

Series 68 Platinum RTD

Rosemount Series 68 Platinum Resistance Temperature Sensors measure from -50 to 400 °C (-58 to 752 °F). Series 68 Class B, Pt100-385 sensors are available in capsule, general purpose, and spring-loaded designs in sensor lengths from 1 to 48 inches.

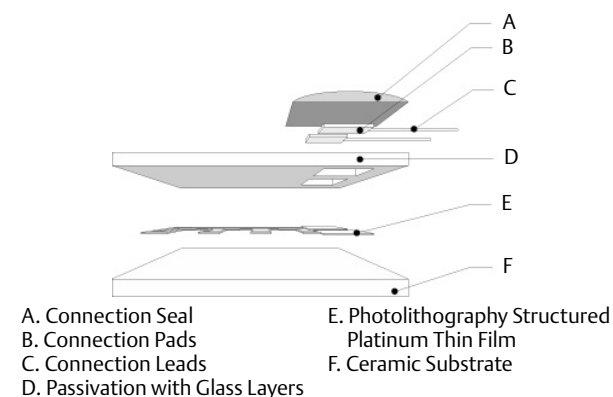
Table 21 shows the interchangeability of the Series 68 RTD. As an option, for maximum system accuracy, Emerson Process Management can provide sensor calibration. See [Sensor characterization \(calibration\) schedules– Option Code V](#). In addition, Emerson Process Management offers optional sensor-to-transmitter matching capability obtainable through the use of Callendar-Van Dusen Constants. See [Option Code “V” Callendar-van Dusen Constants](#).

Table 21. Series 68 Interchangeability

± 0.55 °C (± 0.99 °F) at -50 °C (-58 °F)
± 0.30 °C (± 0.54 °F) at 0 °C (32 °F)
± 0.80 °C (± 1.44 °F) at 100 °C (212 °F)
± 1.30 °C (± 2.34 °F) at 200 °C (392 °F)
± 1.80 °C (± 3.24 °F) at 300 °C (572 °F)
± 2.30 °C (± 4.14 °F) at 400 °C (752 °F)

Construction

Figure 7. Construction of a Platinum Thin Film RTD



Design and construction of the Series 68 Platinum Sensors provides the optimum combination of accuracy and durability available for temperature measurements. The construction of the sensor allows for direct immersion in non-corrosive fluids at reasonable static pressures. For corrosive environments or many industrial applications, these sensors are widely used with standard thermowell assemblies.

Platinum element and lead wire configurations

Single-element temperature sensors have four lead wires and may be used in 2-, 3-, and 4-wire signal conditioning systems.

Specifications

Performance specifications

Temperature range

-50 to 400 °C (-58 to 752 °F)

Effect of temperature cycling

$\pm 0.05\%$ (0.13 °C or 0.23 °F) maximum ice-point resistance shift following 10 cycles over the specified temperature range

Stability

$\pm 0.11\%$ 0.28 °C or 0.51 °F maximum ice-point resistance shift following 1,000 hours at maximum specified temperature (400 °C)

Maximum hysteresis

$\pm 0.1\%$ of operating temperature range

Time constant

12 seconds maximum required to reach 63.2% sensor response in water flowing at 3 ft/s (0.91 m/s)

Nominal R0 100 Ohm

Nominal α 0.00385 $\Omega/\Omega^{\circ}\text{C}$

Physical specifications

Material selection

Emerson provides a variety of Rosemount product with various product options and configurations including materials of construction that can be expected to perform well in a wide range of applications. The Rosemount product information presented is intended as a guide for the purchaser to make an appropriate selection for the application. It is the purchaser's sole responsibility to make a careful analysis of all process parameters (such as all chemical components, temperature, pressure, flow rate, abrasives, contaminants, etc.), when specifying product, materials, options and components for the particular application. Emerson Process Management is not in a position to evaluate or guarantee the compatibility of the process fluid or other process parameters with the product, options, configuration or materials of construction selected.

Sheath material

316 SST and 321 SST

Lead wire

PTFE insulated, silver plated, 24-gauge stranded copper wire

Identification data

The model, serial numbers, and up to six lines of permanent tagging information are etched on each sensor adapter. Stainless steel tags are available upon request.

Environmental specifications

Humidity limits

Lead seal can withstand 100% relative humidity

Vibration limits

±0.05% maximum ice-point resistance shift due to 30 minutes of 14 g peak vibration from 5 to 350 Hz at 20 °C (68 °F) for unsupported stem length of less than 6 inches

Quality assurance

Each sensor is subjected to a resistance accuracy test at 0 °C and an insulation resistance test

Enclosure ratings

When installed properly, Rosemount Series 68 sensors are suitable for indoor and outdoor NEMA 4X and CSA Enclosure Type 4X installations. See [Hazardous area approvals](#) for complete installation information

Insulation resistance

1000 x 10⁶ ohms minimum insulation resistance when measured at 500 Vdc at room temperature

Series 78 Platinum RTD

Series 78 Sensors are intended for applications that require high accuracy, dual-elements, and/or are subjected to high temperatures. Series 78 Platinum Resistance Temperature Sensors measure from -200 to 600 °C (-328 to 1112 °F). These sensors are available in capsule, general-purpose, and spring-loaded in sensor (X) lengths from 1 to 68 inches. They are also available bayonet spring-loaded style in sensor (X) lengths from 1 to 45 inches.

Table shows the interchangeability of the Series 78 Pt100-385 Sensors. The performance of the standard Series 78 Sensor conforms to the standard set by IEC 751 Class B. Additionally, IEC-751 Class A accuracy is available as an option. For maximum system accuracy, Emerson Process Management can provide sensor calibration. See [Sensor characterization \(calibration\) schedules– Option Code V](#). Emerson Process Management also offers optional sensor-to-transmitter matching capability obtainable through the use of Callendar-Van Dusen Constants. See [Option Code “V” Callendar-van Dusen Constants and Graph of a Typical Two-Point Trim](#)

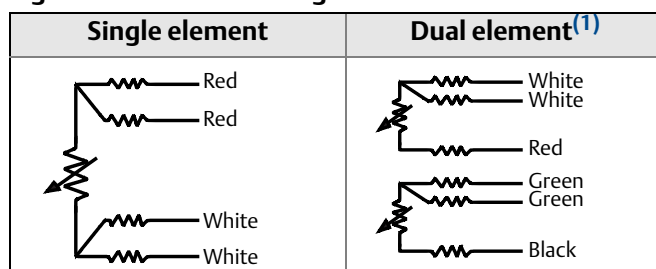
The wire-wound design and construction of the general-purpose Series 78 Sensor allows direct immersion in non-corrosive fluids at reasonable static pressures. For corrosive environments and in many industrial applications, these sensors are commonly used with standard thermowell assemblies.

Platinum element and lead wire configurations

Single-element high-temperature sensors have four lead wires and may be used in 2-, 3-, and 4-wire signal conditioning systems.

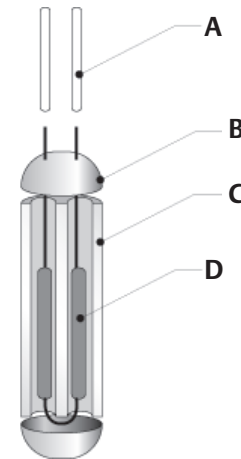
Dual-element sensors have redundant elements to provide separate readout and control signals from a single measurement point. Dual-element sensors have three lead wires for each element and may be used with 2- or 3-wire systems.

Figure 8. Lead Wire Configuration



(1) Dual element sensors are only available on Series 68Q and 78 Sensors.

Figure 9. Construction of a Platinum Wire-Wound RTD



- A. Lead Wires
- B. Seal
- C. High Purity Insulator
- D. Platinum Resistance Element

Specifications

Performance specifications

Temperature range

Series 78 single- and dual-element sensors may be used in temperatures from -200 to 500 °C (-328 to 932 °F). Series 78 single-element high-temperature sensors are provided for high-temperature service over the range of 0 to 600 °C (32 to 1112 °F).

Effect of temperature cycling

$\pm 0.04\%$ (0.10 °C or 0.18 °F) maximum ice-point resistance shift following 10 cycles between -200 and 500 °C (-328 to 932 °F).

Stability

$\pm 0.05\%$ maximum ice-point resistance shift following 1,000 hours at 400 °C (752 °F).

Table 22. Series 78 Interchangeability⁽¹⁾⁽²⁾

Standard series 78 IEC-751 Class B	Temperature
±0.80 °C (±1.44 °F)	-100 °C (-148 °F)
±0.30 °C (±0.54 °F)	0 °C (32 °F)
±0.80 °C (±1.44 °F)	100 °C (212 °F)
±1.80 °C (±3.24 °F)	300 °C (572 °F)
±2.30 °C (±4.14 °F)	400 °C (752 °F)
Series 78 with IEC-751 Class A option	Temperature
±0.35 °C (±0.63 °F)	-100 °C (-148 °F)
±0.15 °C (±0.27 °F)	0 °C (32 °F)
±0.35 °C (±0.63 °F)	100 °C (212 °F)
±0.75 °C (±1.35 °F)	300 °C (572 °F)
±0.95 °C (±1.71 °F)	400 °C (752 °F)

(1) Both tolerances valid from -200 to 500 °C.

(2) Class B tolerances valid from 0 to 600 °C on single- element high temperature sensor.

Maximum hysteresis

- Single- and dual-element, Nominal R0 100 Ohm Nominal alpha 0.00385 Ω/Ω °C: +/- 0.04% of range
- Single-element, high temperature: ±0.1% of range.

Time constant

4 seconds maximum required to reach 63.2% sensor response in water flowing at 3 ft/s (0.91 m/s), 9.5 seconds for single-element high-temperature sensors.

Self heating

18 mW minimum power dissipation required to cause a 1 °C (1.8 °F) temperature measurement error in water flowing at 3 ft/s, 25 mW for single-element high temperature sensors.

Insulation resistance

500 x 10⁶ ohms minimum insulation resistance when measured at 500 Vdc at room temperature [20 °C (68 °F)].

Environmental specifications

Humidity limits

Lead seal is capable of withstanding 100% relative humidity.

Vibration limits

Standard single- and dual-element sensors

- ±0.03% maximum ice-point resistance shift due to 30 minutes of 21 g peak vibration from 5 to 350 Hz continuous sweep at 20 °C (68 °F) for unsupported stem length of less than 5.5 inches (140 mm).

Single-element high-temperature sensors

- Meet ASTM E 1137-95. Cycling time is 3 hours per longitudinal axis, less the time spent at resonant dwells at the axis, from 5 to 500 Hz. The test level is 1.27 mm (0.05 in.) double amplitude displacement or peak g-level of 3, whichever is less.

Quality assurance

Each sensor is subjected to a resistance accuracy test at 0 °C and an insulation resistance test.

Enclosure ratings

When installed properly, Rosemount Series 78 Sensors are suitable for indoor and outdoor NEMA 4X and CSA Enclosure Type 4X installations. See [Hazardous area approvals](#) for complete installation information.

Physical specifications

Sheath material

Single and dual-element, 316 SST

Single element high temperature, 316SST and 321 SST

Lead wires

- Single and dual-element, PTFE-insulated, nickel-coated, 22-gauge stranded copper wire.
- Single element high temperature, PTFE insulated, silver plated, 24-gauge stranded copper wire.

Identification data

The model and serial numbers and up to six lines of permanent tagging information are etched on each sensor adapter. Stainless steel tags are available upon request.