



# Temperature Switches

## General Instructions

This instruction provides information for mounting, electrical connection, process connection, and calibration of SOR® Temperature Switches.

The SOR Inc. Temperature Switch consists of a pressure switch with a sealed temperature sensing bulb attached directly to the pressure port. (An optional remote temperature sensing bulb may be connected to the pressure port with an armor-clad capillary.) The temperature sensing system is pressure filled with a volatile fluid. Process temperature changes cause proportional vapor pressure changes in the temperature sensing bulb that act on the diaphragm/ piston assembly to actuate and deactuate a snap-action electrical switching element at discrete process temperatures. The instrument's behavior is determined by vapor pressure (105 range model fill media is inert gas).



**NOTE: If you suspect that a product is defective, contact the factory or the SOR® Representative in your area for a return authorization number (RMA). This product should only be installed by trained and competent personnel.**

*Design and specifications are subject to change without notice.*

*For latest revision, go to [www.sorinc.com](http://www.sorinc.com)*

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## Installation

### Direct-Mount Probe

The temperature sensing probe is rigidly attached to the instrument's body/housing.

- ① Carefully insert the sensing probe into the process through a suitable fitting or thermowell. The standard process connection is 1/2-inch NPT(M).
- ② Ensure that ample clearance exists before rotating the instrument housing to make threaded connection.
- ③ Tighten the probe hex fitting with 1-1/8-inch open-end wrench for a leak free fit.

**NOTE: A locally customized mounting bracket may be used if more support is desired. Housings L, S, TA, V1, V2, LC, SC, BA, B3, B4, B5 and B6 are not recommended for direct mount where vibration is expected. These housings should be securely mounted to a flat surface (bulkhead or panel rack) or pipe stanchion.**

### Remote-Mount Probe — Capillary

- ① Secure the housing-mounting pad to bulkhead, panel rack or pipe stanchion with suitable 1/4-inch (6.35 mm) bolts.
- ② Mounting by electrical conduit connection is NOT recommended.



***When mounting to an irregular or uneven surface, install rubber washers on bolts between the housing and mounting surface (except for high vibration applications) to prevent deformation of housing, which could change relative positions of internal parts and affect calibration or render device inoperative.***

- ③ Suggested mounting orientation is electrical conduit connection at 3 or 9 o'clock and sensing body at 6 o'clock. However, the device is not position sensitive and may be mounted in any position. If a breather drain is installed, it must be oriented at 6 o'clock (pointing down) so condensation will drain. It must be kept clear of paint and foreign matter.
- ④ Carefully insert the sensing probe into the process through a suitable fitting or thermowell. Adjust the desired insertion length. Tighten the probe hex fitting with a 7/8" open-end wrench. Tighten 9/16" hex nut to fingertight. Then hold the 7/8" fitting with a wrench and tighten the 9/16" hex nut an additional 1-1/4 turns from finger tight. Avoid sharp bends in capillary.

## **Safety Integrity Level (SIL) Installation Requirements**

The SOR pressure switches have been evaluated as Type-A safety related hardware. To meet the necessary installation requirements for the SIL system, the following information must be utilized:

- Proof Test Interval shall be one year.
- Units may only be installed for use in Low Demand Mode.
- Products have a HFT (Hardware Fault Tolerance) of 0, and were evaluated in a 1oo1 (one out of one) configuration.

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## **Process Connection**

The temperature sensing probe is 300 series stainless steel. If the process is compatible, it may be directly inserted into the process without the use of a thermowell. Best results are obtained when the probe is completely immersed in the process. A thermowell increases response time (lag). A thermowell filled with thermal transfer media reduces lag.

## Electrical Connection



*The Switching Element Assembly has been precisely positioned in the housing at the factory for optimum performance. Any inadvertent movement or replacement in the field will degrade performance and could render the device inoperative, unless factory authorized procedures are followed.*

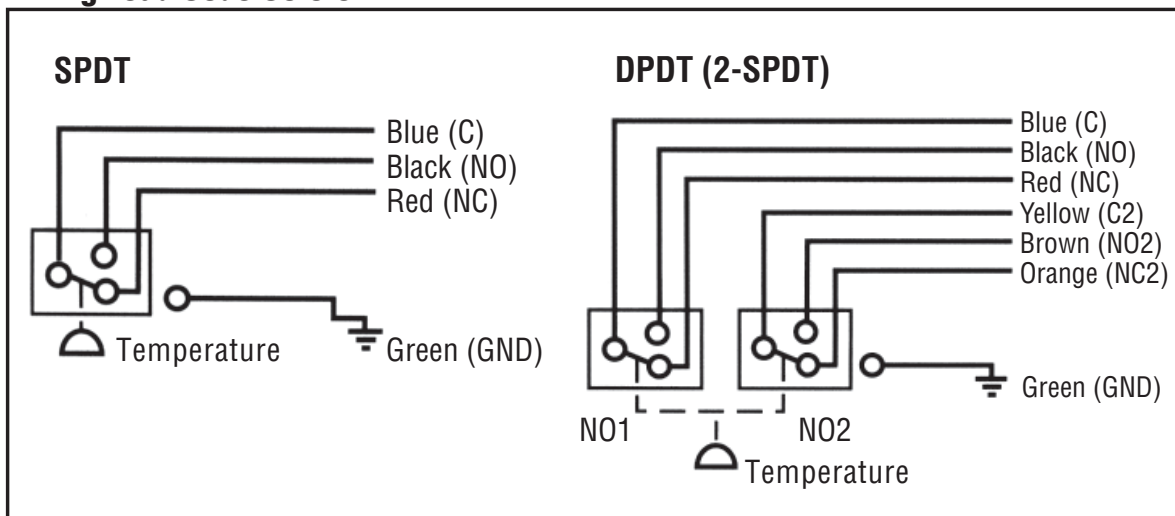
When making electrical connections, use care to apply minimal strain to the electrical switching element. Refer to wiring schematic below for terminal and wire codes.

Ensure that wiring conforms to all applicable local and national electrical codes and install unit(s) according to relevant national and local safety codes.

### Wiring Schematics

Housing Type	Conduit Connection	Contact Termination	Contact Identification
Open Bracket	None	Screw Terminals	Stamped on insulation
		Wire leads	Color coded and marked
All others	3/4 NPT(F), M 20 x 1.5 (F), or 1/2 NPT(M) unless optional adapter is specified	Screw terminals	Stamped on insulation
		Wire leads	Color coded and marked
		Terminal strip	Stamped on insulation

### Wiring Lead Code Colors



## Calibration

- Disconnect electrical power to the temperature switch.

**NOTE:** *It is not necessary to disconnect electrical power with the Big Hermet series or models in B3, B4, B5 and B6 housings provided that only the cover fastened with four captive screws over Set Point adjustment is removed.*

- Remove the housing cover (or weathertight cap).



**Units in Hazardous Locations – Prior to calibration, make sure that the work area is declassified before removing the explosion proof cover to calibrate the unit. Failure to do so could result in severe personal injury or substantial property damage.**

### For instruments with 1/8” hex Allen wrench set point adjustment under weathertight cap:

- Use 1/8” hex Allen wrench to turn adjusting screw to achieve desired set point.
- Turn the adjusting screw clockwise (in) to increase set point and counterclockwise (out) to decrease set point.
- A calibration scale is not installed, so external measurement of the process temperature is necessary. Consult the factory.



**Do not unthread the adjusting screw more than two threads below the flush point of housing as calibration could be adversely affected.**

### For instruments with 3/4-inch hex set point adjustment:

- Use 3/4-inch open-end wrench to turn hex adjusting nut clockwise (in) to increase set point, and counterclockwise (out) to decrease set point.
- Approximate set point can be obtained by sighting across top of adjusting nut to calibration scale on the housing floor.
- If precise set point calibration is required, it will be necessary to use a regulated thermal bath and suitable continuity tester. Consult factory.

### For instruments with dead band adjustment:

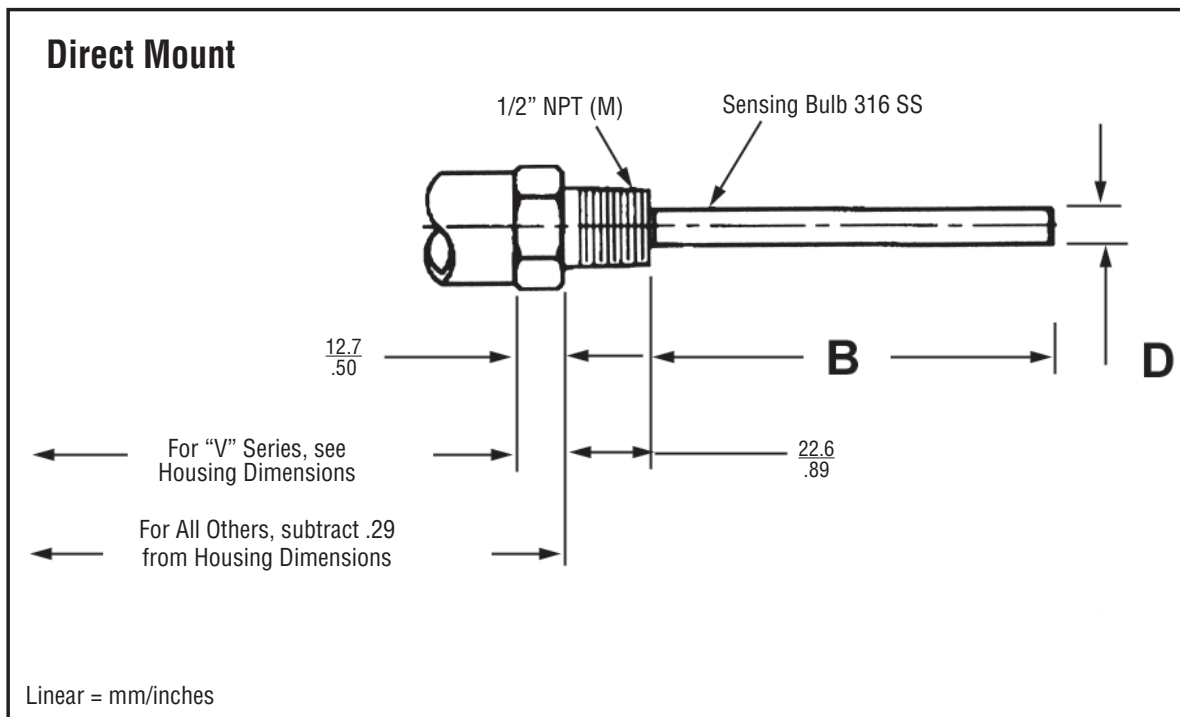
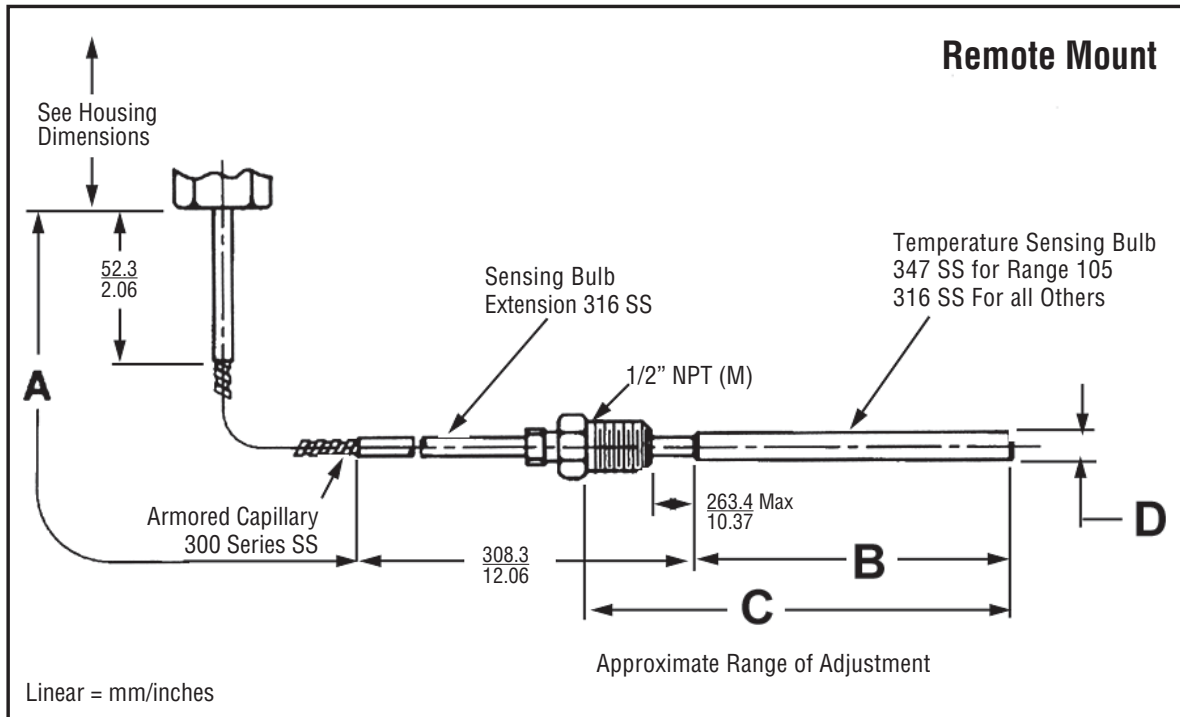
Use the fixed dead band procedure (above) to calibrate the desired decreasing temperature set point. The increasing temperature set point can then be adjusted by turning the white thumbwheel on the electrical switching element. Setting **A** yields the smallest possible dead band. Setting **F** yields the widest possible dead band. Settings above **E** may degrade repeatability.

## Special Conditions for Safe Use for ATEX Certified Mini-Hermet Temperature Switches only

- The permanently attached cables are to be suitably terminated and protected from impact.

## Probe Dimensions

Drawings are for reference only. Contact the factory for certified drawings for a particular model number.



<b>Feature</b>	<b>Range</b>	<b>Probe</b>	<b>201</b>	<b>203</b>	<b>205</b>	<b>207</b>	<b>209</b>
<b>A</b>	All	m	NA	1.8	3.0	4.5	6.0
		ft	NA	6.0	10.0	15.0	20.0
<b>B</b>	135, 125, 115	mm	105.7	112.0	124.7	162.8	194.6
		in.	4.16	4.41	4.91	6.41	7.66
	105	mm	-	148.3	148.3	148.3	148.3
		in.	-	5.84	5.84	5.84	5.84
<b>B with NB opt.</b>	135, 125	mm	107.2	112.0	112.0	112.0	112.0
		in.	4.22	4.41	4.41	4.41	4.41
<b>C</b>	135, 125, 115	mm	128.3	135 to 396	147 to 409	185 to 447	216 to 480
		in.	5.05	5.3 to 15.6	5.8 to 16.1	7.3 to 17.6	8.5 to 18.9
	105	mm	-	170 to 433	170 to 433	170 to 433	170 to 433
		in.	-	6.7 to 17.1	6.7 to 17.1	6.7 to 17.1	6.7 to 17.1
<b>D dia.</b>	135, 125, 115	mm	9.7	9.7	9.7	9.7	9.7
		in.	0.38	0.38	0.38	0.38	0.38
	105	mm	-	16.0	16.0	16.0	16.0
		in.	-	0.63	0.63	0.63	0.63

## General Information for ATEX Certified Models

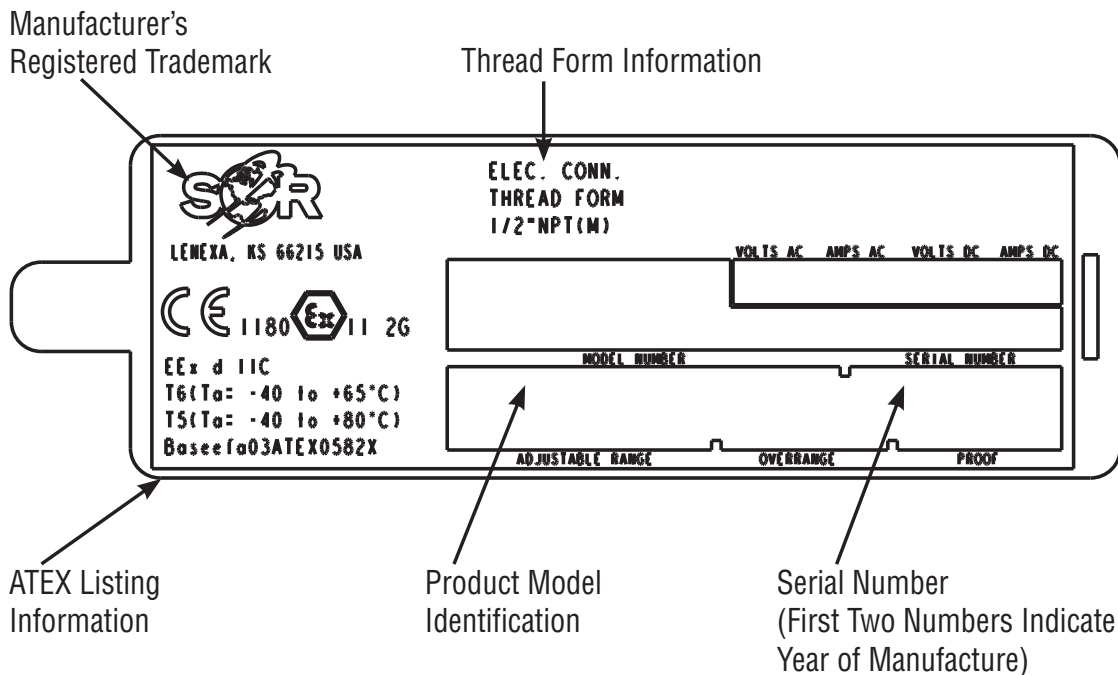
Range Designators	Adjustable Range		Overrange		Maximum Process Pressure	
	°F	°C	°F	°C	psi	bar
135	-50 to 70	-45 to 21	190	88	2300	158
125	40 to 225	5 to 107	360*	182*	2300	158
115	150 to 375	66 to 190	520	270	2300	158
105**	300 to 1000	150 to 540	1100	590	1000	70

\* Overage temperature decreases to 250°F (120°C) when NB option is specified.

\*\* Remote mount only.

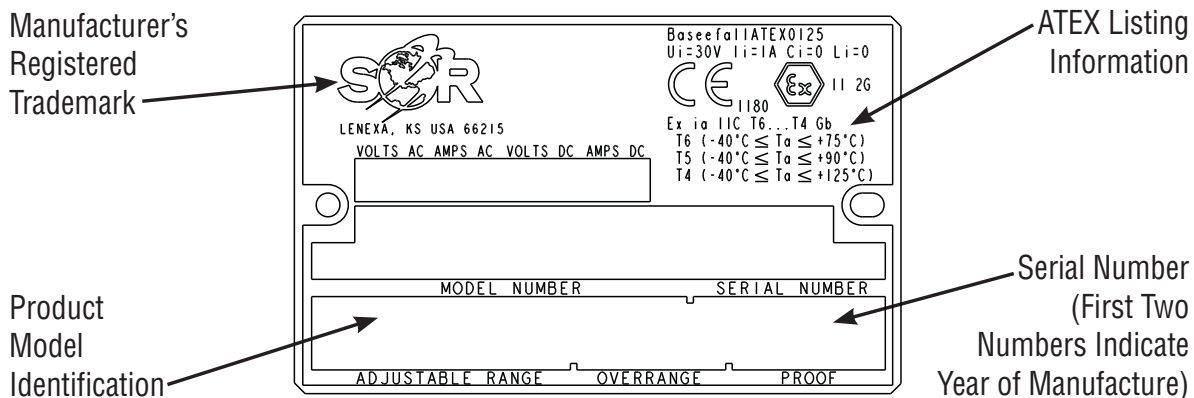
Designator	AC Rating		DC Rating (Resistive)			
	Volts	Amps	Volts	Amps	Volts	Amps
AF & AG	250	11	125	0.5	30	5
EF & EG	250	5	125	0.5	30	5
JF, JG, J & JJ	125	1	-	-	30	1

## For Mini-Hermet ATEX Certified Models



Drawing 8304110

## For R-Series ATEX Certified Models



Drawing 072004x

**NOTE:** The unit conforms to the requirements of clause 6.3.12, EN 60079-11: 2007. The unit is capable of withstanding a 500 Vrms isolation test between circuit and enclosure.

# Declaration of Conformity

For ATEX Certified Models



## EC Declaration of Conformity



**Product** A Mini Hermet Pressure or Temperature Switch


**Manufacturer** SOR Inc.  
14685 West 105<sup>th</sup> Street  
Lenexa, Kansas 66215-5964  
United States of America

**Date of Issue** August 15, 2007

**We declare that the above products conform to the following specifications and directives**

ATEX Directive (94/9/EC) Equipment Intended for use in Potentially Explosive Atmospheres  
EN 60079-0:2004  
EN 60079-1:2004  
EN 50014:1997 + Amds. 1 and 2  
EN 50018:2000

**Carries the marking**

 **II 2 G EEx d IIC T6**  
(Tamb = -40°C to +65°C) or T5 (Tamb = -40°C to +80°C)

**Reference document**

**EC-Type Examination Certificate**  
**Baseefa03ATEX0582X**  
Issued October 31, 2003

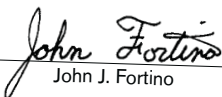
**ATEX Notified Body**

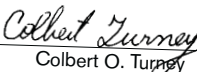
**Baseefa (2001) Ltd.** (Notified Body No. 1180)  
Rockhead Business Park, Staden Lane,  
Buxton, Derbyshire SK17 9RZ  
United Kingdom

Baseefa Customer Reference No. 1021

**Persons responsible**

John J. Fortino (VP of Engineering)  
Colbert O. Turney (VP of Quality Assurance)

  
John J. Fortino

  
Colbert O. Turney

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14685 West 105th Street, Lenexa, KS 66215-5964  
913-888-2630 • 800-676-6794 USA • 913-888-0767 FAX

Process Instrumentation | LEVEL | PRESSURE | FLOW | TEMPERATURE

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# Declaration of Conformity

For ATEX Certified Models



## EC Declaration of Conformity



**Product** R Series Pressure Switches


**Manufacturer** SOR Inc.  
14685 West 105<sup>th</sup> Street  
Lenexa, Kansas 66215-2003  
United States of America

**Date of Issue** March 12, 2012

**We declare that the above  
products conform to  
the following specifications  
and directives**

ATEX Directive (94/9/EC) Equipment Intended for use  
in Potentially Explosive Atmospheres  
EN 60079-0: 2009  
EN 60079-11: 2007

**Carries the marking**

 **II 2 G Ex ia IIC T6...T4 Gb**  
**T6** (-40°C ≤ Ta ≤ 75°C)  
**T5** (-40°C ≤ Ta ≤ 90°C)  
**T4** (-40°C ≤ Ta ≤ 125°C)

**Reference document** **EC-Type Examination Certificate**  
**Baseefa11ATEX0125**  
Issued February 16, 2012

**ATEX Notified Body** **Baseefa (2001) Ltd.** (Notified Body No. 1180)  
Rockhead Business Park, Staden Lane,  
Buxton, Derbyshire SK17 9RZ  
United Kingdom  
Baseefa Customer Reference No. 1021

**Person responsible** John J. Fortino (VP of Engineering)

  
John J. Fortino

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Process Instrumentation | LEVEL | PRESSURE | FLOW | TEMPERATURE

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**12/12** Registered Quality System to ISO 9001:2008

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