



# Nuclear-Qualified Temperature Switches

## General Instructions

The SOR® temperature switch utilizes a SAMA Class II thermal system.

**NOTE:** *This type of system requires that the entire length of the sensing bulb be exposed to the temperature being measured.*

### Recommended Measurement Procedure

In considering the validity of a measurement, remember that temperature-sensing devices respond only to the temperature that they experience. It may be considerably different from the temperature one is attempting to measure if the sensor is of improper size or configuration, or if the sensor is not adequately coupled thermally to the media whose temperature is being measured. The calibration procedures given below will assure accurate and repeatable measurement of the set points of SOR temperature switches. If the switch is normally mounted in a thermowell, consideration should be given to the effect this may have on the accuracy of the switch. It is recommended that a heat transfer paste or oil be used to thermally couple the sensing bulb to the thermowell, both in service and during testing.

**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.*

### Table of Contents

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

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

Recommended Measurement Procedure ...	1
N6 Housing .....	3
TA Housing .....	4
RT Housing .....	5
Installation .....	6
Site Storage .....	6
Electrical Connection .....	6
Calibration .....	7

Recommended temperature measurement procedure for switches used to sense temperatures of liquids and steam with set points below 200°F:

- ① Use a liquid bath (ethylene glycol, water, oil, etc.) with sufficient circulation to provide a uniform bath temperature and efficient transfer of heat from the liquid to the sensing bulb.
- ② Fully submerge the sensing bulb into the bath. Direct-mount sensing bulbs should be submerged up to the bottom of the process connection threads.
- ③ Locate the tip of the temperature measuring standard (thermocouple, RTD, etc.) at the mid point of, and adjacent to the sensing bulb.
- ④ Locate the sensing bulb and temperature measuring standard so that they do not touch the sides or bottom of the bath or the heating and cooling coils.
- ⑤ When the bath temperature is within 3°F of the set points, it is recommended that the temperature of the bath be changed at a rate of 0.1°F per 5 seconds or slower.
- ⑥ The minimum and maximum bath temperatures that the switch sees during testing should be duplicated each time the switch is tested. It is recommended that the temperature of the bath be changed from the normal operating temperature to the critical set point and back to the reset. Do not overshoot the critical set point if the switch is going to be cycled more than once during the test.

**Recommended temperature measurement procedures for switches used to sense temperatures of liquids and steam with set points above 200°F:**

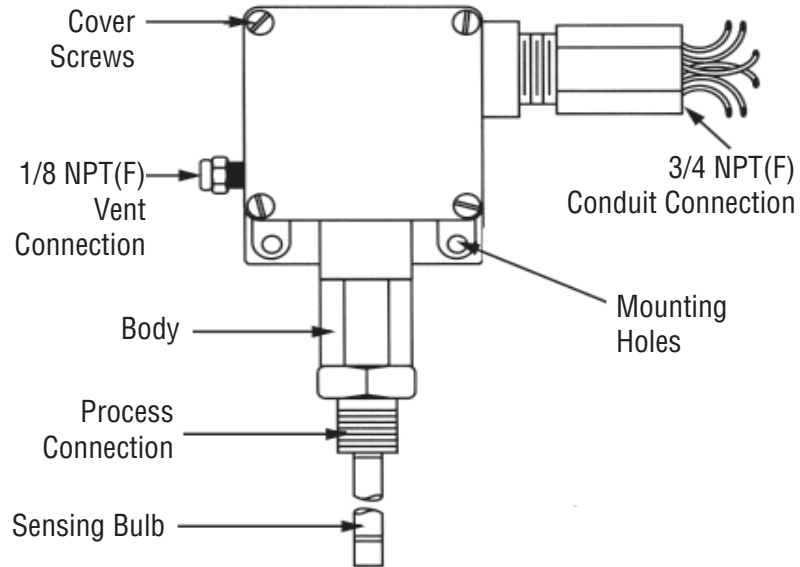
Recommended procedures for set points above 200°F are identical to those for set points below 200°F with the exception of the bath used to test the switches. We recommend either a circulated oil bath or a fluidized sand bath. The bath should be tested for uniformity of temperature from top to bottom and side to side. If necessary, steps may be taken to improve the uniformity of temperature, such as altering the air flow through a sand bath or improving circulation or stirring.

**Recommended temperature measurement procedures for switches used to sense air or gas temperature:**

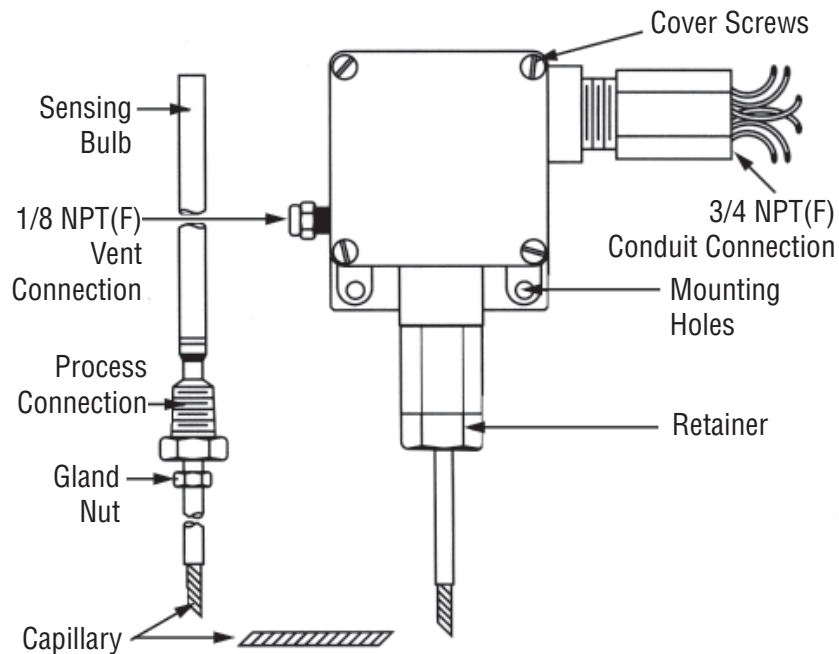
Switches used to measure the temperature of air or gas should be tested in such a way that it simulates the actual service conditions as closely as possible. Chances of measurement error are much greater in air because of its poor thermal conductivity. Rate of change of temperature, velocity of air flow, location of sensing bulb, and location of standard must be duplicated as closely as possible for successive calibration checks to assure repeatable results. If the switch is being used as a room thermostat, the entire switch should be placed in a test oven for calibration and testing. If only the sensing bulb is exposed to the air or gas being measured, then only the sensing bulb should be inserted into the oven or test apparatus for calibration and testing. In this case the switch housing should be kept at room temperature.

## N6 Housing

### Direct Mount



### Remote Mount

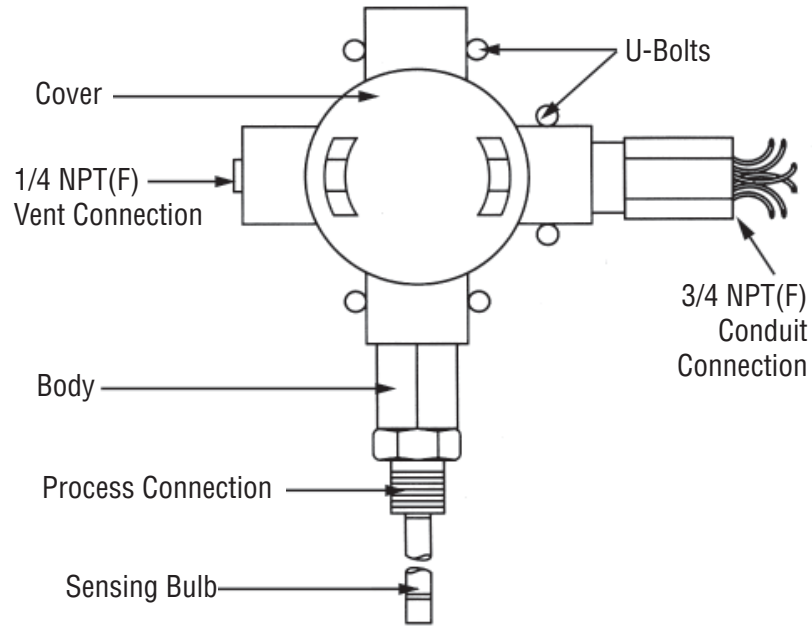


**Mounting Hardware** Fasteners per SOR Test Report 9058-102 consist of two 1/4-20, Grade 5 screws (not supplied). Torque screws to 70 to 85 in-lbs.

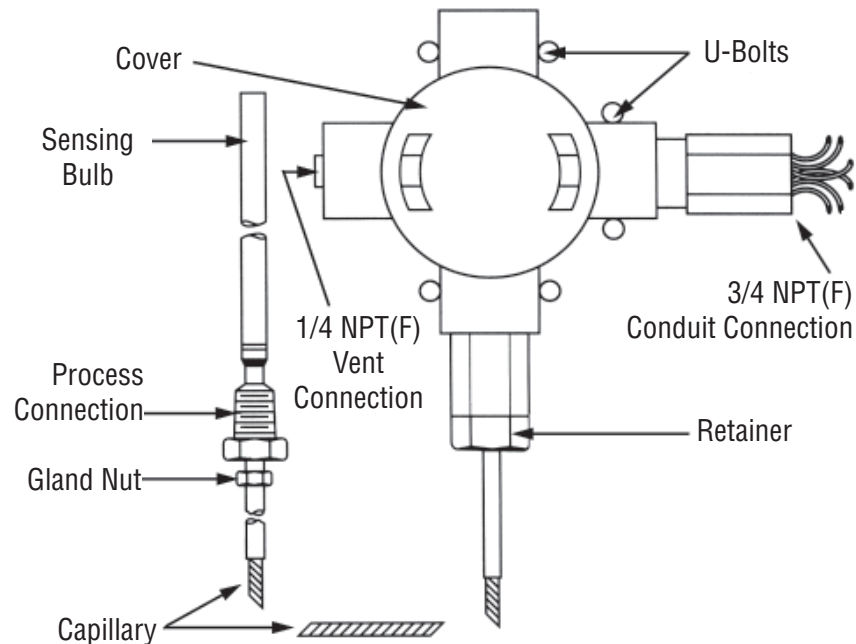
**Maintenance** Replace cover gasket (SOR P/N 8923-180) whenever cover is removed or minimum of once every 5 years, whichever comes first. Remove the four cover screws. Remove the old gasket. Place new gasket between housing and cover. Line up holes in cover, gasket and housing. Insert the 4 screws and torque each to 7 to 10 in-lbs.

## TA Housing

### Direct Mount



### Remote Mount

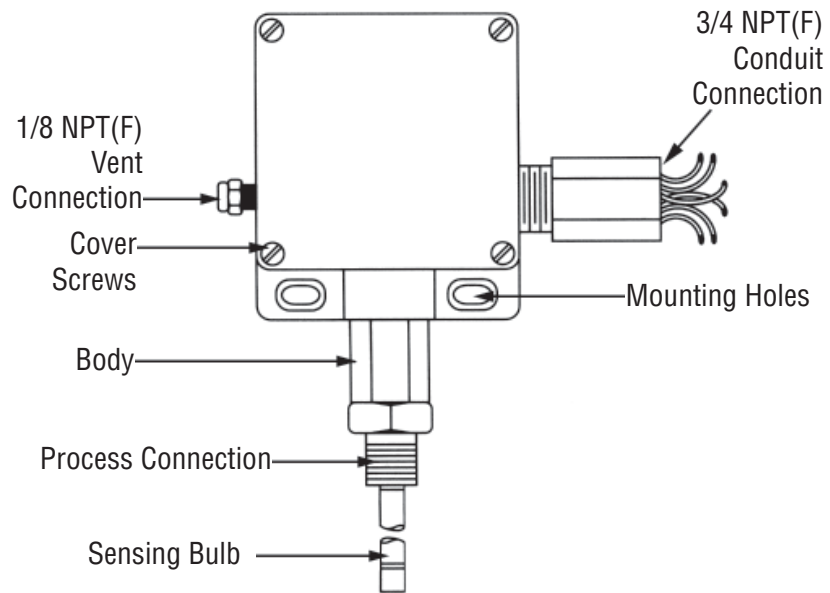


**Mounting Hardware** Fasteners per SOR Test Report 9058-102 consist of three standard-grade 1/4-inch U bolts (not supplied).

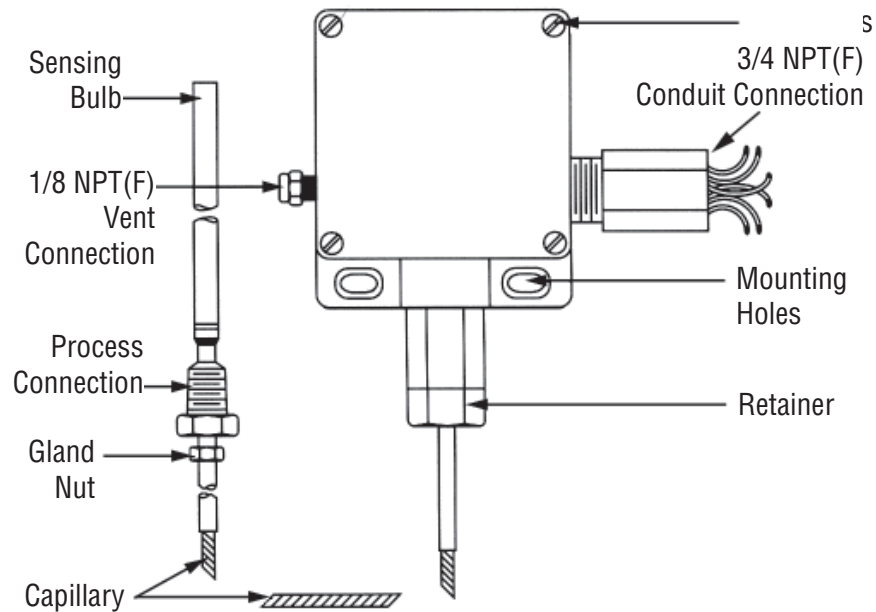
**Maintenance** Replace cover o-rings (SOR P/N 8923-206 and 8923-207) whenever cover is removed or minimum of once every 5 years, whichever comes first. Unscrew the cover. Remove the old o-rings. Place new o-rings in grooves of cover. Lubricate o-rings with light film of Krytox 240AC grease (or equivalent fluorinated grease). Tighten cover until the flange of the cover makes contact with the housing.

## RT Housing

### Direct Mount



### Remote Mount



**Mounting Hardware** Fasteners per SOR Test Report 9058-102 consist of two 1/4-20, Grade 5 screws (not supplied). Torque screws to 70 to 85 in-lbs.

**Maintenance** Replace cover gasket (SOR P/N 8923-181) whenever cover is removed or minimum of once every 5 years, whichever comes first. Remove the four cover screws. Remove old gasket. Place new gasket between housing and cover. Line up holes in cover, gasket and housing. Insert the 4 screws and torque each to 7 to 10 in-lbs.

## Installation

Refer to applicable drawing for mounting dimensions of specific model number. The vent connection must be plugged or vented to dry atmosphere as required by application requirements.

**Direct Mount** Line mount or mount to a rigid mounting surface with process connection down (6 o'clock). If the switch must be removed from a thermowell, loosen the process connection by placing a 1-1/4" wrench on the hex adjacent to the process threads. Do not use wrench on the sensing body. (See drawings.)

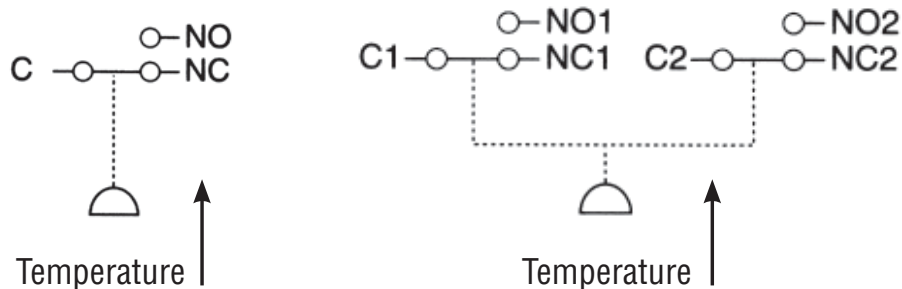
**Remote Mount** Mount to a rigid mounting surface with retainer down (6 o'clock). Secure capillary every two feet. To install sensing bulb, loosen gland nut so that the process connection turns freely. Re-tighten gland nut after process connection is installed.

## Site Storage

Store switch in a dry area in the original shipping package. Shelf life is 10 years for a maximum ambient temperature of 80°F, based on aging data in SOR Test Report 9058-102.

## Electrical Connection

Electrical connections are marked on the insulation of the wire leads. Conduit should be installed without applying strain to the housing.



Minimum Bend Radius for Wire	
Permanent Training	1/2" R
Pulling Tension	1" R
Terminating Junction	1/4" R

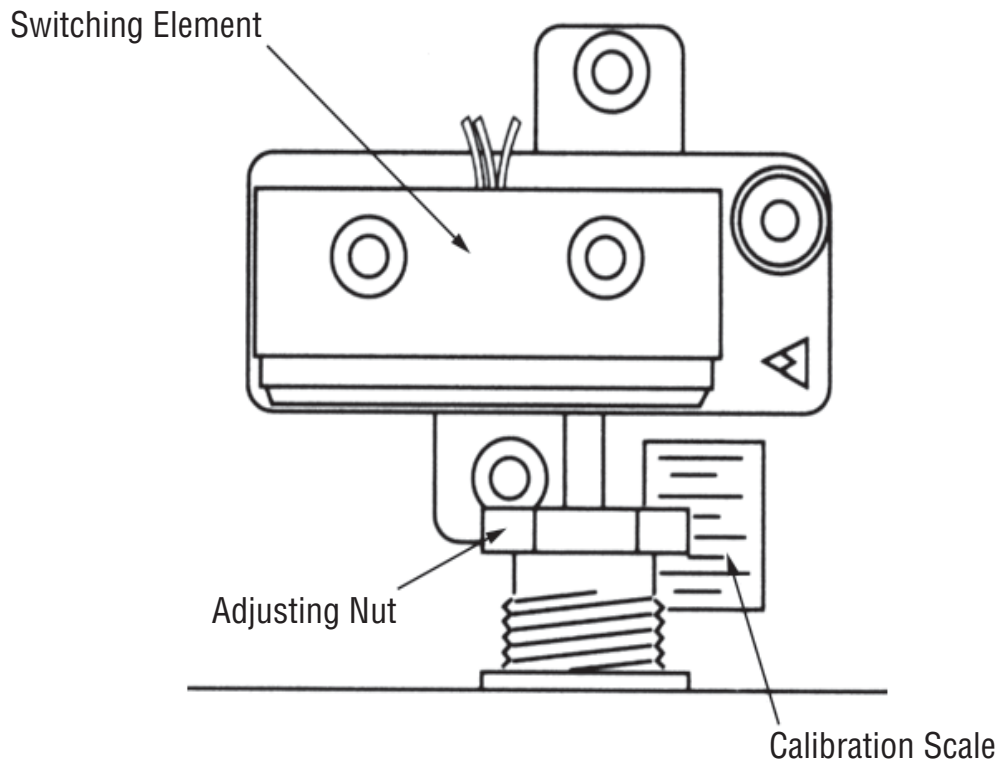
## Calibration

To adjust temperature at which switch will operate, remove cover and tighten the hex head adjusting nut with a 3/4-inch wrench to increase temperature; loosen to reduce temperature.

Sighting across the top of the 3/4-inch hex adjusting nut to the scale gives approximate set point temperature. Use accurate test gear external to the temperature switch to set or check set points. See recommended measurement procedure on Page 1. After calibration is complete, reinstall the cover with new gaskets or o-rings as required by the maintenance instructions.



***The switching element has been positioned with a dial indicator to a tolerance of  $\pm .002$  inches. Do not move this switching element! Its position has nothing to do with the set point adjustment. Any movement can either render the switch inoperative or cause the switching element to be damaged with over-temperature.***





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**8/8 Registered Quality System to ISO 9001:2008**

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