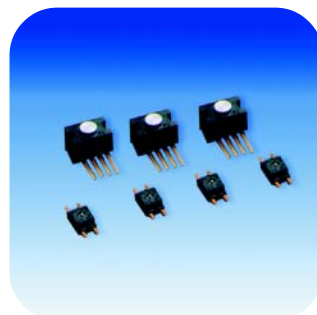


# Commercial Switches and Sensors



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Pressure

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Mass Airflow

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Force

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Humidity

Product solutions on the Interactive Catalogue

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Temperature - RTDs

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Temperature - Thermistors

---

Temperature - Probes

---

Thermostats - Commercial

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Thermostats - Precision

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Heaters

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Combi-sensor

---

Thermal Cutoffs

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Position

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Infrared

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Current

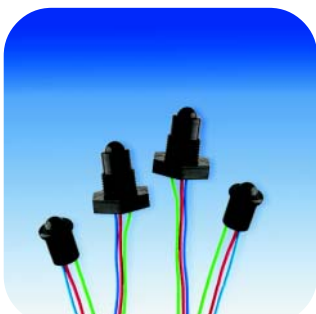
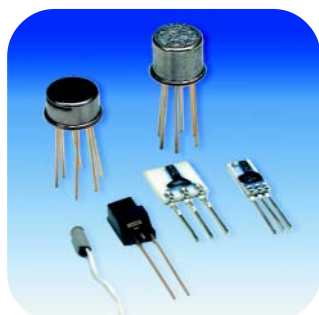
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Liquid Level

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Basic Switches

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

February 2004

## COMMERCIAL SWITCHES AND SENSORS

Honeywell's Commercial Switches and Sensors offer a wide selection of products and technology capability for applications in medical devices and equipment; heating, ventilation, air-conditioning and refrigeration; information technology; home appliances; motor control and automotive passenger cars. This catalogue contains a selection of our most popular, established product listings – all tried and tested in field applications. To view our complete range of products, visit our website at [www.honeywell.com/sensing](http://www.honeywell.com/sensing).

### *How to use this catalogue*

For each referenced listing, key specification parameters, descriptions and mounting drawing information are presented. These listings illustrate our capabilities while the specifications included allow easy differentiation between similar products. For products with no specific reference numbers, please contact your local Honeywell sales office.

There are, of course, many more product options available. Full product specification information may be accessed on our website ([www.honeywell.com/sensing](http://www.honeywell.com/sensing)). At the Home page enter the catalogue listing reference in the SEARCH box and click GO! This will take you directly to the interactive catalogue/specification search tables for this listing. Alternatively, select and click the interactive catalogue icon on the Home page and then choose a product category against which to do a specification search.

Also on the website you can access installation instructions, application notes, Frequently Asked Questions (FAQs), selection guides and additional technical information.

### *Mounting dimensions*

Mounting dimensions shown in each product section are for reference only. For exacting layout work, request an engineering drawing from your nearest Honeywell sales office. Where dual dimensions are shown on mounting drawings, the first or upper one is millimetres (mm) and the second or lower is inches (in). Where single dimensions are shown, they are millimetres (mm), unless otherwise stated.

### *To order these products*

Simply contact your local Honeywell Distributor or your local Honeywell office. More information on Honeywell products and how to contact us can be found at <http://locator.micro.honeywell.com/>



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

### *System critical sensing solutions*

A system is critical if the quality, reliability, delivery and customer service associated with a component part is essential to the performance of the operation or end product. If a sensor or switch is critical to the performance, cost effectiveness, delivery or safety of a product or operation, then it is system critical. It is therefore a defining element in the performance of the system under whatever conditions apply. Failure of the component – or failure of delivery of the component – results in lost productivity, increased costs or a catastrophic event such as a shutdown. Therefore selecting the right product is essential. It can make the difference between success and failure.

### *Honeywell – delivering excellence*

To deliver the right products for our customers' applications we listen to them to understand their needs. Using techniques such as "Voice of the Customer" and "Concept Engineering" we make sure that the products and solutions we deliver are the right ones. As part of Honeywell we can use local knowledge and understanding combined with global expertise and resources to achieve this. We can deploy many key technologies to bring innovative solutions to customers' problems.

Our products are manufactured to work well and to last. We use Six Sigma Plus productivity to ensure this is the case. We have award winning manufacturing facilities around the world and recognised world class business excellence in manufacturing and supply chain management to deliver on time, anywhere in the world.

Our e-business approach offers instant access to product information, technical support and application knowledge through our Internet site. Check out our powerful new interactive catalogue that can search and find the right products for customers' needs and deliver a drawing ready for incorporation in a CAD system direct to your desk.

And of course, we manage our whole business for the benefit of our customers, using an acknowledged world-class business excellence approach that incorporates Six Sigma principles.

## CONTENTS

<b>Pressure Sensors</b>	Page 4	<b>Thermostats - Precision</b>	Page 31
Absolute, differential, gauge, and vacuum gauge pressure sensors for media that are compatible with a silicon diaphragm. These sensors are ideal for low-cost commercial grade applications, such as printed circuit boards. Small and reliable, they offer excellent repeatability and high accuracy under varying environmental conditions.		Hermetic and non-hermetic thermostats in standard and custom packages for use in a wide variety of precision applications.	
<b>Mass Airflow Sensors</b>	Page 10	<b>Heaters</b>	Page 37
Amplified and unamplified microbridge mass airflow sensors provide a sensitive and fast response and high accuracy over a broad range of gas and air flows.		Wire-wound, chemically-etched, high temperature and transparent heaters in a variety of sizes and geometries.	
<b>Force Sensors</b>	Page 13	<b>Combi-sensor</b>	Page 39
Compact, extremely sensitive devices for precise, reliable performance in any application that requires precision force measurement.		Liquid pressure/temperature sensor that uses piezoresistive and thermistor sensing technology to measure water pressure and temperature.	
<b>Humidity Sensors</b>	Page 15	<b>Thermal Cutoffs</b>	Page 40
Relative humidity sensors with on-chip signal conditioning. Chemically resistant packaging to accommodate harsh environments. Sensor construction consists of a planar capacitor with a second polymer layer to protect against dirt, dust, oils and other hazards.		Dependable organic thermal cutoffs in temperatures ranging from 72 °C to 240 °C [162 °F to 464 °F]. They are available in various lead lengths and configurations.	
<b>Temperature Sensors - RTDs</b>	Page 16	<b>Position Sensors</b>	Page 42
Platinum and silicon-based thin film resistance temperature devices (RTDs) for applications that require small package size, accuracy and linear outputs.		Hall effect and magnetoresistive sensors for all applications that require accurate, reliable outputs.	
<b>Temperature Sensors - Thermistors</b>	Page 18	<b>Infrared Products</b>	Page 46
Precision Hi-Rel negative temperature coefficient (NTC) thermistors and positive temperature coefficient (PTC) thermistors for use in a broad variety of temperature measurement and control applications.		Optoelectronic standard infrared emitting diodes (IREDs), sensors and assemblies for object presence, limit and motion sensing, position encoding and movement encoding.	
<b>Temperature Sensors - Probes</b>	Page 24	<b>Current Sensors</b>	Page 52
A variety of customized probes for use in the automotive and other industries.		Adjustable linear null balance, digital and linear output current sensors for monitoring ac or dc current.	
<b>Thermostats - Commercial</b>	Page 27	<b>Liquid Level Sensors</b>	Page 56
Dependable bimetal thermostats include choice of automatic or manual reset, phenolic or ceramic housings, and a variety of mounting brackets and terminal options.		Sensitive sensors in a variety of housing types for detecting the presence or absence of a wide range of liquids.	
		<b>Basic Switches</b>	Page 57
		Standard, miniature and subminiature switches, available in a range of enclosures and with a variety of actuators. They are ideal for use alone or built into assemblies.	

**⚠ WARNING****MISUSE OF DOCUMENTATION**

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as product installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

**Failure to comply with these instructions could result in death or serious injury.**

**⚠ WARNING****PERSONAL INJURY**

DO NOT USE these products as safety or emergency stop devices, or in any other application where failure of the product could result in personal injury

**Failure to comply with these instructions could result in death or serious injury.**

# Pressure Sensors



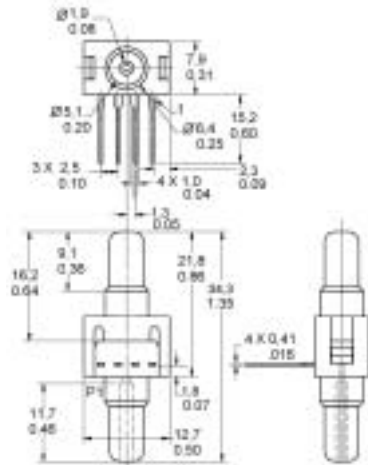
## 24PC/26PC Series

- Signal conditioning:** Unamplified noncompensated - (24PC Series) compensated - (26PC Series)
- Supply voltage:** 10 Vdc typ.  
12 Vdc max. (24PC Series)  
16 Vdc max. (26PC Series)
- Operating temperature:** -40 °C to 85 °C  
-40 °F to 185 °F
- Port style:** Straight or Flow Through
- Termination:** PCB; 1 x 4; 0.600 in (Type 6)  
PCB; 2 x 2; (Type 2)  
1 x 4 with connector (Type 5)

### OPTIONS

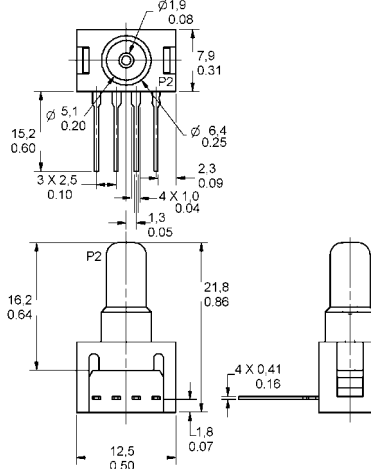
#### Differential

MOUNTING DIMENSIONS (for reference only) mm/in  
DIFFERENTIAL SENSOR  
1 X 4 Termination (Style 6) Port Style A, Straight (Only)



#### Gauge

MOUNTING DIMENSIONS (for reference only) mm/in  
GAUGE SENSOR  
1 x 4 Termination (Style 6) Port Style A, Straight  
Pin 1 is notched, Pin 2 is next to Pin 1, etc.



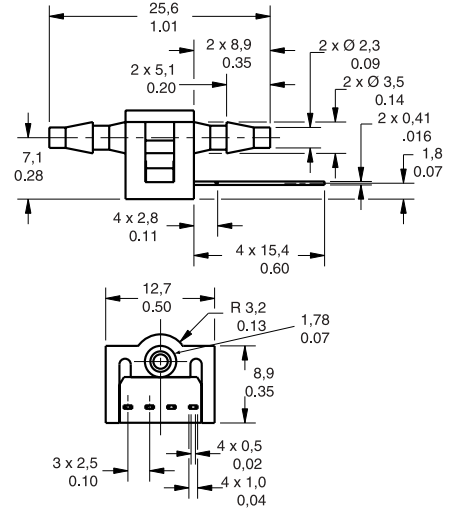
#### 24PC Series

MEASUREMENT TYPE	PRESSURE RANGE	REFERENCE
Gauge/Vacuum Gauge	1.0 psi	24PCFA6G
Differential/Vacuum Gauge	5.0 psi	24PCBFA6D
Gauge/Vacuum Gauge	5.0 psi	24PCBFA6G
Differential/Vacuum Gauge	15.0 psi	24PCCFA6D
Gauge/Vacuum Gauge	15.0 psi	24PCCFA6G
Differential/Vacuum Gauge	30.0 psi	24PCDFA6D
Gauge/Vacuum Gauge	30.0 psi	24PCDFA6G
Differential Gauge	0.5 psi	24PCEFA6D
Gauge	0.5 psi	24PCEFA6G
Differential Gauge	100 psi	24PCFFA6D
Gauge	100 psi	24PCFFA6G

#### 26PC Series

MEASUREMENT TYPE	PRESSURE RANGE	REFERENCE
Differential/Vacuum Gauge	1.0 psi	26PCFA6D
Gauge/Vacuum Gauge	1.0 psi	26PCFA6G
Differential Gauge	5.0 psi	26PCBFA6D
Gauge	5.0 psi	26PCBFA6G
Differential/Vacuum Gauge	15.0 psi	26PCCFA6D
Gauge/Vacuum Gauge	15.0 psi	26PCCFA6G
Differential Gauge	30.0 psi	26PCDFA6D
Gauge	30.0 psi	26PCDFA6G
Gauge	100 psi	26PCFFA6G
Differential	250 psi	26PCGFA6D

#### Flow Through Type 6



#### 24PC Series

MEASUREMENT TYPE	PRESSURE RANGE	REFERENCE
Flow Through/Vacuum Gauge	15.0 psi	24PCCFG6G
Flow Through/Vacuum Gauge	30.0 psi	24PCDFG6G

#### 26PC Series

MEASUREMENT TYPE	PRESSURE RANGE	REFERENCE
Flow Through/Vacuum Gauge	1.0 psi	26PCAFG6G
Flow Through	15.0 psi	26PCCFG6G
Gauge/Vacuum Gauge	100 psi	26PCFFG6G

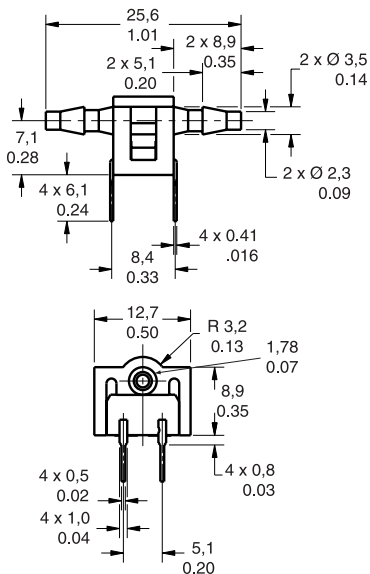
Honeywell pressure sensors are small, low cost and reliable. They feature excellent repeatability, high accuracy, and reliability under varying environmental conditions. In addition, they feature highly consistent operating characteristics from one sensor to the next and interchangeability without recalibration.

We offer three pressure sensor measurement types—absolute, differential and gauge—including vacuum gauge and bidirectional types. A wide variety of pressure ranges, along with both amplified and unamplified versions, are available.

Honeywell pressure sensors are best used in applications which require precision pressure measurement.

## 24PC/26PC Series (Continued)

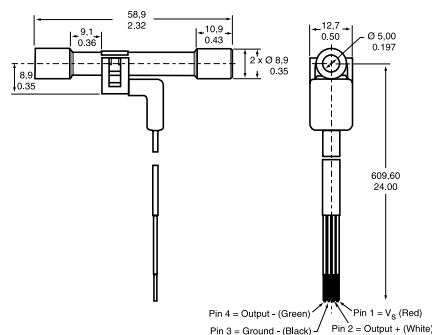
### Type 2



### 26PC Series

MEASUREMENT TYPE	PRESSURE RANGE	REFERENCE
Flow Through	30.0 psi	26PCDFG2G

### Type 5



### 26PC Series

MEASUREMENT TYPE	PRESSURE RANGE	REFERENCE
Flow Through/Vacuum Gauge	100 psi	26PCFFU5G

## 24PC/26PC SMT (Surface Mount Technology)

**Signal conditioning:** Unamplified noncompensated - (24PC SMT Series) compensated - (26 PC SMT Series)

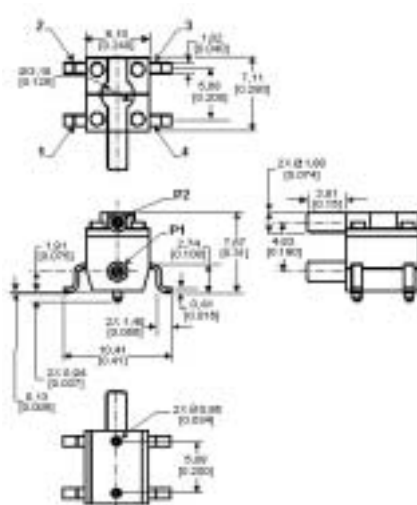
**Supply voltage:** 10 Vdc typ. 12 Vdc max. (24PC SMT Series) 16 Vdc max. (26PC SMT Series)

**Operating temperature:** -40 °C to 85 °C -40 °F to 185 °F

**Port style:** Straight, 1,88 mm Ø (0.74 in)

**Termination:** SMT solder

**Measurement type:** Gauge, Vacuum Gauge, Differential, Wet/Wet Differential



### OPTIONS

#### 24PC SMT Series

PRESSURE RANGE	REFERENCE
0 psi to 1.0 psi	24PC01SMT
0 psi to 5.0 psi	24PC05SMT
0 psi to 15.0 psi	24PC15SMT

#### 26PC SMT Series

PRESSURE RANGE	REFERENCE
0 psi to 1.0 psi	26PC01SMT
0 psi to 5.0 psi	26PC05SMT
0 psi to 15.0 psi	26PC15SMT

## CPC/CPX Series Low Pressure

**Signal conditioning:** Unamplified compensated - (CPC Series) noncompensated - (CPX Series)

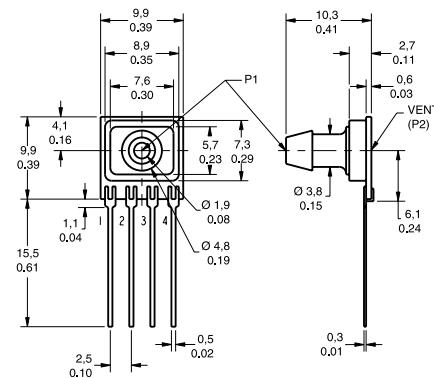
**Supply voltage:** 12 Vdc typ. 16 Vdc max.

**Operating temperature:** -25 °C to 85 °C -13 °F to 185 °F

**Port style:** Barbed

**Termination:** PCB

**Accuracy grade:** Commercial (1.0 %)



### OPTIONS

#### CPC Series

MEASUREMENT TYPE	PRESSURE RANGE	REFERENCE
Differential	(1.0 psi) 4.0 in H <sub>2</sub> O	CPCL04DFC
Gauge	(1.0 psi) 4.0 in H <sub>2</sub> O	CPCL04GFC
Differential	(1.0 psi) 10.0 in H <sub>2</sub> O	CPCL10DFC

#### CPX Series

MEASUREMENT TYPE	PRESSURE RANGE	REFERENCE
Differential	4.0 in H <sub>2</sub> O	CPXL04DF
Differential	10.0 in H <sub>2</sub> O	CPCL10DF

**DC Series, Low Pressure**

**Signal conditioning:** Amplified compensated unregulated (DC001NDC4) regulated (DC005NDR4)

**Supply voltage:** 5 Vdc typ., 5.1 Vdc max. (DC001NDC4) 7 Vdc to 35 Vdc (DC005NDR4)

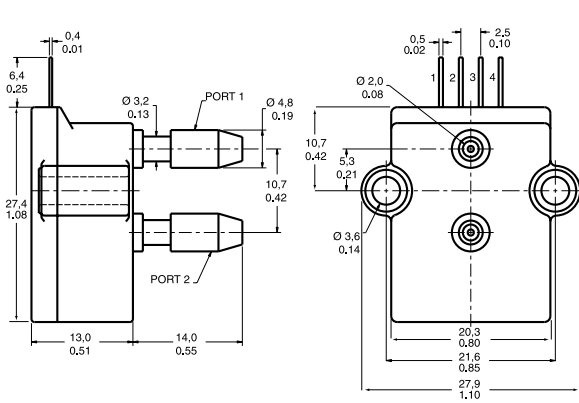
**Operating temperature:** -25 °C to 85 °C -13 °F to 185 °F

**Port style:** Barbed

**Termination:** PCB

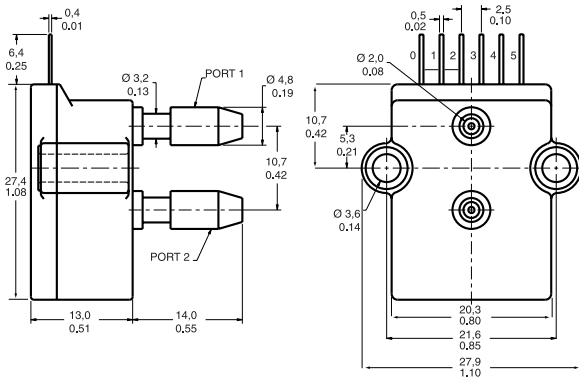
**OPTIONS**

**DC001NDC4**



MEASUREMENT TYPE	PRESSURE RANGE	REFERENCE
Differential	1.0 in H <sub>2</sub> O	DC001NDC4

**DC005NDR4**



MEASUREMENT TYPE	PRESSURE RANGE	REFERENCE
Differential	5.0 in H <sub>2</sub> O	DC005NDR4

**DCXL/DUXL Series, Low Pressure**

**Signal conditioning:** Unamplified compensated (DCXL) noncompensated (DUXL)

**Supply voltage:** 12 Vdc typ., 16 Vdc max. (DCXL) 4.5 Vdc min., 8 Vdc max. (DUXL)

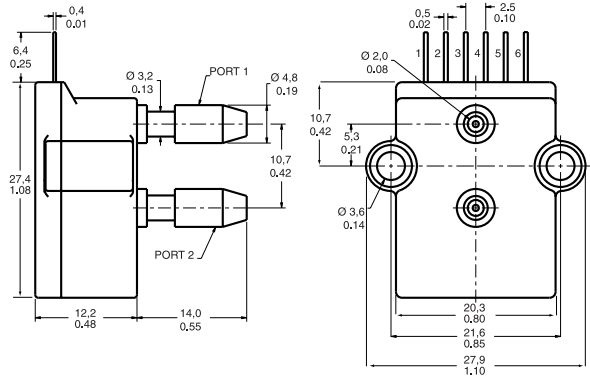
**Operating temperature:** -25 °C to 85 °C -13 °F to 185 °F

**Port style:** Barbed

**Termination:** PCB

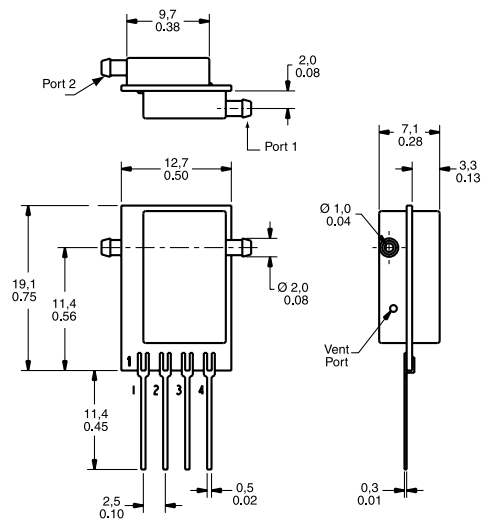
**OPTIONS**

**DCXL Series**



MEASUREMENT TYPE	PRESSURE RANGE	REFERENCE
Differential	1.0 in H <sub>2</sub> O	DCXL01DN
Differential	10.0 in H <sub>2</sub> O	DCXL10DN

**DUXL Series**

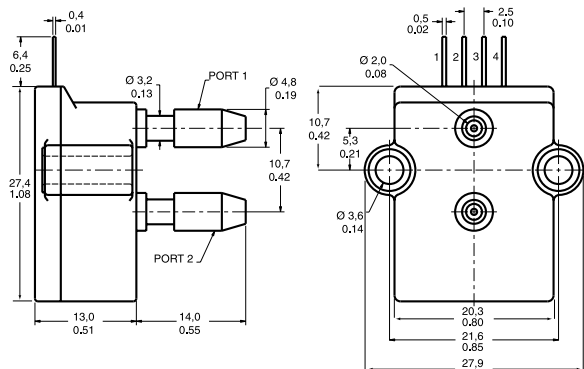


MEASUREMENT TYPE	PRESSURE RANGE	REFERENCE
Differential	1.0 in H <sub>2</sub> O	DUXL01D
Differential	10.0 in H <sub>2</sub> O	DUXL10D

## XCA Series

Signal conditioning: Amplified compensated  
 Supply voltage: 5 Vdc typ., 16 Vdc max.  
 Operating temperature: -25 °C to 85 °C  
 -13 °F to 185 °F

Port style: Barbed  
 Termination: PCB

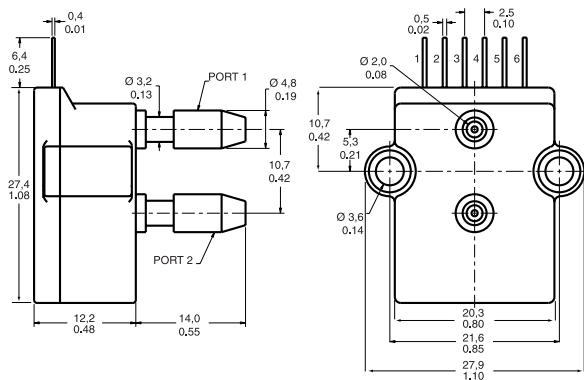


MEASUREMENT TYPE	PRESSURE RANGE	REFERENCE
Absolute	15.0 psia	XCA415AN

## XCX Series

Signal conditioning: Unamplified compensated  
 Supply voltage: 12 Vdc typ., 16 Vdc max.  
 Operating temperature: -25 °C to 85 °C  
 -13 °F to 185 °F

Port style: Barbed  
 Termination: PCB  
 Accuracy grade: Commercial (1.0 %)

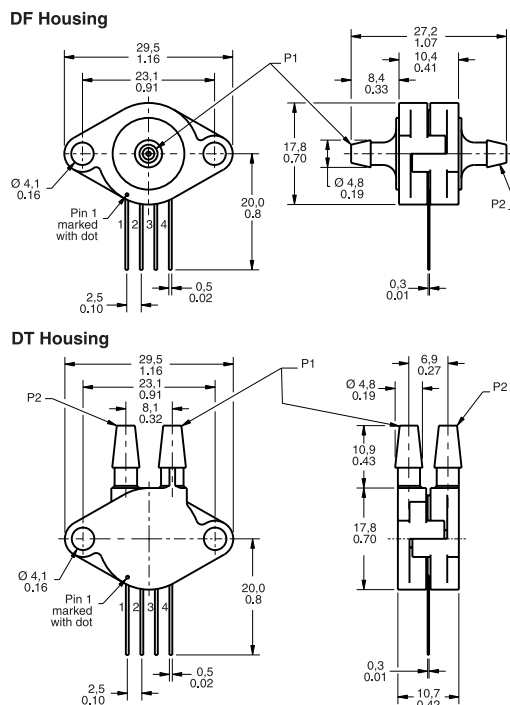


MEASUREMENT TYPE	PRESSURE RANGE	ACCURACY GRADE	REFERENCE
Differential	1.0 psi		XCX01DNC
Differential	1.0 psi	High (0.50 %)	XCX01DNH
Differential	15.0 psi		XCX15DNC

## XPC Series

Signal conditioning: Unamplified compensated  
 Supply voltage: 12 Vdc typ., 16 Vdc max.  
 Operating temperature: -25 °C to 85 °C  
 -13 °F to 185 °F

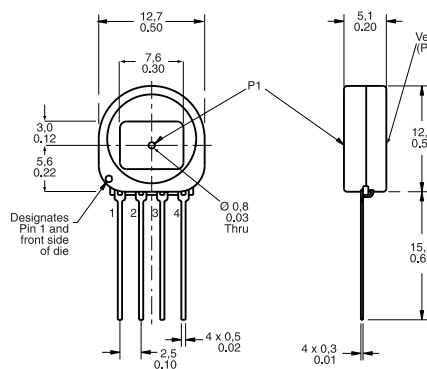
Port style: Barbed  
 Termination: PCB  
 Accuracy grade: Commercial (1.0 %)



MEASUREMENT TYPE	PRESSURE RANGE	PORT STYLE	REFERENCE
Differential	1.0 psi	Axial	XPC01DFC
Differential	15.0 psi	Radial	XPC15DTC

## XSX Series, Low pressure

Signal conditioning: Unamplified uncompensated  
 Supply voltage: 12 Vdc typ., 16 Vdc max.  
 Operating temperature: -25 °C to 85 °C [-13 °F to 185 °F]  
 Port style: Button  
 Termination: PCB  
 Accuracy grade: Commercial (1.0 %)

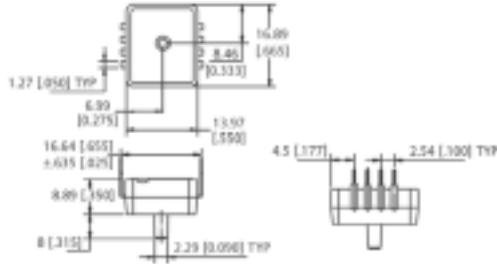


MEASUREMENT TYPE	PRESSURE RANGE	REFERENCE
Gauge	4.0 in H <sub>2</sub> O	XSXL04GF

## ASDX Series

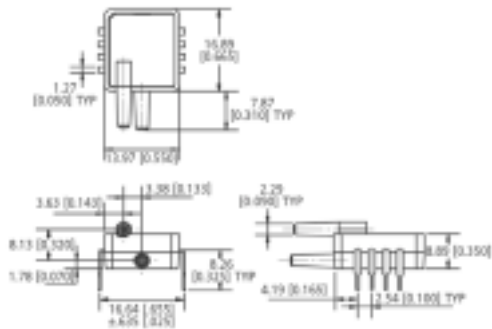
Signal conditioning: Amplified compensated  
 Supply voltage: 4.75 Vdc to 5.25 Vdc  
 Operating temperature: -20 °C to 105 °C [-4 °F to 221 °F]  
 Port style: Taper 2,29 mm [0.090 in]  
 Termination: PCB  
 Accuracy grade: ±2.0 %

### A2 Package



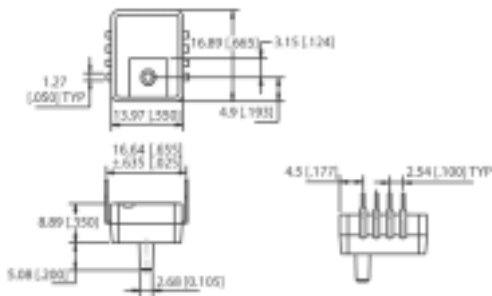
MEASUREMENT TYPE	PRESSURE RANGE	REFERENCE
Absolute	0 psi to 15 psi	ASDX015A24R
Absolute	0 psi to 30 psi	ASDX030A24R
Absolute	0 psi to 100 psi	ASDX100A24R

### D4 Package



MEASUREMENT TYPE	PRESSURE RANGE	REFERENCE
Differential/gauge	0 psi to 1 psi	ASDX001D44R
Differential/gauge	0 psi to 5 psi	ASDX005D44R
Differential/gauge	0 psi to 15 psi	ASDX015D44R
Differential/gauge	0 psi to 30 psi	ASDX030D44R
Differential/gauge	0 psi to 100 psi	ASDX100D44R

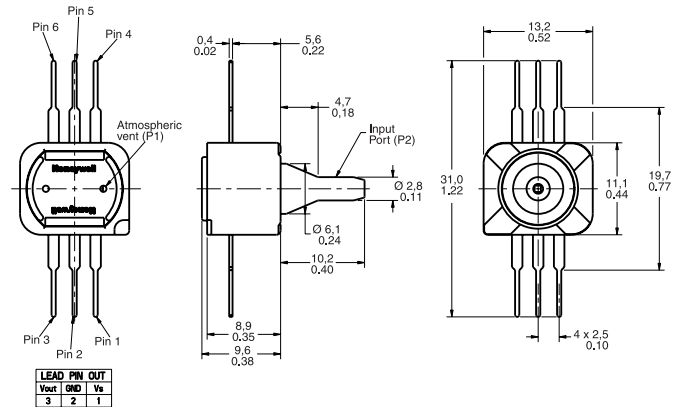
### G2 Package



MEASUREMENT TYPE	PRESSURE RANGE	REFERENCE
Gauge	0 psi to 1 psi	ASDX001G24R
Gauge	0 psi to 5 psi	ASDX005G24R
Gauge	0 psi to 15 psi	ASDX015G24R
Gauge	0 psi to 30 psi	ASDX030G24R
Gauge	0 psi to 100 psi	ASDX100G24R

## 40PC Series, Miniature Signal Conditioned

Signal conditioning: Amplified  
 Supply voltage: 5 Vdc ± 0.25 Vdc  
 Operating temperature: -45 °C to 125 °C  
 -49 °F to 257 °F  
 Port style: Straight for O-ring interface  
 Termination: PCB, unformed



MEASUREMENT TYPE	PRESSURE RANGE	REFERENCE
Bi-Directional Gauge/Vacuum Gauge	± 50 MM HG	40PC001B1A
Gauge	0 to 300 mm HG	40PC006G1A
Vacuum	0 to -15.0 psi	40PC015V1A
Gauge	15.0 psi	40PC015G1A
Gauge	30.0 psi	40PC030G1A
Gauge	100 psi	40PC100G1A
Gauge	150 psi	40PC150G1A
Gauge	250 psi	40PC250G1A
Gauge	500 psi	40PC500G1A

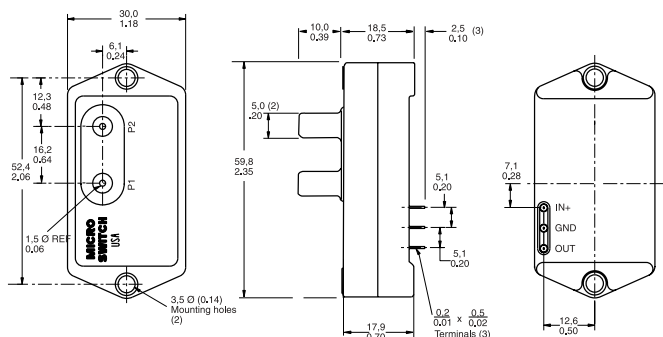


## 140PC Series

Signal conditioning:  
Supply voltage:  
Operating temperature:

Amplified  
8 Vdc typ., 16 Vdc max.  
-40 °C to 85 °C  
-40 °F to 185 °F  
Straight  
PCB

Port style:  
Termination:



**Note:** Dimensions shown apply to Differential and Absolute versions. Gauge units are identical, except the P1 port is absent.

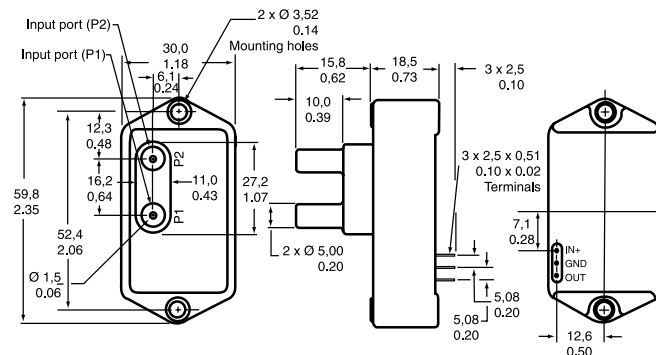
MEASUREMENT TYPE	PRESSURE RANGE	TERMINATION	REFERENCE
Gauge/Vacuum Gauge	-15 psi		141PC15G
Differential/Vacuum Gauge	1.0 psi		142PC01D
Gauge	1.0 psi		142PC01G
Gauge	2.0 psi		142PC02G
Differential/Vacuum Gauge	5.0 psi		142PC05D
Differential/Vacuum Gauge	-39 in H <sub>2</sub> O to 55 in H <sub>2</sub> O		142PC05D97
Gauge	5.0 psi		142PC05G
Absolute	15 psia		142PC15A
Absolute	15 psia	Leadwire	142PC15AW95
Gauge	15 psi		142PC15G
Differential/Vacuum Gauge	± 2.5 psi		143PC03D
Differential/Vacuum Gauge	± 5.0 psi	Leadwire	143PC05DW

## 160PC Series, Low Pressure

Signal conditioning:  
Supply voltage:  
Operating temperature:

Amplified  
8 Vdc typ., 16 Vdc max.  
-40 °C to 85 °C  
-40 °F to 185 °F  
Straight  
PCB

Port style:  
Termination:



**Note:** Dimensions shown apply to Differential and Absolute versions. Gauge units are identical, except the P1 port is absent.

MEASUREMENT TYPE	PRESSURE RANGE	SUPPLY VOLTAGE	REFERENCE
Differential/Vacuum Gauge	0 to 27.68 in H <sub>2</sub> O		162PC01D
Differential/Vacuum Gauge	± 5.0 in H <sub>2</sub> O		163PC01D36
Differential/Vacuum Gauge	-20 cm to 120 cm H <sub>2</sub> O		163PC01D48
Differential/Vacuum Gauge	-20 cm to 120 cm H <sub>2</sub> O	5 Vdc	163PC01D61
Differential/Vacuum Gauge	± 2.5 in H <sub>2</sub> O		163PC01D75
Differential/Vacuum Gauge	10.0 in H <sub>2</sub> O		164PC01D37
Differential/Vacuum Gauge	5.0 in H <sub>2</sub> O		164PC01D76

# Mass Airflow Sensors



Mass Airflow sensors contain a thin-film, thermally isolated bridge structure containing heater and temperature sensing elements. The bridge structure provides a sensitive and fast response to the flow of air or other gas over the chip.

State-of-the-art chip design and manufacturing techniques allow the microbridge to be remarkably sensitive, fast, small. Used wherever airflow needs to be measured.

**Supply voltage:**

8 Vdc to 15 Vdc

**Operating temperature:**

-25 °C to 85 °C (-13 °F to 185 °F)

**Media compatibility:**

Dry gas only

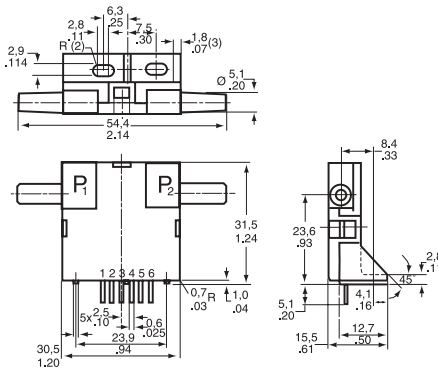
## AWM2000 Series

The AWM2000 Series microbridge mass airflow sensor is a passive device comprised of two Wheatstone bridges and has bidirectional sensing capability. The heater control circuit is required for operation per specifications. The sensing bridge supply circuit is also required for operation per specifications. These two circuits are not on board the package and must be supplied in the application. The differential amplifier is a useful interface for the sensing bridge. It can be used to introduce gain and to voltage offsets to the sensor output.

**Signal conditioning:** Unamplified (-44,5 mVdc to 44,5 mVdc)

**Port style:** Straight

**Sensor resistance:** 5 kOhm



FLOW/PRESSURE RANGE	REFERENCE
± 200 sccm	AWM2100V
± 4.0 in H <sub>2</sub> O (10 mBar)	AWM2200V
± 1000 sccm (1 SLPM)	AWM2300V

## AWM3000 Series

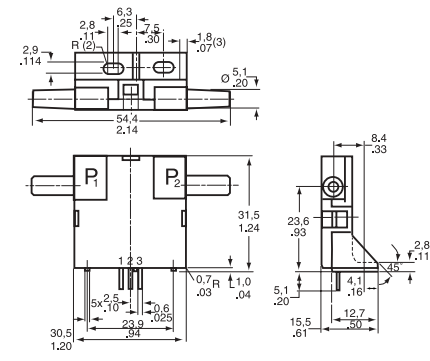
Like the AWM2000 Series, the dual Wheatstone bridges control airflow measurement. The AWM3000 Series is amplified; therefore, it can be used to increase the gain and to introduce voltage offsets to the sensor output. The heater control circuit and the sensing bridge supply circuit are on board the package.

**Signal conditioning:**

Amplified (1 Vdc to 5 Vdc)

**Port style:**

Straight



FLOW/PRESSURE RANGE	REFERENCE
± 200 sccm	AWM3100V
+ 2.0 in H <sub>2</sub> O (5 mBar)	AWM3200V
± 1000 sccm (1 SLPM)	AWM3300V

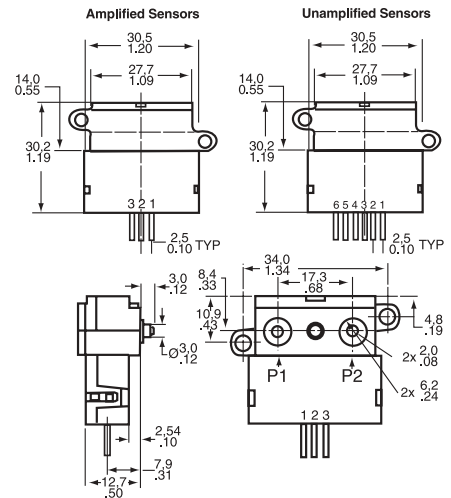
## AWM4000 Series

The microbridge mass airflow sensor operates on the theory of heat transfer. Mass airflow is directed across the surface of the sensing elements. Output voltage varies in proportion to the mass air or other gas flow through the inlet and outlet ports of the package. The specially designed housing precisely directs and controls the airflow across the microstructure sensing element. Mechanical design of the package allows it to be easily mounted to printed circuit boards.

The microbridge mass airflow sensor has a unique silicon chip based on advanced microstructure technology. It consists of a thin-film, thermally isolated bridge structure containing heater and temperature sensing elements. The bridge structure provides a sensitive and fast response to the flow of air or other gas over the chip. Dual sensing elements positioned on both sides of a central heating element indicate flow direction as well as flow rate. Laser trimmed thick film and thin film resistors provide consistent interchangeability from one device to the next.

**Port style:**

Manifold



SIGNAL CONDITIONING	FLOW/PRESSURE RANGE	REFERENCE
Unamplified (8.5 mV)	± 25 sccm	AWM42150VH
Unamplified (54.7 mV)	± 1000 sccm (1 SLPM)	AWM42300V
Amplified	± 1000 sccm (1 SLPM)	AWM43300V
(1 Vdc to 5 Vdc)		
Amplified	+ 6 SLPM	AWM43600V
(1 Vdc to 5 Vdc)		



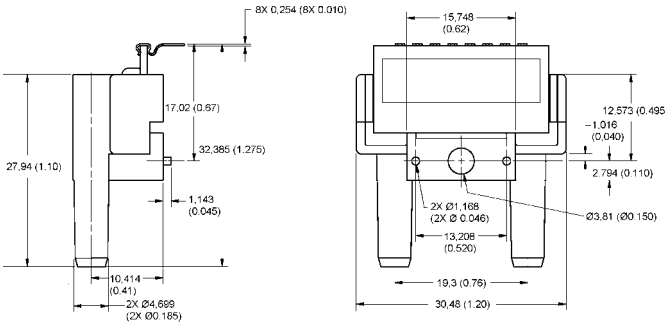
## AWM90000 Series

The AWM90000 Series microbridge mass airflow sensors are available in two versions, mass flow and differential pressure. The AWM92100V has a flow range of  $\pm 200$  sccm with a pressure drop of only 0.49 mBar, typically. The AWM92200V is a differential pressure version that has a range of  $\pm 2$  in  $H_2O$ .

The AWM90000 Series has a 1 ms response time, operates with a supply voltage from 8.0 Vdc to 15.0 Vdc, while consuming only 50 mW of power. The compact plastic package will withstand a maximum overpressure of 25 psi without compromising performance.

**Signal Conditioning:  
Port Style:**

Unamplified  
Straight



FLOW RANGE (FULL SCALE)	PRESSURE RANGE	REFERENCE
$\pm 200$ sccm	—	AWM92100V
—	$\pm 2.0 H_2O$ (5 mBar)	AWM92200V

### NOTICE

#### LAMINAR FLOW

Due to the fast response time of the sensor, these specifications were generated using laminar flow. Airflow instability or “turbulence” present in the airstream will result in an increase in measurement uncertainty.

The turbulent flow problem can be corrected by either straightening the airflow using flow laminarizing or by slowing the response of the sensor using a simple RC time constant on the output of the sensor. This, of course, slows down the sensor response time. The values needed depend on the amount of turbulence present in the application.

Several techniques for laminarizing the flow include adding hex shaped honeycombs, foam, screen materials or adding constrictors (frits) to the flow stream. There are various commercial laminar flow elements that can be purchased. Unfortunately the greater the efficiency of the laminarizer, the greater the increase in pressure drop in order to establish a given flow rate. Plastic honeycomb material probably gives the most improvement for the least pressure drop. In any test fixture, the avoidance of sharp radii is an absolute requirement.

### CAUTION

#### PRODUCT DAMAGE

AWM Series Microbridge Mass Airflow Sensors are not designed to sense liquid flow and will be damaged by liquid flow through the sensor.

**Failure to comply with these instructions could result in product**

# Force Sensors

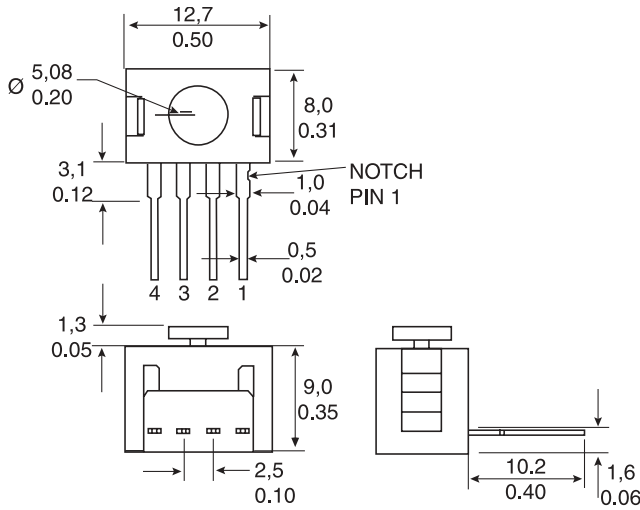
Force sensors operate on the principle that the resistance of silicon implanted piezoresistors will increase when the resistors flex under any applied force. The sensor concentrates force from the application, through the stainless steel plunger, directly to the silicon sensing element. The amount of resistance changes in proportion to the amount of force being applied. This change in circuit resistance results in a corresponding mV output level.



## FSG Series

### Plunger actuator - Force range 1500 g

Supply voltage: 360 mV span @ 10 Vdc  
 Operating temperature: -40 °C to 85 °C  
 -40 °F to 185 °F  
 Sensitivity: 0.20 mV/g min., 0.24 mV/g typ., 0.28 mV/g max.  
 Overforce: 5500 g

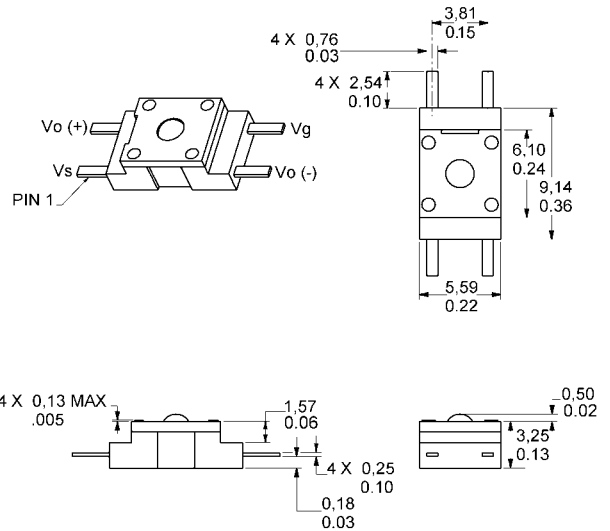


Non-compensated REFERENCE FSG15N1A

## FSL Series

### Ball bearing actuator - Force range 500 g

Supply voltage: 60 mV span @ 5 Vdc  
 Operating temperature: -40 °C to 85 °C  
 -40 °F to 185 °F  
 Sensitivity: 0.10 mV/g min., 0.12 mV/g typ., 0.14 mV/g max.  
 Overforce: 4500 g



Non-compensated REFERENCE FSL05N2C

## Model 1865 Force/Pressure Transducer

The Model 1865 is a high-performance transducer specifically designed to address the needs of medical and specialized OEM applications. Offering laser-trimmed compensation, the Model 1865 may be specified to operate with either a constant current or voltage supply.

The Model 1865 employs a solid state piezoresistive pressure transducer mounted in a plastic package. For applications where force is applied by a flexible membrane to the sensor, such as found in infusion pumps, the Model 1865's precision height silicone diaphragm provides long life and is a reliable replacement for older force or load cell transducers. Utilizing a silicon rubber diaphragm, the 1865 is compatible with some liquid media applications. The Model 1865 may be operated in either current or voltage excitation, and its output may be amplified or signal conditioned, as required. The semiconductor-based sensor offers high resolution using its Wheatstone Bridge strain gauge design. The height of the unit's patented, poured-in-place silicon rubber diaphragm is controlled to ensure sensitivity to low pressure. This diaphragm is bonded to a plastic header and transmits force applied through a special silicone gel to the diaphragm of a silicon piezoresistive die. The back of the die is exposed to atmospheric pressure, which results in a gauge pressure output.

**Pressure over-range protection:** 3X span or 60 psi, whichever is least  
**Media/materials compatibility**

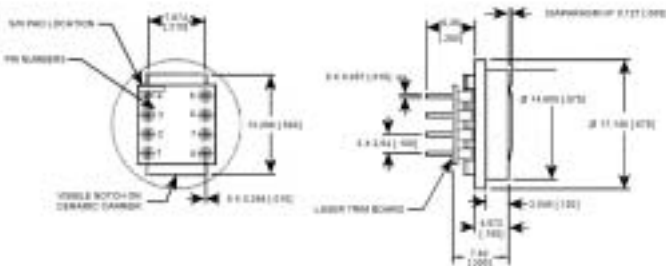
**Top side:** Room atmosphere, directly applied force, and liquids compatible with dimethyl silicon, polyetherimide (Ultem)

**Bottom side:** Non-corrosive dry gasses and fluids compatible with silicon, pyrex, RTV silicone, and ceramic

**Sensor:** Gauge pressure

**Diaphragm:** Dimethyl silicone

**Compensation:** Laser trimmed normalised output



### OPTIONS

#### Excitation 1.5 mA

PRESSURE	REFERENCE
0 psi to 5 psi	1865-01G-L-N
0 psi to 10 psi	1865-02G-L-N
0 psi to 15 psi	1865-03G-L-N
0 psi to 25 psi	1865-04G-L-N
0 psi to 30 psi	1865-05G-L-N

#### Excitation 10 Vdc

PRESSURE	REFERENCE
0 psi to 5 psi	1865-01G-K-N
0 psi to 10 psi	1865-02G-K-N
0 psi to 15 psi	1865-03G-K-N
0 psi to 25 psi	1865-04G-K-N
0 psi to 30 psi	1865-05G-K-N

# Humidity Sensors



Relative Humidity/Temperature and Relative Humidity sensors are configured with integrated circuitry to provide on-chip signal conditioning. These sensors contain a capacitive sensing die set in thermoset polymers that interacts with platinum electrodes. The laser trimmed sensors have an interchangeability of + 5%RH, with stable, low drift performance.

Absorption based humidity sensors provide both temperature and %RH (Relative Humidity) outputs. On-chip signal processing ensures linear voltage output versus %RH. Sensor laser trimming offers + 5%RH accuracy, and achieves 2%RH accuracy with calibration. Packages are chemically resistant and operate in ranges of -40 °C to 85 °C (-40 °F to 185 °F) to accommodate harsh environments.

**Supply voltage:** 4.0 Vdc to 5.8 Vdc  
**Operating humidity range:** 0 to 100% RH, non-condensing  
**Operating temperature range:** -40 °C to 85 °C (-40 °F to 185 °F)

## HIH Series

### OPTIONS

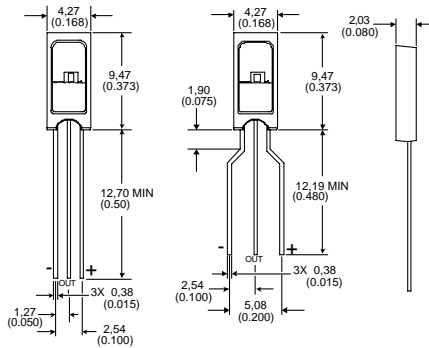
#### HIH-3610 Monolithic integrated circuit

The HIH-3610 humidity sensor is designed specifically for high volume OEM (Original Equipment Manufacturer) users. Direct input to a controller or other device is made possible by this sensor's linear voltage output. With a typical current draw of only 200 µA, the HIH-3610 is ideally suited for low drain, battery powered systems. Tight sensor interchangeability reduces or eliminates OEM production calibration costs. Individual sensor calibration data is available.

The HIH-3610 delivers instrumentation quality RH sensing performance in a low cost, solderable SIP (Single In-line Package). Available in two lead spacing configurations, the RH sensor is a laser trimmed thermoset polymer capacitive sensing element with on-chip integrated signal conditioning.

**Package style:**

Solderable SIP



TERMINATION	NIST CERTIFICATION	REFERENCE
2.54 mm (0.100 in) Lead Pitch	None	HIH-3610-001
1.27 mm (0.050 in) Lead Pitch	None	HIH-3610-002
2.54 mm (0.100 in) Lead Pitch	NIST Calibration sensor-specific printout	HIH-3610-003
1.27 mm (0.050 in) Lead Pitch	NIST Calibration sensor-specific printout	HIH-3610-004

### CAUTION PRODUCT DAMAGE

The inherent design of this component causes it to be sensitive to the electrostatic discharge (ESD). To prevent ESD-induced damage and/or degradation, take normal ESD precautions when handling this product.

**Failure to comply with these instructions could result in product damage**

#### HIH-3602 Monolithic integrated circuit

HIH-3602-A and HIH-3602-C Relative Humidity (RH) sensors combine both relative humidity and temperature sensing in a TO-5 housing with a hydrophobic sintered stainless steel filter.

The temperature sensor is thermally connected with the RH sensor making the HIH-3602-A/C ideal for measuring dew point and other absolute moisture terms.

**Package style:**

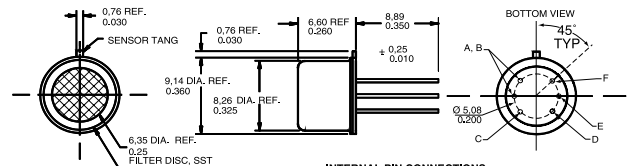
TO-5 can

**Termination:**

0.46 mm (0.18 in)

**NIST Certification:**

NIST Calibration sensor-specific printout



INTERNAL PIN CONNECTIONS	
0.46 mm [0.018 in] dia. lead gold plated (6 places)	
A, B	(HIH-3602-A) Thermistor for temperature compensation
A, B	(HIH-3602-C) RTD for temperature compensation
C	+VDC supply
D	(-) Power or ground
E	VDC out
F	Case ground

TEMPERATURE SENSOR	REFERENCE
100 kOhm ± 5 % @ 25 °C, NTC 0-50 C	HIH-3602-A
1000 Ohm ± 0.2 % @ 0 °C, platinum RTD	HIH-3602-C

#### HIH-3602-L Integrated circuit

The HIH-3602-L Relative Humidity (RH) sensor delivers instrumentation quality RH sensing performance in a rugged, low cost, slotted TO-39 housing.

On-board signal conditioning reduces product development times while a typical current draw of only 200 µA makes the HIH-3602-L perfect for battery powered systems. This sensor should be shielded from bright light.

**Package style:**

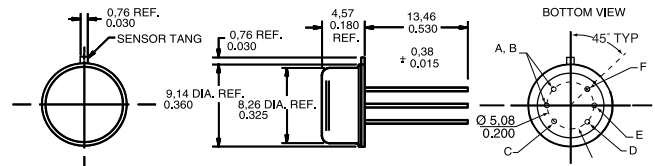
TO-39 can

**Termination:**

0.46 mm (0.18 in)

**NIST Certification:**

None



INTERNAL PIN CONNECTIONS	
0.46mm [0.018 in] dia. lead gold plated (6 places)	
A, B	No connection
C	+VDC supply
D	(-) Power or ground
E	VDC out
F	Case ground

REFERENCE
HIH-3602-L

# Temperature Sensors - RTDs



Honeywell's thin film RTD (Resistance Temperature Detector) temperature sensors feature two distinct series. These sensors are laser trimmed for accuracy and interchangeability. Linear outputs are stable and fast. The TD Series Temperature Sensors are silicon-based RTDs. They offer 2000 Ohm nominal resistance at 20 °C. Temperature range of -40 °C to 150 °C. The HEL Series Temperature Sensors are platinum RTDs, offering 100 Ohm or 1000 Ohm versions and temperature ranges of -200 °C to 540 °C.

## HEL-700 Series 100/1000 Ohm platinum RTD

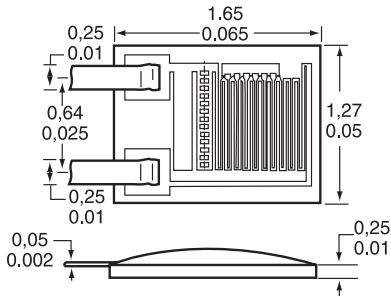
Supply voltage: 4 Vdc to 9 Vdc  
 Base resistance: 1000 ± 2 Ohm (± 0.2 %) @ 0 °C (Standard)  
 and interchangeability: 1000 ± 1 Ohm (± 0.1 %) @ 0 °C (Optional)

### OPTIONS

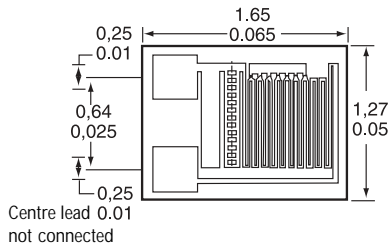
#### HEL-700

Temperature range: -200 °C to 540 °C  
 -300 °F to 1000 °F  
 Packaging style/Termination: Radial chip/ribbon leads (Type A)  
 Radial chip/no leads (Type B)  
 SMT (Axial) flip chip/no leads (Type C)

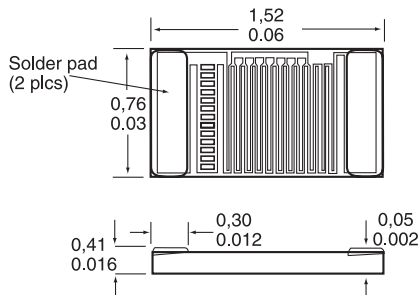
#### Type A



#### Type B



#### Type C



### 100 Ohm (0.00385 Ohm/Ohm/°C DIN standard)

PACKAGING STYLE	BASE RESISTANCE AND INTERCHANGEABILITY	REFERENCE
Type A	Standard	HEL-700-T-0-A
Type A	Optional	HEL-700-T-1-A
Type B	Standard	HEL-700-T-0-B
Type B	Optional	HEL-700-T-1-B

### 1000 Ohm (0.00375 Ohm/Ohm/°C)

PACKAGING STYLE	BASE RESISTANCE AND INTERCHANGEABILITY	REFERENCE
Type A	Standard	HEL-700-U-0-A
Type A	Optional	HEL-700-U-1-A
Type B	Standard	HEL-700-U-0-B
Type B	Optional	HEL-700-U-1-B
Type C	Standard	HEL-700-U-0-C
Type C	Optional	HEL-700-U-1-C

**CAUTION**  
**PRODUCT DAMAGE**  
 The inherent design of this component causes it to be sensitive to the electrostatic discharge (ESD). To prevent ESD-induced damage and/or degradation, take normal ESD precautions when handling this product.  
**Failure to comply with these instructions could result in product damage**

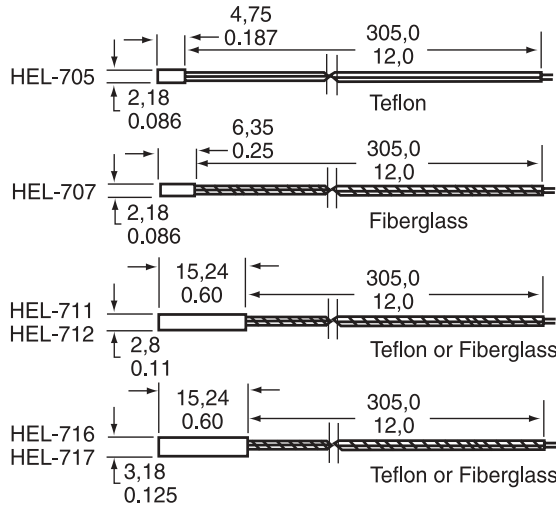


## HEL-700 Series 100/1000 Ohm platinum RTD (Continued)

### HEL-705/707/711/712/716/717

Temperature range:	HEL-705/711/716	-200 °C to 260 °C -320 °F to 500 °F
	HEL-707/712/717	-75 °C to 540 °C -100 °F to 1000 °F

Packaging style:	Ceramic case
Termination:	12 in leadwires
NIST calibration:	None



### 100 Ohm (0.00385 Ohm/Ohm/°C DIN standard)

BASE RESISTANCE AND INTERCHANGEABILITY	REFERENCE
Standard	HEL-705-T-0-12-00
Optional	HEL-705-T-1-12-00
Standard	HEL-707-T-0-12-00
Optional	HEL-707-T-1-12-00
Standard	HEL-711-T-0-12-00
Optional	HEL-711-T-1-12-00
Standard	HEL-712-T-0-12-00
Optional	HEL-712-T-1-12-00
Standard	HEL-716-T-0-12-00
Optional	HEL-716-T-1-12-00
Standard	HEL-717-T-0-12-00
Optional	HEL-717-T-1-12-00

### 1000 Ohm (0.00375 Ohm/Ohm/°C)

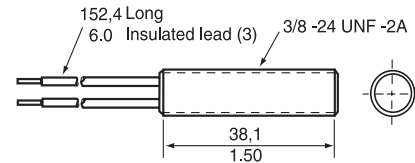
BASE RESISTANCE AND INTERCHANGEABILITY	NIST CALIBRATION	REFERENCE
Standard		HEL-705-U-0-12-00
Optional		HEL-705-U-1-12-00
Standard		HEL-707-U-0-12-00
Optional		HEL-707-U-1-12-00
Standard		HEL-711-U-0-12-00
Optional		HEL-711-U-1-12-00
Standard		HEL-712-U-0-12-00
Optional		HEL-712-U-1-12-00
Standard		HEL-716-U-0-12-00
Optional		HEL-716-U-1-12-00
Optional	NIST @ 0 and 100 °C	HEL-716-U-1-12-C2
Standard		HEL-717-U-0-12-00
Optional		HEL-717-U-1-12-00

## TD Series 2000 Ohm silicon RTD

Supply voltage:	10 Vdc
Temperature range:	-40 °C to 150 °C -40 °F to 302 °F

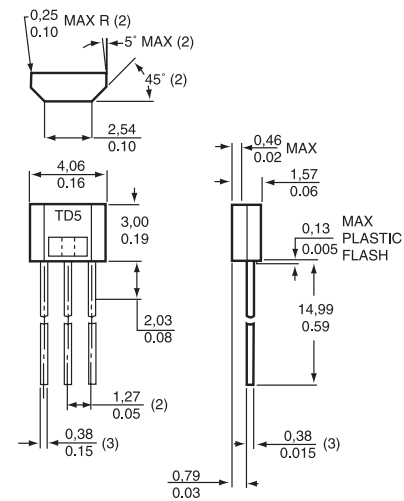
### OPTIONS

#### TD4A Liquid temperature sensor



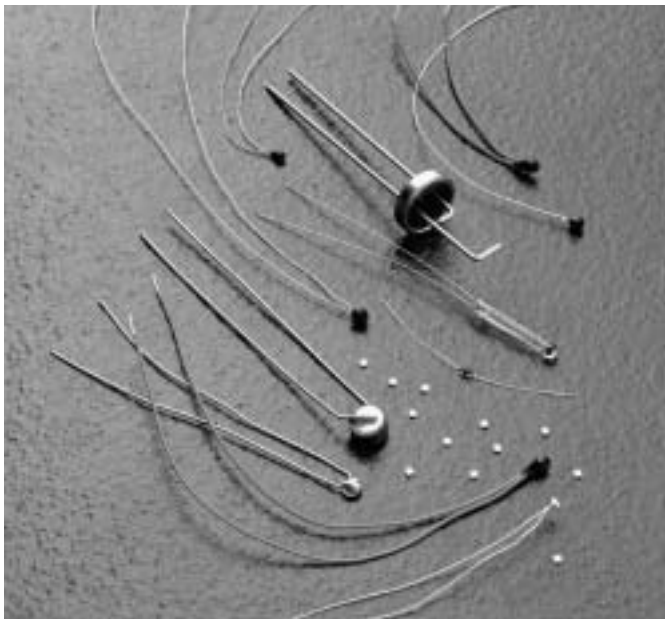
PACKAGING STYLE	TERMINATION	REFERENCE
Threaded aluminium case	Leadwires	TD4A

#### TD5A Subminiature temperature sensor



PACKAGING STYLE	TERMINATION	REFERENCE
Plastic case	SIP	TD5A

# Temperature Sensors - Thermistors



Thermistors change resistance with a change in temperature. They do not amplify, rectify, polarize or generate a signal. The thermistor temperature may be changed by the surrounding temperature or by self-heating the thermistor by passing a current through it.

Most applications such as temperature measurement and control or copper coil compensation require that the power dispersed in a thermistor be kept to a minimum so as not to perceptibly self-heat the thermistor. Other applications depend entirely on the self-heating effect. When the surrounding temperature is fixed, the resistance of a thermistor is largely a function of power being dispersed within it, raising its temperature above its environment. Under these operating conditions, the temperature may rise 100 °C to 200 °C [121 °F to 392 °F] and the resistance may be lowered to 1/1000<sup>th</sup> of its original value at low current.

This self-heating characteristic provides a whole field of uses for the thermistor. In the self-heat state it is thermally sensitive (its resistance will be changed) to any condition, changing the rate at which heat is conducted away from it. If the rate of heat removal is ideally fixed, then the thermistor is sensitive to power input and suited for use in voltage or power level control applications.

## Glass Encapsulated Chip (GEC) Thermistors

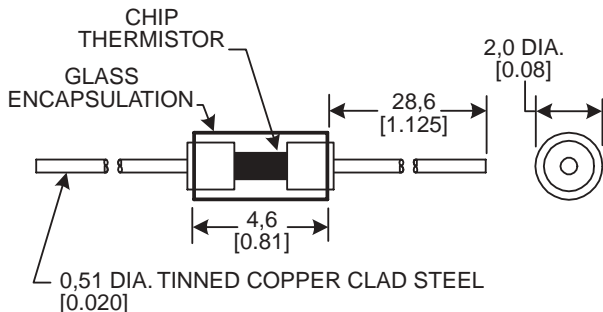
The GECs are high-quality, hermetically-sealed, glass-encapsulated chip thermistors in an axial lead package. They cover the full temperature range of -60 °C to 300 °C [-76 °F to 572 °F]. These rugged sensors are designed for applications which demand reliability at low cost. The uniform dimensions are ideally suited for automated assembly.

**Operating temperature:** -60 °C to 300 °C [-76 °F to 572 °F]  
**Encapsulation:** DO-35 glass  
**Lead material:** Tinned copper-clad steel  
**Dissipation constant (DC):** 2.5 mW/°C in still air min.  
**Time constant (TC):** 4 s in still air max.  
**Resistance range at 25 °C [77 °F]:** 1 kOhm to 1 MOhm

## OPTIONS

At 25 °C [77 °F]

OHM	% TOLERANCE	R/T CURVE	REFERENCE
1,000	10	10A	135-102DAG-J01
2,000	10	10	135-202FAG-J01
3,000	10	10	135-302FAG-J01
5,000	5	10	135-502FAF-J01
5,000	10	10	135-502FAG-J01
10,000	5	10	135-103FAF-J01
10,000	10	16	135-103FAG-J01
10,000	5	16	135-103LAF-J01
20,000	10	16	135-203LAG-J01
30,000	10	16	135-303KAG-J01
50,000	5	16	135-503LAF-J01
50,000	10	16	135-503LAG-J01
100,000	5	16	135-104LAF-J01
100,000	10	16	135-104LAG-J01
200,000	10	1	135-204QAG-J01
500,000	10	1	135-504QAG-J01
1 M	10	1	135-105QAG-J01



Interchangeable R/T curve matched  
 ±1 °C from 0 °C to 100 °C [32 °F to 212 °F]

OHM	R/T CURVE	REFERENCE
10,000	16	135-103LFW-J01
20,000	16	135-203LFW-J01
30,000	16	135-303LFW-J01
50,000	16	135-503LFW-J01
100,000	16	135-104LFW-J01

## Epoxy-coated or Uncoated Chip Thermistors

Epoxy-coated or Uncoated Chip thermistors are available in a broad range of custom resistance values and R/T curves. They are also available in two lead types:

- Uninsulated: 0,2032 mm [0.008 in] diameter, tinned copper for 1 kOhm or less, and tinned copper alloy for greater than 1 kOhm.
- Insulated: 0,254 mm [0.010 in] diameter, nickel wire, Teflon-insulated, 38,1 mm [1.5 in] long and furnished with 6,35 mm [0.25 in] stripped ends of 0,4064 mm [0.016 in] and 0,508 mm [0.020 in] tin-plated copper leads.

**Operating temperature range:** -40 °C to 125 °C\* [-40 °F to 257 °F]\*

**Encapsulation:** Epoxy-coated or uncoated

**Lead material:**

- Uninsulated: tinned copper/copper alloy
- Insulated: tinned copper/copper alloy with nickel wire Teflon

**Dissipation constant (DC):** 0.75 mW/°C in still air min.

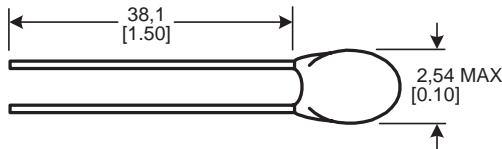
**Time constant (TC):** 15 s in still air max.

**Resistance range at 25 °C [77 °F]:** 100 Ohm to 100 kOhm

\*Very accurate ( $\pm 0.2$  °C) when used between 0 °C to 70 °C [32 °F to 158 °F]. Other ranges and tolerances are available.

### OPTIONS

#### Epoxy-coated chip



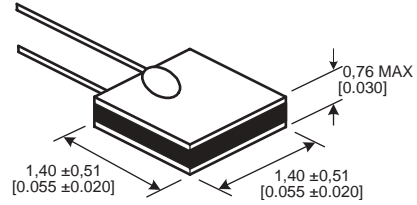
#### 10 % Tolerance at 25 °C [77 °F], uninsulated leads

OHM	R/T CURVE	REFERENCE
100	17	197-101CAG-A01
300	17	197-301CAG-A01
500	10A	197-501DAG-A01
1,000	10A	197-102DAG-A01
2,000	16	197-202LAG-A01
3,000	16	197-302LAG-A01
5,000	16	197-502LAG-A01
10,000	16	197-103LAG-A01
20,000	16	197-203LAG-A01
30,000	18	197-303KAG-A01
50,000	1	197-503QAG-A01
100,000	1	197-104QAG-A01

#### 10 % Tolerance at 25 °C [77 °F], insulated leads

OHM	R/T CURVE	REFERENCE
100	17	199-101CAG-A01
300	17	199-301CAG-A01
500	10A	199-501DAG-A01
1,000	10A	199-102DAG-A01
2,000	16	199-202LAG-A01
3,000	16	199-302LAG-A01
5,000	16	199-502LAG-A01
10,000	16	199-103LAG-A01
20,000	16	199-203LAG-A01
30,000	18	199-303KAG-A01
50,000	1	199-503QAG-A01
100,000	1	199-104QAG-A01

#### Uncoated chip



#### 10 % Tolerance at 25 °C [77 °F], uninsulated leads

OHM	R/T CURVE	REFERENCE
100	17	195-101CAG-A01
300	17	195-301CAG-A01
500	10A	195-501DAG-A01
1,000	10A	195-102DAG-A01
2,000	16	195-202LAG-A01
3,000	16	195-302LAG-A01
5,000	16	195-502LAG-A01
10,000	16	195-103LAG-A01
20,000	16	195-203LAG-A01
30,000	18	195-303KAG-A01
50,000	1	195-503QAG-A01
100,000	1	195-104QAG-A01

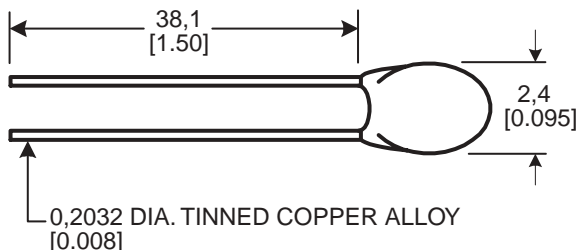
#### 10 % Tolerance at 25 °C [77 °F], insulated leads

OHM	R/T CURVE	REFERENCE
100	17	198-101CAG-A01
300	17	198-301CAG-A01
500	10A	198-501DAG-A01
1,000	10A	198-102DAG-A01
2,000	16	198-202LAG-A01
3,000	16	198-302LAG-A01
5,000	16	198-502LAG-A01
10,000	16	198-103LAG-A01
20,000	16	198-203LAG-A01
30,000	18	198-303KAG-A01
50,000	1	198-503QAG-A01
100,000	1	198-104QAG-A01

## UNI-CURVE Interchangeable Thermistors

The UNI-CURVE Interchangeable thermistors are temperature-matched. They offer additional cost savings by eliminating the need for individual resistance temperature calibration, as well as standardization of circuit components and simplification of design and replacement problems.

**Operating temperature range:** -40 °C to 150 °C\* [-40 °F to 302 °F]\*  
**Encapsulation:** Epoxy-coated  
**Lead material:** Tinned copper alloy  
**Dissipation constant (DC):** 0.75 mW/°C in still air min.  
**Time constant (TC):** 15 s in still air max.  
**Resistance range at 25 °C [77 °F]:** 1 kOhm to 100 kOhm  
 \*Very accurate ( $\pm 0.2$  °C) when used between 0 °C to 70 °C [32 °F to 158 °F]. Other ranges and tolerances are available.



### OPTIONS

$\pm 0,2$  °C Tolerance at 25 °C [77 °F]  
 0 °C to 70 °C [32 °F to 158 °F]

OHM	R/T CURVE	REFERENCE
1,000	10A	192-102DET-A01
2,252	16	192-222LET-A01
3,000	16	192-302LET-A01
5,000	16	192-502LET-A01
10,000	16	192-103LET-A01
30,000	18	192-303KET-A01
30,000	1	192-303OET-A01
50,000	1	192-503OET-A01
100,000	1	192-104OET-A01

$\pm 0,5$  °C Tolerance at 25 °C [77 °F]  
 0 °C to 70 °C [32 °F to 158 °F]

OHM	R/T CURVE	REFERENCE
1,000	10A	192-102DEV-A01
2,252	16	192-222LEV-A01
3,000	16	192-302LEV-A01
5,000	16	192-502LEV-A01
10,000	16	192-103LEV-A01
30,000	18	192-303KEV-A01
30,000	1	192-303QEV-A01
50,000	1	192-503QEV-A01
100,000	1	192-104QEV-A01

$\pm 1,0$  °C Tolerance at 25 °C [77 °F]  
 0 °C to 70 °C [32 °F to 158 °F]

OHM	R/T CURVE	REFERENCE
1,000	10A	192-102DEW-A01
2,252	16	192-222LEW-A01
3,000	16	192-302LEW-A01
5,000	16	192-502LEW-A01
10,000	16	192-103LEW-A01
30,000	18	192-303KEW-A01
30,000	1	192-303QEW-A01
50,000	1	192-503QEW-A01
100,000	1	192-104QEW-A01

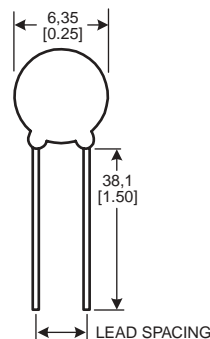
## Disc Thermistors

Uncoated or epoxy-coated Disc thermistors are available in a broad range of custom resistance values and R/T curves. They are only available with uninsulated leads. Diameters range from 2,54 mm [0.1 in] to 10,16 mm [0.4 in]. They are ideally suited for low cost applications with a maximum temperature of 150 °C [302 °F]. They are also well suited for PC board mount and are available on tape and reel.

**Operating temperature range:** -60 °C to 150 °C [-76 °F to 302 °F]  
**Encapsulation:** Epoxy-coated or uncoated  
**Lead material:** Uninsulated: tinned copper/copper alloy  
**Dissipation constant (DC):** Varies with size, ranges from 3 mW/°C to 8 mW/°C  
**Time constant (TC):** Varies with size, ranges from 10 s to 32 s  
**Resistance range at 25 °C [77 °F]:** 100 Ohm to 100 kOhm

### OPTIONS

Epoxy-coated chip



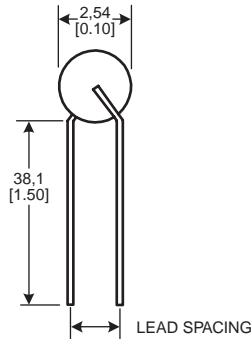
10 % Tolerance at 25 °C [77 °F]  
 Lead diameter 0,4064 mm [0.016 in]  
 Lead spacing 2,54 mm [0.1 in]

OHM	R/T CURVE	DC MIN.	TC MAX.	REFERENCE
500	10	3	10	140-501FAG-RB1
1,000	10	4	10	140-102FAG-RB1
3,000	16	3	10	140-302LAG-RB1
5,000	16	4	10	140-502LAG-RB1
10,000	16	4	10	140-103LAG-RB1
50,000	1	3	10	140-503QAG-RB1
100,000	1	3	10	140-104QAG-RB1

10 % Tolerance at 25 °C [77 °F]  
 Lead diameter 0,508 mm [0.020 in]  
 Lead spacing 5,08 mm [0.2 in]

OHM	R/T CURVE	DC MIN.	TC MAX.	REFERENCE
100	10	4	16	143-101FAG-RC1
200	10	5	18	143-201FAG-RC1
300	10	6	20	143-501FAG-RC1
1,000	16	6	20	143-102LAG-RC1
3,000	16	6	22	143-302LAG-RC1
5,000	16	7	35	143-502LAG-RC1
10,000	1	4	20	143-103QAG-RC1
30,000	1	6	25	143-303QAG-RC1
50,000	1	7	30	143-503QAG-RC1

Uncoated chip



10 % Tolerance at 25 °C [77 °F]  
 Lead diameter 0,4064 mm [0.016 in]  
 Lead spacing 2,54 mm [0.1 in]

OHM	R/T CURVE	DC MIN.	TC MAX.	REFERENCE
500	10	3	10	142-501FAG-RB1
1,000	10	4	10	142-102FAG-RB1
3,000	16	3	10	142-302LAG-RB1
5,000	16	4	10	142-502LAG-RB1
10,000	16	4	10	142-103LAG-RB1
50,000	1	3	10	142-503QAG-RB1
100,000	1	3	10	142-104QAG-RB1

10 % Tolerance at 25 °C [77 °F]  
 Lead diameter 0,508 mm [0.020 in]  
 Lead spacing 5,08 mm [0.2 in]

OHM	R/T CURVE	DC MIN.	TC MAX.	REFERENCE
100	10	4	16	145-101FAG-RC1
200	10	5	18	145-201FAG-RC1
300	10	6	20	145-301FAG-RC1
500	10	6	25	145-501FAG-RC1
1,000	16	6	20	145-102LAG-RC1
3,000	16	6	22	145-302LAG-RC1
5,000	16	7	35	145-502LAG-RC1
10,000	1	4	20	145-103QAG-RC1
30,000	1	7	28	145-303QAG-RC1
50,000	1	8	32	145-503QAG-RC1

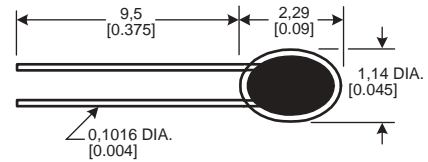
Standard Bead Thermistors

Standard Bead thermistors are hermetically-sealed in glass. These small units provide maximum stability when used to 300 °C [572 °F] for high temperature design requirements. They are ideally suited for the most stringent military, aerospace and oceanographic applications.

Operating temperature range: -60 °C to 300 °C [-76 °F to 572 °F]  
 Encapsulation: Glass hermetic seal  
 Lead material: Platinum iridium  
 Dissipation constant (DC): 0.4 mW/°C in still air min.  
 Time constant (TC): 4 s in still air max.  
 Resistance range at 25 °C [77 °F]: 200 Ohm to 1 MOhm

OPTIONS

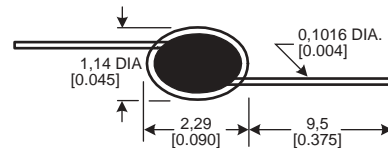
Adjacent leads



20 % Tolerance at 25 °C [77 °F]

OHM	R/T CURVE	RATIO 0 °C/50 °C	REFERENCE
200	8	4.80	112-201BAJ-B01
1,000	11	7.04	112-102EAJ-B01
2,000	11	7.04	112-202EAJ-B01
5,000	11	7.04	112-502EAJ-B01
10,000	12	7.59	112-103FAJ-B01
20,000	13	9.11	112-203HAJ-B01
50,000	14	9.53	112-503JAJ-B01
100,000	15	10.45	112-104KAJ-B01
200,000	15	10.45	112-204KAJ-B01
500,000	4	11.78	112-504NAJ-B01
1 M	5	13.12	112-105PAJ-B01

Axial leads



20 % Tolerance at 25 °C [77 °F]

OHM	R/T CURVE	RATIO 0 °C/50 °C	REFERENCE
2,000	11	7.04	112-202EAJ-H01
5,000	11	7.04	112-502EAJ-H01
10,000	12	7.59	112-103FAJ-H01
100,000	15	10.45	112-104KAJ-H01
600,000	4	11.78	112-604NAJ-H01

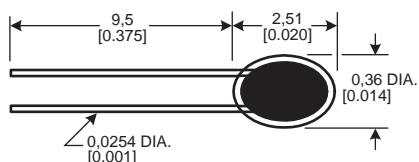
## Small Bead Thermistors

Small Bead thermistors feature relatively uniform size, offer ultra-fast time response and are highly sensitive to electric power. They are ideally suited for use in low heat capacity applications and their micro size makes them perfect for use in extremely small assemblies such as catheters and hypodermic needles. They are also used in self-heat applications such as gas analysis, gas flow measurement and thermal conductivity analysis.

**Operating temperature range:** -60 °C to 300 °C [-76 °F to 572 °F]  
**Encapsulation:** Glass hermetic seal  
**Lead material:** Platinum iridium  
**Dissipation constant (DC):** 0.1 mW/°C in still air min.  
**Time constant (TC):** 1 s in still air max.  
**Resistance range at 25 °C [77 °F]:** 2 kOhm to 100 kOhm

### OPTIONS

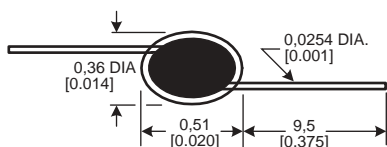
#### Adjacent leads



At 25 °C [77 °F]

OHM	% TOLERANCE	R/T CURVE	RATIO 0 °C/50 °C [32 °F/122 °F]	REFERENCE
2,000	25	9	5.50	111-202CAK-B01
8,000	20	11	7.04	111-802EAJ-B01
30,000	25	11	7.04	111-303EAK-B01

#### Axial leads



At 25 °C [77 °F]

OHM	% TOLERANCE	R/T CURVE	RATIO 0 °C/50 °C [32 °F/122 °F]	REFERENCE
2,000	25	9	5.50	111-202CAK-H01
8,000	20	11	7.04	111-802EAJ-H01
10,000	20	11	7.04	111-103EAJ-H01
100,000	25	13	9.11	111-104HAK-H01

## Glass Probe Thermistors

Glass Probe thermistors are shock resistant, rugged, glass-encapsulated units that are ideally suited for immersion in fluid and convenient for mounting in air sensor assemblies. They are available in two configurations: standard and mini.

**Operating temperature range:** -60 °F to 300 °C [-72 °F to 572 °F]  
**Encapsulation:** Glass  
**Lead material:** Dumet (copper-clad Ni-Fe wire)  
**Dissipation constant (DC):**

- Standard: 1.0 mW/°C in still air min.
- Mini: 0.7 mW/°C in still air min.

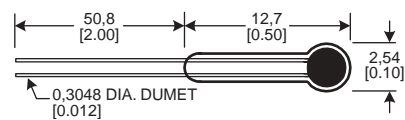
**Time constant (TC):**

- Standard: 22 s in still air max.
- Mini: 10 s in still air max.

**Resistance range at 25 °C [77 °F]:** 1 kOhm to 10 MOhm

### OPTIONS

#### Standard

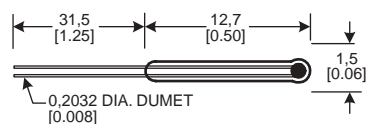


20 % Tolerance at 25 °C [77 °F]

dc 1.0 mW/°C min., TC 22 s max.

OHM	R/T CURVE	RATIO	REFERENCE
1,000	11	7.04	121-102EAJ-Q01
2,000	11	7.04	121-202EAJ-Q01
5,000	11	7.04	121-502EAJ-Q01
10,000	12	7.59	121-103FAJ-Q01
50,000	14	9.53	121-502JAJ-Q01
100,000	15	10.45	121-104KAJ-Q01
200,000	15	10.45	121-202KAJ-Q01
500,000	4	11.89	121-504NAJ-Q01
1 M	5	13.12	121-105PAJ-Q01
10 M	6	15.65	121-106QAJ-Q01

#### Mini



20 % Tolerance at 25 °C [77 °F]

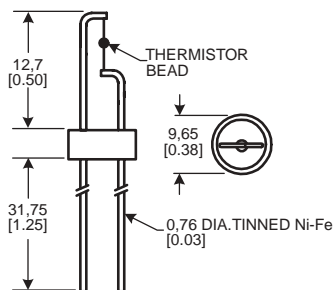
dc 0.7 mW/°C min., TC 10 s max.

OHM	R/T CURVE	RATIO	REFERENCE
1,000	11	7.04	120-102EAJ-Q01
2,000	11	7.04	120-202EAJ-Q01
10,000	12	7.59	120-103FAJ-Q01
50,000	14	9.53	120-502JAJ-Q01
100,000	15	10.45	120-104KAJ-Q01

## E-I Matched Bead Thermistors

E-I Matched Bead thermistors are designed for use in gas chromatography and other thermal conductivity gas analysis instruments. Each bead is mounted to a special hermetically-sealed header. For maximum sensitivity, the higher resistance units should be used at higher ambient temperatures.

**Operating temperature range:** -60 °C to 300 °C [-76 °F to 572 °F]  
**Encapsulation:** Glass hermetic seal  
**Lead material:** Tinned Ni-Fe



### OPTIONS

#### Helium-matched assembly

Characteristics	115-802EDJ-801
Resistance at 25 °C [77 °F]	8000 Ohm ±25 %
Resistance at 0 °C [32 °F] (approx.)	23,200 Ohm
Resistance at 50 °C [122 °F] (approx.)	3,200 Ohm
Ratio of resistance 0 °C/50 °C	6.56 to 7.99
Beta nominal at 25 °C	3495 K
Temperature coefficient at 25 °C	-3.9 %/°C
Time constant (TC) still air max.	1 s
Dissipation constant (DC) still air min.	0.16 mW/°C
DC helium	0.5 mW/°C
Power rating (air)	45 mW
Power rating (helium)	140 mW
Max. ambient temperature	250 °C [482 °F]
Max. operating temperature (including self-heat)	300 °C [572 °F]
Resistance at max. operating temperature	25 Ohm

#### 2 % resistance at 25 °C [77 °F]

DESCRIPTION	REFERENCE
Two 111-802EAJ-H01 each mounted on a glass hermetic seal and matched in helium to within 30 mV, 25 mV and 20 mV of each other at 2 mA, 5 mA, 10 mA and 15 mA.	115-802EDJ-801

#### Air-matched assembly

Characteristics	115-202CDK-801
Resistance at 25 °C [77 °F]	2000 Ohm ±25 %
Resistance at 0 °C [32 °F] (approx.)	4900 Ohm
Resistance at 50 °C [122 °F] (approx.)	890 Ohm
Ratio of resistance 0 °C/50 °C	4.95 to 6.95
Beta nominal at 25 °C	3000 K
Temperature coefficient at 25 °C	-3.4 %/°C
Time constant (TC) still air max.	1 s
Dissipation constant (DC) still air min.	0.16 mW/°C
DC helium	0.5 mW/°C
Power rating (air)	15 mW
Power rating (helium)	60 mW
Max. ambient temperature	100 °C [212 °F]
Max. operating temperature (including self-heat)	150 °C [302 °F]
Resistance at max. operating temperature	88 Ohm

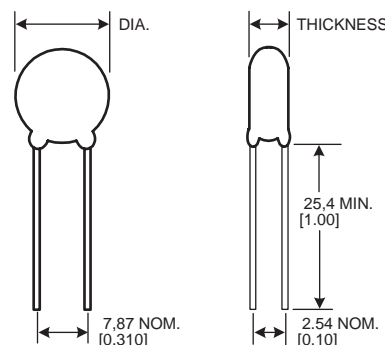
#### 5 % resistance at 25 °C [77 °F]

DESCRIPTION	REFERENCE
Two 111-202CAK-H01 each mounted on a glass hermetic seal and matched in air to within 15 mV of each other at 5 mA, 10 mA and 15 mA.	115-202CDK-801

## ICL Inrush Current Limiter Thermistors

ICL Inrush Current Limiter thermistors are a cost-effective way of limiting the inrush of current that may damage components in a switching power supply and in other power devices when the equipment is turned on. These devices have solderable leads and are PC board mountable.

**Operating temperature range:** -40 °C to 185 °C [-40 °F to 365 °F]  
**Maximum steady state current:** 1 A to 30 A  
**Encapsulation:** Black silicone  
**Lead material:** Tinned copper  
**Dissipation constant (DC):** 12.7 mW/°C to 23 mW/°C  
**Time constant (TC):** 32 s to 93 s  
**Resistance range at 25 °C [77 °F]:** 0.5 Ohm to 220 Ohm ±20 %  
**Resistance at max. steady state current:** 0.01 Ohm to 2.34 Ohm  
**Max. diameter** 9,5 mm [0.374 in] to 32.0 mm [1.260 in]  
**Max. thickness** 5,0 mm [0.204 in] to 8.0 mm [0.327 in]  
**Lead diameter** 0,8 mm [0.032 in] to 1.0 mm [0.040 in]



OHM	MAX. STEADY STATE CURRENT (A)	RESISTANCE AT MAX. STEADY STATE CURRENT (OHM)	REFERENCE
0.5	30	0.01	ICL320R530-01
1	20	0.02	ICL221R020-01
1	30	0.02	ICL321R030-01
2	18	0.03	ICL222R018-01
2.5	8	0.07	ICL152R508-01
2.5	8	0.06	ICL122R508-01
2.5	15	0.03	ICL222R515-01
5	6	0.1	ICL155R006-01
5	7	0.07	ICL155R007-01
10	2	0.3	ICL1010002-01
10	3.2	0.18	ICL1010004-01
10	5	0.13	ICL1210005-01
10	6	0.15	ICL1510006-01
10	8	0.1	ICL2210008-01
12	4	0.26	ICL1512004-01
16	4	0.27	ICL1516004-01
20	2	0.5	ICL1220002-01
40	2	0.6	ICL1240002-01
50	2	0.72	ICL1250002-01
80	2.5	0.75	ICL1580003-01
120	3	0.9	ICL2212103-01
220	2	0.8	ICL1522102-01

# Temperature Sensors - Probes



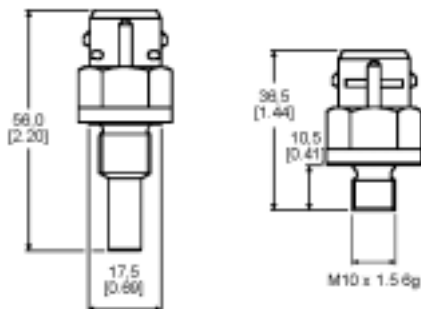
Temperature Sensor Probes are finished thermistor assemblies complete with thermistor housing, extension leads and sometimes a connector. A variety of customized packages are available.

NOTE: The products in this section do not follow the "how to use this catalogue" instructions provided in the catalogue introduction. Specific reference numbers are not given due to their custom nature. Please contact your local Honeywell sales office for ordering information.

## ES120 Series Coolant/Oil Temperature Sensor Probes

The ES120 probe is a thermistor mounted into a plastic lead frame and assembled into a metal body. This subassembly is then overmolded to produce both the electrical connection system and the hexagonal shape for easy installation. The all-plastic design reduces heat loss through the sensor, thereby reducing wind chill effects.

**Operating temperature range:** -40 °C to 155 °C [-40 °F to 311 °F]  
**Encapsulation:** NTC (Negative Temperature Coefficient) encapsulated in thermal epoxy  
**Lead material:** Terminals are 2,8 mm x 0,8 mm [0.11 in x 0.03 in] brass with a copper flash protection layer with final plating to customer requirement (silver, tin, gold, etc.)  
**Dissipation constant:** Tor values (time to reach 63.2 % of the difference between two temperatures) are typically 19 s rising temperature and 14 s falling temperature  
**Time constant:** None  
**Resistance range at 25 °C [77 °F]** 2.5 kOhm at 20 °C [68 °F] ±5 %

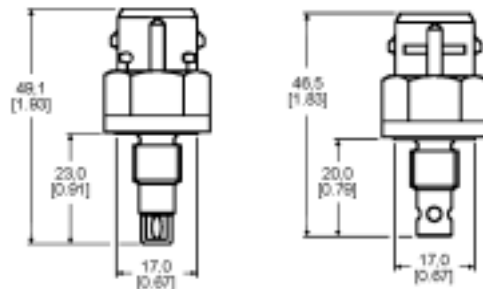


SERIES NAME  
ES120 Coolant/Oil Temperature Sensor Probe

## ES110 Series Inlet Air Temperature Sensor Probes

The ES110 probe is a thermistor mounted into a plastic lead frame and assembled into a metal body. This subassembly is then overmolded to produce both the electrical connection system and the hexagonal shape for easy installation. Two end configurations are available depending upon response required or degree of protection. The all-plastic design reduces heat loss through the sensor, thereby reducing wind chill effects.

**Operating temperature range:** -40 °C to 155 °C [-40 °F to 311 °F]  
**Encapsulation:** Standard NTC (Negative Temperature Coefficient) epoxy protection  
**Lead material:** Terminals are 2,8 mm x 0,8 mm [0.11 in x 0.03 in] brass with a copper flash protection layer with final plating to customer requirement (silver, tin, gold, etc.)  
**Dissipation constant:** 0.85 mW/°C in still air at 25 °C [77 °F]  
**Time constant:** 1 s in liquids, 12 s max. in still air  
**Resistance range at 25 °C [77 °F]** 2.5 kOhm at 20 °C [68 °F] ±5 %



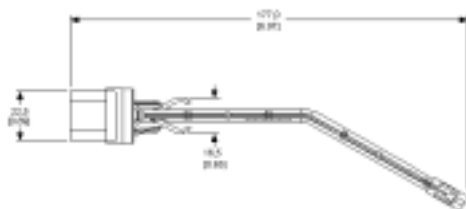
SERIES NAME  
ES110 Inlet Air Temperature Sensor Probe



## Air Conditioning Temperature Sensor Probes

A fully overmolded and protected sensor incorporating a specially developed NTC (Negative Temperature Coefficient) to withstand very aggressive, damp operating conditions. The housing is snap fit for easy assembly.

**Operating temperature range:** -30 °C to 100 °C [-22 °F to 212 °F]  
**Encapsulation:** Special NTC epoxy coating  
**Lead material:** Terminals are 2,8 mm x 0,8 mm [0.11 in x 0.03 in] brass with a copper flash protection layer with final plating to customer requirement (silver, tin, gold, etc.)  
**Dissipation constant:** 2.5 mW/°C in still air  
**Time constant:** 2 s in water, 15 s max. in still air  
**Resistance range at 25 °C [77 °F]** 9 kOhm at 0 °C [32 °F] ±1.5 %

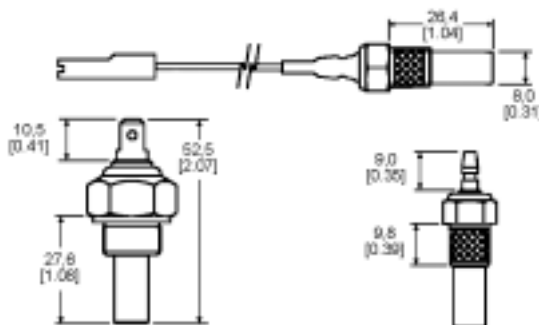


NAME  
Air Conditioning Temperature Sensor Probe

## Earth Return (Ground) Temperature Sensor Probes

An all-metal temperature sensor, with the body being the ground, incorporating a flat disc thermistor held flush on the base of the body by a spring-loaded pressure pad. This sensor provides a quick response to small variations in high temperature changes.

**Operating Temperature Range:** -40 °C to 155 °C [-40 °F to 311 °F]  
**Encapsulation:** NTC (negative temperature coefficient) encapsulated in a silicone paste  
**Lead Material:** Standard Lucar type or other variations  
**Dissipation Constant:** 3 mW/°C in still air  
**Time Constant:** 10 s in automotive coolant  
**Resistance Range at 25 °C [77 °F]** Per customer requirements

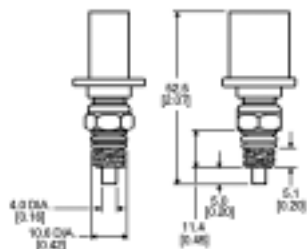


NAME  
Earth Return (Ground) Temperature Sensor Probe

## Refrigerant Temperature Sensor Probes

A fully sealed, quick response temperature sensor suitable for use in HVAC systems.

**Operating temperature range:** -40 °C to 140 °C [-40 °F to 284 °F]  
**Encapsulation:** NTC (Negative Temperature Coefficient) encapsulated in a thermal heat paste  
**Lead material:** Terminals are 1,5 mm x 0,6 mm [0.06 in x 0.02 in] brass with a copper flash protection layer with final plating to customer requirement (silver, tin, gold, etc.)  
**Dissipation constant:** Tor values (time to reach 63.2 % of the difference between two temperatures) are typically 10 s rising temperature and 6 s falling temperature  
**Time constant:** None  
**Resistance range at 25 °C [77 °F]** 2.5 kOhm at 20 °C [68 °F], calibrated at ±3 % at 100 °C [212 °F]

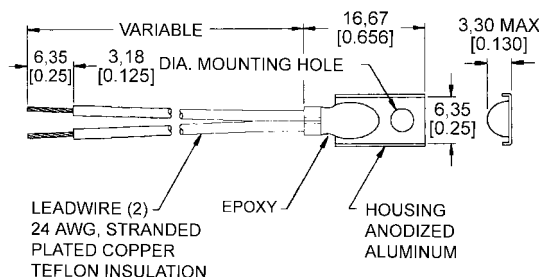


NAME  
Refrigerant Temperature Sensor Probe

## Surface Temperature Sensor Probes

Sensor assembly is designed to have good heat conductivity between the thermistor element and the area to be monitored. Time response is consistent with the thermal conductivity of the surface being measured. Multiple configurations allow sensor to be mounted, bolted, riveted or attached adhesively.

**Operating temperature range:** -60 °C to 150 °C [-76 °F to 302 °F]  
**Encapsulation:** Thermally conductive epoxy used to pot discrete component into surface-style housing  
**Lead material:** Insulated lead wires and terminals when required, other options available  
**Dissipation constant:** 3.3 mW/°C to 12 mW/°C (varies with size and housing style)  
**Time constant:** 1 s to 40 s (application dependent)  
**Resistance range at 25 °C [77 °F]** Per customer requirements

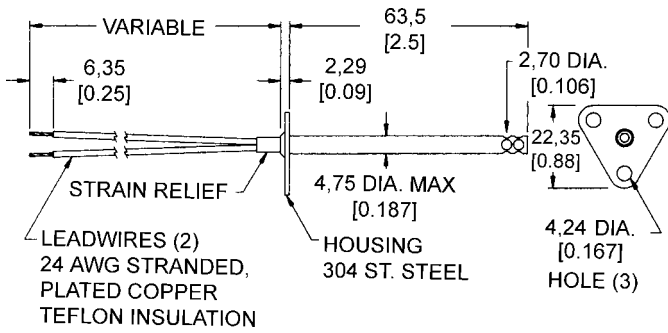


NAME  
Surface Temperature Sensor Probe

## Air/Gas Temperature Sensor Probes

Air/Gas probes contain an exposed thermistor element because gas is not as good a heat conductor or thermal sink as a liquid, and because time response is normally an important consideration. The sensor housing may be composed of plastic or other thermally conductive materials to reduce conduction and heat from the gas circulating around the thermistor. Multiple configurations allow easy mounting.

<b>Operating temperature range:</b>	-60 °C to 150 °C [-76 °F to 302 °F]
<b>Encapsulation:</b>	None, sensing element is exposed
<b>Lead material:</b>	Insulated lead wires and terminals when required, other options available
<b>Dissipation constant:</b>	0.1 mW/°C to 3 mW/°C (design specific)
<b>Time constant:</b>	4 s to 150 s (application and design dependent)
<b>Resistance range at 25 °C [77 °F]</b>	Per customer requirements

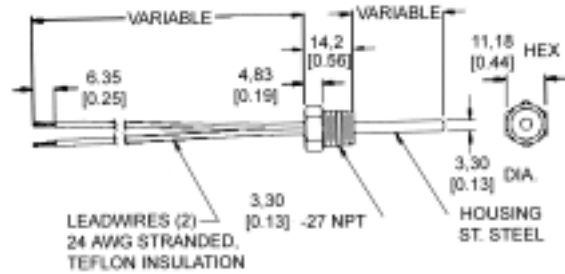


NAME  
Air/Gas Temperature Sensor Probe

## Immersion Temperature Sensor Probes

Custom designed and application specific, immersion probes are designed to be directly placed in the liquid medium to be measured. A large variety of housing alloys are available. Multiple configurations allow easy mounting.

<b>Operating temperature range:</b>	-60 °C to 300 °C [-76 °F to 572 °F]
<b>Encapsulation:</b>	NTC (Negative Temperature Coefficient) encapsulated in housing appropriate to the application
<b>Lead material:</b>	Insulated lead wires and terminals when required, other options available
<b>Dissipation constant:</b>	5 mW/°C to 10 mW/°C (varies with size and housing style)
<b>Time constant:</b>	1 s to 12 s (design dependent)
<b>Resistance range at 25 °C [77 °F]</b>	Per customer requirements



NAME  
Immersion Temperature Sensor Probe

# Thermostats - Commercial



Commercial thermostats include products for use in a wide array of small and major appliances, automotive applications, office copy machines, heat and smoke detectors and HVAC equipment. These snap-action thermostats include automatic or manual reset options, phenolic or ceramic housings, and a variety of mounting brackets and terminal options.

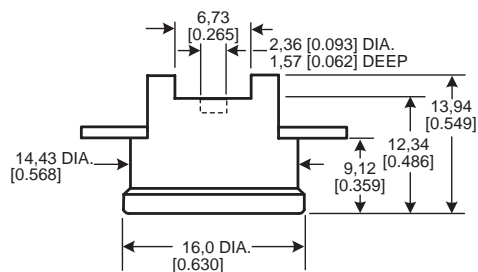
NOTE: The products in this section do not follow the "how to use this catalogue" instructions provided in the catalogue introduction. Specific reference numbers are not given due to their custom nature. Please contact your local Honeywell sales office for ordering information.

## 2450R/2450HR/2455R Series Phenolic Automatic Reset Thermostats

A temperature-sensitive bimetal disc, electrically isolated from the switch, actuates the normally closed contacts. The contacts open when the surface or ambient temperatures increase to the operating snap point of the calibrated disc. Response to temperature changes is extremely rapid due to the inherently low mass of the disc and the small size of the product. These products are factory calibrated to the customer's specification.

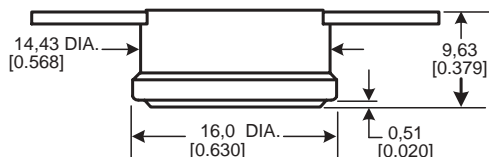
<b>Reset type:</b>	Automatic
<b>Amperage capacity:</b>	15 A resistive max.
<b>Housing material:</b>	Phenolic
<b>Operating temperature range:</b>	0 °C to 150 °C [32 °F to 302 °F]
<b>Environmental exposure range:</b>	0 °C to 177 °C [32 °F to 350 °F]

### 2450HR



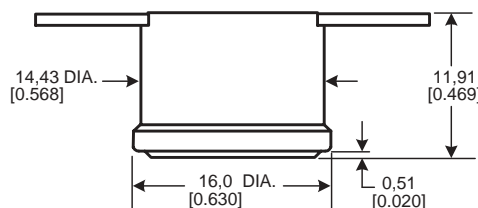
**SERIES NAME**  
2450HR Phenolic Automatic Reset Thermostat

### 2450R



**SERIES NAME**  
2450R Phenolic Automatic Reset Thermostat

### 2455R



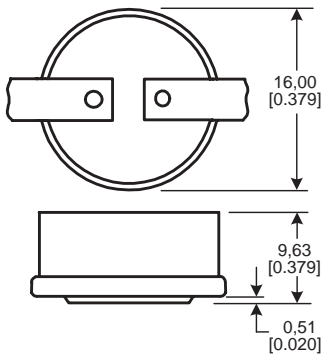
**SERIES NAME**  
2455R Phenolic Automatic Reset Thermostat

## 2450RC/2450RCH/2455RC Series Ceramic Automatic Reset Thermostats

A temperature-sensitive bimetal disc, electrically isolated from the switch, actuates the normally closed contacts. The contacts open when the surface or ambient temperatures increase to the operating snap point of the calibrated disc. Response to temperature changes is extremely rapid due to the inherently low mass of the disc and the small size of the product.

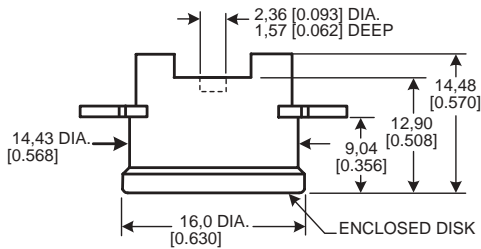
<b>Reset type:</b>	Automatic
<b>Amperage capacity:</b>	15 A resistive max.
<b>Housing material:</b>	Ceramic
<b>Operating temperature range:</b>	0 °C to 260 °C [32 °F to 500 °F]
<b>Environmental exposure range:</b>	-20 °C to 287 °C [0 °F to 550 °F]

### 2450RC



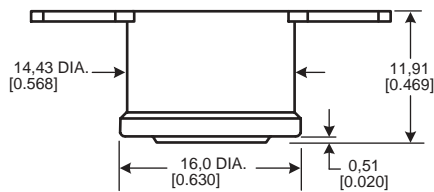
**SERIES NAME**  
2450RC Ceramic Automatic Reset Thermostat

### 2450RCH



**SERIES NAME**  
2450RCH Ceramic Automatic Reset Thermostat

### 2455RC



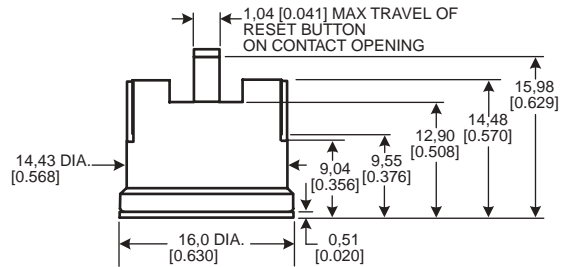
**SERIES NAME**  
2455RC Ceramic Automatic Reset Thermostat

## 2450CM/2455RM Series Ceramic and Phenolic Manual Reset Thermostats

A temperature-sensitive bimetal disc, electrically isolated from the switch, actuates the normally closed contacts. The contacts open when the surface or ambient temperatures increase to the operating snap point of the calibrated disc. The circuit will stay open above room ambient temperature until the manual reset button is pressed. Response to temperature changes is extremely rapid due to the inherently low mass of the disc and the small size of the product.

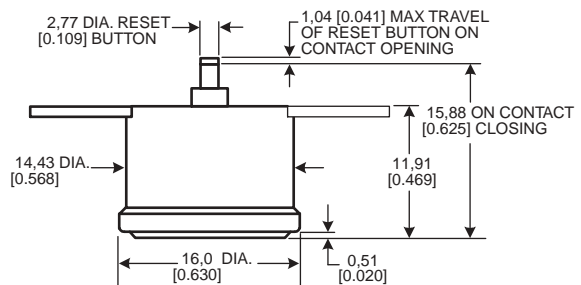
<b>Reset type:</b>	Manual
<b>Amperage capacity:</b>	15 A resistive max.
<b>Housing material:</b>	Ceramic or phenolic
<b>Operating temperature range:</b>	52 °C to 232 °C [125 °F to 450 °F] (ceramic) 52 °C to 150 °C [125 °F to 302 °F] (phenolic)
<b>Environmental exposure range:</b>	10 °C to 260 °C [50 °F to 500 °F] (ceramic) 10 °C to 177 °C [50 °F to 350 °F] (phenolic)

### 2450CM



**SERIES NAME**  
2450CM Ceramic Manual Reset Thermostat

### 2455RM



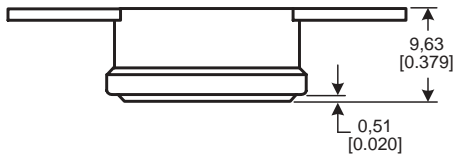
**SERIES NAME**  
2455RM Phenolic Manual Reset Thermostat

## 2450A/2455A Series Heat Detection Thermostats

The gold contacts open or close on a temperature rise of 47 °C to 107 °C [117 °F to 225 °F].

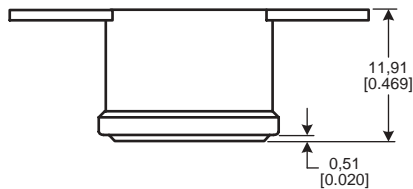
**Reset type:** Automatic  
**Amperage capacity:** 15 A resistive max.  
**Housing material:** Phenolic, epoxy-sealed cap and terminal  
**Operating temperature range:** 47 °C to 107 °C [117 °F to 225 °F]  
**Environmental exposure range:** 0 °C to 150 °C [32 °F to 302 °F]

### 2450A



**SERIES NAME**  
2450A Heat Detection Thermostat

### 2455A



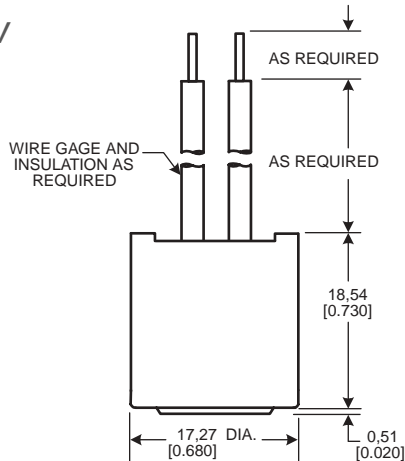
**SERIES NAME**  
2455A Heat Detection Thermostat

## 2455RBV Series Overmolded Automatic Reset Thermostats

A temperature-sensitive bimetal disc, electrically isolated from the switch, actuates the normally closed contacts. The contacts open when the surface or ambient temperatures increase to the operating snap point of the calibrated disc. Response to temperature changes is extremely rapid due to the inherently low mass of the disc and the small size of the product.

**Reset type:** Automatic  
**Amperage capacity:** 15 A resistive max.  
**Housing material:** Ceramic or phenolic, epoxy overmold  
**Operating temperature range:** -12 °C to 105 °C [10 °F to 221 °F]  
**Environmental exposure range:** -18 °C to 121 °C [0 °F to 250 °F]

### 2455RBV



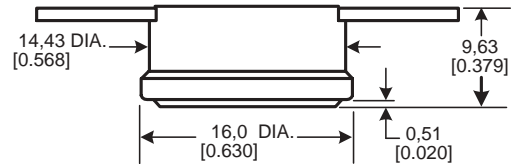
**SERIES NAME**  
2455RBV Overmolded Automatic Reset Thermostat

## 2450R/2450RCH/2455R/2455RC Series "One-shot" ½ in Thermostats

Products are designed for high limit applications where automatic reset is not desired.

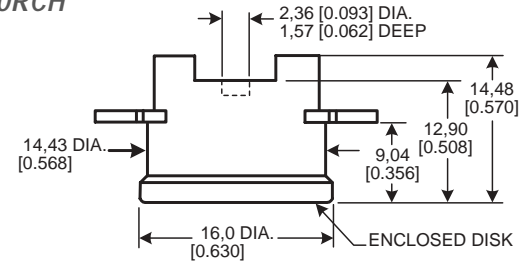
**Reset type:** None  
**Amperage capacity:** 15 A resistive max.  
**Housing material:** ceramic or phenolic  
**Operating temperature range:** 52 °C to 260 °C [125 °F to 500 °F] (ceramic)  
 52 °C to 150 °C [125 °F to 302 °F] (phenolic)  
**Environmental exposure range:** 18 °C to 316 °C [0 °F to 600 °F] (ceramic)  
 18 °C to 177 °C [0 °F to 350 °F] (phenolic)

### 2450R



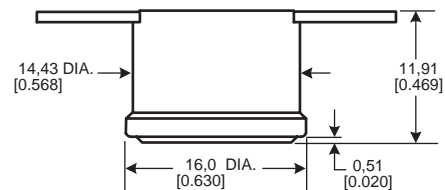
**SERIES NAME**  
2450R Phenolic "One-shot" ½ in Thermostat

### 2450RCH



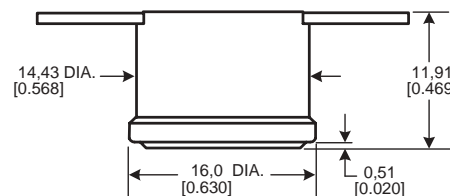
**SERIES NAME**  
2450RCH Ceramic "One-shot" ½ in Thermostat

### 2455R



**SERIES NAME**  
2455R Phenolic "One-shot" ½ in Thermostat

### 2455RC

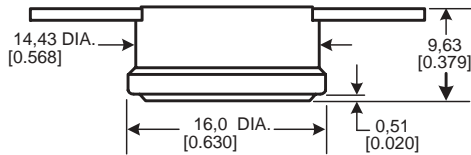


**SERIES NAME**  
2455RC Ceramic "One-shot" ½ in Thermostat

## 2450R Series Annular Ring Cap Automatic Reset Thermostats

A temperature-sensitive bimetal disc, electrically isolated from the switch, actuates the normally closed contacts. The contacts open when the surface or ambient temperatures increase to the operating snap point of the calibrated disc. Response to temperature changes is extremely rapid due to the inherently low mass of the disc and the small size of the product.

<b>Reset type:</b>	Automatic
<b>Amperage capacity:</b>	15 A resistive, 12 Vdc
<b>Housing material:</b>	Phenolic, can be partially or totally sealed against water ingress
<b>Operating temperature range:</b>	-10 °C to 55 °C [14 °F to 131 °F]
<b>Environmental exposure range:</b>	-40 °C to 130 °C [-40 °F to 266 °F]
<b>Life Cycle Capability:</b>	300 K at 12 Vdc, 10 A
<b>Low Temperature Differential:</b>	Down to 8 °C [46 °F]
<b>Switch Temperature Tolerance:</b>	±3 °C

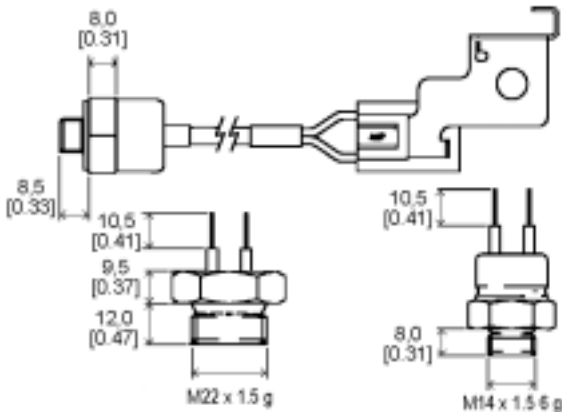


**SERIES NAME**  
2450R Phenolic Annular Ring Cap Automatic Reset Thermostat

## 2450R/2455R Series Protected Thermostats

A temperature-sensitive bimetal disc, electrically isolated from the switch, actuates the normally closed contacts. The contacts open when the surface or ambient temperatures increase to the operating snap point of the calibrated disc. Basic thermostat is protected from the environment by sealing it in a metal housing or encapsulating it in epoxy.

<b>Reset type:</b>	Automatic
<b>Amperage capacity:</b>	15 A resistive, 12 Vdc
<b>Housing material:</b>	Brass, aluminium, stainless steel and epoxy
<b>Operating temperature range:</b>	15 °C to 130 °C [59 °F to 266 °F]
<b>Environmental exposure range:</b>	-40 °C to 155 °C [-40 °F to 311 °F]

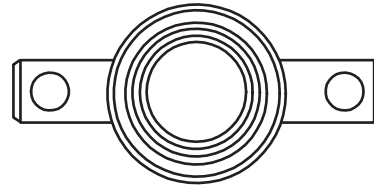
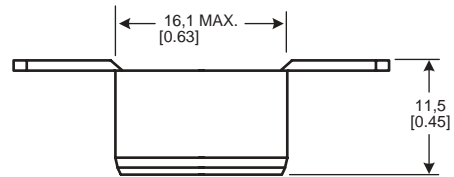


**SERIES NAME**  
2450R Protected Thermostat  
2455R Protected Thermostat

## 2450R Series Fully Sealed Thermostats

A temperature-sensitive bimetal disc, electrically isolated from the switch, actuates the normally closed contacts. The contacts open when the surface or ambient temperatures increase to the operating snap point of the calibrated disc. Response to temperature changes is extremely rapid due to the inherently low mass of the disc and the small size of the product.

<b>Reset type:</b>	Automatic
<b>Amperage capacity:</b>	15 A resistive, 12 Vdc
<b>Housing material:</b>	Phenolic housing, aluminium cap totally encapsulated in water resistant epoxy
<b>Operating temperature range:</b>	-10 °C to 55 °C [14 °F to 131 °F]
<b>Environmental exposure range:</b>	-40 °C to 130 °C [-40 °F to 266 °F]
<b>Life cycle capability:</b>	300 K at 12 Vdc, 10 A
<b>Low temperature differential:</b>	Down to 8 °C [46 °F]
<b>Switch temperature tolerance:</b>	±3 °C



**SERIES NAME**  
2450R Fully Sealed Thermostat

# Thermostats - Precision



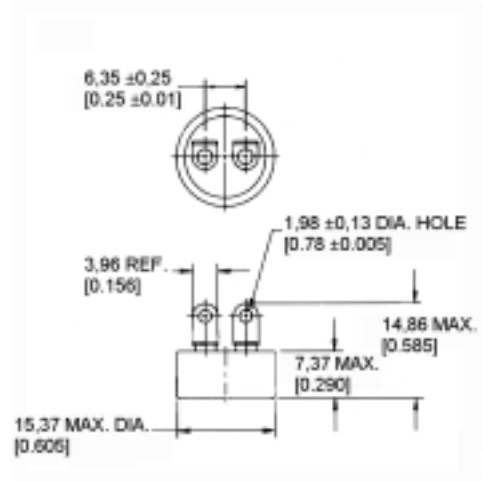
Precision snap-action thermostats include both hermetic and non-hermetic devices for use in a wide array of applications including computers, copy machines, aircraft, radar equipment, medical equipment and electronic control systems. We also offer custom-packaged thermostats for application flexibility and industrial-grade thermostats designed to operate in extreme environmental conditions.

NOTE: The products in this section do not follow the "how to use this catalogue" instructions provided in the catalogue introduction. Specific reference numbers are not given due to their custom nature. Please contact your local Honeywell sales office for ordering information.

## 3100/3106 Series Hermetic Thermostats

The 3100/3106 Series is a single pole, single throw switch activated by a snap-action bimetal disc. Temperature calibrations are pre-set at the factory and each unit is 100 % thermally and mechanically inspected. It is available to open or close on temperature rise. The case is laser welded to form a hermetically-sealed steel housing with a glass-to-metal seal at the terminal junction. It is manufactured and tested to meet or exceed critical commercial and industrial specifications. The 3106 Series has gold alloy contacts for low voltage applications.

- Amperage:** 0.5 A resistive (3106 Series)  
7 A resistive (3100 Series)
- Housing material:** Steel housing with glass-to-metal seal at terminal junction
- Operating temperature range:** -29 °C to 260 °C [-20 °F to 500 °F] (3100 Series)  
-29 °C to 204 °C [-20 °F to 400 °F] (3106 Series)
- Environmental exposure range:** -62 °C to 288 °C [-80 °F to 550 °F]
- Dielectric strength:** MIL-STD-202, Method 301  
1250 Vac 60 Hz terminal to case (3100, 3100U, 3106 Series)  
1500 Vac 60 Hz terminal to case (3100UX Series)
- Insulation resistance:** MIL-STD-202, Method 302, Condition B  
50 MOhm, 500 Vdc applied
- Contact resistance:** MIL-STD-202, Method 307  
25 mOhm (3106 Series)  
50 mOhm (3100 Series)
- Hermetic seal:** MIL-STD-202, Method 112, Condition A  
1x10<sup>-5</sup> atm cc/s
- Moisture resistance:** MIL-STD-202 Method 106

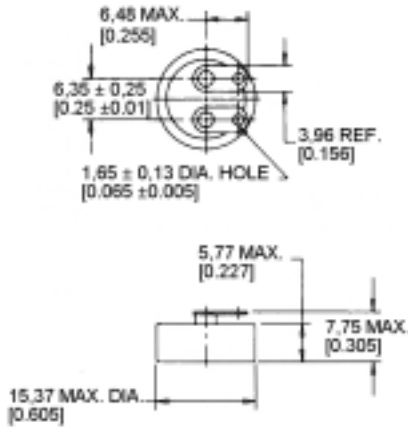


- SERIES NAME**
- 3100 Hermetic Thermostat
  - 3100U Hermetic Thermostat
  - 3100UX Hermetic Thermostat
  - 3106 Hermetic Thermostat

## 3150/3156 Series Low Silhouette Hermetic Thermostats

The 3150/3156 Series is a single pole, single throw switch activated by a snap-action bimetal disc. Temperature calibrations are pre-set at the factory and each unit is 100% thermally and mechanically inspected. It is available to open or close on temperature rise. The case is laser welded to form a hermetically-sealed steel housing with a glass-to-metal seal at the terminal junction. The low silhouette and compact design make it especially well suited for applications that require miniaturization. The 3156 Series has gold alloy contacts for low voltage applications.

<b>Amperage:</b>	0.5 A resistive (3156 Series) 7 A resistive (3150 Series)
<b>Housing material:</b>	Steel housing with glass-to-metal seal at terminal junction
<b>Operating temperature range:</b>	-29 °C to 177 °C [-20 °F to 350 °F]
<b>Environmental exposure range:</b>	-62 °C to 260 °C [-80 °F to 500 °F]
<b>Dielectric strength:</b>	MIL-STD-202, Method 301 750 Vac 60 Hz terminal to case (3150, 3156 Series) 1250 Vac 60 Hz terminal to case (3150U, 3156U Series) 1500 Vac 60 Hz terminal to case (3150UX Series)
<b>Insulation resistance:</b>	MIL-STD-202, Method 302, Condition B 50 MOhm, 500 Vdc applied
<b>Contact resistance:</b>	MIL-STD-202, Method 307 25 mOhm (3156 Series) 50 mOhm (3150 Series)
<b>Hermetic seal:</b>	MIL-STD-202, Method 112, Condition A 1x10 <sup>-5</sup> atm cc/s
<b>Moisture</b>	Method 106



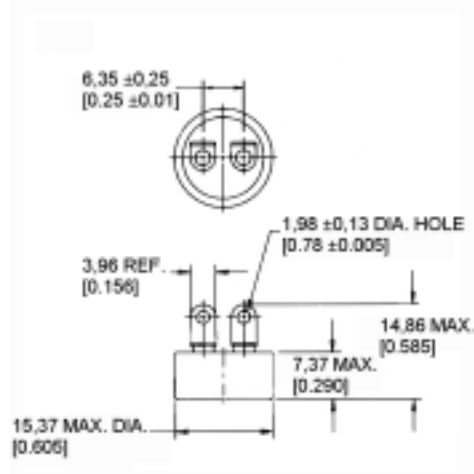
**SERIES NAME**

- 3150 Low Silhouette Hermetic Thermostat
- 3150U Low Silhouette Hermetic Thermostat
- 3150UX Low Silhouette Hermetic Thermostat
- 3156 Low Silhouette Hermetic Thermostat
- 3156U Low Silhouette Hermetic Thermostat

## 3800 Series Industrial-Grade Thermostats for Severe Duty Applications

The 3800 Series is used where high levels of vibration and mechanical shock are common but a military device is not required. It is easily customized for use in a variety of applications.

<b>Amperage:</b>	7 A resistive
<b>Housing material:</b>	Steel housing with glass-to-metal seal at terminal junction
<b>Operating temperature range:</b>	-29 °C to 260 °C [-20 °F to 500 °F]
<b>Environmental exposure range:</b>	-62 °C to 260 °C [-80 °F to 500 °F]
<b>Dielectric strength:</b>	MIL-STD-202, Method 301 1250 Vac terminal to case
<b>Insulation resistance:</b>	MIL-STD-202, Method 302, Condition B 50 MOhm min. terminal to case
<b>Contact resistance:</b>	MIL-STD-202, Method 307 50 mOhm max.
<b>Hermetic seal:</b>	MIL-STD-202, Method 112, Condition A 1 x 10 <sup>-5</sup> atm cc/s
<b>Moisture resistance:</b>	MIL-STD-202, Method 106
<b>Vibration (random):</b>	MIL-STD-202, Method 214 30 g, 20 Hz to 2,000 Hz
<b>Vibration (sinusoidal):</b>	MIL-STD-202, Method 204 Condition D 20 G, 20 Hz to 2,000 Hz
<b>Mechanical shock:</b>	MIL-STD-202, Method 213, 400 G
<b>Thermal shock:</b>	MIL-STD-202, Method 107, Condition B
<b>Acceleration:</b>	MIL-STD-202, Method 212, 20 G



**SERIES NAME**

- 3800 Industrial Grade Thermostat

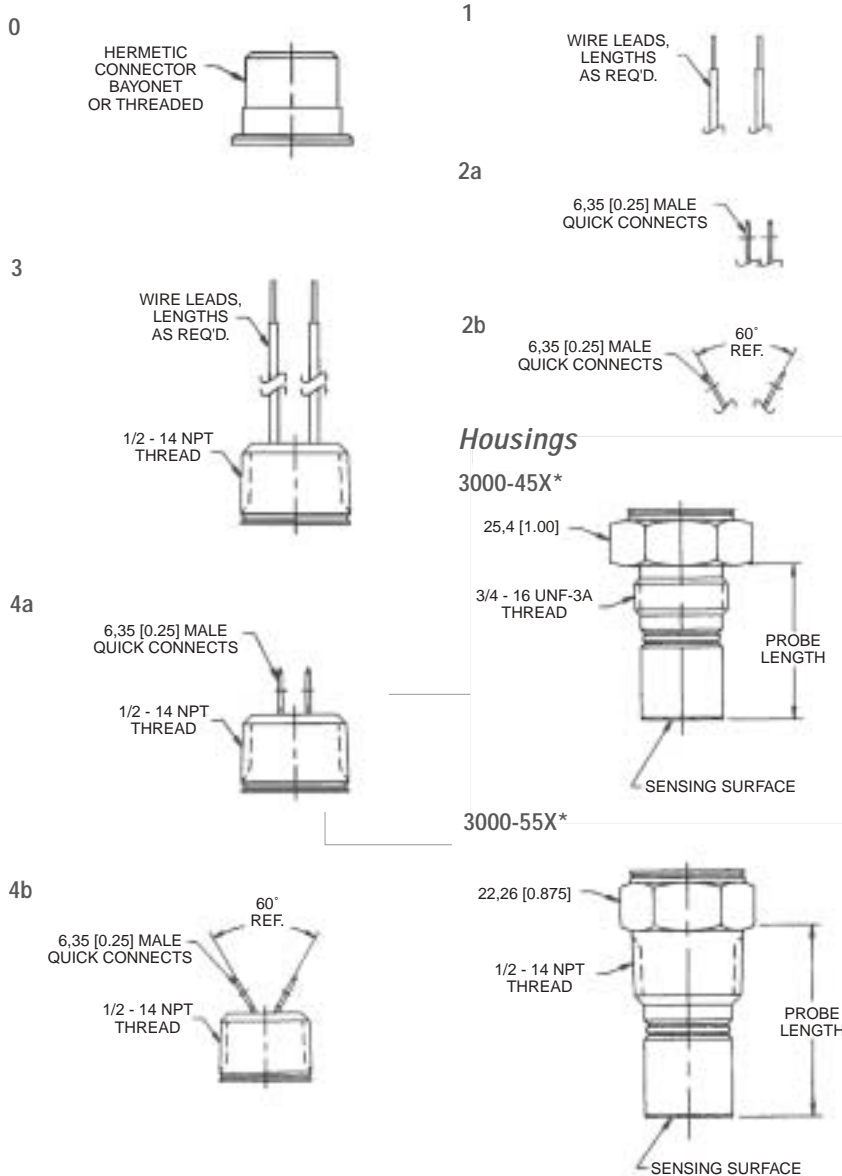


# 3000 Series Custom-packaged Thermostats

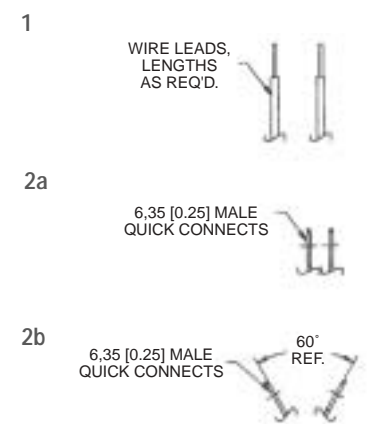
The 3000 Series incorporates a Honeywell thermostat assembled in a custom package for use in a variety of applications that require flexibility in mounting and terminal configurations. A typical product includes a 3100 hermetic internal thermostat with a terminal selection, housing selection and customized part number. These custom package devices operate in extreme environmental conditions, including exposure to hazardous substances, dust particles and liquid immersion.

<b>Amperage:</b>	7 A resistive	<b>Insulation resistance:</b>	MIL-STD-202, Method 302
<b>Housing material:</b>	Stainless steel or brass		50 MOhm to 500 MOhm
<b>Operating temperature range:</b>	-29 °C to 260 °C [-20 °F to 500 °F]	<b>Contact resistance:</b>	MIL-STD-202, Method 307
<b>Environmental exposure range:</b>	-62 °C to 288 °C [-80 °F to 550 °F]		50 mOhm max.
<b>Dielectric strength:</b>	MIL-STD-202, Method 301	<b>Hermetic seal:</b>	MIL-STD-202, Method 112, Condition A
	1250 Vac 60 Hz terminal to case		1 x 10 <sup>-5</sup> atm cc/s
		<b>Moisture resistance:</b>	MIL-STD-202 Method 106

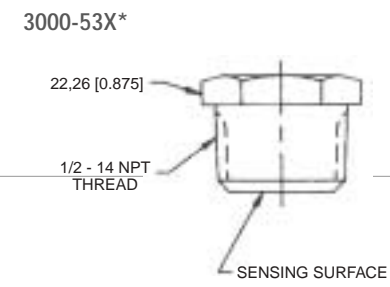
## Terminations for 3000-45X\* and 3000-55X\* Housings



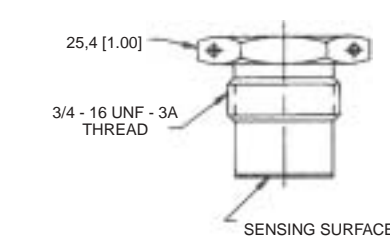
## Terminations for 3000-53X\* and 3000-141 Housings



## Housings



## 3000-141



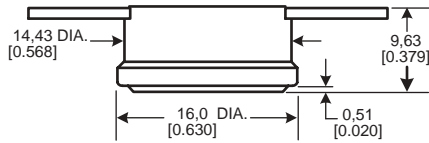
**SERIES NAME**  
3000 Custom-packaged Thermostat

### 3450R/3450HR/3455R Series Phenolic Automatic Reset Thermostats

A temperature-sensitive bimetal disc, electrically isolated from the switch, actuates the normally closed contacts. The contacts open when the surface or ambient temperatures increase to the operating snap point of the calibrated disc. Response to temperature changes is extremely rapid due to the inherently low mass of the disc and the small size of the product. These products are factory calibrated to the customer's specification.

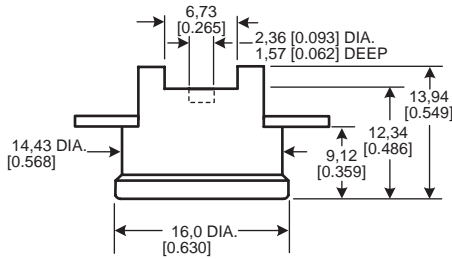
<b>Reset type:</b>	Automatic
<b>Amperage capacity:</b>	15 A resistive max.
<b>Housing material:</b>	Phenolic
<b>Operating temperature range:</b>	0 °C to 150 °C [32 °F to 302 °F]
<b>Environmental exposure range:</b>	0 °C to 177 °C [32 °F to 350 °F]

#### 3450R



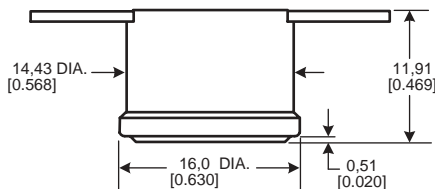
**SERIES NAME**  
3450R Phenolic Automatic Reset Thermostat

#### 3450HR



**SERIES NAME**  
3450HR Phenolic Automatic Reset Thermostat

#### 3455R



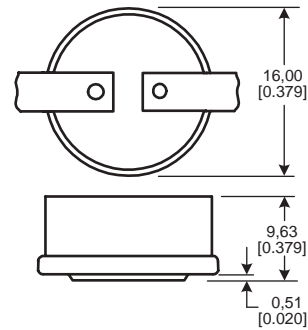
**SERIES NAME**  
3455R Phenolic Automatic Reset Thermostat

### 3450RC/3450RCH/3455RC Series Ceramic Automatic Reset Thermostats

A temperature-sensitive bimetal disc, electrically isolated from the switch, actuates the normally closed contacts. The contacts open when the surface or ambient temperatures increase to the operating snap point of the calibrated disc. Response to temperature changes is extremely rapid due to the inherently low mass of the disc and the small size of the product.

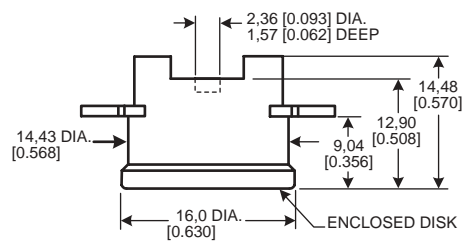
<b>Reset type:</b>	Automatic
<b>Amperage capacity:</b>	15 A resistive max.
<b>Housing material:</b>	Ceramic
<b>Operating temperature range:</b>	0 °C to 260 °C [32 °F to 500 °F]
<b>Environmental exposure range:</b>	-20 °C to 287 °C [0 °F to 550 °F]

#### 3450RC



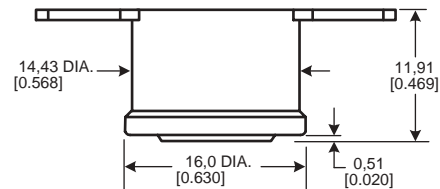
**SERIES NAME**  
3450RC Ceramic Automatic Reset Thermostat

#### 3450RCH



**SERIES NAME**  
3450RCH Ceramic Automatic Reset Thermostat

#### 3455RC



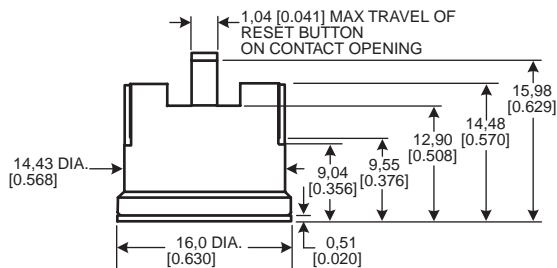
**SERIES NAME**  
3455RC Ceramic Automatic Reset Thermostat

### 3450CM/3455RM Series Ceramic and Phenolic Manual Reset Thermostats

A temperature-sensitive bimetal disc, electrically isolated from the switch, actuates the normally closed contacts. The contacts open when the surface or ambient temperatures increase to the operating snap point of the calibrated disc. The circuit will stay open above room ambient temperature until the manual reset button is pressed. Response to temperature changes is extremely rapid due to the inherently low mass of the disc and the small size of the product.

<b>Reset type:</b>	Manual
<b>Amperage capacity:</b>	15 A resistive max.
<b>Housing material:</b>	Ceramic or phenolic
<b>Operating temperature range:</b>	52 °C to 232 °C [125 °F to 450 °F] (ceramic) 52 °C to 150 °C [125 °F to 302 °F] (phenolic)
<b>Environmental exposure range:</b>	10 °C to 260 °C [50 °F to 500 °F] (ceramic) 10 °C to 177 °C [50 °F to 350 °F] (phenolic)

#### 3450CM

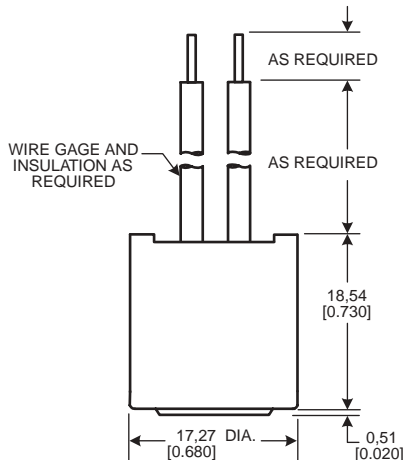


**SERIES NAME**  
3450CM Ceramic Manual Reset Thermostat

### 3455RBV Series Overmolded Automatic Reset Thermostats

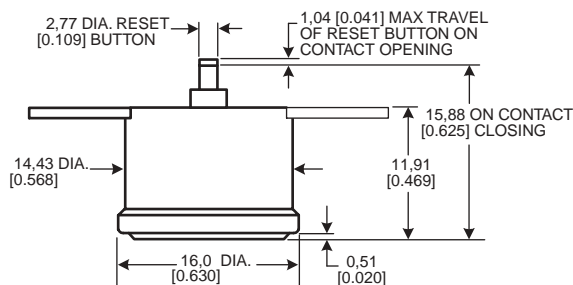
A temperature-sensitive bimetal disc, electrically isolated from the switch, actuates the normally closed contacts. The contacts open when the surface or ambient temperatures increase to the operating snap point of the calibrated disc. Response to temperature changes is extremely rapid due to the inherently low mass of the disc and the small size of the product.

<b>Reset type:</b>	Automatic
<b>Amperage capacity:</b>	15 A resistive max.
<b>Housing material:</b>	Ceramic or phenolic, epoxy overmold
<b>Operating temperature range:</b>	-12 °C to 105 °C [10 °F to 221 °F]
<b>Environmental exposure range:</b>	-18 °C to 121 °C [0 °F to 250 °F]



**SERIES NAME**  
3455RBV Overmolded Automatic Reset Thermostat

#### 3455RM



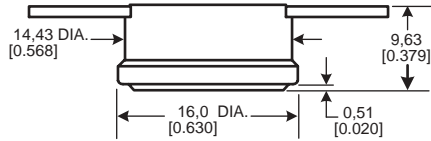
**SERIES NAME**  
3455RM Phenolic Manual Reset Thermostat

**3450R/3450RC/3450RCH/3455R/3455RC**  
**Series "One-shot" ½ in Thermostats**

Products are designed for high limit applications where automatic reset is not desired.

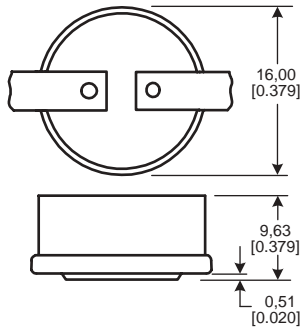
- Reset type: None
- Amperage capacity: 15 A resistive max.
- Housing material: Ceramic or phenolic
- Operating temperature range: 52 °C to 260 °C [125 °F to 500 °F] (ceramic)  
 52 °C to 150 °C [125 °F to 302 °F] (phenolic)
- Environmental exposure range: 18 °C to 316 °C [0 °F to 600 °F] (ceramic)  
 18 °C to 177 °C [0 °F to 350 °F] (phenolic)

**3450R**



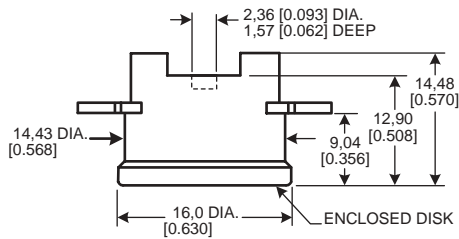
**SERIES NAME**  
 3450R Phenolic "One-shot" ½ in Thermostat

**3450RC**



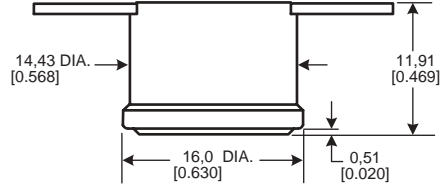
**SERIES NAME**  
 3450RC Ceramic "One-shot" ½ in Thermostat

**3450RCH**



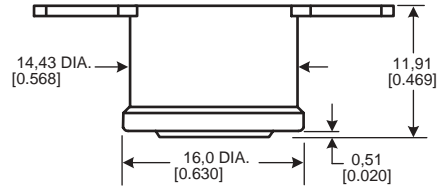
**SERIES NAME**  
 3450RCH Ceramic "One-shot" ½ in Thermostat

**3455R**



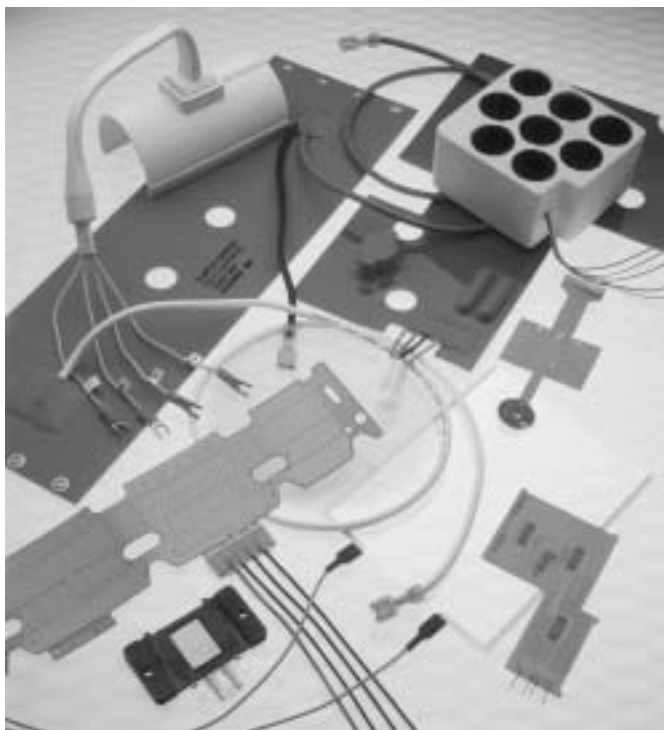
**SERIES NAME**  
 3455R Phenolic "One-shot" ½ in Thermostat

**3455RC**



**SERIES NAME**  
 3455RC Ceramic "One-shot" ½ in Thermostat

# Heaters



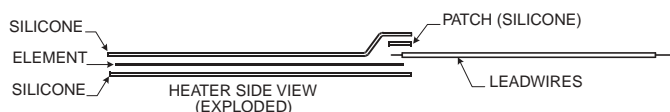
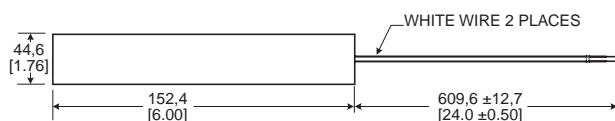
Heaters are resistive devices that are used in a variety of applications such as airborne valves, appliances, satellites and medical electronics. They are available in flat, molded-to-shape, spiral wrap, transparent, composite and high temperature configurations. Honeywell uses a variety of materials to manufacture its heaters. These include silicone, which can easily be vulcanized to metal parts; Kapton, noted for its thermal stability over a wide temperature range; as well as other flexible dielectric materials. Heaters are available with single, multiple or variable watt densities to customize heat output to unique application needs. They may also be bonded to other system parts or combined with Honeywell thermostats, thermistors, thermocouples, temperature sensors and thermal fuses to form custom-engineered heating systems. Optional PSA (Pressure Sensitive Adhesive) is available with all series.

NOTE: The products in this section do not follow the "how to use this catalogue" instructions provided in the catalogue introduction. Specific reference numbers are not given due to their custom nature. Please contact your local Honeywell sales office for ordering information.

## 3100 Series Silicone Wire-wound Heaters

The 3100 Series contains resistive wire encased between two layers of fiberglass-supported silicone rubber. All bonding adhesives are uncured silicone rubber. These heaters are cured under pressure and temperature during manufacturing. The multi-stranded resistance wires allow wire-wound heaters to conform to three dimensional shapes. Optional PSA (Pressure Sensitive Adhesive) is available with all series.

**Maximum power:** 40 W/in<sup>2</sup>  
**Operating/storage temperature range:** 250 °C [482 °F] max.  
 200 °C [392 °F] max. (UL)  
**Size constraints:** None, virtually any size and shape  
**Geometry:** Specific to customer requirements  
**Heater trace pattern:** Specific to customer requirements

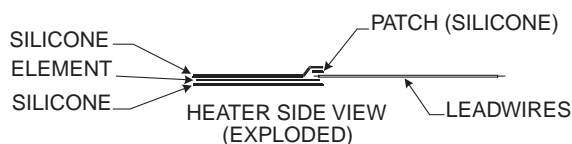
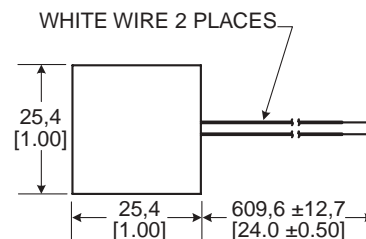


SERIES NAME  
3100 Silicone Wire-wound Heater

## 3200 Series Silicone Chemically-etched Heaters

The 3200 Series contains resistive foil traces encased between two layers of fiberglass-supported silicone rubber. All bonding adhesives are uncured silicone rubber. These heaters are cured under pressure and temperature during their manufacturing. They are the optimal choice for multiple watt densities or varying trace geometry requirements.

**Maximum power:** 40 W/in<sup>2</sup>  
**Operating/storage temperature range:** 250 °C [482 °F] max.  
 200 °C [392 °F] max. (UL)  
**Size constraints:** 0,61 m x 0,61 m [24 in x 24 in]  
**Geometry:** Specific to customer requirements  
**Heater trace pattern:** Specific to customer requirements

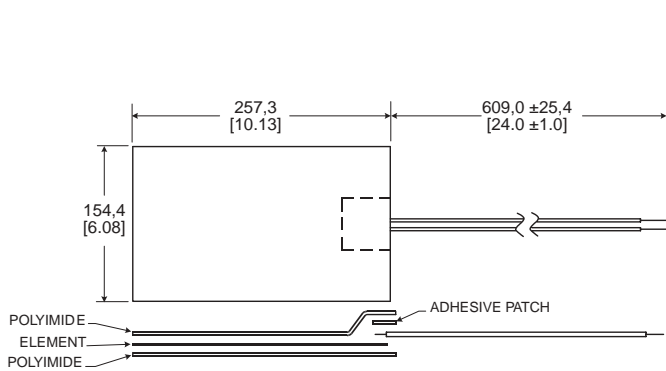


SERIES NAME  
3200 Silicone Chemically-etched Heater

## 3400 Series Kapton or High Temperature Insulated Heaters

The 3400 Series contains etched, resistive foil encased between two layers of Kapton. The Kapton Insulated Heaters use an acrylic thermoset bonding adhesive, while the Kapton Insulated High Temperature Heaters use a Teflon™ bonding adhesive. Insulated heaters are used in applications where thin profile and or low material outgassing are important considerations.

- Maximum power:** 40 W/in<sup>2</sup>
- Operating/storage temp. range:**
- Kapton insulated: 177 °C [350 °F] max.
  - Kapton high temperature insulated: 260 °C [500 °F] max.
- Size constraints:** 0,61 m x 0,61 m [24 in x 24 in]
- Geometry:** Specific to customer requirements within size constraints
- Heater trace pattern:** Specific to customer requirements

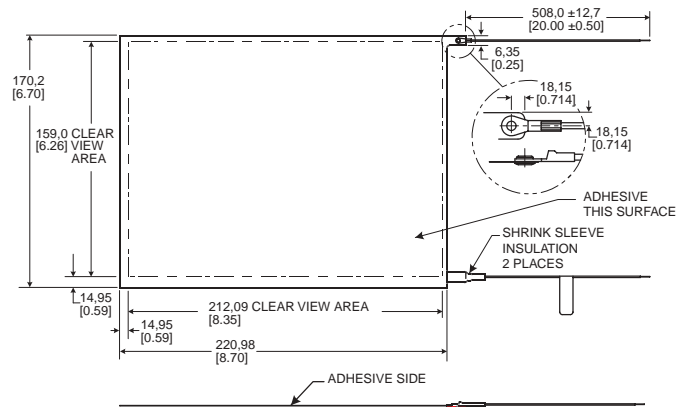


**SERIES NAME**  
3400 Kapton or High Temperature Insulated Heater

## 78000 Series Transparent Heaters

The 78000 Series heater resistive element consists of a very thin layer of ITO (Indium Tin Oxide) electrically sputtered on PET polyester film. The electrical connection is made via silver ink or carbon bus bars laid on top of the ITO. Wire connections are made via ring terminals eyeleted to the silver or carbon bus bars or flexible tail/connector. Transparent heaters are used to warm liquid crystal displays (LCDs) in cold, moist environments.

- Maximum power:** 5 W/in<sup>2</sup>
- Operating/storage temp. range:** -40 °C to 85 °C [-40 °F to 185 °F]
- Size constraints:** 0,60 m x 0,43 m [22 in x 17 in]
- Geometry:** Specific to customer requirements within size constraints
- Heater trace pattern:** Continuous layer of ITO (Indium Tin Oxide) evenly sputtered across entire surface



**SERIES NAME**  
78000 Transparent Heater

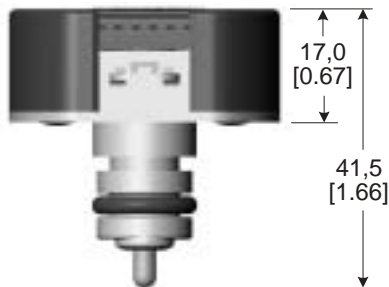
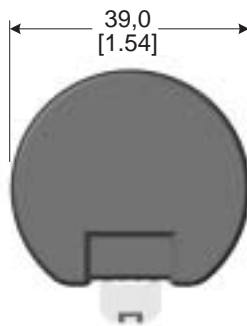
# Combi-sensor



The Combi-sensor is a liquid pressure/temperature sensor that uses piezoresistive and thermistor sensing technology to measure water pressure and temperature. It is designed for use in boiler system water pressure and inflow temperature measurement applications.

Pressure range:	0 bar to 3.0 bar relative
Accuracy:	±2 % over full range
Response time:	<3 s
Operating temperature:	5 °C to 110 °C [41 °F to 203 °F]
Overpressure:	5 bar for 1 hour
Burst pressure:	9 bar for 1 min
Power supply:	5 Vdc ±10 %
Voltage output:	0.5 Vdc to 4.5 Vdc ratiometric to Vs
Maximum current limit:	250 mA (not self-limiting) (for reverse polarity)
NTC (Negative Temperature Coefficient) characteristics:	10 kOhm at 25 °C ±3 % beta(25/85) = 3998 K ±2 %
Connection:	Lumberg rast 2.5 edge connector ESL code 312-600

DESCRIPTION	REFERENCE
Combi-sensor	FS300-100



## Honeywell

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

# Thermal Cutoffs



Thermal Cutoffs include products for use in a wide array of small appliances, major appliances, office copy machines, automotive, and HVAC equipment. These devices are available in various lead lengths and configurations.

NOTE: The products in this section do not follow the "how to use this catalogue" instructions provided in the catalogue introduction. Specific reference numbers are not given due to their custom nature. Please contact your local Honeywell sales office for ordering information.

**NOTICE**

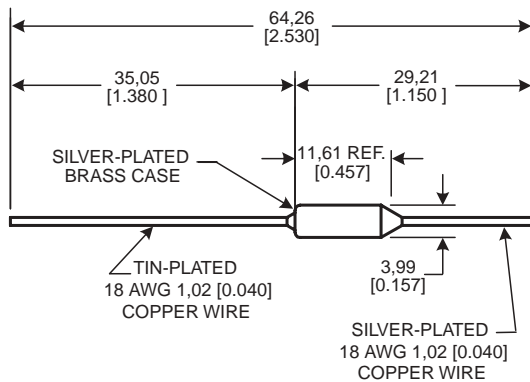
- To maximize product life, use a 30 °C [86 °F] min. differential between the operating ambient temperature at the fuse location and the specified functioning temperature of the fuse being used. Maintain a 40 °C [104 °F] min. differential between devices with functioning temperatures above 200 °C [392 °F].
- Under no condition should the thermal cutoff be exposed to a continuous normal temperature rating in excess of 200 °C [392 °F]. Only proper testing of the above will determine the selected thermal cutoff's suitability within the application.

## D Series

The D Series responds to temperature by interrupting an electrical circuit when the operating and/or environmental temperature exceeds the thermal rating of the fuse. This is accomplished when the organic pellet experiences a phase change, allowing the spring activated contacts to permanently open the circuit.

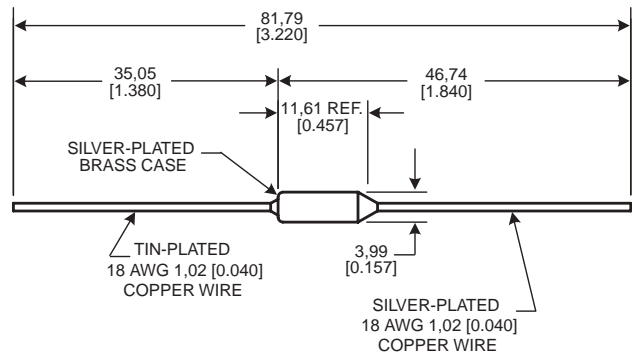
**Operating temperature range:** 72 °C to 240 °C [162 °F to 464 °F]  
**Environmental exposure range:** see notice

### DXXX-001



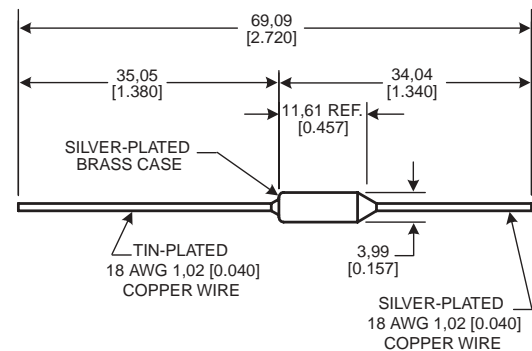
NAME  
DXXX-001

### DXXX-002



NAME  
DXXX-002

### DXXX-003



NAME  
DXXX-003



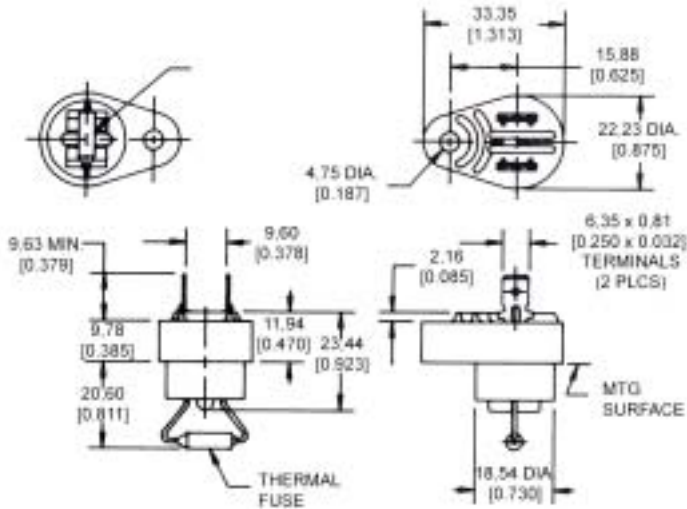
## RD Series

The RD Series responds to temperature by interrupting an electrical circuit when the operating and/or environmental temperature exceeds the thermal rating of the fuse. This is accomplished when the organic pellet experiences a phase change, allowing the spring activated contacts to permanently open the circuit.

The electrical resistance of an RD Series thermal cutoff is comparable to that found in an equal length of 18 gauge solid copper wire. With proper heat flow, heat generation below 15 A is minimal. Above 15 A, the upper limit on current capacity will depend on the environment for each specification

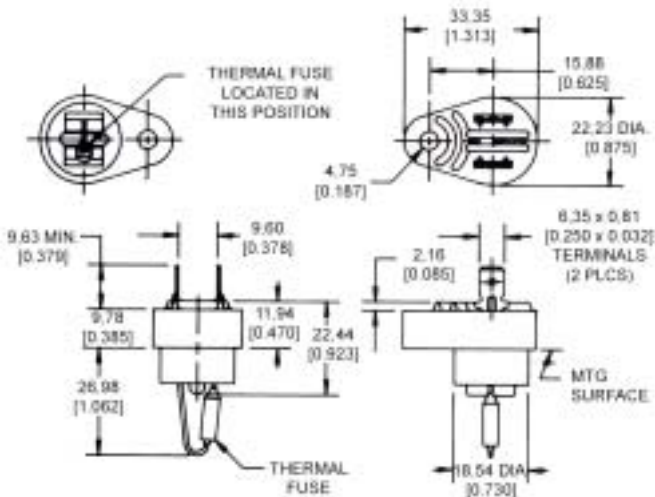
**Operating temperature range:** 72 °C to 240 °C [162 °F to 464 °F]  
**Environmental exposure range:** see notice

### RDXXX-001



NAME  
RDXXX-001

### RDXXX-002



NAME  
RDXXX-002

# Position Sensors

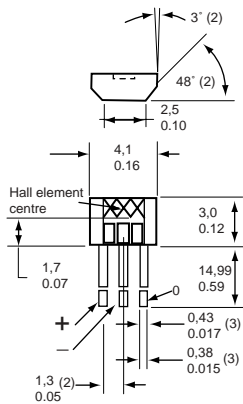


## SS40/400 Series Hall effect digital position sensor

SS400 Series position sensors have a thermally balanced integrated circuit over full temperature range. The negative compensation slope is optimized to match the negative temperature coefficient of lower cost magnets. Bipolar, latching and unipolar magnetics are available.

Band gap regulation provides extremely stable operation over 3.8 Vdc to 30 Vdc supply voltage range.

Package style: Radial lead IC  
 Supply voltage: 3.8 Vdc to 30 Vdc  
 Operating temperature: -40 °C to 150 °C  
 -40 °F to 302 °F



### OPTIONS

MAXIMUM Operating Point and MINIMUM Release Point are specified @ 25 °C

#### Bipolar - temperature compensated

OPERATING POINT (MAXIMUM)	RELEASE POINT (MINIMUM)	REFERENCE
60 Gauss	-60 Gauss	SS411A
140 Gauss	-140 Gauss	SS413A

#### Bipolar - non temperature compensated

Supply voltage: 4.5 to 24 Vdc  
 Operating temperature: -55 °C to 150 °C  
 -67 °F to 302 °F

OPERATING POINT (MAXIMUM)	RELEASE POINT (MINIMUM)	REFERENCE
150 Gauss	-140 Gauss	SS41

#### Unipolar - temperature compensated

OPERATING POINT (MAXIMUM)	RELEASE POINT (MINIMUM)	REFERENCE
115 Gauss	20 Gauss	SS441A
180 Gauss	75 Gauss	SS443A
390 Gauss	235 Gauss	SS449A

#### Bipolar latching- temperature compensated

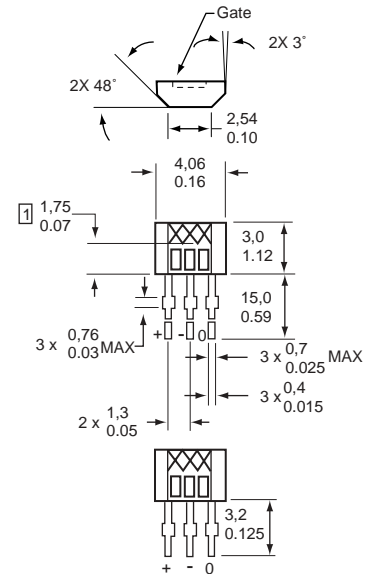
OPERATING POINT (MAXIMUM)	RELEASE POINT (MINIMUM)	REFERENCE
85 Gauss	-85 Gauss	SS461A
180 Gauss	-180 Gauss	SS466A

## SS49/490 Series Ratiometric hall effect linear position sensor

Package style: Radial lead IC  
 Supply voltage: 4.5 to 10.5 Vdc  
 Operating temperature: -40 °C to 150 °C  
 -40 °F to 302 °F  
 Magnetic range: -670 to 670 Gauss

### OPTIONS

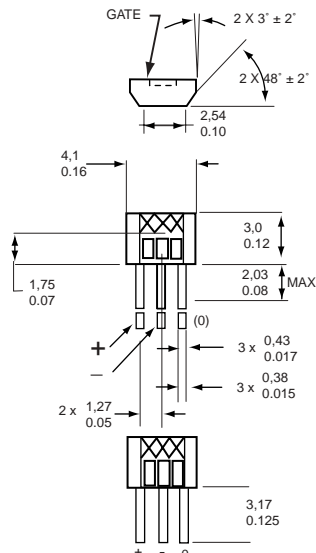
#### Temperature compensated



	PACKAGE STYLE	REFERENCE
		SS495A
High accuracy		SS495A1
High accuracy	Surface mount	SS495A1-S
	Surface mount reel	SS495A-SP

## SS49/490 Series Ratiometric hall effect linear position sensor (Continued)

*Non temperature compensated*



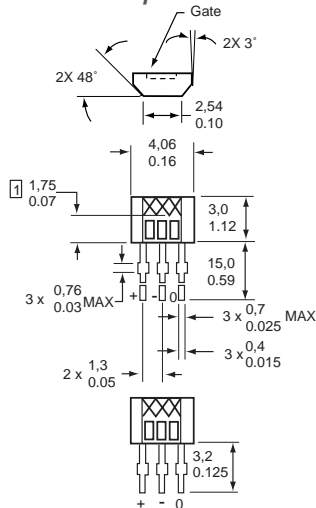
Supply voltage: 4 to 10 Vdc  
 Operating temperature: -25 °C to 85 °C  
 -13 °F to 185 °F  
 Magnetic range: -1000 to 1000 Gauss

REFERENCE  
SS49

## Miniature Ratiometric hall effect linear position sensor

SS490 Series MRL (Miniature Ratiometric Linear) sensors have a ratiometric output voltage, set by the supply voltage. It varies in proportion to the strength of the magnetic field.

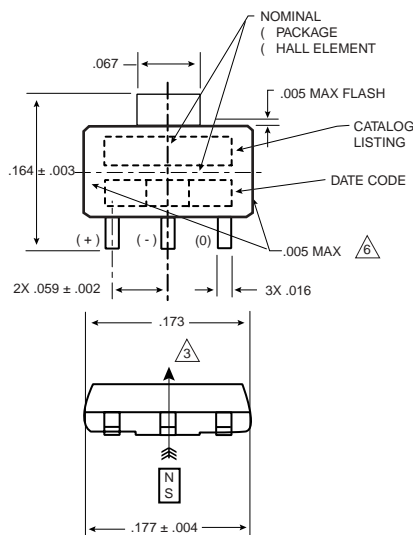
*Temperature compensated*



MAGNETIC RANGE REFERENCE  
 -670 to 670 Gauss SS495B  
 -840 to 840 Gauss SS496B

## SS500 Series Hall effect digital position sensor

Package style: Surface mount  
 Supply voltage: 3.8 to 30 Vdc  
 Operating temperature: -40 °C to 150 °C  
 -40 °F to 302 °F



### OPTIONS

MAXIMUM Operating Point and MINIMUM Release Point are specified @ 25 °C

*Bipolar - temperature compensated*

OPERATING POINT (MAXIMUM)	RELEASE POINT (MINIMUM)	REFERENCE
60 Gauss	-60 Gauss	SS511AT
140 Gauss	-140 Gauss	SS513AT

*Bipolar - non temperature compensated*

Supply voltage: 4.5 to 24 Vdc

OPERATING POINT (MAXIMUM)	RELEASE POINT (MINIMUM)	REFERENCE
140 Gauss	-140 Gauss	SS51T

*Unipolar - temperature compensated*

OPERATING POINT (MAXIMUM)	RELEASE POINT (MINIMUM)	REFERENCE
115 Gauss	20 Gauss	SS541AT
180 Gauss	75 Gauss	SS543AT
390 Gauss	235 Gauss	SS549AT

*Bipolar latching- temperature compensated*

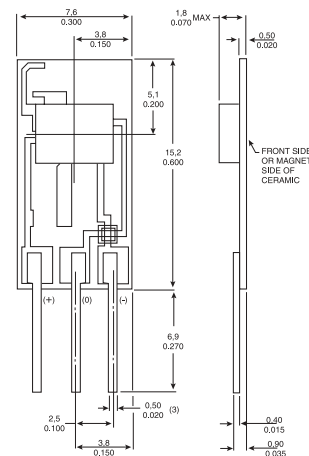
OPERATING POINT (MAXIMUM)	RELEASE POINT (MINIMUM)	REFERENCE
85 Gauss	-85 Gauss	SS561AT
180 Gauss	-180 Gauss	SS566AT

## SS94 Series Ratiometric hall effect linear position sensor

The SS9 utilizes a Hall effect integrated circuit chip which provides increased temperature stability and performance. Laser trimmed thick film resistors on the ceramic substrate and thin film resistors on the integrated circuit reduce null and gain shifts over temperature which results in consistent sensitivity from one device to the next.

Package style: Ceramic  
 Supply voltage: 6.6 Vdc to 12.6 Vdc  
 Operating temperature: -40 °C to 125 °C  
 -40 °F to 257 °F  
 Magnetic range: -500 to 500 Gauss  
 SS94A1F -100 to 100 Gauss

Magnetic range:  
SS94A1F



### OPTIONS

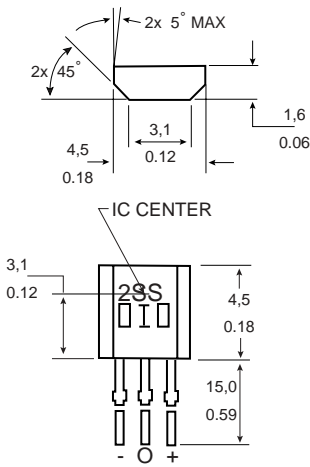
*Temperature compensated*

MAIN FEATURE	REFERENCE
General purpose	SS94A1
High sensitivity (25 mV/Gauss output @ 8 Vdc supply)	SS94A1F
Noise shielded	SS94A2

## 2SS Series Magnetoresistive digital position sensor

2SS Series position sensors have magnetoresistive material integrated on silicon and encapsulated in a plastic package. The integrated circuit provides a digital output in response to very low magnetic fields. Though this signal is identical to our digital Hall effect sensors, it can be achieved by magnetoresistive sensors at much greater sensor-to-magnet distances.

**Supply voltage:** 3.8 Vdc to 30 Vdc  
**Operating temperature:** -40 °C to 150 °C  
 -40 °F to 302 °F  
**Maximum operating point:** 25 Gauss  
**Minimum release point:** 5 Gauss



### OPTIONS

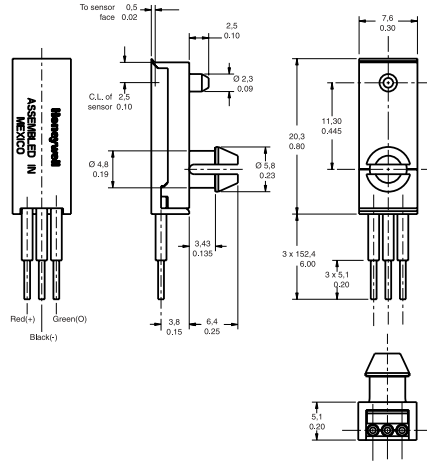
#### Omnipolar

PACKAGE STYLE	REFERENCE
Radial lead IC	2SS52M
Surface Mount	2SS52M-S

## SR13 Series Hall effect digital position sensor

SR13 series Hall-effect digital position sensors permit quick and easy sensor installation, with snap-in and flat mount sensor packages, and can house any of the present SS400 series sensors or any similarly sized sensing elements.

**Package style:** Plastic snap-in  
**Supply voltage:** 3.8 Vdc to 30 Vdc  
**Operating temperature:** -40 °C to 150 °C  
 -40 °F to 302 °F



### OPTIONS

MAXIMUM Operating Point and MINIMUM Release Point are specified @ 25 °C

#### Unipolar

OPERATING POINT (MAXIMUM)	RELEASE POINT (MINIMUM)	REFERENCE
180 Gauss	75 Gauss	SR13C-A1
115 Gauss	20 Gauss	SR13D-A1
390 Gauss	235 Gauss	SR13F-A1

#### Bipolar latching

OPERATING POINT (MAXIMUM)	RELEASE POINT (MINIMUM)	REFERENCE
85 Gauss	-85 Gauss	SR13R-A1

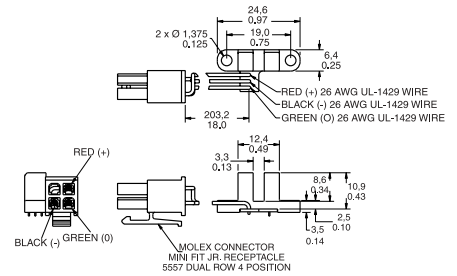
## SR16 Series Cost effective digital vane sensor

SR16 series competitively priced Hall-effect digital vane sensors contain an internal magnet and Hall effect sensor mounted in a twin tower configuration.

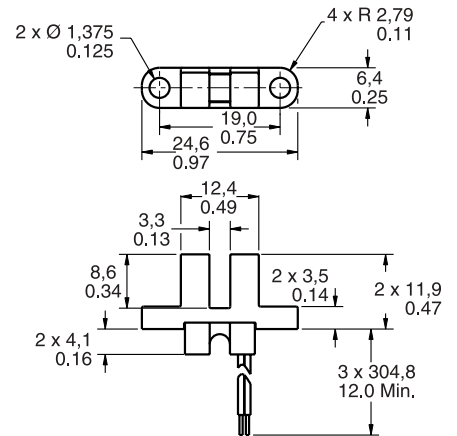
**Package style:** Dual tower  
**Supply voltage:** 3.8 Vdc to 30 Vdc  
**Operating temperature:** -20 °C to 85 °C  
 -4 °F to 185 °F

### OPTIONS

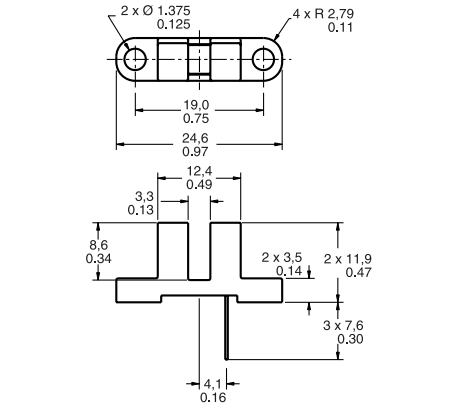
#### Type J4



#### Type J6



#### Type N



PACKAGE STYLE	REFERENCE
PCB/Molex 5557 connector	SR16C-J4
Wire exit	SR16C-J6
PCB mount leads	SR16C-N

# SR17 Series

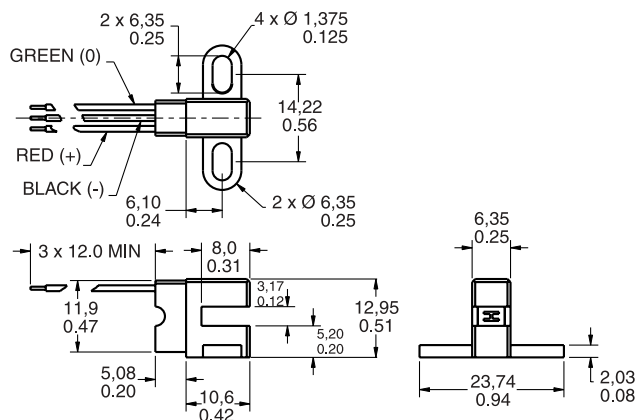
## Cost effective digital vane sensor

SR17 series competitively priced Hall-effect digital vane sensors are designed for position and speed sensing and are offered in a side-mount twin tower package.

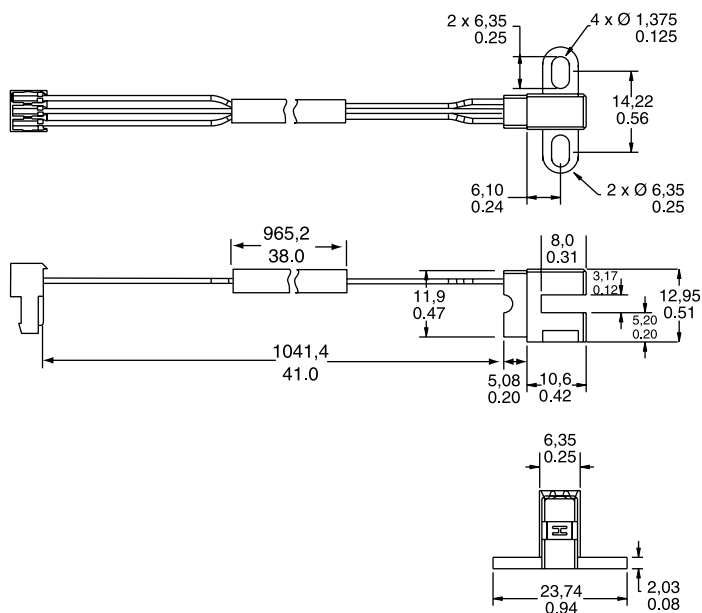
Package style: Side looker mounting  
 Supply voltage: 3.8 Vdc to 30 Vdc  
 Operating temperature: -20 °C to 85 °C  
 -4 °F to 185 °F

### OPTIONS

#### Type J6



#### Type J7



PACKAGE STYLE  
 Side mount wire exit  
 41 in wire leads and connector

REFERENCE  
 SR17C-J6  
 SR17C-J7

# Infrared Products



Optoelectronics is the integration of optical principles and semi-conductor electronics. Optoelectronic components are reliable, cost effective sensors. Standard infrared emitting diodes (IREDs), sensors and assemblies are covered.

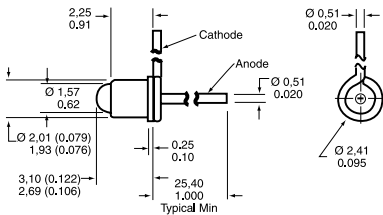
Infrared sensors are used for presence sensing, motion sensing, position encoding, limit sensing, movement detection and counting.

## Infrared emitting diodes

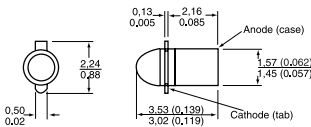
### OPTIONS

*Metal package, end-emitting*

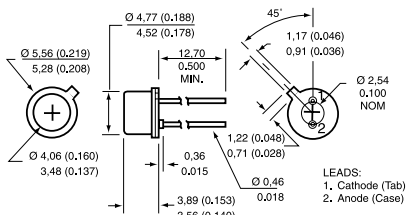
Coaxial, lead case - SE1450/1470(L)



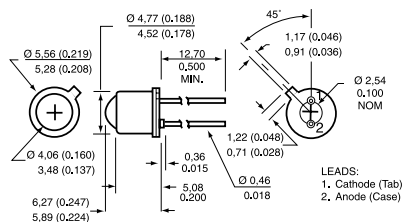
Miniature pill - SE2460/2470



TO-46, flat window - SE3455/3470



TO-46, dome lensed - SE5455/5470

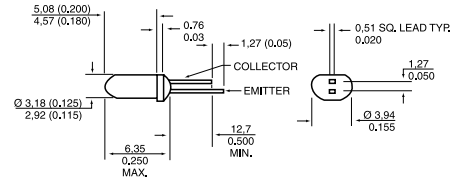


Operating temperature: -55 °C to 125 °C (-67 °F to 257 °F)

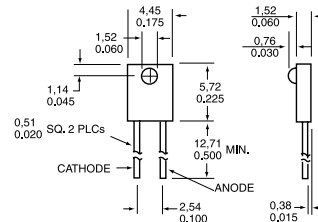
OUTPUT WAVELENGTH (nm)	BEAM ANGLE (°)	POWER OUTPUT	REFERENCE
935	24	0.70 mW min.	SE1450-003L
880	24	1.10 to 4.50 mW/cm <sup>2</sup>	SE1470-003L
935	18	1.00 mW min.	SE2460-003
880	18	6.0 mW/sr min.	SE2470-002
935	90	5.4 mW min.	SE3455-004
880	90	10.5 mW min.	SE3470-003
935	20	4.8 mW min.	SE5455-003
880	20	3.5 mW/cm <sup>2</sup> min.	SE5470-004

## Plastic package

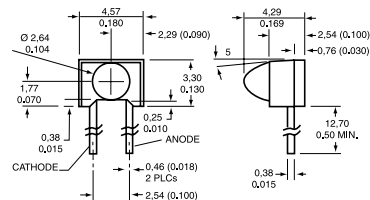
T1, end-emitting - SEP8505/8705



Side-emitting - SEP8506/8706



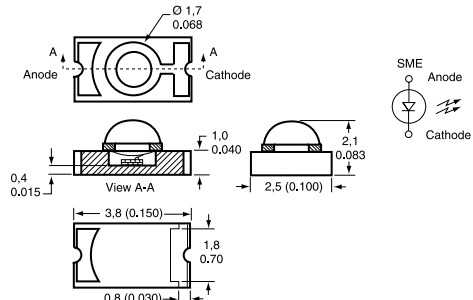
Side-emitting - SEP8736



Operating temperature: -40 °C to 85 °C (-40 °F to 185 °F)

OUTPUT WAVELENGTH (nm)	BEAM ANGLE (°)	POWER OUTPUT	REFERENCE
935	15	2.0 to 4.0 mW/cm <sup>2</sup>	SEP8505-003
935	50	0.33 to 0.52 mW/cm <sup>2</sup>	SEP8506-002
880	15	2.7 to 7.8 mW/cm <sup>2</sup>	SEP8705-003
880	10	1.7 to 3.0 mW/cm <sup>2</sup>	SEP8736-003

## Ceramic discrete surface mount - glass lens



**Note:**

This device can be mounted with the lens up or down, looking through PCB.

Operating temperature: -55 °C to 125 °C (-67 °F to 257 °F)

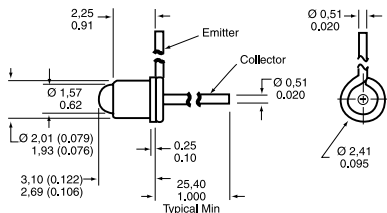
OUTPUT WAVELENGTH (NM)	BEAM ANGLE (°)	POWER OUTPUT	REFERENCE
880	24	0.60 mW/cm <sup>2</sup> min.	SME2470-021

# Phototransistors

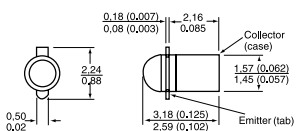
## OPTIONS

### Metal package

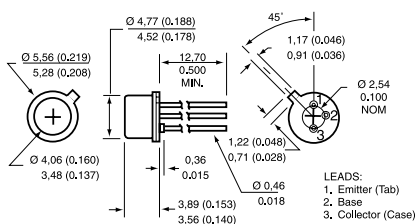
Coaxial, lead case - SD1440(L)



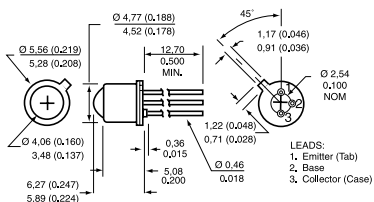
Miniature pill - SD2440



TO-46, flat window - SD3443



TO-46, dome lensed - SD5443

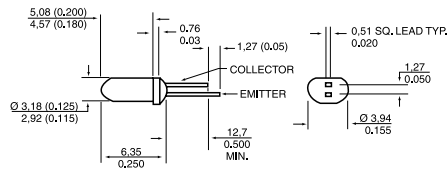


Operating temperature: -55 °C to 125 °C (-67 °F to 257 °F)

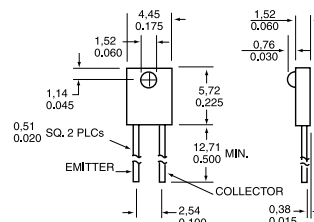
ANGULAR RESPONSE (°)	LIGHT CURRENT MINIMUM (mA)	REFERENCE
24	3.0	SD1440-003L
48	7.0	SD2440-004
90	2.0	SD3443-003
18	8.0	SD5443-003

### Plastic package

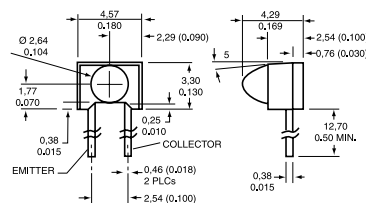
T1, end-looking - SDP8405



Side-looking - SDP8406



Side-looking - SDP8436

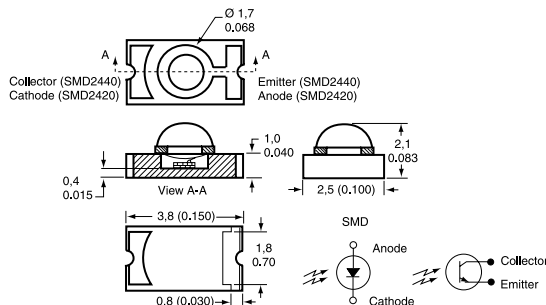


Operating temperature: -40 °C to 85 °C (-40 °F to 185 °F)

ANGULAR RESPONSE (°)	LIGHT CURRENT MINIMUM (mA)	REFERENCE
20	12.0	SDP8405-003
50	1.80	SDP8406-002
18	7.0	SDP8436-003

### Ceramic discrete surface mount - glass lens

Top-looking - SMD2420/2440



Note:

This device can be mounted with the lens up or down, looking through PCB.

Operating temperature: -55 °C to 125 °C (-67 °F to 257 °F)

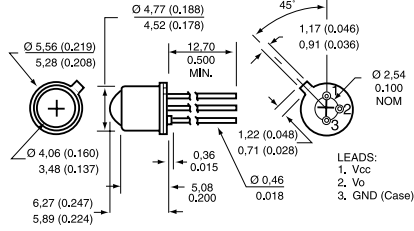
ANGULAR RESPONSE (°)	LIGHT CURRENT MINIMUM (mA)	REFERENCE
28	3.0	SMD2440-012

Optoschmitt detectors

OPTIONS

Metal package

TO-46, dome lensed

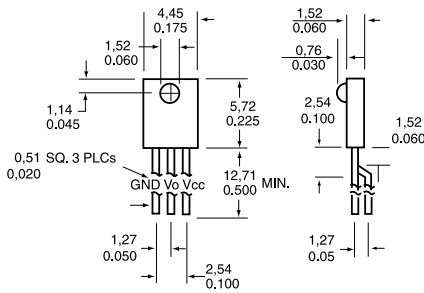


Operating temperature: -40 °C to 100 °C (-40 °F to 212 °F)  
 Supply voltage: 16.0 V  
 Output: 10 kOhm Pull-up  
 Angular response: 12°

OUTPUT LOGIC	TURN-ON THRESHOLD IRRADIANCE	REFERENCE
Buffer	2.5 mW/cm <sup>2</sup> max.	SD5600-001
Inverter	2.5 mW/cm <sup>2</sup> max.	SD5610-001
Buffer	0.25 mW/cm <sup>2</sup>	SD5620-001
Inverter	0.25 mW/cm <sup>2</sup>	SD5630-001

Plastic package

Side-looking



Operating temperature: -40 °C to 85 °C (-40 °F to 185 °F)  
 Supply voltage: 16.0 V  
 Output: 10 kOhm Pull-up  
 Angular response: 50°

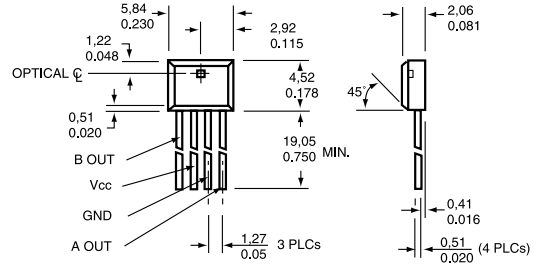
OUTPUT LOGIC	TURN-ON THRESHOLD IRRADIANCE	REFERENCE
Buffer	2.5 mW/cm <sup>2</sup> max.	SDP8600-001

Encoder sensors

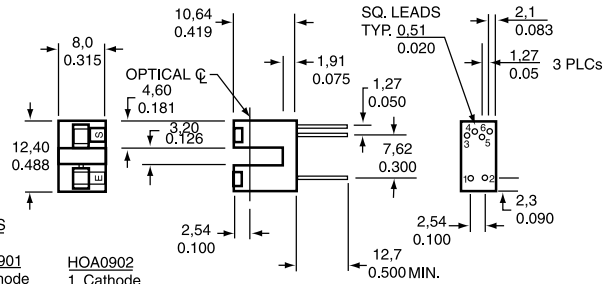
Operating temperature: -40 °C to 85 °C (-40 °F to 185 °F)  
 Turn-on threshold irradiance: 0.05 mW/cm<sup>2</sup> to 2.0 mW/cm<sup>2</sup>  
 Supply voltage: 4.5 Vdc to 5.5 Vdc  
 Package style: Plastic, PC mount

OPTIONS

Side-looking - HLC2705



PC mount - HOA0901/0902



OUTPUT OPTION	REFERENCE
Speed and direction	HLC2705-001
Direction, inverting logic	HOA0901-011
Speed and direction, 2 tachometer	HOA0902-011

NOTICE

Housings are soluble in chlorinated hydrocarbons and ketones. Recommended cleaning agents are methanol and isopropanol.

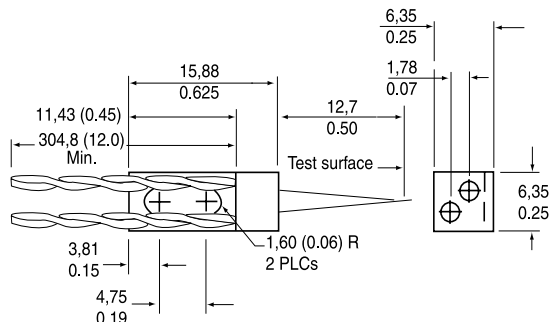


## Reflective sensors

### OPTIONS

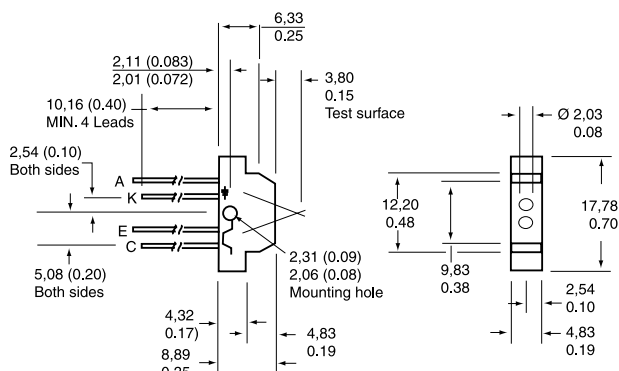
#### Metal components

#### Converging/focused optical axis - HOA1180

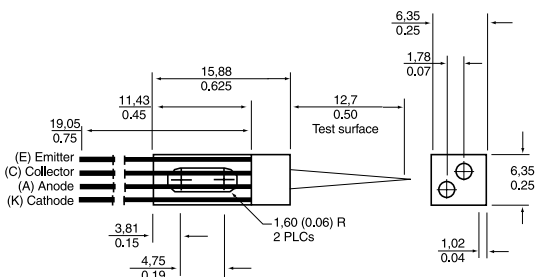


#### HOA Series

#### Converging/focused optical axis - HOA0149



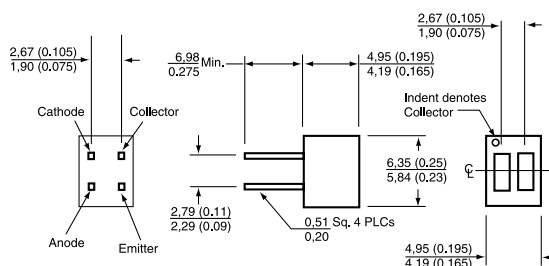
#### Converging/focused optical axis - HOA2498



Operating temperature: -55 °C to 100 °C (-67 °F to 212 °F)  
Output: Transistor

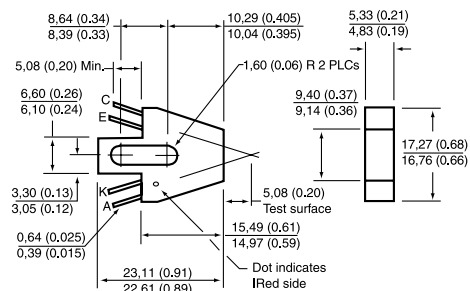
ON-STATE COLLECTOR CURRENT	REFERENCE
0.16 mA	HOA1180-002
0.16 mA	HOA2498-002

#### HOA1397



(1.27 mm/0.05 in) point of optimum response

#### Converging/focused optical axis - HOA1405

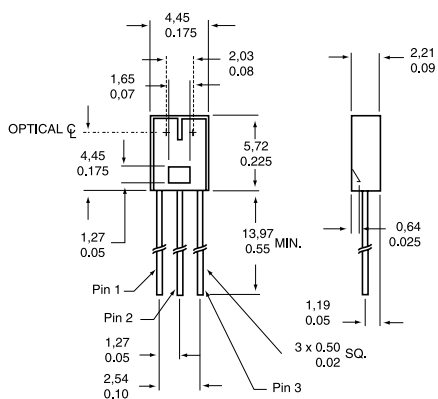


Operating temperature: -40 °C to 85 °C (-40 °F to 185 °F)  
Output: Transistor

	ON-STATE COLLECTOR CURRENT	REFERENCE
Low profile	0.60 mA	HLC1395-002
	1.00 mA	HOA0149-001
	0.70 mA	HOA1397-002
	0.80 mA	HOA1405-002

#### Plastic package

#### HLC1395 Series, short distance detection



(1.0 mm/0.04 in) point of optimum response

#### NOTICE

Housings are soluble in chlorinated hydrocarbons and ketones. Recommended cleaning agents are methanol and isopropanol.

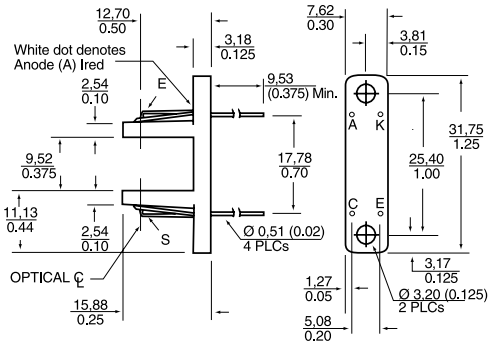
# Transmissive sensors, Phototransistor output

## OPTIONS

### Metal components

#### HOA1877

Aperture (emitter and detector):  $\varnothing 1,27 \text{ mm}$  (0.050 in)

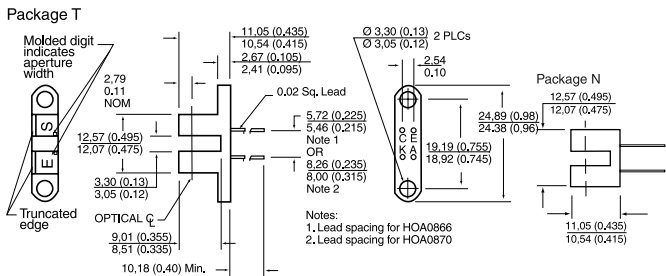


Operating temperature:  $-55 \text{ }^{\circ}\text{C}$  to  $100 \text{ }^{\circ}\text{C}$  ( $-67 \text{ }^{\circ}\text{F}$  to  $212 \text{ }^{\circ}\text{F}$ )  
Output: Transistor

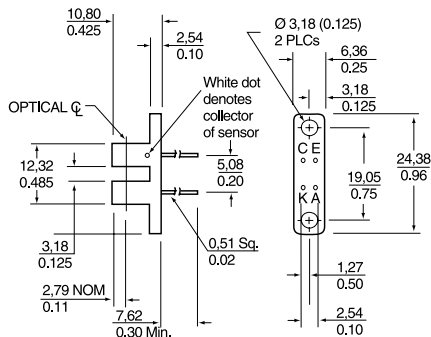
ON-STATE COLLECTOR CURRENT	REFERENCE
0.1 mA	HOA1877-001

### Plastic components

#### HOA086X/087X



#### HOA1879

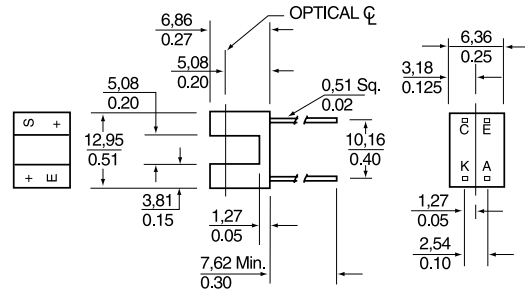


### NOTICE

Housings are soluble in chlorinated hydrocarbons and ketones. Recommended cleaning agents are methanol and isopropanol.

#### HOA1882

Aperture (emitter and detector):  $\varnothing 1,52 \text{ mm}$  (0.060 in)



### Plastic components, wire leads

#### HOA088X/089X

Wire colour code and functions

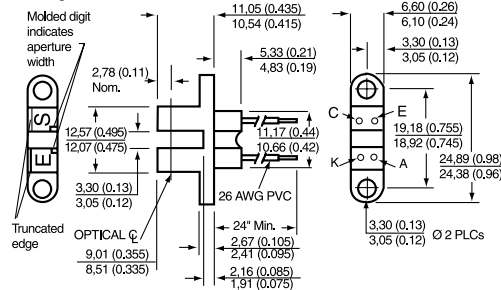
Red - IRED Anode

Black - IRED Cathode

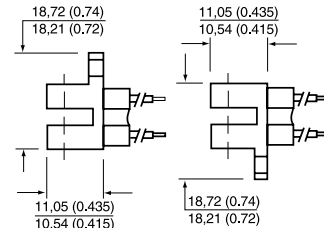
White - Detector Collector

Green - Detector Emitter

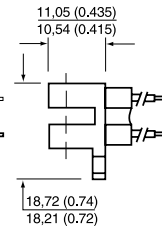
Package T



Package P



Package L



#### HOA1870

Wire colour code and functions:

Orange - IRED Anode

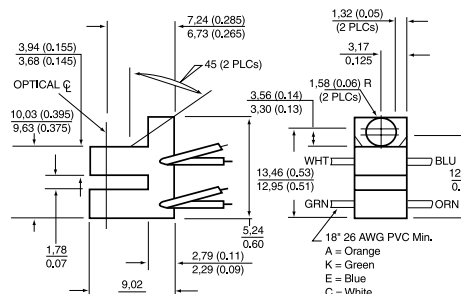
Green - IRED Cathode

White - Detector Collector

Blue - Detector Emitter

Aperture (emitter and detector):

0.15 mm (0.006 in) wide



Operating temperature:  $-40 \text{ }^{\circ}\text{C}$  to  $85 \text{ }^{\circ}\text{C}$  ( $-40 \text{ }^{\circ}\text{F}$  to  $185 \text{ }^{\circ}\text{F}$ )  
Output: Transistor

	ON-STATE COLLECTOR CURRENT	REFERENCE
	1.00 mA	HOA0866-T55
Opaque housing	0.50 mA	HOA0870-N51
	0.50 mA	HOA0880-P51
Opaque housing	0.50 mA	HOA0890-L55
	0.30 mA	HOA1870-031
	0.50 mA	HOA1879-015
	1.80 mA	HOA1882-012

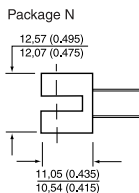
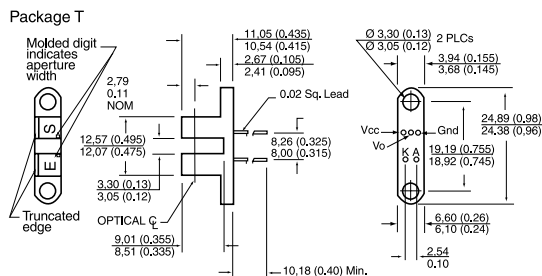
# Transmissive sensors, Optoschmitt output

## OPTIONS

### Plastic components

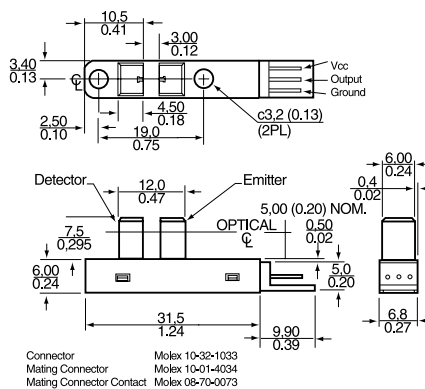
HOA096X/097X

HOA696X/697X



### Plastic components, integral 3 pin connector

HOA7720/30



Operating temperature: -40 °C to 70 °C (-40 °F to 158 °F)

	OUTPUT	OUTPUT LOGIC	HYSTERESIS	REFERENCE
Opaque housing	10 kOhm Pull-up	Buffer	10 %	HOA0961-N51
	10 kOhm Pull-up	Buffer	10 %	HOA0971-N51
	Open-Collector	Inverter	5 %	HOA6963-N51
Opaque housing	Totem-Pole	Inverter	5 %	HOA6972-N55
	Open-Collector	Buffer	5 %	HOA6981-L51
Opaque housing	Totem-Pole	Buffer	5 %	HOA6990-T51
	Totem-Pole	Inverter	5 %	HOA7720-M22
	Open-Collector	Inverter	5 %	HOA7730-M22

### Plastic components, wire leads

HOA698X/699X

#### Wire colour code and functions:

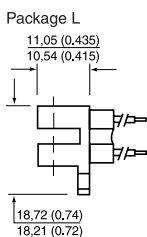
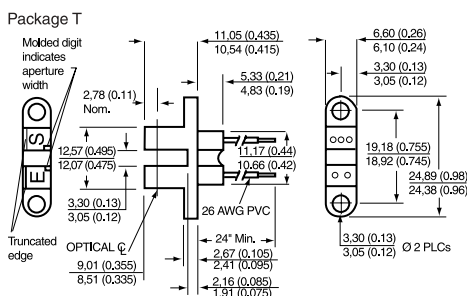
Red - IRED Anode

Black - IRED Cathode

Green - Detector Ground

White - Detector Vcc

Blue - Detector Output



## NOTICE

Housings are soluble in chlorinated hydrocarbons and ketones. Recommended cleaning agents are methanol and isopropanol.

# Current Sensors

Current sensors monitor ac or dc current. Included are adjustable linear, null balance, digital, and linear current sensors.

Digital current sensors can sound an alarm, start a motor, open a valve or shut down a pump. The linear signal duplicates the waveform of the current being sensed, and can be used as a feedback element to control a motor or regulate the amount of work being done by a machine.

## CSN Series Closed Loop Current Sensors



Closed loop current sensors measure ac, dc and impulse currents over 0-25, 0-50, 0-100, 0-600 and 0-1200 Amp ranges. The CSN series is based on the Hall effect principle and the null balance or zero magnetic flux method (feedback system). The magnetic flux in the sensor core is constantly controlled at zero. The amount of current required to balance zero flux is the measure of the primary current flowing through the conductor, multiplied by the ratio of the primary to secondary windings. This closed loop current is the output from the device and presents an image of the primary current reduced by the number of secondary turns at any time. This current can be expressed as a voltage by passing it through a resistor.

The CSN Series has a high overload capacity, a high level of electrical insulation between primary and secondary circuits and a rapid response rate. Lightweight and compact, and with no restriction on input current waveform, the sensors are ideal for variable speed drives, power supplies, feedback control systems, robotics/welding equipment and general overcurrent protection.

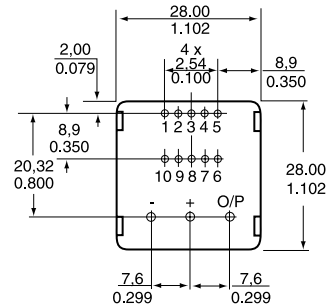
Sensed current type: ac or dc  
 EMC: EN 50082-2, EN 50081-2  
 Accuracy: ± 0.5 %

### OPTIONS

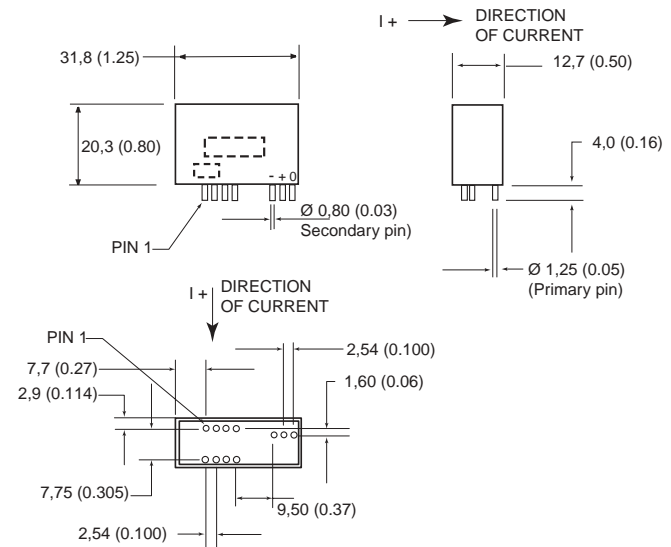
#### Multi turn PCB mounted

Housing material:  
 Mounting:

Bayblend KU2-1468 (UL94-V0)  
 PCB on 13 pins



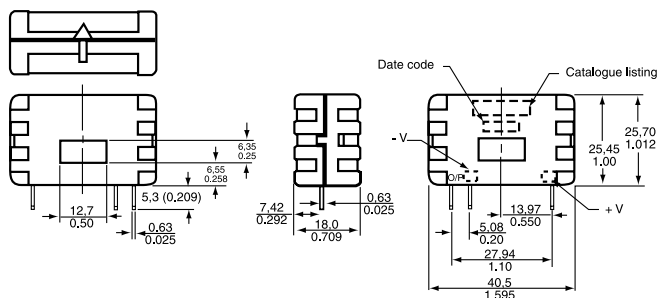
SENSED CURRENT RANGE	COIL TURNS	SUPPLY VOLTAGE	REFERENCE
± 36 A	1000 (110 Ohm coil)	± 15 Vdc	CSNE151



SENSED CURRENT RANGE	NOMINAL CURRENT	COIL TURNS	SUPPLY VOLTAGE	REFERENCE
± 90 A	25 A	1000 (66 Ohm coil)	± 12 Vdc to 15 Vdc	CSNE151-100
± 90 A	50 A	1000 (66 Ohm coil)	± 12 Vdc to 15 Vdc	CSNE151-200

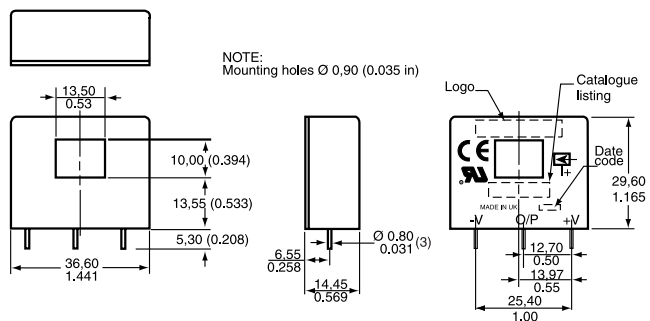
### Small housed style

Housing material: Bayblend FR 1440 (UL94-V0)  
 Mounting: PCB on 3 pins



SENSED CURRENT RANGE	COIL TURNS	SUPPLY VOLTAGE	REFERENCE
± 70 A	1000 (90 Ohm coil)	± 15 Vdc	CSNA111
± 90 A	1000 (50 Ohm coil)	± 13 Vdc	CSNC241-500
± 100 A	2000 (160 Ohm coil)	± 15 Vdc	CSNB121
± 100 A	2000 (130 Ohm coil)	± 15 Vdc	CSNB131

### Pinout style 'B'

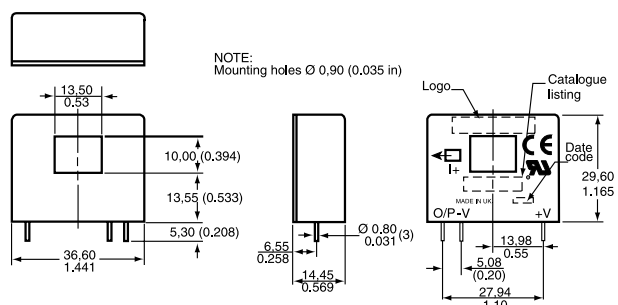


SENSED CURRENT RANGE	COIL TURNS	SUPPLY VOLTAGE	REFERENCE
± 150 A	1000 (30 Ohm coil)	± 12 to ± 15 Vdc	CSNF161
± 180 A	2000 (100 Ohm coil)	± 12 to ± 15 Vdc	CSNF151
± 200 A	2000 (100 Ohm coil)	± 12 to ± 15 Vdc	CSNR151
± 200 A	1000 (30 Ohm coil)	± 12 to ± 15 Vdc	CSNR161

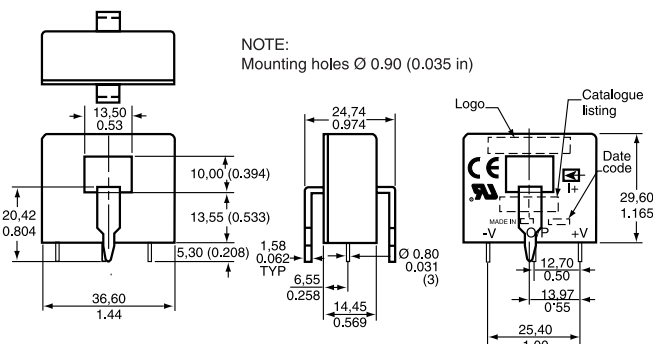
### Small housed family

Housing material: Bayblend KU2-1468 (UL94-V0)  
 Mounting: PCB on 3 pins

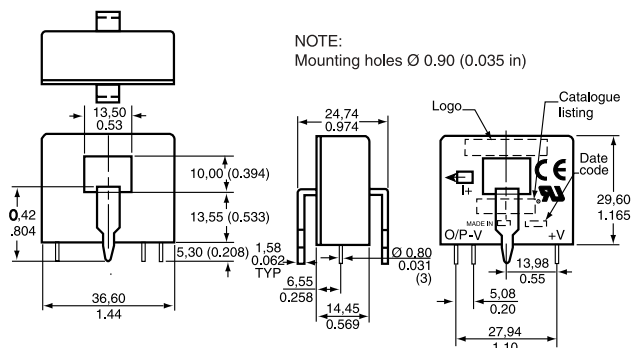
#### Pinout style 'A'



SENSED CURRENT RANGE	COIL TURNS	SUPPLY VOLTAGE	REFERENCE
± 90 A	1000 (30 Ohm coil)	± 12 to ± 15 Vdc	CSNP661
± 150 A	2000 (100 Ohm coil)	± 12 to ± 15 Vdc	CSNT651
± 180 A	2000 (100 Ohm coil)	± 15 Vdc	CSNG251



SENSED CURRENT RANGE	COIL TURNS	SUPPLY VOLTAGE	REFERENCE
± 150 A	1000 (30 Ohm coil)	± 12 to ± 15 Vdc	CSNF161-002
± 200 A	2000 (100 Ohm coil)	± 12 to ± 15 Vdc	CSNR151-002
± 200 A	1000 (30 Ohm coil)	± 12 to ± 15 Vdc	CSNR161-002



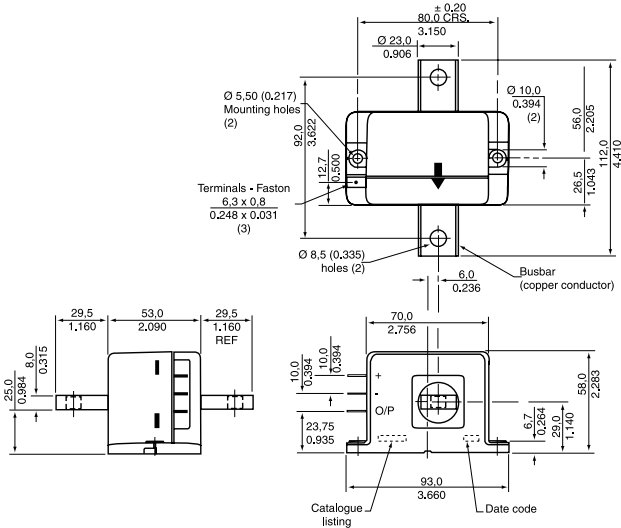
SENSED CURRENT RANGE	COIL TURNS	SUPPLY VOLTAGE	REFERENCE
± 90 A	1000 (30 Ohm coil)	± 12 to ± 15 Vdc	CSNP661-002
± 150 A	2000 (100 Ohm coil)	± 12 to ± 15 Vdc	CSNT651-001

## CSN Series Closed Loop Current Sensors (Continued)

### Mid range housed style

Housing material:  
Mounting:

Bayblend KU2-1468 (UL94-V0)  
Panel, spade terminals x 3

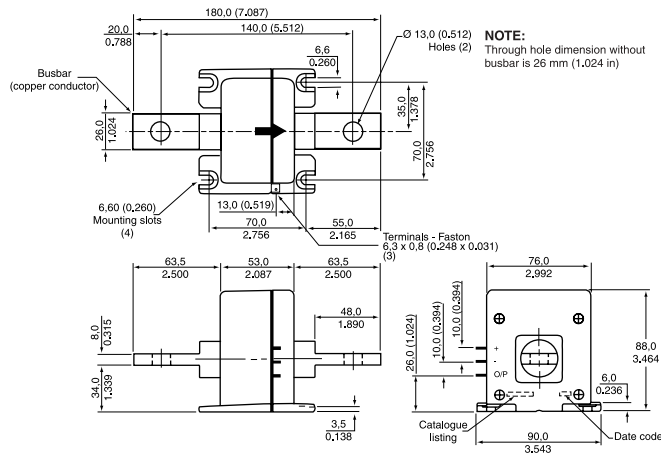


SENSED CURRENT RANGE	COIL TURNS	SUPPLY VOLTAGE	REFERENCE
± 600 A	2000 (25 Ohm coil)	± 12 to ± 18 Vdc	CSNJ481
± 600 A (fitted with busbar)	2000 (25 Ohm coil)	± 12 to ± 18 Vdc	CSNJ481-001

### Large housed style

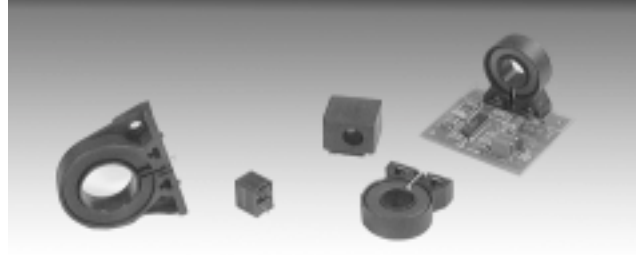
Housing material:  
Mounting:

Bayblend KU2-1468 (UL94-V0)  
Panel, spade terminals x 3



SENSED CURRENT RANGE	COIL TURNS	SUPPLY VOLTAGE	REFERENCE
± 1200 A	5000 (50 Ohm coil)	± 15 to ± 24 Vdc	CSNK591
± 1200 A (fitted with busbar)	5000 (50 Ohm coil)	± 15 to ± 24 Vdc	CSNK591-001

## CSLA Series Open Loop Current Sensors

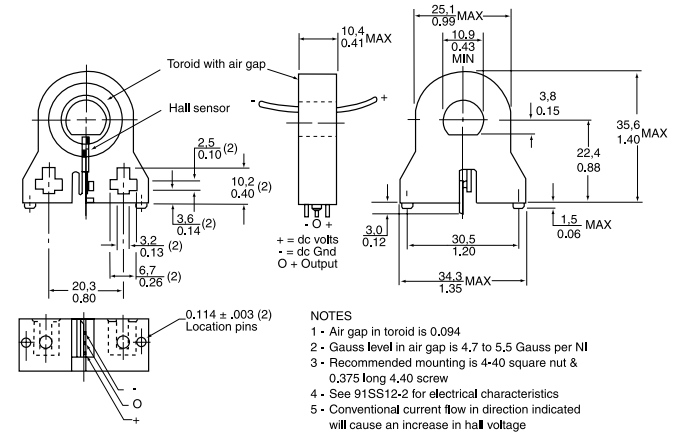


CS series linear current sensors incorporate our 91SS12-2 and SS94A1 linear output Hall effect transducer (LOHET™). These sensors cover measuring ranges from 0-950 Amps. The sensing element is assembled in a printed circuit board mountable housing. This housing is available in four configurations. Normal mounting is with 0.375 inch long 4-40 screw and square nut (not provided) inserted in the housing or a 6-20 self-tapping screw. The combination of the sensor, flux collector, and housing comprises the holder assembly. These sensors are ratiometric.

Sensed current type: ac or dc  
Housing: PBT Polyester

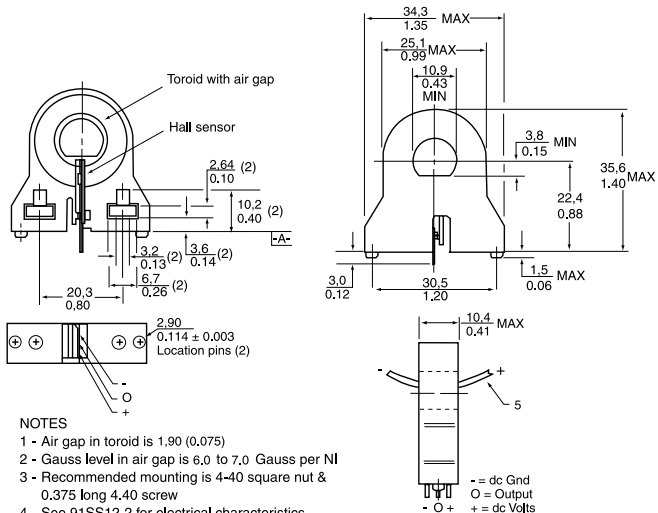
### OPTIONS

#### PCB bottom mount



SENSED CURRENT RANGE	SUPPLY VOLTAGE	REFERENCE
0 to 75 A	8 to 16 Vdc	CSLA1DE
0 to 92 A	6 to 12 Vdc	CSLA2DE
0 to 150 A	6 to 12 Vdc	CSLA2DG
0 to 225 A	8 to 16 Vdc	CSLA1DJ
0 to 225 A	6 to 12 Vdc	CSLA2DJ
0 to 325 A	8 to 16 Vdc	CSLA1DK
0 to 400 A	6 to 12 Vdc	CSLA2DK

PCB bottom mount

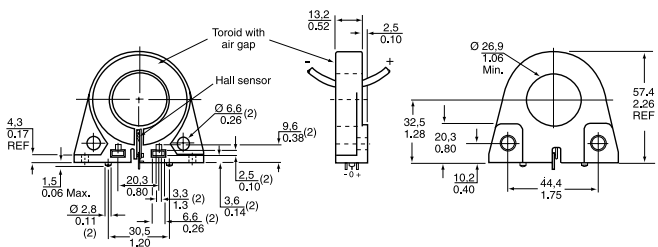


NOTES

- 1 - Air gap in toroid is 1.90 (0.075)
- 2 - Gauss level in air gap is 6.0 to 7.0 Gauss per NI
- 3 - Recommended mounting is 4-40 square nut & 0.375 long 4.40 screw
- 4 - See 91SS12-2 for electrical characteristics
- 5 - Conventional current flow in direction indicated will cause an increase in hall voltage

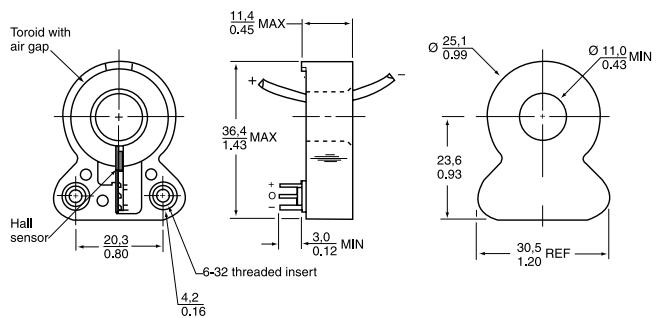
SENSED CURRENT RANGE	SUPPLY VOLTAGE	REFERENCE
0 to 57 A	8 to 16 Vdc	CSLA1CD
0 to 72 A	6 to 12 Vdc	CSLA2CD
0 to 100 A	8 to 16 Vdc	CSLA1CF
0 to 150 A	8 to 16 Vdc	CSLA1CH

PCB bottom mount



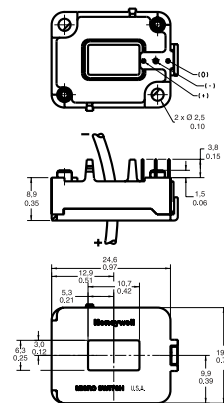
SENSED CURRENT RANGE	SUPPLY VOLTAGE	REFERENCE
0 to 310 A	6 to 12 Vdc	CSLA2EJ
0 to 550 A	6 to 12 Vdc	CSLA2EL
0 to 625 A	8 to 16 Vdc	CSLA1EL
0 to 765 A	6 to 12 Vdc	CSLA2EM
0 to 950 A	6 to 12 Vdc	CSLA2EN

PCB side mount



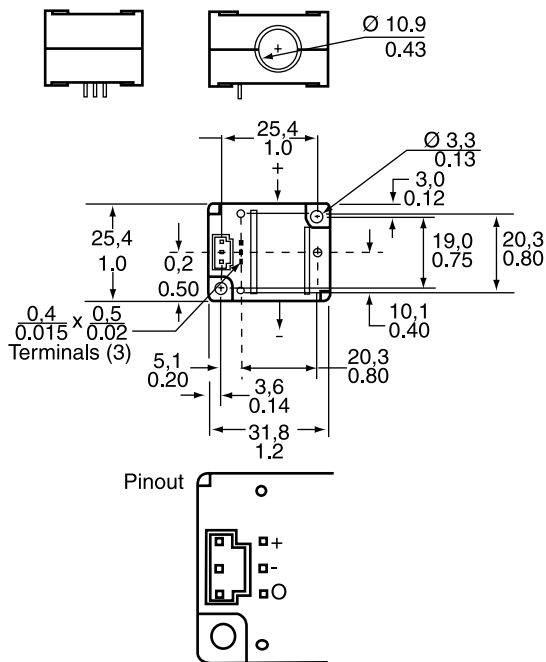
SENSED CURRENT RANGE	SUPPLY VOLTAGE	REFERENCE
0 to 57 A	8 to 16 Vdc	CSLA1GD
0 to 72 A	6 to 12 Vdc	CSLA2GD

PCB side mount



SENSED CURRENT RANGE	SUPPLY VOLTAGE	REFERENCE
± 45 A	4.5 to 10.5 Vdc	CSLH3A45

Digital current sensor



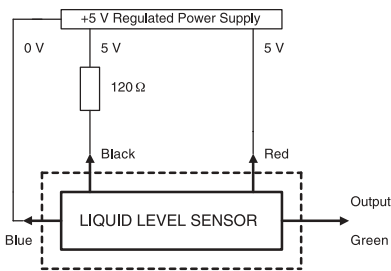
OPERATE CURRENT	SUPPLY VOLTAGE	REFERENCE
3.5 A.t Nominal	6 to 16 Vdc	CSDA1BC

# Liquid Level Sensors



## LL Series

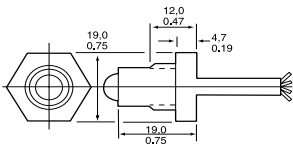
<b>Operating temperature:</b>	
Standard	-20 °C to 85 °C -4 °F to 185 °F
High temperature	-40 °C to 125 °C -40 °F to 257 °F
<b>Storage temperature:</b>	
Standard	-40 °C to 100 °C -40 °F to 212 °F
High temperature	-50 °C to 150 °C -58 °F to 302 °F



Liquid Level Sensor - LL Series

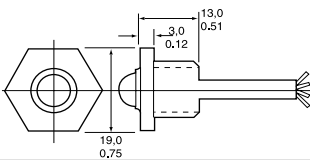
## OPTIONS

### Type 2



	<b>SEAL WASHER</b>	<b>REFERENCE</b>
High temperature	Vamac	LL102101

### Type 3



	<b>SEAL WASHER</b>	<b>REFERENCE</b>
Standard	Nitrile rubber	LL103000
High temperature	Vamac	LL103101

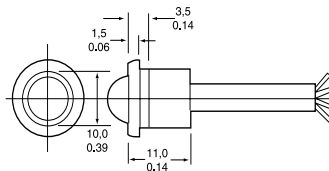
Honeywell liquid level sensor components incorporate a voltage level switch which provides a digital output that denotes the presence or absence of liquid.

The mode of operation is derived from the principle of total internal reflection. An LED and detector are housed within a plastic dome at the head of the device. When no liquid is present, all light from the LED is totally internally reflected from the dome boundary to the detector. When liquid covers the dome, the effective refractive index at the dome/liquid boundary changes, allowing some light from the LED to escape. Thus the amount of light received by the voltage level switch is reduced and the output switches, denoting the presence of liquid. This method of liquid level sensing is very fast, and instantaneous for water.

The LL Series is a basic component which requires external circuit protection; this protection is incorporated in the LLE Series.

<b>Housing:</b>	Polysulphone
<b>Termination:</b>	250 mm lead wires
<b>Supply voltage:</b>	+5 Vdc
<b>Pressure range:</b>	0 to 5 bar

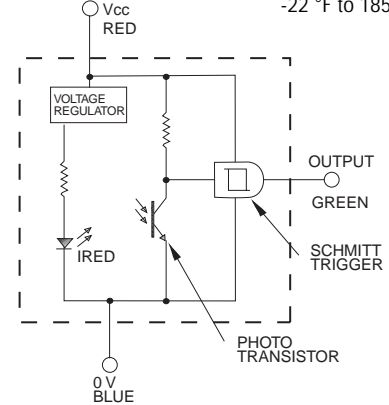
## Type 5



	<b>SEAL WASHER</b>	<b>REFERENCE</b>
High temperature	Nitrile rubber	LL105100

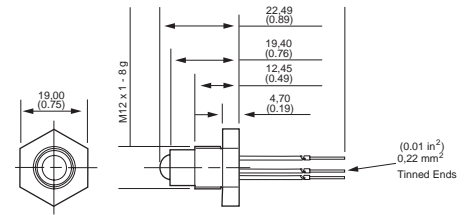
## LLE Series

<b>Operating temperature:</b>	-25 °C to 80 °C -13 °F to 176 °F
<b>Storage temperature:</b>	-30 °C to 85 °C -22 °F to 185 °F



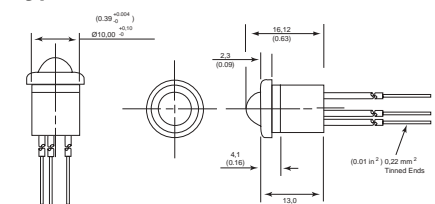
## OPTIONS

### Type 2



<b>SEAL WASHER</b>	<b>REFERENCE</b>
Nitrile rubber	LLE102000

### Type 5



<b>SEAL WASHER</b>	<b>REFERENCE</b>
Nitrile rubber	LLE105000



# Basic Switches



These listings include standard size basics, miniature, subminiature, switches. The precision snap-action mechanisms are offered with a wide variety of actuators and operating characteristics. Basic switches are ideal for applications requiring compactness, light weight, accurate repeatability and long life.

They are best used for presence/absence detection where physical contact with object is permissible. Very economical.

## BA/BE/BZ Series Basic Switches

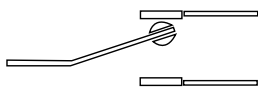
BA/BE/BZ Series Standard Basic Switches are used for simple or precision on/off application needs.

As well as the catalogue listings presented here, we offer other versions with higher temperature ratings, different termination options, different electrical ratings and Single Pole, Single Throw (SPST) circuitry. Refer to our website for details.

**Voltage:** 250 Vac  
**Electrical rating:** 16 A  
**Operating temperature:** -55 °C to 85 °C  
 -67 ° F to 185 ° F

**Termination:** Screw  
**Contact type:** Silver  
**Approvals:** CE, CSA, UL  
**Switching options:** SPDT

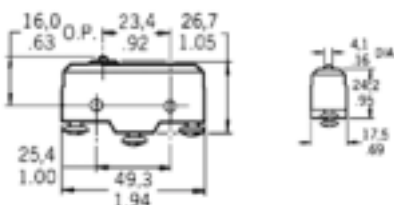
Single Pole, Double Throw



### OPTIONS

*Note: BA/BE plunger position distance from mounting hole = 19 mm (0.75 in)*

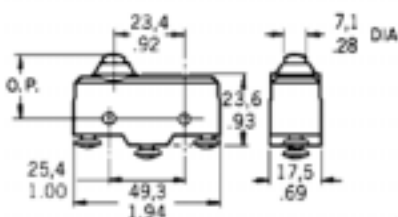
#### Top pin plunger



**Approvals:** BE-2R-A4 CSA, UL

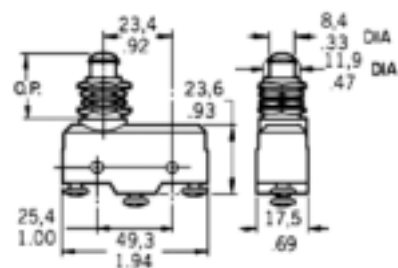
ELECTRICAL RATING	TERMINATION	REFERENCE
25 A	Solder	BZ-R
	Screw	BZ-R-A2
	Solder	BZ-R169
	Screw	BZ-2R-A2
	Screw	BE-2R-A4

#### Overtravel plunger - standard



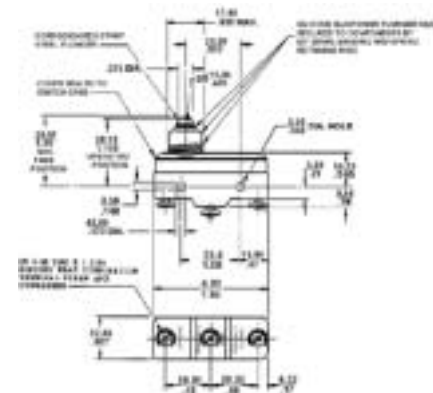
ELECTRICAL RATING	REFERENCE
20 A	BZ-2RD-A2 BA-2RB-A2

#### Panel mount overtravel plunger



ELECTRICAL RATING	APPROVALS	REFERENCE
20 A	DEMKO	BZ-2RQ1-A2 BA-2RQ1-A2

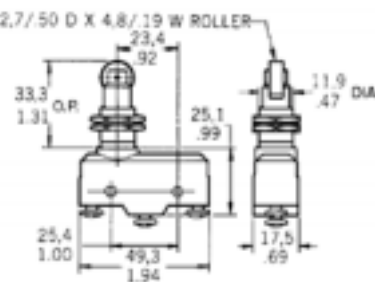
#### Overtravel plunger (splash resistant)



REFERENCE
BZ-2RDS-A2 BZ-2RDS-A2S

Stainless steel spring

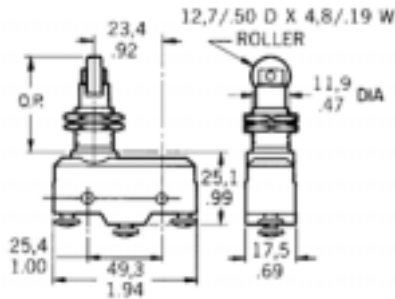
#### Overtravel roller plunger



REFERENCE
BZ-2RQ18-A2

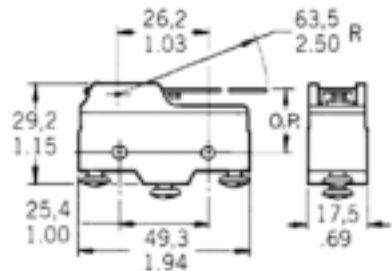
**BA/BE/BZ Series  
Basic Switches  
(Continued)**

*Overtravel roller plunger,  
perpendicular*



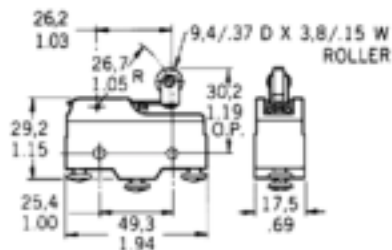
REFERENCE  
BZ-2RQ181-A2

*Straight lever*



ELECTRICAL RATING	APPROVALS	LEVER RADIUS	REFERENCE
20 A	DEMKO	No return spring 152.4 mm	BA-2RV-A2 BZ-2RW80-A2 BZ-2RW84-A2 BZ-2RW863-A2

*Roller lever*

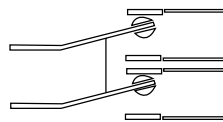


TERMINATION	LEVER RADIUS	REFERENCE
Solder		BZ-2RW822-A2 BZ-2RW822
Splash resistant	One way, 32.1 mm 48.3 mm	BZ-2RW8225551-A2 BZ-2RW826-A2 BZ-2RW82-A2

**DT Series Basic Switch**

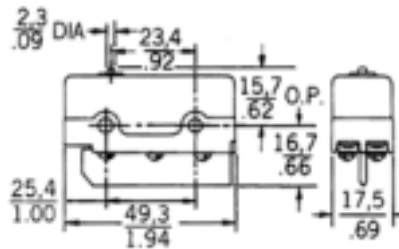
DT Series Standard Basic Switches consist of two independent single-pole double throw circuits in one housing actuated by one actuator. The terminals are separated by a non-conductive shield to reduce shorting.

**Voltage:** 250 Vac  
**Electrical rating:** 10 A  
**Operating temperature:** -55 °C to 85 °C  
 -67 °F to 185 °F  
**Termination:** Screw  
**Contact type:** Silver  
**Approvals:** CSA, UL  
**Switching options:** DPDT  
 Double Pole, Double Throw



**OPTIONS**

*Top pin plunger*



REFERENCE  
DT-2R-A7

**Basic Switch Accessories**

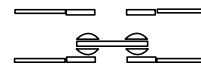
A range of accessories is available for BA, BE, BZ and DT switches, such as the 5PA2 terminal enclosure. For more information please contact your local sales office.

REFERENCE  
1TB1-2

**TB Series  
Miniature Double-break  
Basic Switch**

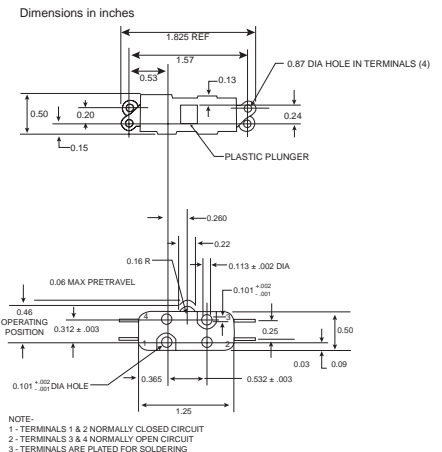
TB Series Miniature Double-break Basic Switches are basic double-break units that offer a means of controlling isolated circuits. Each circuit may be driven by an independent voltage source.

**Voltage:** 250 Vac  
**Electrical rating:** 10 A  
**Operating temperature:** -55 °C to 125 °C  
 -67 °F to 257 °F  
**Termination:** Solder  
**Contact type:** Silver  
**Approvals:** CSA, UL  
**Switching options:** (SPDT DB)  
 Single Pole, Double Throw, Double Break



**OPTIONS**

*Top pin plunger*



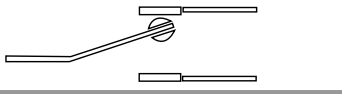
NOTE:  
 1- TERMINALS 1 & 2 NORMALLY CLOSED CIRCUIT  
 2- TERMINALS 3 & 4 NORMALLY OPEN CIRCUIT  
 3- TERMINALS ARE PLATED FOR SOLDERING

# SM and SX Series Subminiature Basic Switches

SM and SX Series Subminiature Basic Switches are used for simple or precision on/off application needs. These switches combine small size and light weight with ample electrical capacity, precision operation and long life. The SX Series are small, precision, snap-action switches that are ideal where savings in space and weight are important.

Voltage: 250 Vac  
 Operating temperature: -55 °C to 125 °C  
 -67 °F to 257 °F

Termination: Solder  
 Contact type: Silver  
 Switching options: SPDT  
 Single Pole, Double Throw

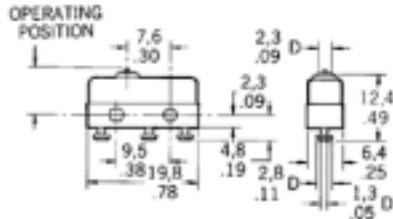


## SM Series

Approvals: CE, CSA, UL  
 Ampere rating: 5 A

### OPTIONS

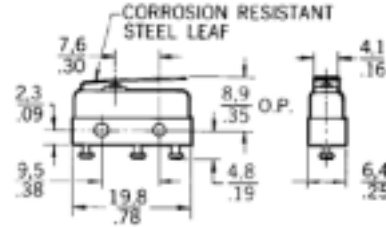
#### Top pin plunger



Approvals: 11SM601-H4 UL, CSA

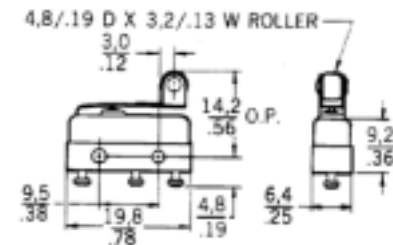
TERMINATION	REFERENCE
Quick connect	11SM601-H4

#### Straight lever



REFERENCE 111SM1  
 Lever length 4,83 mm

#### Roller lever



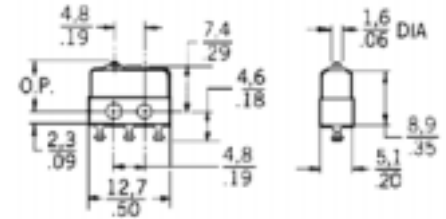
REFERENCE 111SM2-T

## SX Series

Approvals: CE, CSA, UL  
 Ampere rating: 5 A

### OPTIONS

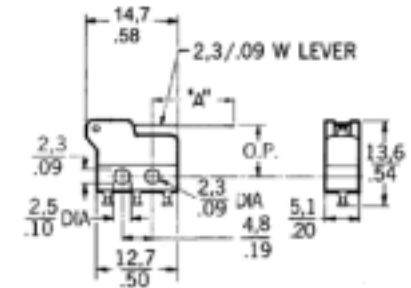
#### Top pin plunger



Approvals: 6SX7-T UL, CSA

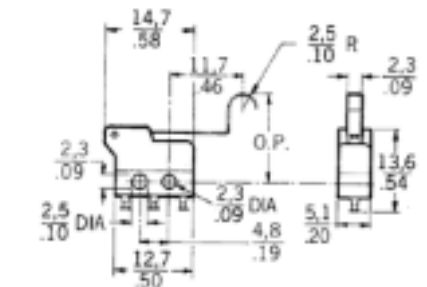
CONTACTS	AMPERE RATING	REFERENCE
Silver	7 A	1SX1-T
Silver	3 A	11SX1-T
Gold	1 A	6SX7-T

#### Straight lever



REFERENCE 311SX2-T  
 311SX3-T  
 Lever length 'A' 12,8 mm  
 Lever length 'A' 24,5 mm

#### Simulated roller



REFERENCE 311SX5-T

## ZM, ZX, ZV and ZW Series Subminiature Basic Switches

ZM, ZX, ZV and ZW Series Subminiature Basic Switches are cost-effective devices used for simple on/off applications. These switches combine small size and light weight with ample electrical capability and long life. Plastic lever capability is available on the ZV Series.

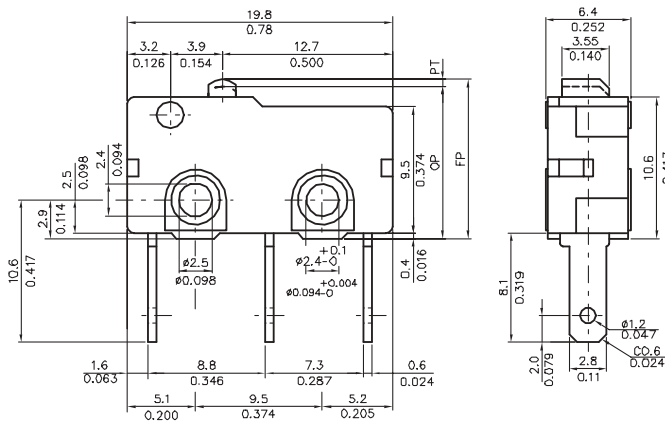
**Electrical rating:** 0.1 A, 3 A, 5 A or 10.1 A  
**Voltage:** 125/250 Vac  
**Operating temperature:** 25 °C to 85 °C [-13 °F to 185 °F]  
**Termination:** Quick connect, solder, PCB  
**Contact type:** Gold or silver  
**Switching options:** SPDT

### ZM Series

**Approvals:** UL/CSA  
**Electrical rating:** 0.1 A, 5 A or 10.1 A

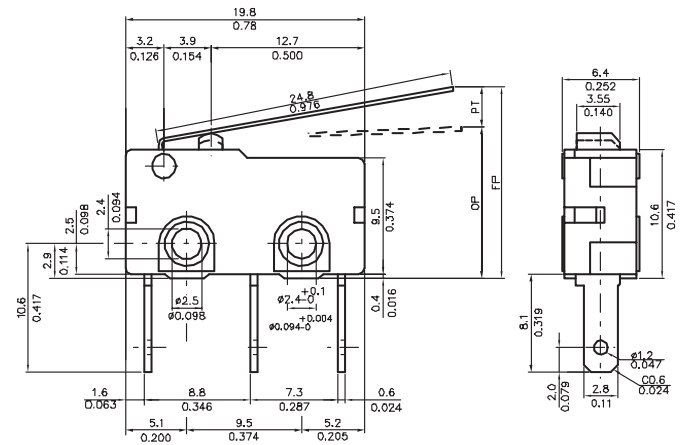
### OPTIONS

#### Top pin plunger



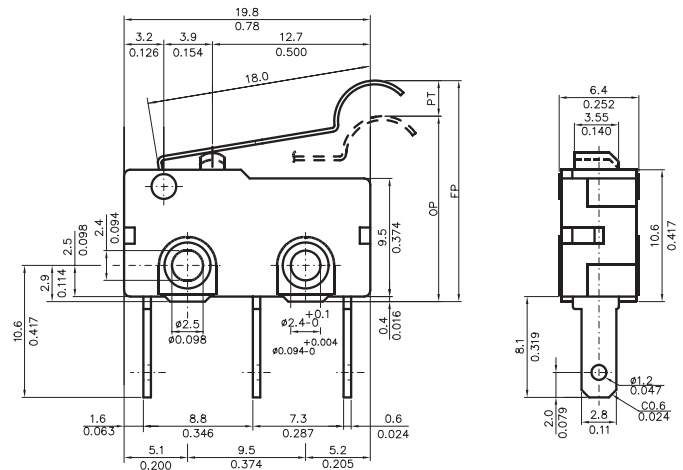
TERMINATION	ELECTRICAL RATING	CONTACT TYPE	REFERENCE
Quick connect	5 A	silver	ZM50E70A01
Solder	5 A	silver	ZM50E10A01
PCB	10.1 A	silver	ZM90G20A01
Solder	0.1 A	gold	ZM10B10A01

#### Straight lever



TERMINATION	ELECTRICAL RATING	CONTACT TYPE	REFERENCE
Quick connect	5 A	silver	ZM50E70D01
Solder	5 A	silver	ZM50E10D01

#### Simulated roller lever



TERMINATION	ELECTRICAL RATING	CONTACT TYPE	REFERENCE
Quick connect	5 A	silver	ZM50E70E01
Solder	5 A	silver	ZM50E10E01

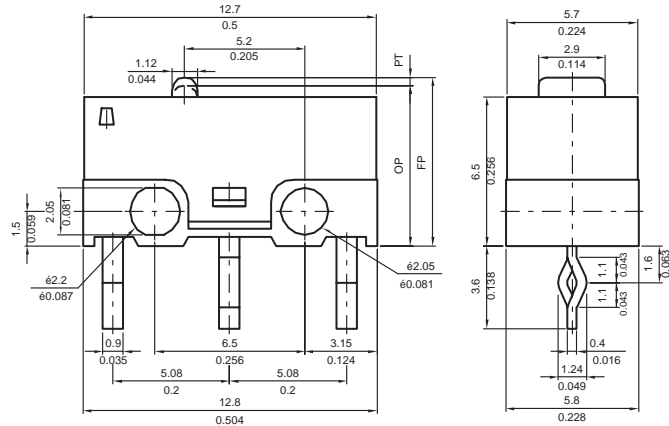
## ZX Series

Approvals:  
Electrical rating:

UL/CSA  
0.1 A or 3 A

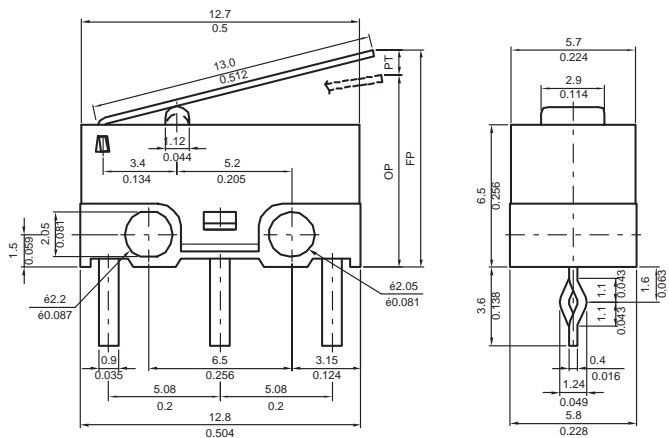
### OPTIONS

#### Top pin plunger



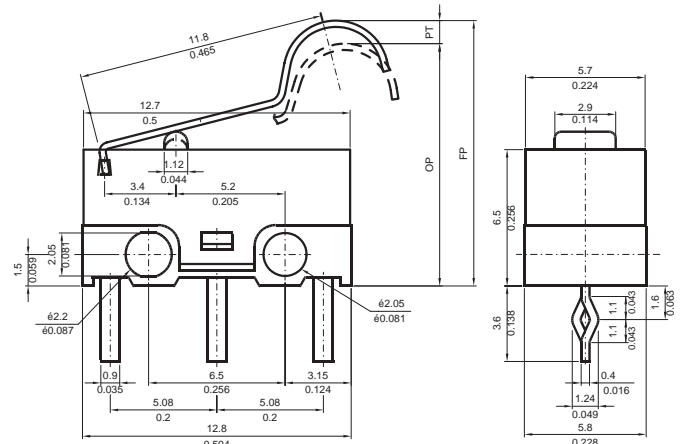
TERMINATION	ELECTRICAL RATING	CONTACT TYPE	REFERENCE
PCB	3 A	silver	ZX40E30A01
Solder	0.1 A	gold	ZX10C10A01

#### Straight lever



TERMINATION	ELECTRICAL RATING	CONTACT TYPE	REFERENCE
PCB	3 A	silver	ZX40E30C01
Solder	3 A	silver	ZX40E10C01

#### Simulated roller lever



TERMINATION	ELECTRICAL RATING	CONTACT TYPE	REFERENCE
PCB	3 A	silver	ZX40E30E01
Solder	3 A	silver	ZX40E10E01

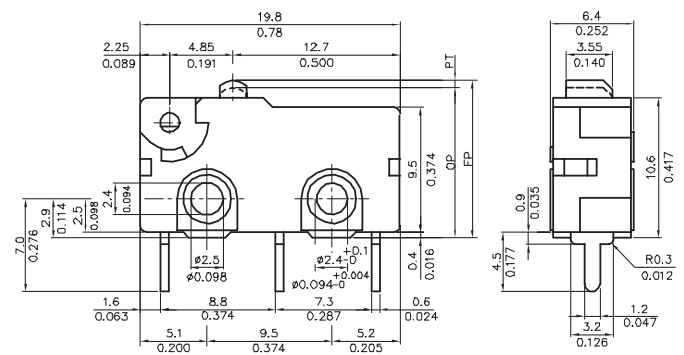
## ZV Series

Approvals:  
Electrical rating:

UL/ENEC  
0.1 A, 5 A or 10.1 A

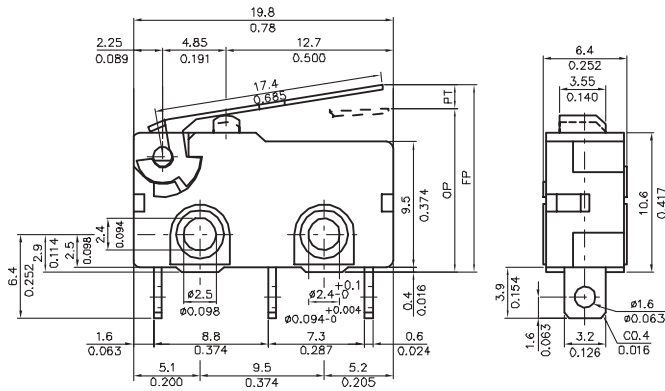
### OPTIONS

#### Top pin plunger



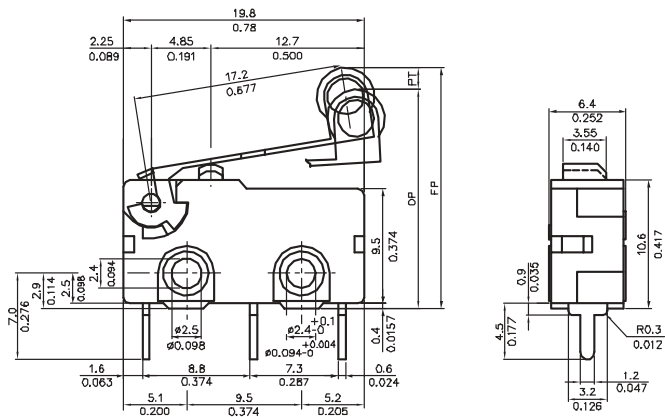
TERMINATION	ELECTRICAL RATING	CONTACT TYPE	REFERENCE
PCB	5 A	silver	ZV50E20A01
Solder	5 A	silver	ZV50E10A01
Quick connect	0.1 A	gold	ZV10B70A01

*Straight lever*



TERMINATION	ELECTRICAL RATING	CONTACT TYPE	REFERENCE
Solder	5 A	silver	ZV50E10B01
Quick connect	5 A	silver	ZV50E70C01

*Roller lever*



TERMINATION	ELECTRICAL RATING	CONTACT TYPE	REFERENCE
PCB	5 A	silver	ZV50E20F01
Quick connect	5 A	silver	ZV50E70F01

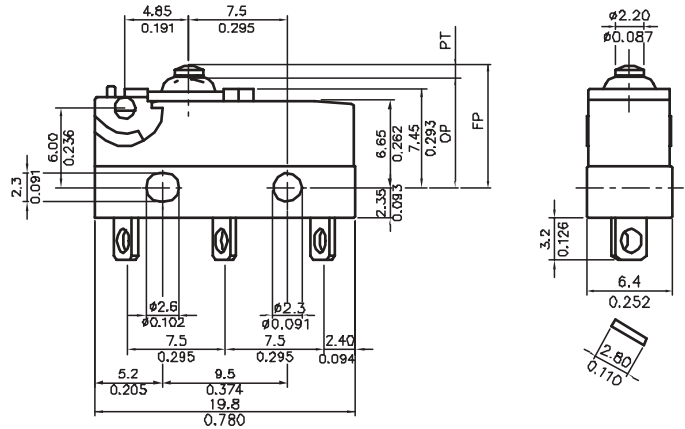
**ZW Sealed Series**

Approvals:  
Electrical rating:

UL/ENEC  
0.1 A or 5 A

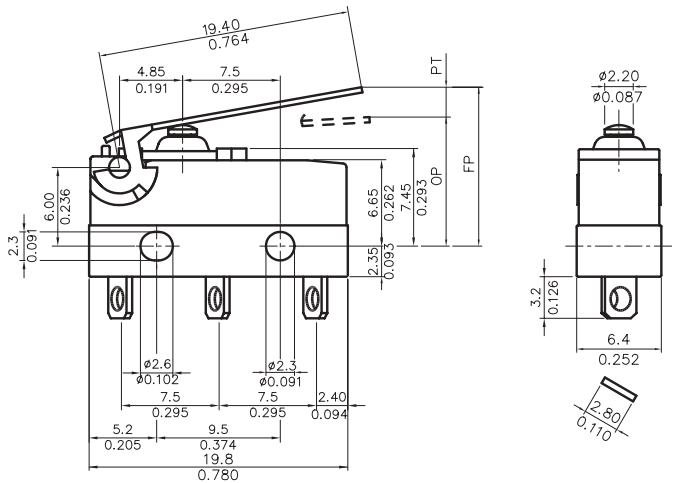
**OPTIONS**

*Top pin plunger*



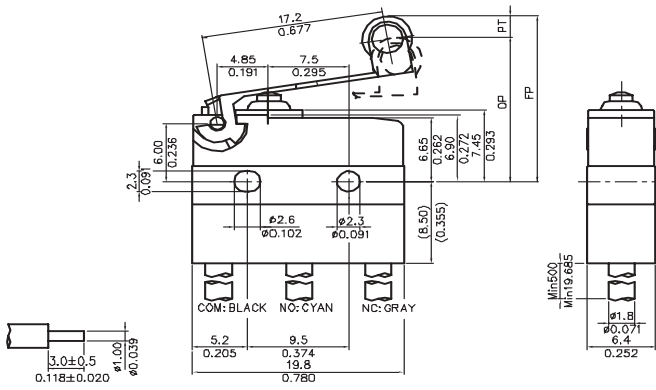
TERMINATION	ELECTRICAL RATING	CONTACT TYPE	REFERENCE
Solder	5 A	silver	ZW50F15AD1

*Straight lever*



TERMINATION	ELECTRICAL RATING	CONTACT TYPE	REFERENCE
Solder	0.1 A	gold	ZW10E15CD1

Roller lever



TERMINATION	ELECTRICAL RATING	CONTACT TYPE	REFERENCE
Wire leads	0.1 A	gold	ZW10E90FW1

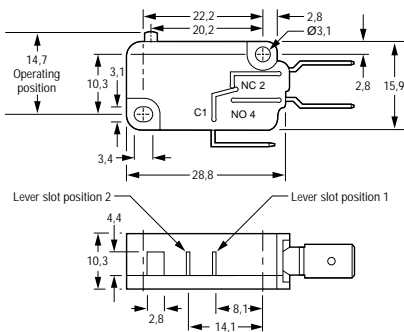
## V5 Series Miniature Basic Switches

V5 Series Basic Switches are used for simple or precision on/off, end of limit, presence/absence, pressure, temperature and manual operator interface application needs.

<b>Voltage:</b>	250 Vac
<b>Operating temperature:</b>	Standard -55 °C to 85 °C -67 °F to 185 °F
High temperature	-55 °C to 150 °C -67 °F to 302 °F
<b>Termination:</b>	6,3 mm x 0,8 mm Quick connect (QC)
<b>Contact type:</b>	Silver/silver cadmium oxide
<b>Electrical rating:</b>	V5A 20 A V5B/P/R 16 A V5C/D 10 A V5S 22 A
<b>Switching options:</b>	SPDT Single Pole Double Throw

### OPTIONS

#### Top pin plunger

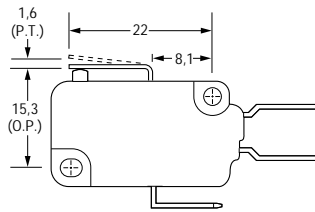


APPROVALS	REFERENCE
CE, ENEC	V5A010CB
CE, CSA, ENEC, UL	V5B010CB3
CE, CSA, UL	4,8 mm x 0,5 mm QC
CE, ENEC	V5B010FB3
CE, ENEC	Solder terminals
CE, ENEC	V5B010TB
CE, ENEC	High temperature
CE, ENEC	V5B210CB
CE, ENEC	V5C010BB
CE, CSA, ENEC, UL	4,8 mm x 0,5 mm QC
CE, CSA, ENEC, UL	V5C010EB3
CE, CSA, ENEC, UL	Solder terminals
CE, ENEC	V5C010TB3
CE, ENEC	V5P010CB

APPROVALS	SWITCHING OPTIONS	REFERENCE
CE, ENEC	SPNO	V5D030BB
CE, ENEC	SPNO	V5R030CB
CE, BEAB	SPNC	V5S020CB
CE, BEAB	SPNO	V5S030CB

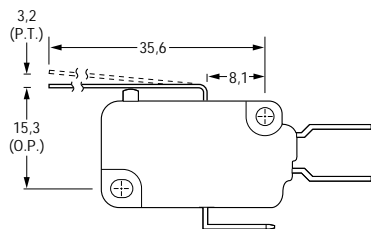
### Straight lever

#### Type B



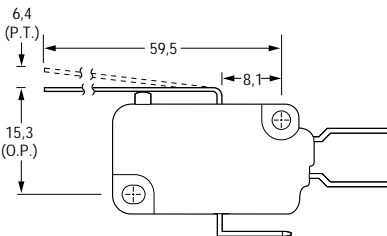
APPROVALS	REFERENCE
CE, CSA, ENEC, UL	V5C010BB3B

#### Type C



APPROVALS	REFERENCE
CE, ENEC	High temperature
	V5B210CB1C

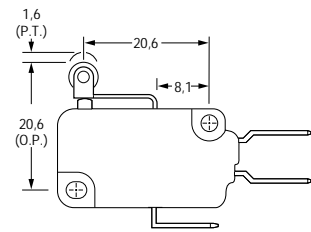
#### Type G



APPROVALS	REFERENCE
CE, ENEC	V5C010BB1G

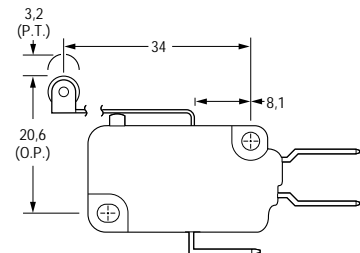
### Roller lever

#### Type D



APPROVALS	REFERENCE
CE, CSA, ENEC, UL	High temperature
CE, CSA, ENEC, UL	V5B210CB3D
	V5C010BB3D

#### Type E



APPROVALS	REFERENCE
CE, CSA, ENEC, UL	Lever position 2
CE, ENEC	High temperature
	V5A010CB4E
	V5B210CB1E



## V7 Series Miniature Basic Switches

V5 and V7 Series Basic Switches are used for simple or precision on/off, end of limit, presence/absence, pressure, temperature and manual operator interface application needs.

The V7 Series also offers listings with Single Pole, Single Throw circuitry (available in either normally open (NO) or normally closed (NC) configurations). Refer to our website for details.

### Operating temperature:

Standard -40 °C to 82 °C  
 -40 °F to 180 °F  
 High temperature -40 °C to 200 °C  
 -40 °F to 350 °F

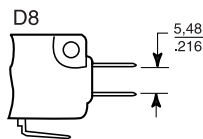
**Termination:** Quick connect (QC)  
 D8, E8 - 4,8 mm (0.187 in) x 0.5 mm (0.02 in)  
 E9 - 6,35 mm (0.25 in) x 0,80 mm (0.032 in)  
 Printed circuit board (PCB)

Electrical rating	Contact Type
V7-*A 5 A	Silver
V7-*B 11 A	Silver
V7-*C/W 15 A	Silver
V7-*D 1 A	Gold alloy
V7-*E 10 A	Silver
V7-*S 100 mA	Gold alloy
V7-*V 21 A	Silver alloy
V7-*Z 25 A	Silver cadmium oxide

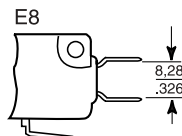
**Approvals:** CSA, UL, ENEC  
 V7-\*C/D/W CSA, UL  
**Switching options:** SPDT  
 Single Pole Double Throw

## AVAILABLE TERMINALS

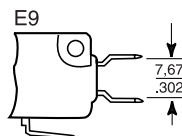
### Quick Connect (QC)



D8 terminals are European approved when used with electrical ratings A, B, D, E or S. International approving agencies require that switches with these terminals have insulated receptacles or connector.

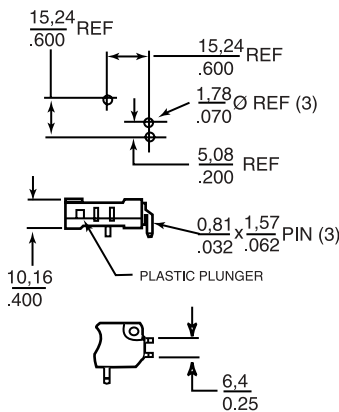


E8 terminals are European approved when used with electrical ratings A, B, D, E or S.



E9 terminals are European approved when used with electrical ratings A, B, D, E, S, V or Z.

### Printed circuit board (PO2)

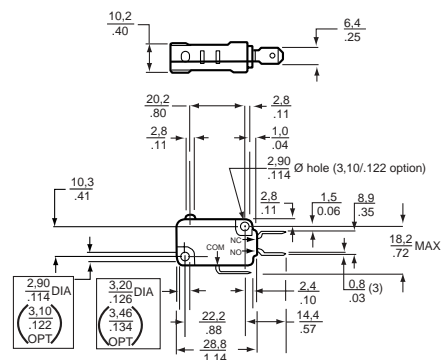


These terminals interface with snap-on receptacles and other components from AMPNODU interconnection system.

PCB terminals are European approved when used with electrical ratings A, B, D, E, S.

## OPTIONS

### Top pin plunger

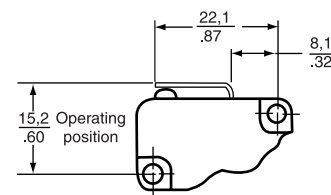


**Note:** The optional mounting hole dimensions shown above are standard on V5/V7 International Series switches.

VOLTAGE	TERMINATION	REFERENCE
250 Vac		V7-1A17D8
250 Vac	PCB	V7-1A17P02
250 Vac		V7-1B17D8
250 Vac		V7-1B19E9
250 Vac		V7-1C17D8
277 Vac		V7-1C17E9
277 Vac		V7-1C18E9
125 Vac		V7-1D10D8
277 Vac		V7-1E10D8
277 Vac	PCB	V7-1E17P02
277 Vac		V7-1E19E9
125 Vac		V7-1S17D8
277 Vac		V7-1V19E9
250 Vac		V7-1Z19E9
250 Vac		V7-2A17E9
250 Vac		V7-2B17D8
277 Vac	PCB	V7-2B17P02
125 Vac		V7-2S17D8
250 Vac		V7-3A17D8
277 Vac		V7-3E10E8
277 Vac		V7-3E10E9
277 Vac		V7-3E17D8
277 Vac		V7-3E17E9
125 Vac		V7-3E19E9
250 Vac		V7-3S17E9
250 Vac		V7-4A17D8
125 Vac		V7-4A18E9
125 Vac		V7-4S17D8
125 Vac		V7-5D17E9
277 Vac		V7-6B19D8
277 Vac		V7-6C17D8
277 Vac		V7-7A19D8

### Straight lever

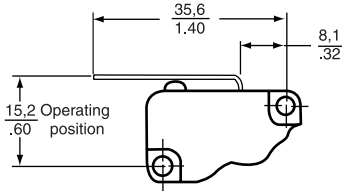
#### Type -002



VOLTAGE	REFERENCE
277 Vac	V7-1C17D8-002
277 Vac	V7-1C17E9-002
277 Vac	V7-2B17E9-002
277 Vac	V7-6C18D8-002

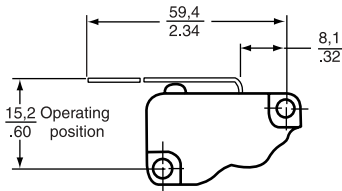
**V7 Series  
Miniature Basic Switches  
(Continued)**

*Straight lever*  
Type -022



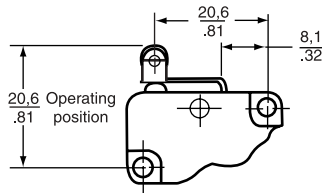
VOLTAGE	REFERENCE
250 Vac	V7-1A17D8-022
277 Vac	V7-1B19D8-022
277 Vac	V7-1C17D8-022
277 Vac	V7-1C18E9-022
125 Vac	V7-1S17D8-022
250 Vac	V7-2A17D8-022
277 Vac	V7-2B17D8-022
125 Vac	V7-2S17D8-022
277 Vac	V7-3E17E9-022
125 Vac	V7-3S17D8-022
125 Vac	V7-3S17E9-022

Type -048



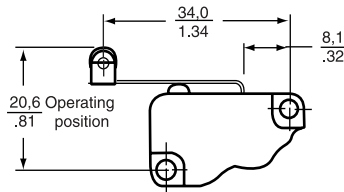
VOLTAGE	REFERENCE
277 Vac	V7-1B17D8-048
277 Vac	V7-1C17D8-048
277 Vac	V7-1V19E9-048
277 Vac	V7-2B17D8-048
277 Vac	V7-2B19E9-048
125 Vac	V7-3S17D8-048
277 Vac	V7-6C18D8-048
250 Vac	High temperature V7-9W1AE9-048

*Roller lever*  
Type -201



VOLTAGE	REFERENCE
277 Vac	V7-1C17D8-201
277 Vac	V7-1C17E9-201
125 Vac	V7-1S17D8-201
277 Vac	V7-2B17D8-201
125 Vac	V7-2S17D8-201
277 Vac	V7-7B17D8-201

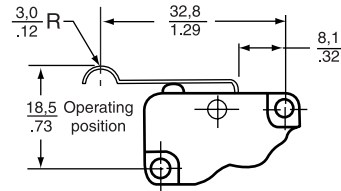
Type -207



VOLTAGE	REFERENCE
277 Vac	V7-1B10E9-207
277 Vac	V7-1C17D8-207
277 Vac	V7-1C17E9-207
125 Vac	V7-1S17D8-207
277 Vac	V7-1V19E9-207
250 Vac	V7-2A17D8-207
277 Vac	V7-2B17D8-207
125 Vac	V7-7D17D8-207

*Simulated roller lever*

Type -263



VOLTAGE	REFERENCE
277 Vac	V7-1B17D8-263
277 Vac	V7-1C17D8-263
125 Vac	V7-1S17D8-263
125 Vac	V7-2S17D8-263
125 Vac	V7-3S17E9-263
277 Vac	V7-6C17D8-263
277 Vac	V7-7B19D8-263

## Index

111-103EAJ-H01	22	135-502FAF-J01	18	1865-04G-L-N	14
111-104HAK-H01	22	135-502FAG-J01	18	1865-05G-L-N	14
111-202CAK-B01	22	135-503LAF-J01	18	1865-01G-K-N	14
111-202CAK-H01	22	135-503LAG-J01	18	1865-02G-K-N	14
111-303EAK-B01	22	135-503LFW-J01	18	1865-03G-K-N	14
111-802EAJ-B01	22	135-504QAG-J01	18	1865-04G-K-N	14
111-802EAJ-H01	22	140-102FAG-RB1	20	1865-05G-K-N	14
111SM1	59	140-103LAG-RB1	20	192-102DET-A01	20
111SM2-T	59	140-104QAG-RB1	20	192-102DEV-A01	20
11SM1	59	140-302LAG-RB1	20	192-102DEW-A01	20
11SM601-H4	59	140-501FAG-RB1	20	192-103LET-A01	20
11SX1-T	59	140-502LAG-RB1	20	192-103LEV-A01	20
112-102EAJ-B01	21	140-503QAG-RB1	20	192-103LEW-A01	20
112-103FAJ-B01	21	141PC15G	9	192-104OET-A01	20
112-103FAJ-H01	21	142-102FAG-RB1	21	192-104QEV-A01	20
112-104KAJ-B01	21	142-103LAG-RB1	21	192-104QEW-A01	20
112-104KAJ-H01	21	142-104QAG-RB1	21	192-222LET-A01	20
112-105PAJ-B01	21	142-302LAG-RB1	21	192-222LEV-A01	20
112-201BAJ-B01	21	142-501FAG-RB1	21	192-222LEW-A01	20
112-202EAJ-B01	21	142-502LAG-RB1	21	192-302LET-A01	20
112-202EAJ-H01	21	142-503QAG-RB1	21	192-302LEV-A01	20
112-203HAJ-B01	21	142PC01D	9	192-302LEW-A01	20
112-204KAJ-B01	21	142PC01G	9	192-303KET-A01	20
112-502EAJ-B01	21	142PC02G	9	192-303KEV-A01	20
112-502EAJ-H01	21	142PC05D	9	192-303KEW-A01	20
112-503JAJ-B01	21	142PC05D97	9	192-303OET-A01	20
112-504NAJ-B01	21	142PC05G	9	192-303QEV-A01	20
112-604NAJ-H01	21	142PC15A	9	192-303QEW-A01	20
115-202CDK-801	23	142PC15AW95	9	192-502LET-A01	20
115-802EDJ-801	23	142PC15G	9	192-502LEV-A01	20
120-102EAJ-Q01	22	143-101FAG-RC1	20	192-502LEW-A01	20
120-103FAJ-Q01	22	143-102LAG-RC1	20	192-503OET-A01	20
120-104KAJ-Q01	22	143-103QAG-RC1	20	192-503QEV-A01	20
120-202EAJ-Q01	22	143-201FAG-RC1	20	192-503QEW-A01	20
120-502JAJ-Q01	22	143-302LAG-RC1	20	195-101CAG-A01	19
121-102EAJ-Q01	22	143-303QAG-RC1	20	195-102DAG-A01	19
121-103FAJ-Q01	22	143-501FAG-RC1	20	195-103LAG-A01	19
121-104KAJ-Q01	22	143-502LAG-RC1	20	195-104QAG-A01	19
121-105PAJ-Q01	22	143-503QAG-RC1	20	195-202LAG-A01	19
121-106QAJ-Q01	22	143PC03D	9	195-203LAG-A01	19
121-202EAJ-Q01	22	143PC05DW	9	195-301CAG-A01	19
121-202KAJ-Q01	22	145-101FAG-RC1	21	195-302LAG-A01	19
121-502EAJ-Q01	22	145-102LAG-RC1	21	195-303KAG-A01	19
121-502JAJ-Q01	22	145-103QAG-RC1	21	195-501DAG-A01	19
121-504NAJ-Q01	22	145-201FAG-RC1	21	195-502LAG-A01	19
135-102DAG-J01	18	145-301FAG-RC1	21	195-503QAG-A01	19
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135-103FAG-J01	18	145-303QAG-RC1	21	197-102DAG-A01	19
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135-104LAF-J01	18	145-503QAG-RC1	21	197-202LAG-A01	19
135-104LAG-J01	18	162PC01D	9	197-203LAG-A01	19
135-104LFW-J01	18	163PC01D36	9	197-301CAG-A01	19
135-105QAG-J01	18	163PC01D48	9	197-302LAG-A01	19
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135-203LAG-J01	18	163PC01D75	9	197-501DAG-A01	19
135-203LFW-J01	18	164PC01D37	9	197-502LAG-A01	19
135-204QAG-J01	18	164PC01D76	9	197-503QAG-A01	19
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135-303KAG-J01	18	1865-02G-L-N	14	198-102DAG-A01	19
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198-202LAG-A01	19	40PC015V1A	8	CSDA1BC	55
198-203LAG-A01	19	40PC030G1A	8	CSLA1CD	55
198-301CAG-A01	19	40PC100G1A	8	CSLA1CF	55
198-302LAG-A01	19	40PC150G1A	8	CSLA1CH	55
198-303KAG-A01	19	40PC250G1A	8	CSLA1DE	54
198-501DAG-A01	19	40PC500G1A	8	CSLA1DJ	54
198-502LAG-A01	19	6SX7-T	59	CSLA1DK	54
198-503QAG-A01	19	ASDX001D44R	8	CSLA1EL	55
199-101CAG-A01	19	ASDX001G24R	8	CSLA1GD	55
199-102DAG-A01	19	ASDX005D44R	8	CSLA2CD	55
199-103LAG-A01	19	ASDX005G24R	8	CSLA2DE	54
199-104QAG-A01	19	ASDX015A24R	8	CSLA2DG	54
199-202LAG-A01	19	ASDX015D44R	8	CSLA2DJ	54
199-203LAG-A01	19	ASDX015G24R	8	CSLA2DK	54
199-301CAG-A01	19	ASDX030A24R	8	CSLA2EJ	55
199-302LAG-A01	19	ASDX030D44R	8	CSLA2EL	55
199-303KAG-A01	19	ASDX030G24R	8	CSLA2EM	55
199-501DAG-A01	19	ASDX100A24R	8	CSLA2EN	55
199-502LAG-A01	19	ASDX100D44R	8	CSLA2GD	55
199-503QAG-A01	19	ASDX100G24R	8	CSLH3A45	55
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24PCCFA6D	4	AWM43300V	10	CSNF161	53
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24PCDFA6G	4	AWM5104VC	11	CSNJ481-001	54
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