



# **AEROSPACE PRODUCTS OVERVIEW**



## ABOUT SENSATA TECHNOLOGIES

Sensata Technologies is one of the world's leading suppliers of sensing, electrical protection, control and power management solutions with operations and business centers in twelve countries. Sensata's products improve safety, efficiency and comfort for millions of people every day in automotive, appliance, aircraft, industrial, military, heavy vehicle, heating, air-conditioning and ventilation, data, telecommunications, recreational vehicle and marine applications.

For more information please visit Sensata's website at [www.sensata.com](http://www.sensata.com)

## OUR AEROSPACE PRODUCT SOLUTIONS

Get the best solution to improve your application's efficiency with Sensata's electrical protection, pressure, position and temperature product portfolio.

The synergy of leading brands and years of proven expertise in extremely demanding automotive and industrial markets allow us to provide you with the **highest level of quality, service, technical expertise and worldwide support** to improve safety, efficiency and comfort in your flight control, landing gear, power distribution, engine monitoring and environmental control applications.

### PRODUCT LINES

CIRCUIT BREAKERS	4
SWITCHES, TEMPERATURE SENSORS & THERMOSTATS	6
POSITION SENSORS	8
PRESSURE SENSORS	10



# CIRCUIT BREAKERS

50+ years of serving mission critical power distribution and switching applications in Aerospace and Defense coupled with sensing innovation and operational excellence.

## OUR BRANDS

Klixon



## SEGMENTS

- Commercial
- Defense
- Business Jet
- Rotorcraft
- Ground Defense Vehicles

Klixon



## APPLICATIONS

- Primary & Secondary Power Distribution
- Electrical Panels
- Galley Equipment
- Cockpit Circuit Breaker Panels

For more information on these and other products visit [sensata.com](http://sensata.com)

# CIRCUIT BREAKERS.....

### performance features

- Low voltage drop
- High vibration resistance
- 100% Calibrated and tested
- Miniature size for minimal weight
- High short circuit interrupting capacity
- Thermal response analogous to heat up rate of wire
- Coordinated ratings for improved system reliability

### advantages & options

- Auxiliary switch circuits
- Alternate length pushbuttons
- English or metric thread sizes
- Dual safety, "Fusible link", for redundant protection in hard fault conditions
- Temperature compensation to offset effects of ambient temperature allowing use of smaller gauge wire

### featured products



Family	Approval	Rating (amps)	Approx. Maj. Dim. (in) L x W x H	Approx. WT (g)
2TC	MS3320 , EN2995-004 & -005	1 – 30	75 x .56 x 1.2	25.0
2TC49	MS5809/1	2.5 – 15	1.21 x .75 x .56	25.0
3TC	MS14105, MS14105L & MS25244	5 – 35	1.10 x .75 x 1.2	36.0
5TC	EN3661-005 & -006	20 – 70	1.65 x .77 x 1.92	52 (std.) 75 (aux.)
6TC	MS14154, MS14154L, MS14154V, EN2996-004 & -005	2 – 25	.75 x 1.78 x 1.2	65.0
9TC	MS14153	1, 15 – 35	1.10 x 2.35 x 1.2	110.0
15TC	EN3662-005 & -006	20 – 50	1.3 x 2.15 x 2.1	130 (std.) 140 (aux.)
6752-12	MS24571	2.5 – 50	2.2 x .75 x 3.3	91.0
6752-100	MS25361 & MS25361V	50 – 100	2.2 x .75 x 3.3	113
6752-305		2.5 – 90	2.2 x 2.25 x 3.3	292.0

All manual trip / indicating devices; only shows high volume options – many others available

## SOLUTIONS ENGINEERED TO PERFORM

Sensata prides itself on designing and manufacturing solutions for the most demanding, mission critical applications.

# SWITCHES, TEMPERATURE SENSORS & THERMOSTATS

KLIXON hermetic miniature and sub-miniature snap-action switches are ideal for extremely harsh and demanding environments as found in aircraft, military, aerospace, and aircraft engines applications.

## OUR BRANDS

Klixon

## APPLICATIONS

- Landing Systems
- Environmental Control Systems
- Engine Systems (Pressure and Temperature)
- Actuator and Valve Controls
- Cockpit Controls
- Space and Satellite Systems

For more information on these and other products visit [sensata.com](http://sensata.com)

## TEMPERATURE SENSORS

### thin film platinum temperature sensors

#### PT200 SERIES



Thin Film Platinum Temperature Sensors (PT200) are a proven technology for temperature measurements with many applications in airframe and engine sensing. Building on Sensata's leading position in automotive and industrial temperature sensing to offer:

- Optimal cost versus robustness
- Fast response time by reduced tip diameter and thermal decoupling
- High absolute accuracy up to 850°C by thermal decoupling of measurement element and housing
- High linearity
- Flexibility in insertion depth: 25mm, 35mm, 40mm, 50mm, 70mm
- Fail safe design
- Digital output

### wire-wound RTD sensors

#### 90 OHM



Responsive and reliable for use in oil and air temperature measurement, these 90 ohm wire wound sensor will be offered to MS28034.

### thermocouple temperature sensors

#### TYPE-K & TYPE-N



Leveraging Sensata's experience in thermocouples for automotive exhaust gas temperature sensing, KLIXON aerospace thermocouple temperature sensors are available in a variety of configurations for use in temperatures up to 1000°C.

## SWITCHES

### hermetic position

#### AT Switch Packages



#### AT Basic Switch



#### KX Switch Package



- Available per MIL-PRF-8805, Enclosure Symbol 5
- Hermetically sealed with dry nitrogen gas backfill
- Small, lightweight axis-symmetric design
- Proven snap-action switching, reliable performance and long life
- Excellent shock and vibration resistance
- Switching up to 4 amps at 30VDC
- Optimal for low level circuits
- Temperature range between -275°F and +450°F
- Single and multiple pole designs available
- Various mounting configurations for custom applications
- Wide range of side plate designs for narrow width applications
- PMA Approvals for various commercial aircraft
- Customer approvals for space and military applications

### hermetic pressure

#### 6PS SERIES



6PS Series precision pressure switches are snap-acting, all-welded devices with hermetically sealed switch contacts. They were developed for applications in aerospace and electronics where high reliability and/or resistance to severe environments is required.

- Actuation range of 45 to 600 PSIA
- High vibration resistance
- Corrosion resistant: 300 series stainless steel construction for all environment and media exposed parts
- 8000 psi minimum burst pressure
- Available in wide range of standard and custom configurations
- Typical applications include APU and Aircraft Engine Oil Systems

## THERMOSTATS

### hermetic thermostats

#### 11041 (M24236/1) Thermostat



#### Tiny Stats



#### Thermostat Probes



#### M2 Narrow Differential Thermostat



Utilizing a bimetal, snap acting disc as the thermal sensing element, KLIXON precision thermostats feature exceptionally high reliability and long life. Standard configurations, probe style packages, or custom packaging can meet most design requirements. Thermostats shown to the right are qualified to MIL-PRF-24236, NASA S-311-P641 and UL/CSA certified.

## YOUR TRUSTED PARTNER

Your trusted partner for design, development, and manufacturing of sensors and controls.

# POSITION SENSORS

The Kavlico brand is the Global leader in the Aerospace LVDT market through excellence in technology innovation, service, and product reliability. Kavlico brand RVDTs specialize in harsh environment rotary position sensing and have been qualified for many high vibration pressurized applications.

## OUR BRANDS

BEI Kimco

BEI Sensors

Kavlico

## APPLICATIONS

- Flight Control Actuators
- Engine Valve Controls
- Landing Gear Feedback
- Cockpit Controls
- Environmental Controls

For more information on these and other products visit [sensata.com](http://sensata.com)

### linear variable differential transformers



Over 1 million LVDTs are installed in aircraft worldwide. Sensata LVDTs have market leading MTBF. The design is inherently more reliable because of the design principle: non-contacting mutual induction which provides friction-free motion and nearly infinite resolution.

Sensata designs and manufactures single and multi-channel devices as well as DC/DC and industrial LVDTs.

### rotary variable differential transformers



An industry standard for light weight, robust position measurement in aviation applications. Typically capable of +/- 80 degrees of rotation, designs with integral gear heads are also available for applications where higher angular displacements or multiple revolutions are required.

RVDTs are also available in single and multi-channel as well as DC/DC configurations.

Typical Product Specifications	LVDTs	RVDTs
Range	0.010 to 20.0"	+/- 80 degrees
Linearity	+/- 0.25% F.S.	
Accuracy	+/- 1.0% F.S. (-65 to 450F)	+/- 1.0% F.S. (-65 to 250F)
MTBF	700,000 hours	500,000 hours
Temperature	-65 to 450F*	-65 to 350F
Redundancy	1 to 4 channels	
Environmental	MIL-STD-810 or DO-160	
Gear Ratios		Up to 4000:1

\*NEW high temperature LVDT development for 600 to 1000 degrees F

### force transducers



LVDT-based force transducers provide force feedback through a precise measurement of spring deflection. The Sensata design provides the highest accuracy and greatest stability with temperature over time of any force sensor in aerospace application, and the rugged design makes them ideal for the most extreme environments.

NEW development of strain gauge force sensors also being tested for new applications to provide haptic feedback and other force sensing application using innovative MEMs technology from Sensata.

#### Typical Product Specifications

Operating Loads	+/- 10 to 750 lbf
Limit Load	+/- 200 to 3000 lbf
Ultimate Load	+/- 300 to 4500 lbf
Spring Rate	2000 to 20k lbf/in.
Excitation	8+/-2VRMS, 1.5 to 3kHz or 28+/-2VRMS, 400Hz
Sensitivity	.000100 to .004500 V/V/lbf
Accuracy	+/-0.5 to 1.5% F.S.

### potentiometers, Hall effect & encoders



The experience in design and product qualification of the Sensata Aerospace organization has allowed the adaptation of traditionally industrial speed and position sensing products to many Aerospace and Defense applications including cabin air pressurization, flight controls, and guidance applications.

QPL Standard Products:

- MIL-PRF-12934
- MIL-PRF 29023

### cockpit controls



These custom designed devices can incorporate our RVDT sensors, motors, and switches within one packaged control. Kavlico cockpit controls meet customer and market demand for small envelope, minimum weight, and high reliability. Our experience includes:

- Speed Brake / Variable Air Brake Handle
- Landing Gear Control Lever (LGCL)
- Steering Control Wheel (Tiller)
- Flap Level Selector (FLS)
- Flight Spoiler Control Lever (FSCL)
- NEW Throttle Quadrant Assembly (TQA)

### motors & voice coil actuators



With the adoption of electro-mechanical actuation in aerospace and defense, motors have become increasingly important in actuation and motion control systems including applications such as targeting, scanning controls, and fin actuation. Motors and magnetic products:

- Brushless DC
- Special Motors (designed to embed in application)
- Linear & Rotary Voice Coil Actuators

## AFTERMARKET CAPABILITY

Fully Certified FAA 145 Repair Station in Thousand Oaks, CA and committed to full customer support including troubleshooting, repair, spares, and AOG service.

# PRESSURE SENSORS

Sensata sells more pressure sensors than any other company worldwide. Decades of experience mean that Sensata can develop and manufacture application-specific products in-house, reducing costs to the customer and ensuring strict adherence to quality and qualification standards. Sensata is pushing the limits for next generation aerospace pressure sensors which will incorporate wireless connectivity, complex electronics and edge computing, as well as higher temperature capability for harsh environment sensing applications.

## APPLICATIONS

- Hydraulic Flight Control
- Engine Control
- Cabin Air and Climate Control
- Bleed Air
- Tire Pressure Monitoring
- Landing and Brake Systems
- Waste water and Galley Systems
- Space and Satellite
- And more...

For more information on these and other products visit [sensata.com](http://sensata.com)

### ceramic capacitive



For over 30 years the Kavlico brand and Sensata have led innovation in ceramic capacitive pressure sensing within Automotive and Industrial markets. Kavlico and Sensata brand sensors were developed with superior performance characteristics to perform in the high temp Industrial landscape, and thus today the sensors have direct applications in tough aerospace applications. The ceramic sensing diaphragm is compatible to most media including acidic/corrosive fluids. The sensing technology is inherently suited toward amplified outputs, and can be easily adapted to different media, with the selection of readily available compatible sealing elastomers.

### resistive strain gauge

Micro-fused Strain Gauge (MSG)



MSGs provide a Pressure and Temperature output signal to the application's computer that is used to control various systems. The output is an analog or digital signal that reflects the pressure and temperature of the medium being measured in the application. It offers a small package and a cost effective solution, but the MSG elements are very sensitive to temperature fluctuation.

High Gain Thin Film Strain Gauge (TiON)



Kavlico brand thin film sensors use a proprietary process for sputtering resistive gauges directly onto insulated metal flexure surfaces allowing for excellent thermal performances in elevated temperature applications. The metal gauge material, Titanium Oxy-Nitride (TiON), provides for very high thin film gauge factors, greater than 5mV/V. This gage factor is nearly 2x the output of a typical thin film gauge material, Nickel Chromium (NiCr), with the added ability of being able to operate at temperatures above 300C. These sense elements can be produced on metal substrates manufactured from 17-4 PH, Inconel 718 and other high strength weldable materials.

### MEMs piezoresistive



Superior process controls from the semiconductor industry are used to produce accurate and reliable silicon based resistive Wheatstone bridge strain gauges that respond linearly to applied pressure. MEMS based Pressure Transducers can be configured to provide passively compensated low voltage outputs (50mV to 100mV Full Span), as well as amplified voltage and current (mA) outputs. This sensing approach can be used in absolute, gage and differential reference applications. Packaging options allow for extreme low pressure gas measurement and also for high pressure, hermetically sealed configurations. Packaged transducers can be configured with single or redundant outputs for increasing levels of reliability.

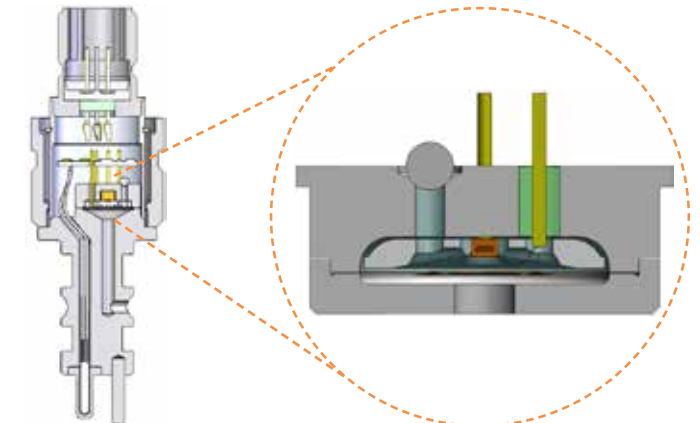
NEW development of high temperature MEMs (450-600 degrees C) MEMs pressure sensors for harsh environment applications are well underway and ready for partnership development customers.

### board mount MEMs



For low pressure, gaseous media applications, the Board Mount MEMs product provides a small footprint, highly integrable solution. This technology, with design origins from safety-critical Automotive air brake applications, has been leveraged for Aerospace Cabin Air and Climate Control systems as well as other Air Management applications.

### oil-filled MEMs



When an application calls for a robust, hermetically sealed construction, oil-filled MEMs technology is the answer. In this package, the MEMs element is protected via a laser-welded isolation diaphragm leaving the sensed media in contact with only corrosion-resistant steel surfaces. This is the standard sensing approach for all Hydraulic, Fuel, Oil, and Bleed Air pressure applications; and our most configurable design.

Typical Product Specifications	MEMs (Board Mount)	MEMs (Oil-Filled)	Thin Film (TiON)	Capacitive	MSG
Pressure Range (bar)	0.1 to 20	2 to 300	10 to 3000	0.5 to 70	290 to 50k
Accuracy 0 to 100C	+/- 0.5% F.S.				
Accuracy -55 to 150C	+/- 1.5% F.S.				
Linearity	+/- 0.25% FS, BFSL				NA
Temperature, C	-55 to 150	-55 to 300	-55 to 150	-55 to 150	-40 to 140
Environmental	RTCA DO-160				Hermetic

## DIGITAL OUTPUT, SIGNAL CONDITIONING AND ON-BOARD DIAGNOSTICS

Sensata is the global leader for digital output pressure sensing, and is leading innovation in signal conditioning and on-board diagnostics including in-house capability to design and develop application specific integrated circuits (ASICs). We are ready to be your trusted partner for smart sensors in aerospace applications.

## Sales & Business Offices

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## Commitment to Quality

ISO 9001, AS9100:C, and Boeing  
D1-9000 certification. Every employee  
at Sensata is accountable for and  
committed to the quality of our  
products and continuous improvement  
of our processes.

## Platform Experience

COMMERCIAL TRANSPORT:  
All Airbus, Boeing, COMAC, and  
Bombardier

REGIONAL, BUSINESS JET, AND GENERAL  
AVIATION:  
Bombardier, Gulfstream, Embraer,  
Dassault, COMAC, Cessna, Irkut,  
HondaJet, Mitsubishi, and more...

HELICOPTERS:  
Sikorsky, Boeing, Bell, Airbus, Augusta,  
Robinson, and more...

DEFENSE:  
Extensive experience in Fighters,  
Bombers, UAV, and Missiles as well as  
many applications for Space vehicles and  
engines

