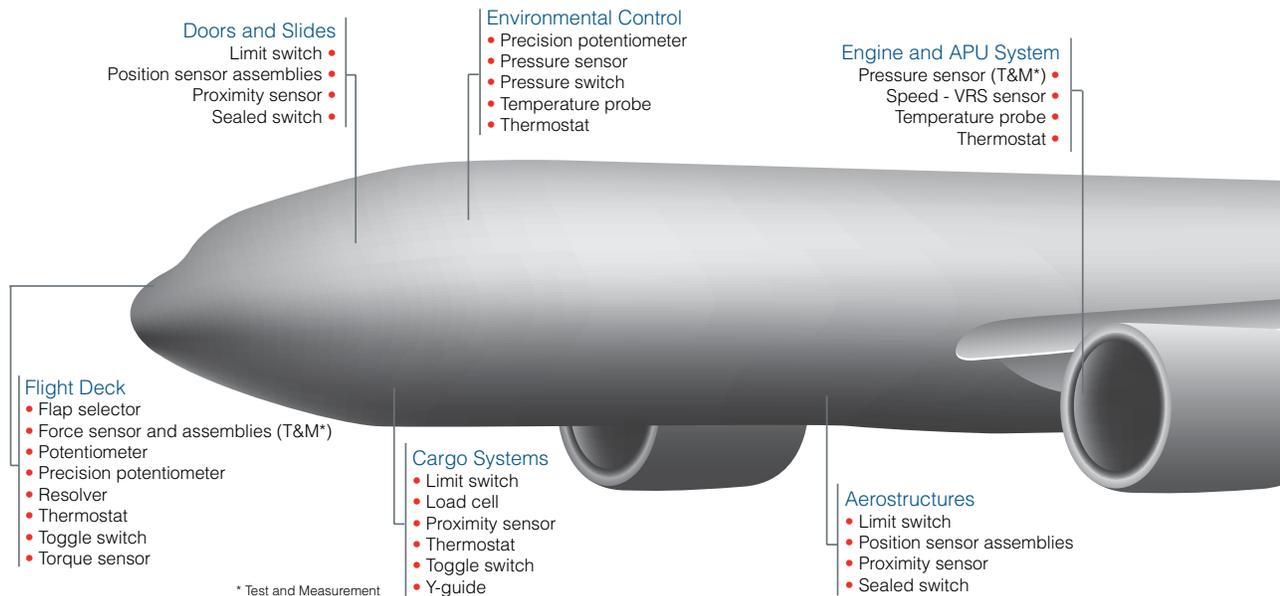




**SENSING AND CONTROL**

## **Product Range Guide**

# Commercial and Business Aircraft



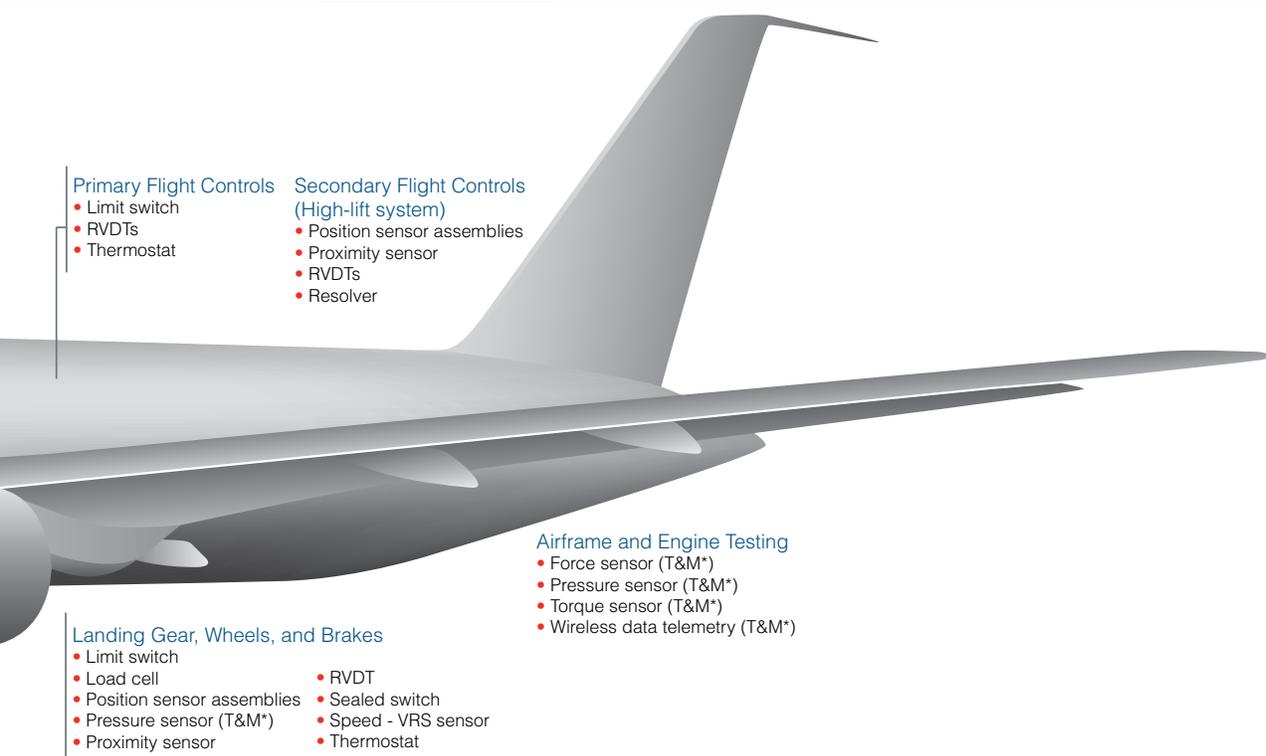
**H**oneywell Sensing and Control (S&C) is an industry leader with a broad portfolio of sensing, switching, and assembly solutions. With over 50 year's experience designing and delivering aerospace products, Honeywell's core expertise include engineering, sensor development, analog/digital electronics, and environmental packaging. Part and assembly customization is Honeywell Sensing and Control's strength. Honeywell:

- **Delivers electrical and mechanical designs quickly** for build-to-print, redesign, new design, and/or testing purposes
- **Integrates features** such as gearing, redundant channels, environmental sealing, and more
- **Creates designs** that are retrofittable while reducing component count (weight savings)
- **Meets demanding schedules** with application knowledge, world-class engineering, and global manufacturing facilities
- **Certifies and qualifies products in-house**, delivering fully compliant reports with all the required documentation
- **Offers customer support** throughout the design process, into production, and beyond

**We are a long-term partner.**

**Honeywell maintains relevant approvals:** ISO 9000; 2000; AS 9100; QS 9000; EASA21 subpart G; EASA 145; ISO 14000; FAA-certified Repair Station; JAA-certified Repair Station.





**Primary Flight Controls**

- Limit switch
- RVDTs
- Thermostat

**Secondary Flight Controls (High-lift system)**

- Position sensor assemblies
- Proximity sensor
- RVDTs
- Resolver

**Airframe and Engine Testing**

- Force sensor (T&M\*)
- Pressure sensor (T&M\*)
- Torque sensor (T&M\*)
- Wireless data telemetry (T&M\*)

**Landing Gear, Wheels, and Brakes**

- Limit switch
- Load cell
- Position sensor assemblies
- Pressure sensor (T&M\*)
- Proximity sensor
- RVDT
- Sealed switch
- Speed - VRS sensor
- Thermostat

**H**oneywell Sensing and Control is a leading supplier to engine and auxiliary power unit (APU) manufacturers for fuel, air, and lubrication systems to meet the needs of on-engine sensing and interface for FADEC/DEEC control systems.

- Temperature sensors
- Pressure transducers
- Position transducers
- Speed sensors
- Oil level sensors
- Pressure and level switches
- Accelerometers

These products are also used in engine valves and hydraulic systems: position and pressure sensing products with enhanced reliability and temperature/vibration performance; built-in test options for vital applications. Honeywell S&C engineers have industry-wide expertise in the design and integration of switch and sensor assemblies for engine control systems.





# Military Aircraft

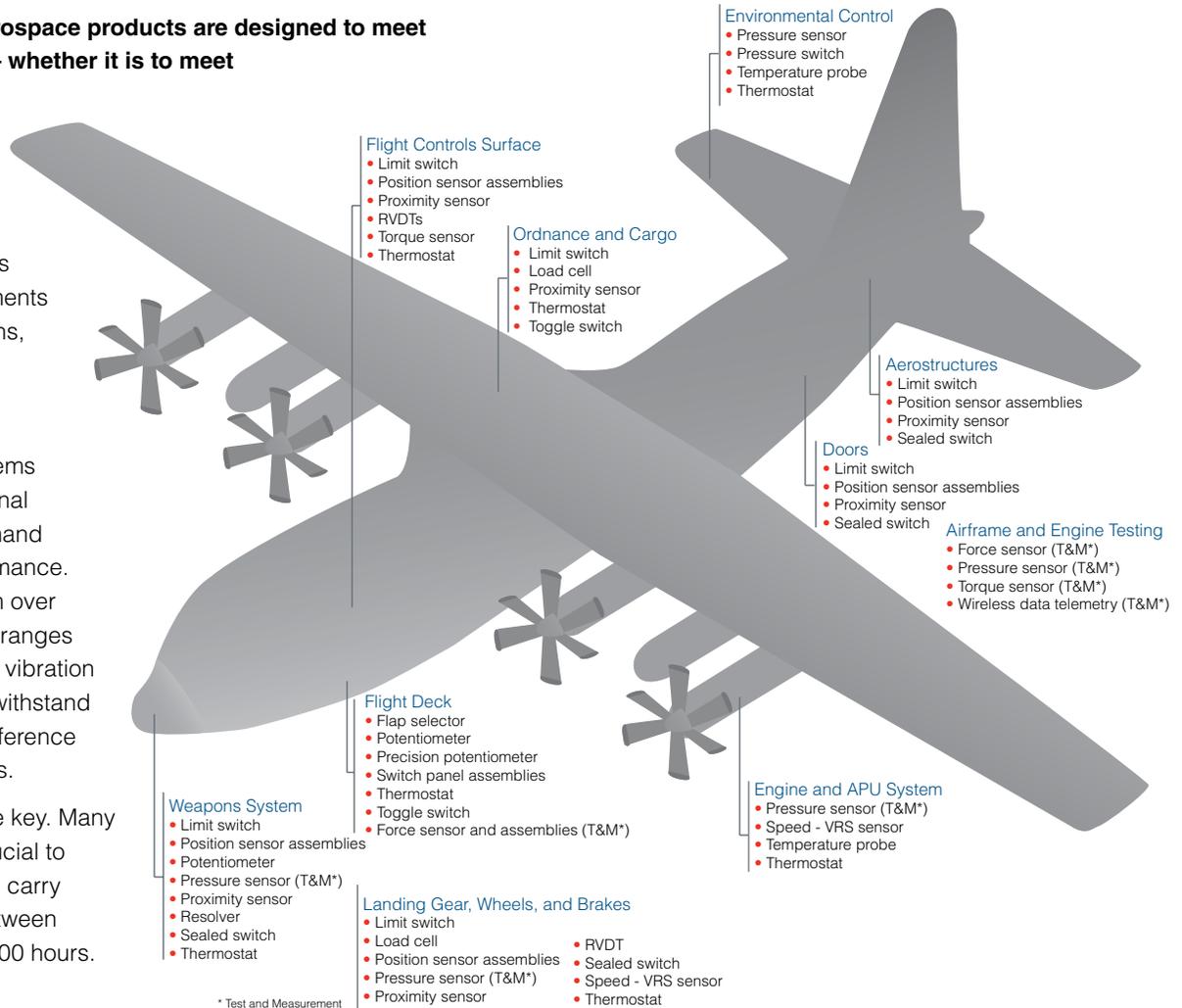
**H**oneywell aerospace products are designed to meet challenges – whether it is to meet commercial industry standards or unique high performance environments.

Honeywell's engineers focus on the requirements for military applications, including pilot safety and comfort, smooth and accurate flight control, weapon systems reliability, and additional applications that demand highly reliable performance. Our products perform over extreme temperature ranges while enduring heavy vibration and shock, and can withstand electromagnetic interference and voltage transients.

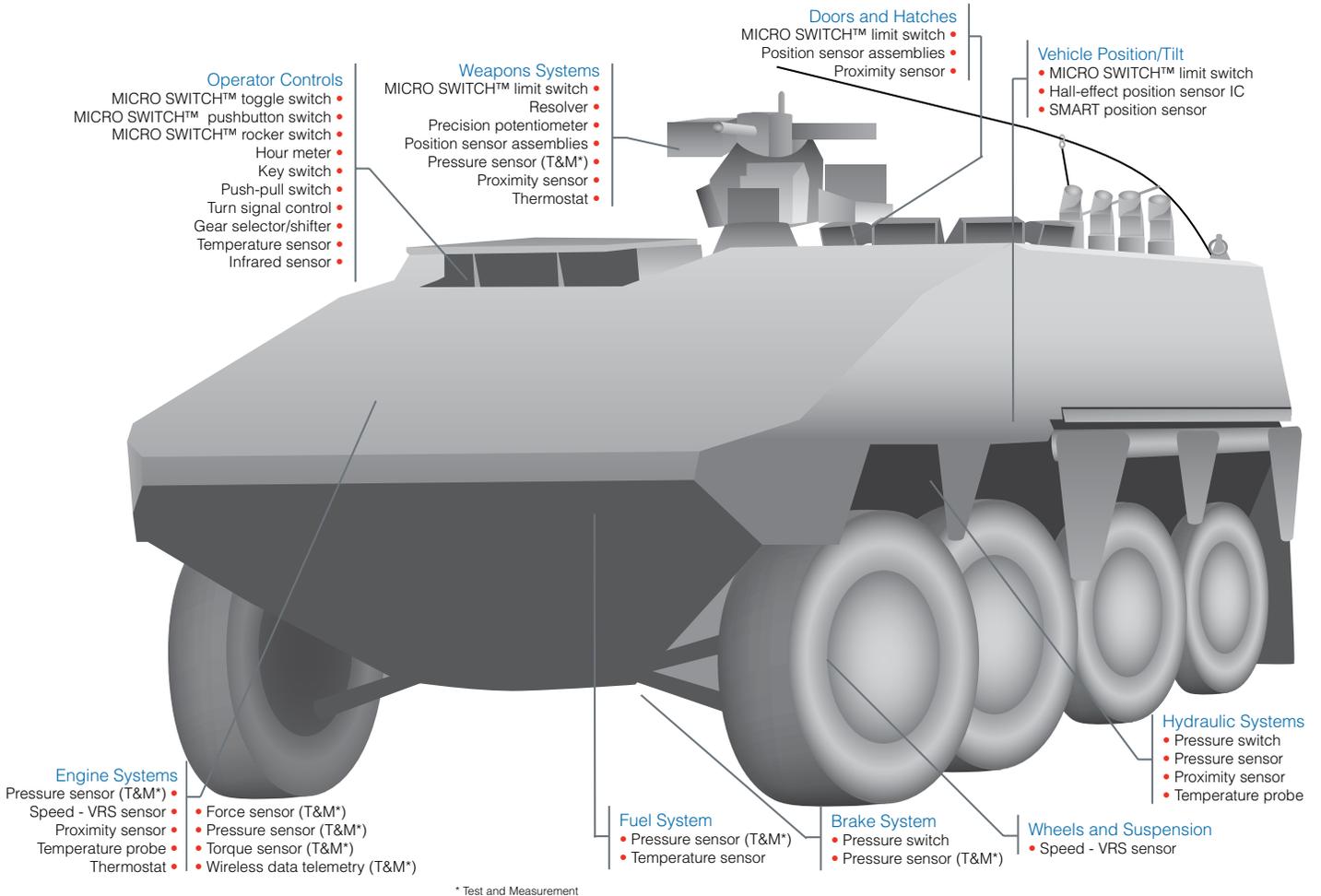
Again, reliability is the key. Many S&C products are crucial to aircraft operation and carry MTBF (mean time between failure) beyond 200,000 hours.

Honeywell:

- **Provides a strong, supporting infrastructure** with many years of on-time aerospace delivery experience
- **Delivers configurable designs.** From simple packaged sensors to multi-function integrated assemblies, Honeywell S&C can provide a solution
- **Creates integrated assemblies** by providing sensing solutions to the aerospace industry by designing and delivering fully sealed, qualified products complete with a connector and mounting
- **Manufactures rugged solutions.** Field data proves Honeywell designs stand up to the rigors of pressure cycling, wash-down, temperature extremes, and high vibration



# Military Ground Vehicles



**D**esigned for harsh environments. When crews are under fire, they should never have to think twice about whether their systems will work properly. With Honeywell sensors, switches, and custom controls, you get performance levels you can rely on.

Honeywell military-specified position sensing and temperature products monitor an armoured vehicle's gun control and ammunition loading systems. Resolvers and proximity sensors provide highly precise position feedback and extremely fast switching frequency for optimal gun system control. Temperature monitoring promotes a safe environment for optimal firing rates.



# Rotorcraft

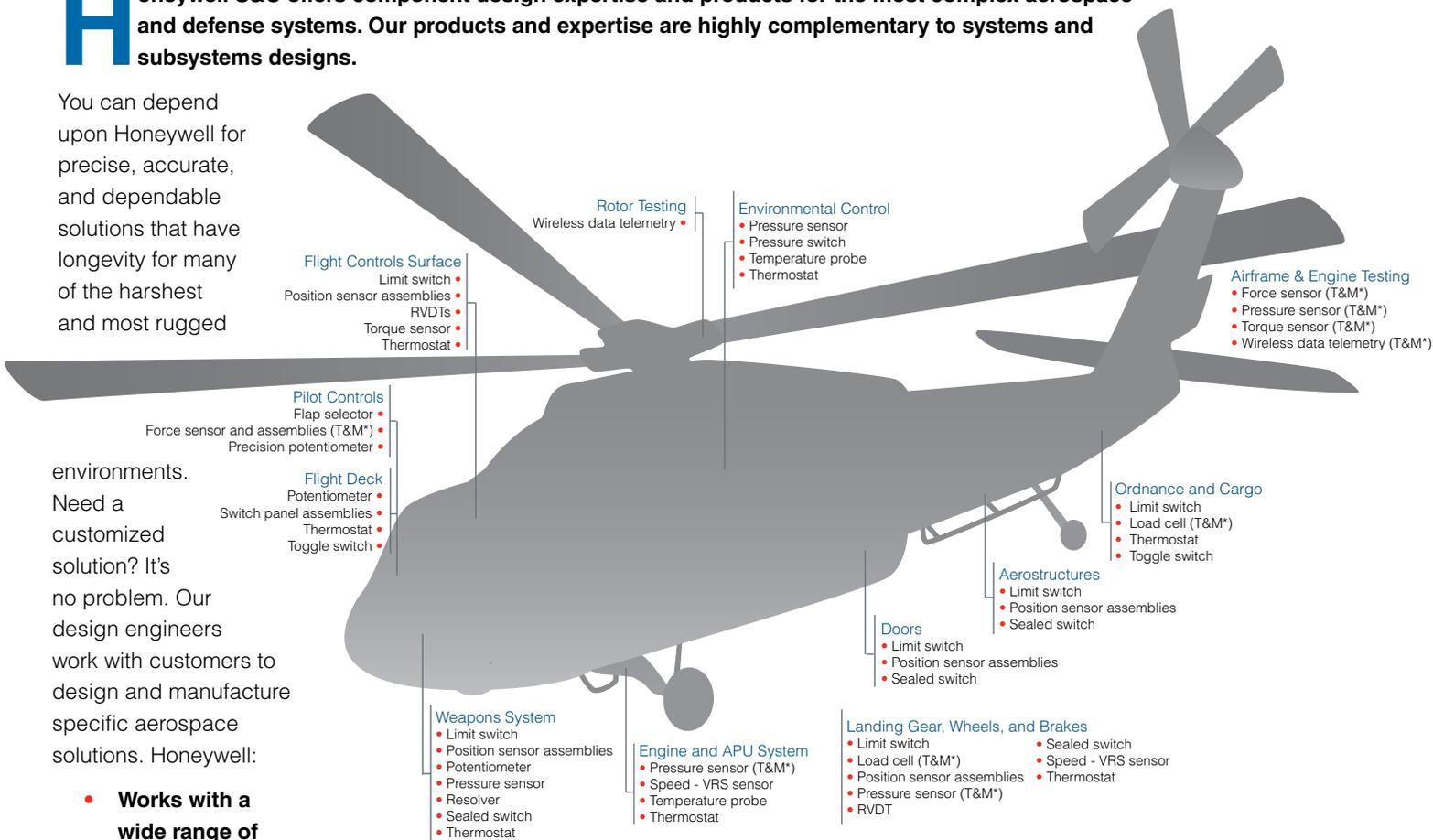
**H**oneywell S&C offers component design expertise and products for the most complex aerospace and defense systems. Our products and expertise are highly complementary to systems and subsystems designs.

You can depend upon Honeywell for precise, accurate, and dependable solutions that have longevity for many of the harshest and most rugged

environments.

Need a customized solution? It's no problem. Our design engineers work with customers to design and manufacture specific aerospace solutions. Honeywell:

- **Works with a wide range of technologies.** We offer RVDT, LVDT, resolver, synchro, metal-foil strain gage, high gain thick film gage, and spring-LVDT, potentiometer, and switches as standard sensing elements – the most accepted in the industry. Honeywell S&C has built an unmatched sensing technology portfolio to solve customers' challenging applications.
- **Delivers fully interchangeable and integral signal conditioning.** Our linear force measurement products include integrated signal conditions to meet system interface needs. Optional signal conditioning provides calibration and compensation to allow interchangeability of products without the need to re-calibrate the system.



\* Test and Measurement



# Weapon Systems

**H**oneywell components are utilized in military vehicles, aircraft, and launchers to optimize and control weapon systems. Field data proves that Honeywell designs stand up to the rigor of pressure cycling, wash-downs, temperature extremes, and high vibration. They must function correctly every time. There's no margin for error.

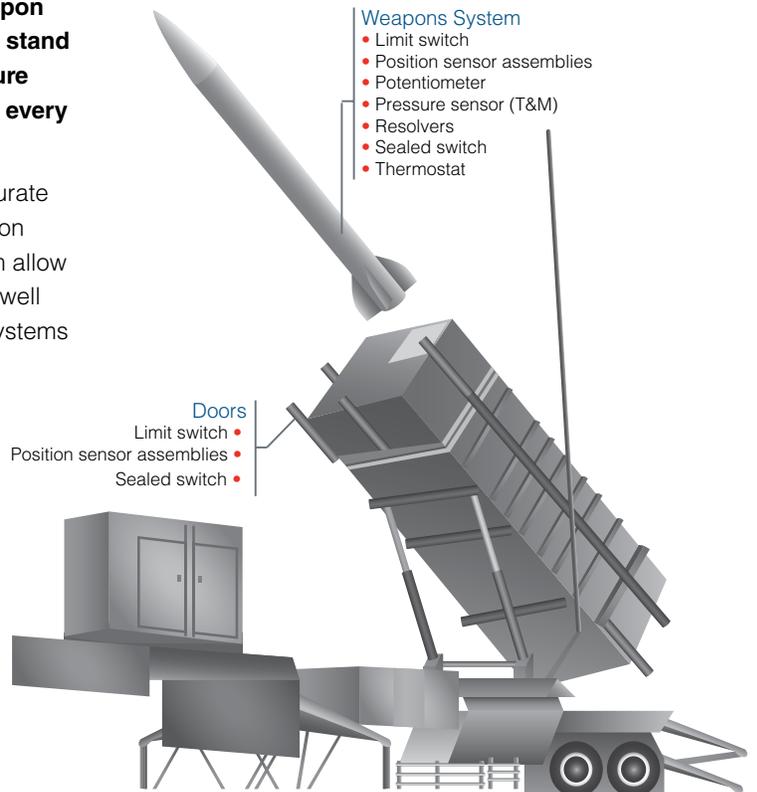
Subsystem interfacing expertise is apparent in our highly accurate and reliable sensors, switches, and control products for weapon systems. Honeywell position sensors in the seeker mechanism allow the system to interpret location in real time. In addition, Honeywell components feature design flexibility and the reuseability of systems on different platforms.

Resolvers deliver non-contact, 360° sensing, along with enhanced accuracy, resolution, and repeatability under severe environmental conditions.

Honeywell precision potentiometers deliver real-time information to a missile guidance system while the missile is en route, providing reliable directional control to the control surfaces. In addition, Honeywell has position sensors in the seeker mechanism that allow the system to interpret the location in real-time.

Honeywell S&C products are often used in the following weapon system applications:

- Gun aiming systems
- Multiple-launched rocket systems
- Precision pointed systems
- Common Remotely Operated Weapon System (CROWS)
- Lasers
- Integrated assemblies



# Custom Capabilities

## Packaged Switch Solutions

**H**oneywell combines our MICRO SWITCH™ electromechanical switches with ruggedized, application-specific packaging to address unique needs and environmental challenges. These assemblies are fully qualified to DO-160 or MIL-standard environmental test requirements.

**Applications onboard aircraft today range from Power Door Operating Systems to Landing Gear and Gunport Doors; where extreme reliability and integrity are critical.**



Custom engineered packaging design allows for combining features into one interchangeable, precalibrated assembly. Save time, weight, and wiring compared to using independent switches and brackets; and improve environmental resistance with a Honeywell custom-engineered solution.

- Can be custom engineered to survive extremely high shock and vibration
- Uses genuine MICRO SWITCH™ military grade electromechanical switches
- Unparalleled experience and library of custom switch devices
- Both hermetic and environmental configurations available

## RVDTs

**H**oneywell Position Transmitters fly on a multitude of commercial and military aircraft, and have become the standard when high integrity and reliability are critical. Always custom-configured by Honeywell in cooperation with our customers to help optimize system function, these transmitters are designed for high-lift system applications including flap and slat instrumentation, along with rudder and stabilizer monitoring.

Position transmitters normally utilize RVDT in conjunction with precision gearing, cams, and other mechanisms to deliver accuracy over the full range of flight control operation. Honeywell also supports and offers other sensors including resolvers, synchros, and other rotary sensors and switches that can be configured in many combinations to provide the required system monitoring. We often work with our customers to recommend the most effective solution.



- Environmentally sealed to withstand rapid pressure changes, de-icing fluid and other exposure to the elements
- Up to four redundant sensing channels available for high integrity applications
- Mean time between failures (MTBF) typically between 100k and 200k hours for the entire assembly
- Dissimilar channel option is available to meet common mode fault design requirements



## Force and Torque Sensors for Aircraft

**H**oneywell provides instrumented flight control linkage to monitor pilot input forces for ailerons, rudder, and brakes. Designed to comply with FAA part 135, 121 and other sections, devices are configured in length or envelope to the specific application. Specifically designed for onboard use, all devices are custom-configured and tested to DO-160 aircraft environmental requirements.



Control rods are available with either traditional strain-gage sensing, or spring/LVDT-based instrumentation. Each technology has unique advantages; please contact our application engineering for assistance. To enhance safety, a unique redundant load-path design option is also available.

- High vibration/turbo-prop rugged
- Customizable scale factor, output, and input voltage
- Unique torque quadrant design saves weight and space over control rods
- Entire suites of FAA part 135 position and force sensors

## Robust IHM Series Proximity Sensors

**T**he latest series of proximity sensors are designed to meet the increased EMI, lightning, and vibration requirements of today's modern aircrafts. In addition to being fully qualified to DO-160, we have enhanced traditional eddy current technology to provide Integral Health Monitoring (IHM) capability. This is available as a special option and effectively provides real-time indication of the health of the sensor through the use of a 3-state output.



Specifically designed for modern composite aircraft structures and engine accessories that carry higher levels of vibration and thermal shock, these sensors are fully hermetic and available with several connector and mounting options.

- Extremely robust to handle vibration and thermal shock
- Fully hermetic; robust to handle environmental exposure
- Health monitoring provides fault indication that is distinct from both target-near and target-far output state
- See page 13 for typical device specifications

## Solid State Valve Position Switch

**I**n addition to traditional harsh-duty electromechanical switches, Honeywell now offers a solid-state, non-contact option for sensing butterfly valve open/closed status. Specifically designed for aircraft onboard applications, these devices are fully qualified to DO-160 including harsh EMI and indirect lighting effects. Devices typically include two (redundant) channels within one hermetically sealed enclosure. Devices can be custom configured to fit specific valve characteristics.



Packaging design allows for ease of installation and calibration, and extremely repeatable channel to channel switchpoint matching. Internal switch points can be custom-configured to operate simultaneously or at different operating angles based on the application.

- Extremely resistant to vibration and shock
- Fully hermetic; robust to handle environmental exposure
- Two sensing channels allow redundant sensing in one bolt-on assembly

# Aerospace & Military Products

## Resolvers



Variable transformers in which both rotor and stator usually have two phase windings mechanically displaced by 90°. Typically sine and cosine channel outputs. Provide non-contact measurement for 360° sensing, enhanced accuracy, resolution, and repeatability under severe environmental conditions. Often used in ATOM – gunners site position (azimuth and elevation), forward looking radar, missile guidance, solar panel position, and antenna position applications.



Series	Honeywell Hawk™ 1-inch	Cased - Brushless Dual Speed	Cased - Brushless Single Speed
<b>Type</b>	fully housed	one-speed and multi-speed resolver and rotary transformer	one-speed, one-pole pair resolver and rotary transformer
<b>Size diameter</b>	1.06 in	(1/10 in) 30	(1/10 in) 17
<b>Speed</b>	1X	1&32	1X
<b>Accuracy</b>	±7 arcmin	1&32	1.25 arcmin to 3.50 arcmin
<b>Transformation ratio</b>	–	various	various
<b>Operating temperature range</b>	50.8 °C to 93.3 °C [-60 °F to 200 °F]	-46 °C to 71 °C [-51 °F to 160 °F]	-46 °C to 71 °C [-51 °F to 160 °F]
<b>Measurements</b>	1.06 in dia. x 2.77 in L	various	various
<b>Features</b>	non-contact magnetic technology eliminates mechanical contact, reducing wear and improving reliability and durability by enhancing operation in harsh environments; meets multiple military/aerospace specifications: DO-160D, MIL-STD-202G, MIL-STD-810G, MIL-STD-81963B, MIL-STD-461F; complies with space outgassing requirement SP-R0022	non-contact measurement for enhanced reliability; 360° sensing range; multi-speed designs available; variety of excitation voltages and frequencies; environmentally sealed and qualified to RTCA DO-160D	non-contact measurement for enhanced reliability; 360° sensing range; multi-speed designs available; variety of excitation voltages and frequencies; environmentally sealed and qualified to RTCA DO-160D



**Pancake -  
Brushless  
Multi-Speed**

**Pancake -  
Brushless Dual-  
Speed**

**Pancake - Dual-  
Speed**

**Pancake - Multi-  
Speed**

**Pancake -  
Single Speed**

multiple pole pairs resolver and rotary transformer

one-speed and multi-speed resolver and rotary transformer

one-speed and multiple-speed

multiple pole pairs

one-speed, one-pole pair

(1/10 in) 38 to 63

(1/10 in) 92

(1/10 in) 31 to 130

(1/10 in) 16 to 67

(1/10 in) 24 to 68

1-64

1&64

1&8, 1&16, 1&32, 1&36, 2&36, 1&64, 1&128

4, 8, 16, 32, 64

1

3 arcmin to 30 arcsec (low distortion harmonic)

(multi-speed) 30 arcsec

(multi-speed) 36 arcsec to 4 arcsec

1 arcmin to 5 arcsec

3 arcmin to 30 arcsec

various

various

0.45 ±5 %

0.45 ±5 %

various

-46 °C to 71 °C [-51 °F to 160 °F]

-46 °C to 71 °C [-51 °F to 160 °F]

-29 °C to 75 °C [-21 °F to 167 °F]

-29 °C to 75 °C [-21 °F to 167 °F]

-29 °C to 75 °C [-21 °F to 167 °F]

various

various

12 in x 10.5 in

26 in

various

non-contact measurement for enhanced reliability; 360° sensing range; multi-speed designs available; variety of excitation voltages and frequencies; environmentally sealed and qualified to RTCA DO-160D

non-contact measurement for enhanced reliability; 360° sensing range; multi-speed designs available; variety of excitation voltages and frequencies; environmentally sealed and qualified to RTCA DO-160D

non-contact measurement for enhanced reliability; 360° sensing range; multi-speed designs available; variety of excitation voltages and frequencies; environmentally sealed and qualified to RTCA DO-160D

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non-contact measurement for enhanced reliability; 360° sensing range; multi-speed designs available; variety of excitation voltages and frequencies; environmentally sealed and qualified to RTCA DO-160D

# Aerospace & Military Products

## Precision Potentiometers



Compact and rugged thick-film devices are available in a wide range of resistance values. These devices use precision technology developed for military applications. Often used in missile fin, track vehicle transmission height, and FLIR mirror position.



Series	MKV	Custom Precision
<b>Type</b>	conductive plastic element	conductive plastic
<b>Expected rotational life</b>	10 million cycles	50 million cycles
<b>Element type</b>	conductive plastic	conductive plastic
<b>Power rating</b>	1 W	1 W
<b>Terminal type</b>	turret	various
<b>Resistance range</b>	500 Ohm to 20 kOhm	500 Ohm to 20 kOhm
<b>Bushing type</b>	no bushing, standard	bushing or servo
<b>Governing standard</b>	MIL-PRF-39023/DO-160	MIL-PRF-39023/DO-160
<b>Electrical taper</b>	linear	linear
<b>Measurements</b>	body: Ø 22,23 mm [Ø 0.875 in]	body: 12,7 mm to 76,3 mm [0.5 in to 3 in]
<b>Features</b>	linearity 0.5 % or less; Servo and bushing mounting; custom electrical travels	linearity 0.5 % to 0.05 %; custom lead wire and connectors

# Aerospace & Military Products

## Proximity Sensors



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 innovative options available within the IHM series include a true hermetic cable exit and a unique continuous health monitoring function.



Series	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
<b>Technology</b>	enhanced ECKO <sup>1</sup>	enhanced ECKO with health monitoring option <sup>1</sup>
<b>Target material</b>	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>	15 mA max., <6 mA typ.	4 mA typ. (does not include load current)
<b>Sensing face</b>	shielded	shielded
<b>Housing material</b>	hermetic - stainless steel	hermetic - stainless steel
<b>Guaranteed actuation distance</b>	to 4 mm	to 4 mm
<b>Operating temperature range</b>	-55 °C to 125 °C [-67 °F to 257 °F]	-55 °C to 125 °C [-67 °F to 257 °F]
<b>Supply voltage</b>	18 Vdc to 32 Vdc, or 11 Vdc to 18 Vdc standard	15 Vdc to 32 Vdc standard
<b>Output type</b>	normally open/closed, current sinking (NPN)	current loop
<b>BIT diagnostics</b>	available (non standard)	health monitoring (3-state output) standard; disabled as option <sup>1</sup>
<b>Short circuit</b>	yes	yes
<b>Pressure proof</b>	custom option <sup>2</sup>	custom option <sup>2</sup>
<b>Reverse polarity</b>	yes	yes
<b>MTBF (hours)</b>	–	–
<b>Approvals</b>	DO-254, DO-160 <sup>1</sup>	DO-254, DO-160 <sup>1</sup>
<b>Measurements</b>	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>	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

# Aerospace & Military Products

## Proximity Sensors, continued



Broad range of robust operational capabilities and package sizes allow added flexibility in applications including ordnance, marine, offshore and aircraft cargo systems.



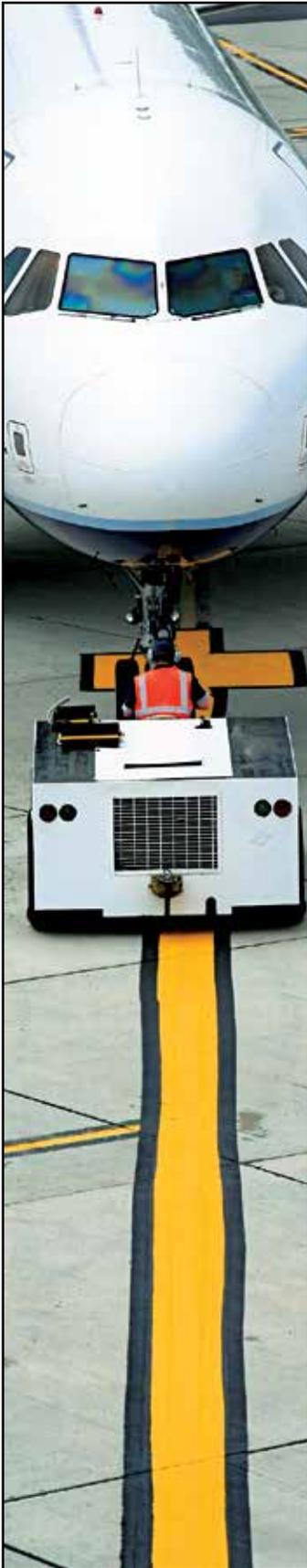
Series	932AB2W	ZS-00351-01	932AA3W
<b>Description</b>	one-piece M12 proximity sensor	one-piece M18 proximity sensor	one-piece M18 proximity sensor
<b>Technology</b>	ECKO	ECKO	ECKO
<b>Target material</b>	metallic	metallic	metallic
<b>Load current</b>	200 mA	100 mA	≤200 mA up to 85 °C to 100 mA at 100 °C
<b>Supply current</b>	–	–	–
<b>Supply voltage</b>	20 Vdc to 33 Vdc	12 Vdc to 32 Vdc	20 Vdc to 323 Vdc
<b>Sensing face</b>	ceramic	ceramic	ceramic
<b>Housing material</b>	stainless steel	stainless steel	stainless steel
<b>Guaranteed actuation distance</b>	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]	4 mm to 4,99 mm [0.1574 in to 0.19646 in]
<b>Operating frequency</b>	200 mA	100 mA	≤ 200 mA up to 85 °C to 100 mA at 100 °C
<b>Operating temperature range</b>	-40 °C to 100 °C [-40 °F to 212 °F]	-35 °C to 63 °C [-31 °F to 145 °F]	-40 °C to 100 °C [-40 °F to 212 °F]
<b>Supply voltage</b>	20 Vdc to 33 Vdc	12 Vdc to 32 Vdc	20 Vdc to 323 Vdc
<b>Output type</b>	normally open, current sourcing	normally open, current sinking	normally open, current sourcing
<b>BIT diagnostics</b>	no	yes	no
<b>Short circuit</b>	yes	yes	yes
<b>Pressure proof</b>	no	no	no
<b>Reverse polarity</b>	yes	yes	yes
<b>MTBF (hours)</b>	144000 hr @ 20 °C, NU/GM application	106000 hr @ 20 °C, GM	144000 hr @ 20 °C, NU/GM application
<b>Approvals</b>			
<b>Measurements</b>	M12 x 1 77 mm L [3.03 in L]	M18 x 1 73 mm L [2.87 in L]	M18 x 1 80 mm L [3.15 in L]
<b>Features</b>	stainless steel; high level of electronics protection; high frequency switching; lead wire or connector termination	stainless steel; high level of electronics protection; built-in test function (BITE); lead wire or connector termination	Hall-effect, magnetic field sensitive; stainless steel; high level of electronics protection; high frequency switching



100 FW	200 FW	300 FW	21 FW	23 FW	5 FW
one-piece 5/8 in proximity sensor	one-piece 5/8 in proximity sensor	two-piece proximity sensor	one-piece 12 mm proximity sensor	one-piece 22,2 mm proximity sensor	target, special, proximity sensor
ECKO	hall	ECKO	hall	hall	magnet
all metals	magnet	ferrous metals	–	–	–
120 mA, 50 mA lamp	100 mA, 50 mA lamp	750 mA	20 mA	20 mA	–
20 mA max. @ 25 °C	20 mA max. @ 25 °C	65 mA max.	25 mA	25 mA	–
18 Vdc to 32 Vdc	18 Vdc to 32 Vdc	18 Vdc to 32 Vdc	18 Vdc to 32 Vdc	18 Vdc to 32 Vdc	–
shielded, unshielded	shielded	shielded	stainless steel	stainless steel	stainless steel
stainless steel	stainless steel	stainless steel	stainless steel	stainless steel	stainless steel
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]	250 gauss	250 gauss	–
–	–	–	–	–	–
-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]	-55 °C to 150 °C [-67 °F to 302 °F]	-55 °C to 125 °C [-67 °F to 257 °F]	-55 °C to 150 °C [-67 °F to 302 °F]
18 Vdc to 32 Vdc	18 Vdc to 32 Vdc	18 Vdc to 32 Vdc	18 Vdc to 32 Vdc	18 Vdc to 32 Vdc	–
normally open, current sinking	normally open/closed, current sinking	normally open/closed, current sinking	normally open, current sinking	normally open, current sinking	–
–	–	–	yes	yes	–
–	–	–	no	no	–
–	–	–	no	no	–
–	–	–	no	no	–
–	–	–	35000	115000	–
FM Class 1, Division 2, Groups A, B, C, D	FM Class 1, Division 2, Groups A, B, C, D	MIL-STD-810B	MIL-STD-461E	MIL-STD-461E	–
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]	Ø 12 mm [Ø 0.47 in]	Ø 22,2 mm [Ø 0.9 in]	Ø 12 mm [Ø 0.47 in]
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	Hall-effect magnetic field sensitive; single channel; three-wire dc	Hall-effect magnetic field sensitive; triple channel; nine-wire dc	Hall-effect magnetic field sensitive

# Aerospace & Military Products

## MICRO SWITCH™ Sealed Switches



Military performance standard and most global approvals. Environmental and hermetic sealing to resist many severe environment conditions, changes in atmospheric pressures/temperatures. Potential applications include aircraft landing gear and flap/stabilizer controls, de-icers, doors/slides, engine thrust reversers, space vehicles, armored personnel carriers, weapon systems, and wingfold actuators.



Series	MICRO SWITCH™ SE/XE	MICRO SWITCH™ HM	MICRO SWITCH™ HS
<b>Type</b>	anodized aluminum snap-action switch	stainless steel snap-action switch	stainless steel, phenolic snap-action switch
<b>Sealing</b>	MIL-PRF-8805, symbol 3	MIL-PRF-8805, symbol 5 hermetic	MIL-PRF-8805, symbol 5 hermetic
<b>Operating temperature range</b>	-53 °C to 105 °C [-65 °F to 221 °F]	-65 °C to 121 °C [-85 °F to 250 °F] high temp available: 500 °F	-54 °C to 121 °C [-65 °F to 250 °F]
<b>Actuators/levers</b>	auxiliary actuators available	integral lever; aux. actuators: leaf, roller leaf, straight, roller lever	integral lever
<b>Termination</b>	solder, leadwire	solder, leadwire	screw, leadwire
<b>Circuitry</b>	SPDT	SPDT	SPDT
<b>Contacts</b>	silver, gold, bifurcated gold	silver, gold, bifurcated gold	silver
<b>Amp rating</b>	7 A max.	0.5 A to 3 A	1 A to 25 A
<b>Approvals</b>	CE, UL/CSA, MIL-PRF-8805 (selected listings)	MIL-PRF-8805	UL, CSA, MIL-PRF-8805
<b>Measurements</b>	SE: 19,05 mm H x 8,64 mm W x 22,35 mm L [0.75 in H x 0.34 in W x 0.88 in L] XE: 19,05 mm H x 8,13 mm W x 15,75 mm L [0.75 in H x 0.32 in W x 0.62 in L]	12,7 mm H x 6,35 mm W x 20,3 mm L [0.5 in H x 0.25 in W x 0.8 in L]	25,4 mm H x 17,8 mm W x 50,8 mm L [1.0 in H x 0.7 in W x 2.0 in L]
<b>Features</b>	watertight and military standard construction per MIL-PRF-8805; corrosion-resistant aluminum housing	hermetically sealed per MIL-S-8805; high temperature construction; reduced sensitivity to changes in altitude or pressure	hermetically sealed per MIL-S-8805; high temperature construction; reduced sensitivity to changes in altitude or pressure



MICRO SWITCH™ EN	MICRO SWITCH™ HE	MICRO SWITCH™ HR	E1-217 Series
military-grade stainless steel with environmental seals limit switch	hermetically sealed stainless steel limit switch	hermetically sealed stainless steel limit switch	military-grade limit switch
MIL-PRF-8805, symbol 4 hermetic	MIL-PRF-8805, symbol 5 hermetic	MIL-PRF-8805, symbol 5 hermetic	MIL-S-8805
-55 °C to 85 °C [-65 °F to 185 °F]	-55 °C to 125 °C [-67 °F to 257 °F]	-65 °C to 315 °C [-85 °F to 600 °F]	-55 °C to 82 °C [-67 °F to 180 °F]
top plunger, top roller, top rotary	top plunger, top roller plunger, nylon button	top plunger, top roller plunger	various
screw, leadwire, leadwire with connector, pin receptacle, side receptacle	screw, leadwire, bottom receptacle	screw, leadwire (receptacle termination available)	various
SPDT, DPDT	two or four SPDT circuits	SPNO, DPDT	SPDT, snap-action
silver, gold	silver, gold	silver, gold	silver, gold
1 A to 15 A (resistive)	1 A, 5 A, 7 A (resistive)	5 A (resistive)	7 A (resistive)
MIL-PRF-8805 symbol 4 hermetic (MIL-PRF-8805 QPL listings available)	MIL-PRF-8805, symbol 5 hermetic	MIL-PRF-8805, symbol 5 hermetic	MIL-S-8805
bottom receptacle: 114,3 mm H x 25,4 mm dia [4.5 in H x 1.0 in dia] side receptacle: 57,2 mm H x 26,7 mm W x 58,9 mm L [2.25 in H x 1.05 in W x 2.32 in L]	top pin plunger: 60,1 mm H x 25,4 mm dia [2.36 in H x 1.0 in dia] top roller plunger: 32,8 mm H x 17,5 mm dia [1.29 in H x 0.69 in dia]	screw termination: 80,8 mm H x 25,4 mm dia [3.18 in H x 1.0 in dia] leadwire termination: 103,7 mm H x 27,0 mm dia [4.08 in H x 1.06 in dia]	48 mm H x 21,5 mm W x 40,2 mm L [1.89 in H x 0.85 in W x 1.58 in L]
top & roller plunger actuators have internal ice scraper ring	features true hermetic sealing (metal- to-metal, glass-to-metal construction); meets sand and dust, explosion, icing, minimum current, and moisture resistance requirements; top & roller plunger actuators have internal ice scraper ring	meets moisture resistance, explosion, and salt spray requirements; top plunger actuator has internal ice scraper ring	small size and lightweight, without sacrificing performance or electrical capacity

# Aerospace & Military Products

## MICRO SWITCH™ Toggle Switches



Hermetic and environmentally sealed toggle switches offer reliable operations with MICRO SWITCH™ technology. Often used in applications where a panel-mount switch with an environment-proof rating is needed, including military and commercial aviation and process control.



Series	AT	TW	ET	TL
<b>Type</b>	stainless steel toggle	miniature stainless steel toggle	magnetically held toggle	military-grade toggle
<b>Sealing</b>	MIL-S-8805/26/98	qualified to MIL-S-83781	most listings qualified to MIL-S-5594	qualified to MIL-S-3950
<b>Operating temperature</b>	various	-65 °C to 71 °C [-85 °F to 160 °F]	-65 °C to 71 °C [-85 °F to 160 °F]	-65 °C to 71 °C [-85 °F to 160 °F]
<b>Actuator/lever</b>	standard, locking, tab, special design	standard, locking, special design, tab	standard, pull/push-to-unlock, tab	standard, special design, tab, paddle, none
<b>Action</b>	2-position, momentary & maintained	2- or 3-position, momentary & maintained	2- or 3-position, momentary & maintained	2- or 3-position, momentary & maintained
<b>Mounting</b>	15/32 in bushing, 1/4 in bushing, 3-hole, above panel	bushing 15/32 in or 1/4 in	bushing 15/32 in	bushing 15/32 in
<b>Termination</b>	solder, solder T2, screw, quick connect, leadwire, H58	IWTS, solder, screw, quick connect, H58, T2	screw, leadwire, turret	IWTS, solder, screw, quick connect, leadwire
<b>Circuitry</b>	SPDT, DPDT, DPNO, 3PDT, 4PDT, 6PDT, 7PDT, 8PDT, 10PDT	SPST, SPDT, DPST, DPDT	SPDT, DPDT, 4PDT	SPST, SPDT, DPST, DPDT, 3PST, 3PDT, 4PST, 4PDT
<b>Contacts</b>	silver, gold	silver alloy, gold-plated	silver alloy, gold-plated	silver alloy, gold-plated
<b>Amp rating</b>	0.01 A to 5 A (resistive)	0.1 A to 5.0 A @ 0.5 Vdc to 28 Vdc; 0.1 A to 5.0 A @ 0.5 Vac to 115 Vac	7 A max. (resistive)	up to 20 A (resistive)
<b>Measurements</b>	various	49,78 mm H x 14,61 mm W x 14,61 mm D [1.96 in H x 0.575 in W x 0.575 in D]	51,56 mm H x 25,4 mm W x 25,4 mm D [2.03 in H x 1.0 in W x 1.0 in D]	26,7 mm H x 33,5 mm W x 22,6 mm D [1.05 in H x 1.32 in W x 0.89 in D]
<b>Approvals</b>	qualified to MIL-S-8805/26/98	UL, qualified to MIL-S-83781	qualified to MIL-S-5594	UL, CSA, CE, qualified to MIL-S-3950
<b>Features</b>	choice of sealed bushing; short behind panel depth	saves space and weight; sealed bushing versions	holding coil replaces mechanical holding mechanisms to maintain toggle in operate	environment-proof sealing; qualified to MIL-DTL-3950

# Aerospace & Military Products

## MICRO SWITCH™ Pushbutton Switches



Lighted or unlighted, pushbuttons are designed to enhance manual operation with a flexible and attractive interface. Snap-in surface products are easy to apply, operate, and maintain. Often used in control boards and panels found in instrumentation, flight decks, and test equipment.



Series	AML	PB
<b>Housing type</b>	non-lighted, rectangle; 1 lamp circuit, rectangle; 2 lamp circuits, rectangle	equipped with HM hermetically sealed switch units that have metal-to-metal fusion around cover, actuator base, and mounting holes
<b>Circuitry</b>	SPST, SPDT, DPST, DPDT, 4PDT	2-pole, 3-pole, 4-pole
<b>Action</b>	2 position, 3 position (momentary or maintained action)	–
<b>Mounting</b>	snap-in panel	threaded bushing
<b>Sealing</b>	–	panel-seal version, hermetically sealed switch units
<b>Termination</b>	solder, quick connect, printed circuit, push-on	solder, H58, quick-connect
<b>Ampere/voltage range</b>	0.4 A to 2 A @ 0.5 Vdc to 30 Vdc; 0.4 A to 3 A @ 0.5 Vac to 125 Vac; 0.4 A to 2 A @ 0.5 Vac to 250 Vac	2 A to 5 A, 125/250 Vac
<b>Light (if applicable)</b>	no lamp installed; incandescent 6 V, 14 V, 28 V; neon	–
<b>LED/neon color</b>	red, yellow, green	–
<b>Measurements</b>	panel area: 20,5 mm x 30,5 mm [0.80 in x 1.20 in]	various
<b>Approvals</b>	–	UL, CSA external parts corrosion-resistant per MIL-PRF-8805; meets explosion-proof requirements of MIL-PRF-8805
<b>Features</b>	silver and gold contacts; available with or without diode protection for LEDs; lamp circuit independent of switch circuit	up to four poles; compact or miniature sizes; sealed versions available

Product support and availability are limited to existing products.

# Aerospace & Military Products

## Variable Reluctance Speed Sensors



Simple, rugged devices that do not require an external voltage source for operation, Variable Reluctance sensors provide direct conversion of actuator speed to output frequency. Potential applications include engine and motor RPM, process, flow, wheel-slip, and gear-speed measurement.



Variable Reluctance Speed Sensors	
<b>Output voltage range</b>	4 Vp-p to 500 Vp-p (inclusive)
<b>Housing diameter</b>	3/8 in to 15/16 in
<b>Housing material/style</b>	stainless steel threaded or smooth
<b>Termination</b>	MS3106, D38999, M83723 connectors and leadwires
<b>Operating temperature range</b>	-73 °C to 232 °C [-100 °F to 450 °F]
<b>Coil resistance</b>	10 Ohm to 2300 Ohm
<b>Inductance</b>	2 mH to 600 mH
<b>Gear pitch range</b>	various
<b>Min. surface speed</b>	0,38 ms [15 in/s] typ.
<b>Max. operating freq.</b>	50 kHz
<b>Vibration</b>	MIL-STD-810G, Method 514
<b>Features</b>	self-powered operation; simple installation; no moving parts; operates over wide speed range; customized versions available

# Aerospace & Military Products

## Pressure Sensors and Switches



Known for enhanced quality, reliability, and durability. Engineered with fully steel media isolating with stainless steel and no internal elastomeric seals. Resistant to harsh, aggressive media, and challenging environments. Potential applications include aerospace (environmental systems, engines, fuel pressure, and hydraulic systems), military ground vehicles, ordnance and munitions release systems, and military maritime systems.



Series	MLH	1HP
<b>Pressure connection</b>	1/4-18 NPT; M12 x 1.5 (ISO 6149); M14 x 1.5 (ISO 6149); 3/8-24 UNF (SAE-3 o-ring boss); M18 x 1.5 (ISO 6149); 1/8 in-27 NPT; 1/2 in-20 UNF (SAE-5 o-ring boss); M10 x 1 (ISO 6149); 1/4 in SAE female Schrader; 7/16-20 UNF (SAE-4 o-ring boss); 1/2 in NPT; 9/16-18 UNF (SAE-6 o-ring boss); PT 1/4-19 BSP tapered thread; G 1/4-19 (DIN 3852-2); G 1/8 with o-ring groove; M16 x 1.5 (ISO 6149); G 1/4 with o-ring groove; G 1/8 (DIN 3852-2); PT1/8-28 BSP tapered thread; M20 x 1.5 (ISO 6149); 1/2-20 37° Flare (SAE JIC)	MS33656E4 MS33514E4 MS33656E3 AS5202-04
<b>Measurement</b>	gage, sealed gage	gage, sealed gage
<b>Construction</b>	port - 304L stainless steel; diaphragm - Haynes 214 alloy	stainless steel
<b>Pressure range</b>	0 psi to 50 psi through 0 psi to 8000 psi	150 psi to 5000 psi
<b>Output signal</b>	0.5 Vdc to 4.5 Vdc ratiometric output at 5 Vdc excitation; 4 mA to 20 mA current from 9.5 Vdc to 30 Vdc excitation; 1.0 Vdc to 6.0 Vdc regulated output from 8 Vdc to 30 Vdc excitation; 0.25 Vdc to 10.25 Vdc regulated output from 14 Vdc to 30 Vdc excitation; 0.5 Vdc to 4.5 Vdc regulated output from 7 Vdc to 30 Vdc excitation; 0 mV to 50 mV from 5 Vdc excitation; 1 Vdc to 5 Vdc output from 8 Vdc to 30 Vdc excitation	28 Vdc excitation
<b>Accuracy</b>	±0.25 % full scale BFSL (±0.5 % full scale BFSL on ranges below 100 psi)	set point precision: ±10 %
<b>Amplified</b>	yes	no
<b>Temp. range</b>	-40 °C to 125 °C [-40 °F to 257 °F] (comp.)	-55 °C to 70 °C [-67 °F to 158 °F]
<b>Termination</b>	Packard MetriPak 150; Hirschmann; M12 x 1 (Brad Harrison micro); DIN 72585 (Cannon APD type); DIN 43650-C (IP65); Amp Superseal 1.5 (IP67); cable; flying leads; Deutsch DTM04-3P (integral)	back exit, M22759/7-20 wire; right angle exit, M27759-7-20 wire MS3106A-10SL-3S connector
<b>Measurements</b>	27,0 mm H x 27,0 mm W x 55 mm D [1.06 in H x 1.06 in W x 2.18 in D]	Ø 21 mm x 70 mm L [Ø 0.825 in x 2.77 in L]
<b>Approvals</b>	UL, CE (for many models) <b>Product is not DO-160/DO-254 compliant.</b>	qualified to RTCA DO-160D; MIL-PFR-8805 rated switch mechanism
<b>Features</b>	all-wetted parts; no internal elastomeric seals; stable and creep-free; reverse voltage and output short circuit protected; less than 2 ms response time	suitable for air, fuel, water, oil, or Skydro™; easily configurable to different pressure set points and differentials; burst pressure rating of 12000 psi; high current or logic-level loads; configurable with multiple pressure fittings and electrical connectors

# Aerospace & Military Products

## Precision Thermostats



Hermetic/non-hermetic devices available. High reliability versions meet stringent requirements of military and aerospace industries for dielectric strength, moisture, resistance, vibration, and shock. Often used in environmental and flight controls, aerospace engines, flight decks, cargo holds, landing gear, and space craft.



Series	3000 Custom Packaged	3100 Hermetic
<b>Description</b>	custom packaged	hermetic
<b>Amperage</b>	dependent on the internal device	2.0 A/1.0 A/5.0 A
<b>Housing material</b>	stainless steel or brass	steel housing hermetically sealed with glass-to-metal seal at terminal junction
<b>Operating temperature range</b>	-29 °C to 260 °C [-20 °F to 500 °F]	-29 °C to 260 °C [-20 °F to 500 °F]
<b>Environmental exposure range</b>	-62 °C to 288 °C [-80 °F to 550 °F]	-62 °C to 288 °C [-80 °F to 550 °F]
<b>Dielectric strength</b>	MIL-STD-202, Method 301; 1250 Vac 60 Hz - terminal to case	MIL-STD-202, Method 301; 1250 Vac 60 Hz - terminal to case
<b>Insulation resistance</b>	MIL-STD-202, Method 302; 50 MOhm min. terminal to case	MIL-STD-202, Method 302; Cond. B - 50 MOhm - 500 Vdc applied
<b>Contact resistance</b>	MIL-STD-202, Method 307; 0.050 Ohm	MIL-STD-202, Method 307; 0.050 Ohm
<b>Hermetic seal</b>	MIL-STD-202, Method 112; Cond. A, 1 x 10 <sup>-5</sup> atm cc/s	MIL-STD-202, Method 112; Cond. 1 x 10 <sup>-5</sup> atm cc/s
<b>Moisture resistance</b>	MIL-STD-202, Method 106	MIL-STD-202, Method 106
<b>Shock</b>	-	-
<b>Vibration</b>	-	-
<b>Thermal shock</b>	-	-
<b>Salt spray</b>	-	-
<b>Acceleration</b>	-	-
<b>Approvals</b>	-	-
<b>Features</b>	custom packaging; hermetically sealed; tight tolerances and differentials; hermetic connector or potted construction	hermetically sealed; tight tolerances and differentials; pre-set and tamper proof; SPST contacts



### 3MS1 Series

QPL series military thermostats

5.0 A resistive

steel housing hermetically sealed with glass-to-metal seal at terminal junction

-46 °C to 190 °C [-50 °F to 375 °F]

-65 °C to 260 °C [-85 °F to 500 °F]

MIL-STD-202, Method 301;  
1250 Vac 60 Hz - terminal to case

MIL-STD-202, Method 302; 500 MOhm

MIL-STD-202, Method 307; 0.050 Ohm max.

MIL-STD-202, Method 112; Cond. C

MIL-STD-202, Method 106

MIL-STD-202, Method 213; 100 G

MIL-STD-202, Method 204; 20 G

MIL-STD-202, Method 107; Cond. B

MIL-STD-202, Method 101; Cond. B

MIL-STD-202, Method 212; 20 G

MIL-PRF-24236/1 and QPL

hermetically sealed; tight tolerances and differentials; hi-rel; QPL listed



### 35XX Series

military thermostat

5.0 A resistive

steel housing hermetically sealed with glass-to-metal seal at terminal junction

-46 °C to 204 °C [-50 °F to 400 °F]

-65 °C to 260 °C [-85 °F to 500 °F]

MIL-STD-202, Method 301;  
1250 Vac 60 Hz - Terminal to Case

MIL-STD-202, Method 302; 500 MOhm

MIL-STD-202, Method 307; 0.050 Ohm max.

MIL-STD-202, Method 112; Cond. C

MIL-STD-202, Method 106

MIL-STD-202, Method 213; 400 G

MIL-STD-202, Method 204; 20 G

MIL-STD-202, Method 107; Cond. B

MIL-STD-202, Method 101; Cond. B

MIL-STD-202, Method 212; 20 G

meets or exceeds requirements of MIL-PRF-24236

hermetically sealed; tight tolerances and differentials; hi-rel



### 3200 Aerospace

aerospace

5.0 A resistive

steel housing hermetically sealed with glass-to-metal seal at terminal junction

-51 °C to 163 °C [-60 °F to 325 °F]

-65 °C to 177 °C [-85 °F to 350 °F]

MIL-STD-202, Method 301; 1250 Vac

MIL-STD-202, Method 302; 500 MOhm

MIL-STD-202, Method 307; 0.025 Ohm max.

MIL-STD-202, Method 112; Cond. C

MIL-STD-202, Method 106

MIL-STD-202, Method 213; 750 G

MIL-STD-202, Method 204; 30 G;  
MIL-STD-202, Method 214; 50 G

MIL-STD-202, Method 107; Cond. B

MIL-STD-202, Method 101; Cond. B

MIL-STD-202, Method 212; 20 G

MIL-S-24236/NASA S-311-641/01

NASA certified; space qualified; hermetically sealed; tight tolerances and differentials; pre-set and tamper proof; SPST contacts

# Aerospace & Military Products

## Packaged Temperature Probes

Compact, lightweight. Operate with enhanced sensitivity, reliability, and stability under diverse conditions of shock, vibration, humidity, and corrosion. Variety of custom packages available for air, liquid, and solid temperature sensing applications. Often used for engine bleed air, operator controls, environmental control systems, and weather stations.



Series	R300	ES-110
<b>Temp. sensing type</b>	immersion	air/gas
<b>Thermistor type</b>	RTD	NTC
<b>Nominal resistance at 25 °C [77 °F]</b>	100 Ohm	2000 Ohm
<b>Operating temperature range</b>	-40 °C to 275 °C [-40 °F to 572 °F] continuous, excursion to 300 °C [572 °F] for 10 minutes max.	-40 °C to 150 °C [-40 °F to 302 °F]
<b>Housing material</b>	stainless steel	brass
<b>Electrical and mechanical interface</b>	overmolded connector with M14 x 1.50 thread	overmolded connector with M10 x 1.25 or M12 x 1.50 thread
<b>Features</b>	enhanced response, reliability, and accuracy; stainless steel construction	exposed thermistor; rugged design; brass encapsulation





ES-120	512	526	534	590
immersion	surface	surface	surface	surface
NTC or KTY	NTC	NTC	NTC	NTC
2000 Ohm	various	various	various	various
-40 °C to 150 °C [-40 °F to 302 °F]	-60 °C to 204 °C [-76 °F to 399 °F]	-60 °C to 160 °C [-76 °F to 320 °F]	-30 °C to 50 °C [-22 °F to 122 °C]	-60 °C to 125 °C [-76 °F to 257 °F]
brass	aluminum	aluminum or stainless steel	various	aluminum or stainless steel
overmolded connector with M10 x 1.25, M10 x 1.0, M12 x 1.5, M14 x 1.50 thread, or 1/8 PTF	ring tongue #5 with two flying leads	adhesion with two flying leads; bullet housing with two flying leads	three tinned copper alloy leads; network configuration: two thermistors in a thermoplastic housing with two flying leads	adhesion with two flying leads; ring tongue (#5, #6, #10) with two flying leads; ring tongue with Molex connector; threaded body with flying leads
enclosed thermistor; rugged design; brass encapsulation	wide variety of probe assembly styles; choice of custom or existing designs; enhanced sensitivity, accuracy, stability/low drift; RTD linear output available	wide variety of probe assembly styles; choice of custom or existing designs; enhanced sensitivity, accuracy, stability/low drift; RTD linear output available	simplifies circuitry in digital readout systems; delivers relatively linear resistance output and offers the enhanced sensitivity and accuracy of a thermistor; can be used in a resistance or voltage mode	wide variety of probe assembly styles; choice of custom or existing designs; enhanced sensitivity, accuracy, stability/low drift; RTD linear output available

# Test & Measurement Capabilities



**W**hen designing, testing, and building the latest products for the aerospace industry, sensors must stand up to the job and be able to perform under harsh and demanding conditions, fit in extremely tight spaces, and be rugged enough to withstand multiple testing runs to provide precise, accurate results over time, every time.

See why more aerospace manufacturers turn to Honeywell whenever they need sensors for their aerospace test and measurement applications. Honeywell offers...

- Nearly 80 years of experience serving the aerospace industry
- A comprehensive portfolio of test and measurement sensor products
- High product accuracy, reliability, and robustness
- Calibration, repair, and warranty service for all Honeywell test and measurement sensors
- Extensive custom engineering capabilities
  - In-house design ability
  - Global engineering and manufacturing expertise
  - Fast delivery for both large and small custom orders
- Custom designs for:
  - Extreme operating conditions
  - Demanding specifications
  - Specific physical configuration requirements

## Comprehensive Portfolio

Honeywell has one of the broadest product portfolios on the planet. This amazing breadth of solutions covers a wide array of technical platforms, eliminating the need for multiple suppliers. We also offer products that comply with specific agency approvals or other industry standards for trusted product performance.

## Application Expertise

Honeywell S&C delivers extensive expertise to help address sensing challenges. Whether it's assisting in determining which existing product best serves an existing need or designing a new sensor, we ensure superior performance from each product and solution.

## Custom Engineering

When no "standard" part seems just right, our engineers will design a custom solution by performing minor – or sometimes major – modifications to our sensors. In-house design, engineering, and manufacturing expertise means fast delivery for both large and small batches of custom-engineered solutions.



Our application expertise and custom engineering help our customers find solutions!

An aerospace controls system developer had a problem... and they came to Honeywell S&C to solve it.

This manufacturer required specialized load cells for throttle controls used in military aircraft and the supplier was not meeting product specification requirements.

Looking for a vendor that had the expertise to customize products, they approached Honeywell. Honeywell's engineering team developed a miniature load cell with a special thread, internal amplifier, and specialized connector to meet the customer's exact specification requirements – something their previous supplier could not do.

By designing a superior load cell to meet the customer's specifications for the application, along with ongoing service and support as a single-source supplier, Honeywell has been this customer's supplier for more than 13 years.

**Problem solved.**

### Load Cell/Miniature Load Cell Applications

- In-flight refueling\*
- Flight test airframe testing and structural support
- Pilot force input (stick, wheel pedals) to black box\*
- Hook load sensor for helicopters\*
- Airframe testing
- Throttle control sensors\*
- Landing gear, systems, and doors
- Braking systems

### Pressure Sensor/Miniature Pressure Sensor Applications

- Aircraft environmental control system pressure sensors\*
- Various hydraulic systems on flight test aircraft\*
- Ground testing of aerospace support systems
- Component test validation and quality assurance
- Surface aerodynamic testing
- Tire pressure testing

### Torque Applications

- Aircraft hydraulic pump testing
- Flap actuator testing
- Satellite panel actuator torque monitoring sensor\*
- Torque measurement of propeller of a turboprop aircraft engine\*
- Customized, strain-gaged torque sensors for demanding, individualized customer applications

### Wireless Telemetry Applications

- Main rotor / tail rotor drive torque measurement
- Space shuttle fuel pump testing
- Dynamic strain measurement on turbine blades for jet engines

\* on board position



As one of the world's leading providers of sensors and switches, Honeywell understands and meets the requirements of a wide variety of industries.

Honeywell Sensing and Control is a global leader in providing reliable, cost-effective sensing and switching solutions for our customers' applications. We serve thousands of customers in four core industry segments: industrial, medical equipment, transportation, and aerospace/military products.

### **Aerospace**

Aerospace applications are among the most demanding for any type of product. Rigorous FAA requirements, extreme environments (temperature, shock, vibration, the need for hermetic sealing), and the ability to customize devices are just a few of the parameters often required of sensors and switches in these applications. Aerospace customers typically value speed in prototyping and development, and Honeywell's vertically integrated, AS9100-approved manufacturing locations enhance our ability to produce devices in a wide variety of packages. The precision output of our products helps reduce risk and cost in key applications while also minimizing the need for unscheduled maintenance.

Honeywell's in-depth aerospace engineering experience allows us to work with customers in the design and development of

products that best meet the specified requirements of their individual applications. Making products simple to install makes the job easier every step of the way. And, the odds are that Honeywell is already on the list of trusted suppliers for many aerospace companies, underscoring the decades of experience we bring to this field.

Honeywell products for this industry (many of them PMA-certified) include force sensors, load cells, potentiometers, pilot controls, pressure sensors, pressure switches, resolvers, sensor/actuator assemblies for systems ranging from aerostructures to fuel control to flight surfaces, speed sensors, temperature probes, thermostats, torque sensors, y-guides for cargo systems, MICRO SWITCH™ sealed and high-accuracy switches, MICRO SWITCH™ pushbutton switches, and MICRO SWITCH™ rocker and toggle switches.

## Medical

Medical applications typically require sensors and switches that are highly stable and extremely reliable to enhance patient safety and comfort. Stability is often essential to minimize long term drift, reduce the need for recalibration, and improve ease of use for medical equipment operators. Reliability enhances patient safety in life-critical applications, reduces downtime, and improves test throughput in applications such as clinical diagnostics. The product needs to be easy to use and easy to design into a system, so Honeywell's extensive customization and built-in calibration/amplification capabilities are strong benefits. Confidence in Honeywell's product performance, reliability, and availability provide peace of mind for medical equipment manufacturers who choose Honeywell.

Honeywell offerings for this industry include airflow sensors, board mount and stainless steel media isolated pressure sensors, Hall-effect magnetic position sensors, humidity sensors, flexible heaters, force sensors, thermostats, commercial solid state sensors, infrared sensors, oxygen sensors, pressure and vacuum switches, potentiometers and encoders, MICRO SWITCH™ pushbutton, rocker, and toggle switches, and hour meters.

## Industrial

The industrial arena can be a rough one. From high-speed food processing to high-force stamping applications, reliable and cost-effective sensors and switches often help minimize repair costs, maximize system life, and reduce overall system expense. Durability can mean the difference between smooth-running processes and expensive downtime. Accurate, repeatable sensor or switch output can reduce the need for calibration once the device is applied. Because of the wide variety of potential applications, Honeywell's ability to deliver a customized product that can meet virtually any size, weight, and power requirement – as well as any packaging stipulations for tough, harsh environments – often makes it easy to incorporate and use our devices. Safety is another important consideration for industrial

users, and our products meet a wide variety of regulatory safety requirements.

Honeywell's industrial product line includes airflow sensors, current sensors, humidity sensors, fiber-optic and liquid-level sensors, linear position sensors, oxygen sensors, pressure sensors, potentiometers and encoders, speed sensors, temperature probes, ultrasonic sensors, wirewound resistors, thermostats, commercial solid state sensors, flex heaters, SMART position sensors, board mount and stainless steel media isolated pressure sensors, force sensors, safety light curtains, push-pull switches, and MICRO SWITCH™ basic switches, hazardous area switches, safety switches, key and rotary switches, limit switches, sealed and high-accuracy switches, pushbutton, rocker, toggle switches, and relays.

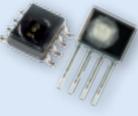
## Transportation

Getting from Point A to Point B is often challenging for end-customers of transportation providers – Honeywell aims to make the trip easier with highly reliable, cost-effective switches and sensors. Our products are designed to support rigorous engine requirements, and their efficiency can also help optimize engine performance. Customization is often required to allow a switch or sensor to be mounted in tight or challenging environments including vibration, temperature extremes, and road contamination. The durability of Honeywell products enhances system reliability, which is also boosted by the stable, accurate output of our devices. All of these capabilities allow demanding customers to rely on Honeywell's many years of experience in the transportation industry.

Honeywell products for transportation applications include Hall-effect rotary position sensors, inertial measurement units, infrared sensors, keyless entry sensors, magnetic position sensors, pressure sensors, speed and direction sensors, ultrasonic sensors, thermostats, temperature probes, commercial solid state sensors, SMART position sensors, and MICRO SWITCH™ pushbutton, rocker, and toggle switches.



## SENSORS

	<p><b>Thermostats:</b> Commercial and precision snap-action. Automatic or manual reset options, phenolic or ceramic housings.  <b>May be used in:</b> Telecommunications • Battery Heater Controls          • Computers • Copy Machines • Fax Machines • Food Service • Food Carts • Small and Major Appliances • Heat and Smoke Detectors • HVAC Equipment</p>		<p><b>Pressure transducers – heavy duty:</b> Provide a complete amplified and compensated pressure measurement solution. Choice of ports, connectors, outputs and pressure ranges, engineered to be resistant to a wide variety of media for use in most harsh environments.  <b>May be used in:</b> Industrial HVAC/R and Air Compressors • General System and Factory Automation Pump, Valve and Fluid Pressure • Transportation (Heavy Equipment and Alternative Fuel Vehicles) System • Pneumatics • Hydraulics</p>
	<p><b>Pressure sensors – heavy duty:</b> Small, allowing use on their own in tight packages or as the building block for a complete transducer. Developed for potential use in pressure applications that involve measurement of hostile media in harsh environments compatible with 316 stainless steel.  <b>May be used in:</b> Industrial Controls • Process Control Systems          • Industrial Automation</p>		<p><b>Humidity sensors:</b> Digital, analog, and combined humidity/temperature sensing versions. Provide on-chip signal conditioning with accuracy capability to <math>\pm 1.7</math> %RH. Stable, reliable, low-drift performance. Standardized, platform-based sensors.  <b>May be used in:</b> Medical • HVAC/R • Weather Stations • Air Compressors • Telecommunications • Grain Storage • Incubators</p>
	<p><b>Current sensors:</b> Accurate and fast response. Almost no thermal drift or offset with temperature. Adjustable linear, null balance, digital and linear current sensors.  <b>May be used in:</b> Variable Speed Drives • Overcurrent Protection • Power Supplies • Ground Fault Detectors • Robotics • Industrial Process Control • Wattmeters</p>		<p><b>Flexible heaters:</b> Flat or custom geometry configurations with single, multiple and variable watt densities. Stable, uniform heating. Can be bonded parts or combined in value-added assemblies.  <b>May be used in:</b> Medical • HVAC/R • LCD Displays • Power Generation • Telecommunication</p>
	<p><b>Pressure sensors – board mount:</b> Full line of industrial-grade sensors: media-isolating design, multiple ports and outlets, and electrical configurations.  <b>May be used in:</b> Pneumatic Controls • Air Compressors • Process Monitoring • Hydraulic Controls • VAV Controls • Clogged Filter Detection • Presence/Absence of Flow • Transmissions</p>		<p><b>Temperature sensors:</b> Customized probes, thermistors and RTD sensors. Plastic/ceramic, miniaturized, surface-mount housings and printed circuit board terminations.  <b>May be used in:</b> Semi-Conductor Protection • Vending Machines • Power Generation • Hydraulic Systems • Thermal Management • Temperature Compensation</p>
	<p><b>Magnetic sensors:</b> Digital and analog Hall-effect position ICs, magnetoresistive position ICs, Hall-effect vane, gear-tooth and magnetic sensors.  <b>May be used in:</b> Speed and RPM Sensing • Motor/Fan Control • Magnetic Encoding • Disc Speed • Tape • Flow-Rate Sensing • Conveyors • Ignitions • Motion Control/Detection • Power/Position • Magnetic Code Reading • Vibration • Weight Sensing</p>		

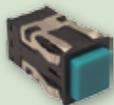
## ELECTROMECHANICAL SWITCHES

	<p><b>MICRO SWITCH™ basic switches:</b> Snap-action precision switches. Compact. Lightweight. Designed for repeatability and enhanced life. Basic switches: large, standard, miniature, subminiature, hermetically sealed, water-tight and high-temperature versions.  <b>May be used in:</b> Vending Machines • Communication Equipment • HVAC • Appliances • Automotive • Electronic Gaming Machinery • Valve Controls • Irrigation Systems • Foot Switches • Pressure • Temperature Controls</p>		<p><b>MICRO SWITCH™ sealed and high accuracy switches:</b> Precision “snap action” mechanisms. Wide variety of actuators, terminations, circuitry configurations, electrical ratings, contact materials and operating characteristics.  <b>May be used in:</b> Landing Gear • Flap/Stabilizer Controls • Thrust Reversers • Space Vehicles • Armored Personnel Carriers • De-Icer Controls • Wingfold Actuators • Industrial Environments • Valves • Underwater</p>
	<p><b>MICRO SWITCH™ hazardous area switches:</b> Flame path designed to contain and cool escaping hot gases that could cause an explosion. MICRO SWITCH™ EX, BX, CX and LSX Series.  <b>May be used in:</b> Grain Elevators and Conveyors • Off-Shore Drilling • Petrochemical • Waste-Treatment Plants • Control Valves • Paint Booths • Hazardous Waste Handling Facilities</p>		<p><b>Key and rotary switches:</b> Environmentally sealed, 2-3-4 position switches. O-rings help keep dirt and moisture out and prolong life.  <b>May be used in:</b> All-Terrain Vehicles • Golf Carts • Snowmobiles • Scissor Lifts • Telehandlers • Construction and Marine Equipment • Skid Loaders • Agricultural Equipment • Material Handlers</p>
	<p><b>Pressure and vacuum switches:</b> Feature setpoints from 3 psi to 4500 psi. Rugged components have enhanced repeatability, flexibility and wide media capability. Uses diaphragm or quad seal/piston.  <b>May be used in:</b> Transmissions • Hydraulics • Brakes • Steering • Generators/Compressors • Dental Air • Embalming Equipment • Oxygen Concentrators • Air Cleaners • Fuel Filters • Pool Water Pressure</p>		<p><b>MICRO SWITCH™ toggle switches:</b> Hermetic and environmentally sealed options. Enhanced reliability. Center pin for ultimate stabilization. Available in many shapes, sizes and configurations.  <b>May be used in:</b> Aerial Lifts • Construction Equipment • Agriculture and Material-Handling Equipment • Factory-Floor Controls • Process Control • Medical Instrumentation • Test Instruments • Military/Commercial Aviation</p>

## LIMITLESS™ WIRELESS SOLUTIONS

	<p><b>Limitless™ switches and receivers:</b> Combines the best of MICRO SWITCH™ limit switches with commercial wireless technology. Beneficial for remote monitoring where wiring/maintenance is not physically possible or economically feasible. Used for position sensing and presence/absence detection.  <b>Limitless™ Operator Interface:</b> Adds a human interface device to the product-driven interfaces of Limitless™ switches and receivers. Choose and install a desired operator or utilize one of Honeywell's pushbuttons.  <b>May be used in:</b> Valve Position • Crane Boom/Jib/Skew Position • Lifts • Material Handling • Presses • Construction/Ag Machines • Conveyors • Industrial Environments • Remote/Temporary Equipment • Grain Diverters or Flaps • Door Position</p>		
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	<p><b>Position sensors:</b> The <b>SMART position sensor</b> measures linear, angular or rotary position of a magnet attached to a moving object so that the object's position can be determined or controlled. Its simple, non-contact design eliminates mechanical failure mechanisms, reduces wear and tear, and improves reliability and durability. <b>May be used in:</b> Valve Position • Material Handling • Plastic Molding • Passenger Bus Level Position • Truck-Mounted Crane Outrigger Position • Aerial Work Lift Platform • Front Loader and Digger/Excavation Boom Position</p> <p><b>Potentiometer sensors:</b> Measure linear, rotary position or displacement. Honeywell's proprietary conductive plastic delivers extensive temperature range and infinite resolution, and provides precision position measurement. <b>May be used in:</b> Robotic Motion Control • Marine Steering • In-Tank Level Sensing</p> <p><b>Ultrasonic sensors:</b> Measure time delays between emitted and echo pulses, often accurately determining the sensor-to-target distance. <b>May be used in:</b> Level Measurement • Height and Thickness Sensing • Diameter Control</p>		
	<p><b>Infrared sensors:</b> IREDs, sensors and assemblies for object presence, limit and motion sensing, position encoding and movement encoding. Variety of package styles, materials and terminations. <b>May be used in:</b> Printers/Copiers • Motion Control Systems • Metering • Data Storage Systems • Scanning • Automated Transaction • Drop Sensors • Non-Invasive Medical Equipment</p>		<p><b>Force sensors:</b> Variety of package styles and various electrical interconnects including pre-wired connectors, printed circuit board mounting and surface mounting for flexibility. <b>May be used in:</b> Infusion and Syringe Pumps • Blood Pressure Equipment • Pump Pressure • Drug Delivery Systems • Occlusion Detection • Kidney Dialysis Machines</p>
	<p><b>Proximity sensors:</b> Designed to meet demanding temperature, vibration, shock and EMI/EMP interference requirements. Number of housing materials and termination styles. <b>May be used in:</b> Aircraft Landing Gear • Gun Turret Position Control • Door/Hatch Monitoring</p>		<p><b>Speed sensors:</b> Measure speed, position and presence detection utilizing magneto-resistive, variable reluctance, Hall-effect, variable inductance and spiral technologies. <b>May be used in:</b> Cam and Crankshafts • Transmissions • Fans • Pumps • Mixers • Rollers • Motors</p>
	<p><b>Airflow sensors:</b> Advanced microstructure technology. Sensitive and fast response to flow, amount/direction of air or other gas. Analog or digital output. Thin-film, thermally isolated bridge structure consists of a heater and temperature sensing elements. <b>May be used in:</b> HVAC • Respirators • Process Control • Oxygen Concentrators • Gas Metering • Chromatography • Leak Detection Equipment • Medical/Analytical Instrumentation • Ventilation Equipment</p>		<p><b>Rotary position sensors:</b> Digital and analog Hall-effect, magneto-resistive and potentiometric devices and resolvers for sensing presence of a magnetic field or rotary position. Directly compatible with electronic circuits for application flexibility. <b>May be used in:</b> Audio and Lighting • Frequency • Temperature • Position • Medical/Instrumentation • Computer Peripherals • Manual Controls • Joysticks • Telecom • Welding • Heating • Aerospace</p>

	<p><b>MICRO SWITCH™ aerospace-grade pressure switches:</b> Lightweight, compact pressure switches. Meets military and DO-160 standards. Lower operating force provides application versatility with enhanced precision. Design modularity allows for configuration of the switch, facilitating rapid customization. <b>May be used in:</b> Aerospace Systems • Engines, Fuel Pressure and Hydraulic Systems • Military Ground Vehicles • Ordnance and Munitions Release Systems • Military Maritime Systems</p>		<p><b>MICRO SWITCH™ limit switches:</b> Broadest and deepest limit switch portfolio. Rugged, dependable position detection solutions. MICRO SWITCH™ heavy-duty limit switches (HDLS), medium-duty and global limit switches. Hermetically and environmentally sealed switches. <b>May be used in:</b> Machine Tools • Woodworking • Textile • Printing Machinery • Metal Fabrication • Balers/Compactors • Forklifts • Bridges • Robotics • Wind Turbines • Elevators • Moving Stairs • Doors • Dock Locks/Levelers • Aerial Lifts • Cranes • Conveyors • Rail • Shipboards • Dock Side</p>
	<p><b>MICRO SWITCH™ pushbutton switches:</b> Lit or unlit. Wide range of electrical and display design, pushbuttons and manual switches. Many shapes, sizes and configurations. Easy to apply, operate and maintain. <b>May be used in:</b> Control Boards and Panels • Industrial and Test Equipment • Flight Decks • Medical Instrumentation • Process Control</p>		<p><b>MICRO SWITCH™ sealed and standard rocker switches:</b> Wide range of electrical and display design. Many shapes, sizes, buttons and configurations to enhance manual operation. <b>May be used in:</b> Transportation • Agricultural and Construction Equipment • Test Equipment • Heavy-Duty Machinery • Marine Equipment • Small Appliances • Telecom • Medical Instrumentation • Commercial Aviation</p>

## SAFETY PRODUCTS

	<p><b>MICRO SWITCH™ safety switches:</b> For operator point-of-operation protection, access detection, presence sensing, gate monitoring and electrical interfacing. High-quality, dependable, cost-effective solutions. <b>May be used in:</b> Packaging and Semi-Conductor Equipment • Plastic-Molding Machinery • Machine Tools • Textile Machines • Lifts • Industrial Doors • Balers • Compactors • Aircraft Bridges • Telescopic Handlers • Refuse Vehicles</p>
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## **Warranty/Remedy**

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgment or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective.

**The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

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

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

## **Find out more**

To learn more about Honeywell's sensing and control products, call **+1-815-235-6847**, email inquiries to **info.sc@honeywell.com**, or visit **sensing.honeywell.com**

Sensing and Control

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