

Sanitary and CIP Toroidal Sensor

For additional information, please visit our website at www.rosemountanalytical.com

CAUTION Sensor/Process Application Compatibility

The wetted sensor materials may not be compatible with process composition and operating conditions. Application compatibility is entirely the responsibility of the user.

CAUTION

Before removing the sensor, be absolutely certain that the process pressure is reduced to 0 psig and the process temperature is lowered to a safe level!

Specifications

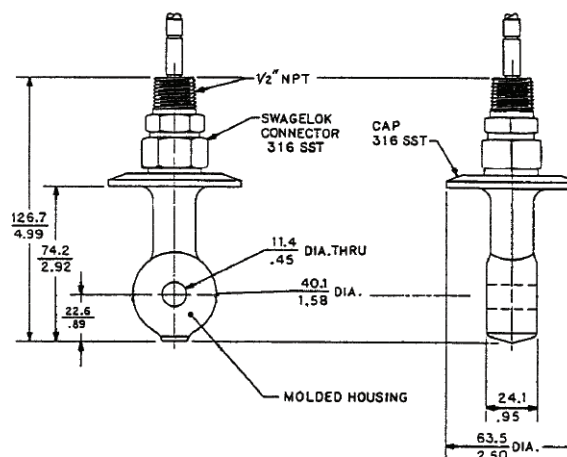
Model	Wetted Materials	Temperature	Pressure
225-03	PEEK (glass-filled)	230 °F (110 °C)	200 psig (1480 kPa abs)
225-07	Unfilled PEEK, meets 21CFR177.2415 ¹	266 °F (130 °C)	200 psig (1480 kPa abs)
225-08	Unfilled PEEK, meets USP Class VI	266 °F (130 °C)	200 psig (1480 kPa abs)
225-09	Tefzel (unfilled)	230 °F (110 °C)	200 psig (1480 kPa abs)

¹ Sensor meets 3A sanitary requirements for sensors and sensor fittings and connections used on milk and milk products equipment (74-03).

Installation

The sensor may be installed in either a tank or pipe using a customer-supplied Tri-Clamp and tee assembly. The sensor requires a 2-inch Tri-Clamp, a 2-inch type 1 gasket, and a 2-inch tank ferrule or tee. Keep at least 1 in. (25 cm) between sensor and pipe wall. If clearance is too small, calibrate the sensor in place. Ensure that the sensor is completely submerged in liquid to the flange. Mounting the sensor in a vertical pipe run with the flow from bottom to top is best. If the sensor must be mounted in a horizontal pipe run, orient the sensor in the 3 o'clock or 9 o'clock position.

Figure 1. Dimensions



Wiring

Keep sensor wiring away from ac conductors and high current demanding equipment. Do not cut cable. Cutting the cable may void the warranty.

Note

For additional wiring information on this product, including sensor combinations not shown here, please refer to either our online wiring programs or the Manual DVD enclosed with each product.

1056, 1057, 56, 5081, 6081, 54e, and XMT : <http://www3.emersonprocess.com/raihome/sp/liquid/wiring/XMT/>
 1066 and sensors with SMART preamps: http://www2.emersonprocess.com/en-US/brands/rosemountanalytical/Liquid/Sensors/Pages/Wiring_Diagram.aspx
 1055: <http://www3.emersonprocess.com/raihome/sp/liquid/wiring/1055/>

Figure 2. Wire Functions

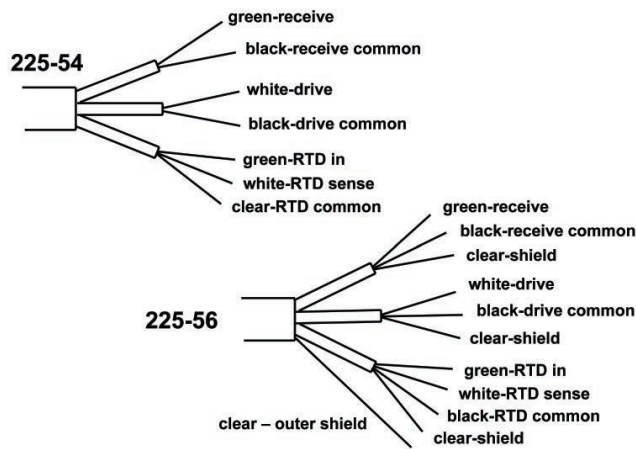


Figure 3. Wiring for 225-54 and 225-56 sensors to 1056 and 56 analyzers

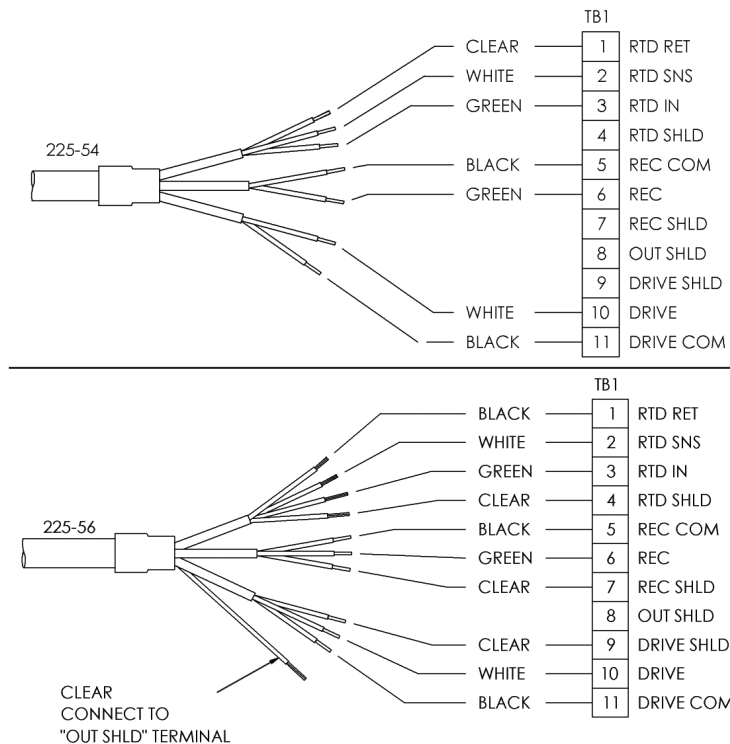


Figure 4. Wiring for 225-54 and 225-56 sensors to 54eC analyzer

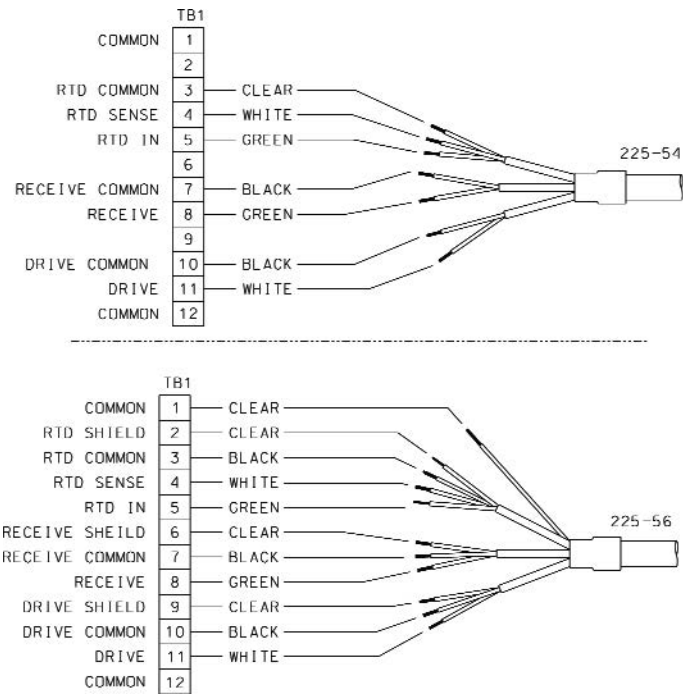


Figure 5. Wiring for 225-54 and 225-56 sensors to Xmt-T panel mount transmitter

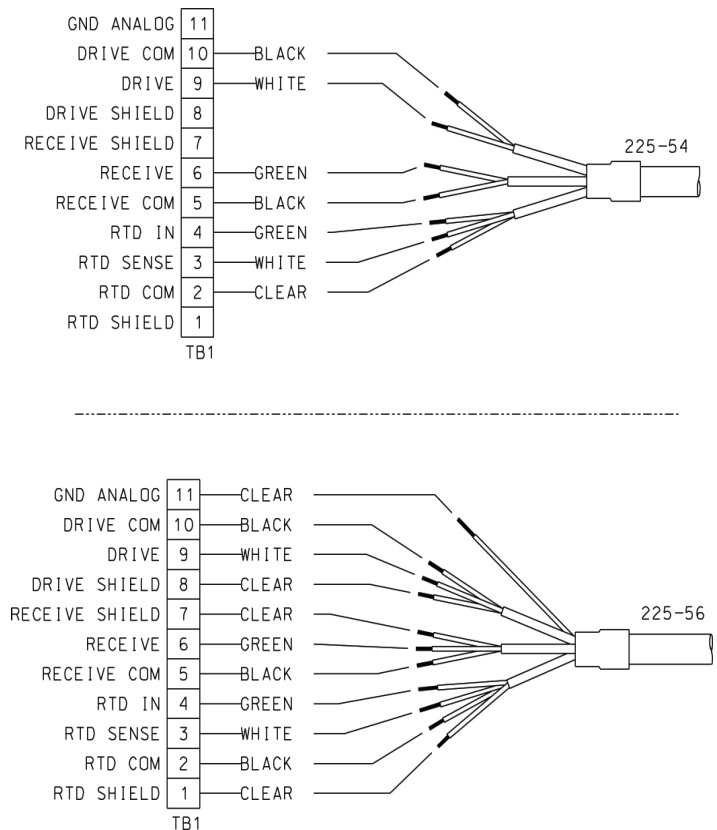


Figure 6. Wiring for 225-54 and 22-56 sensors to Xmt-T pipe/wall mount transmitter

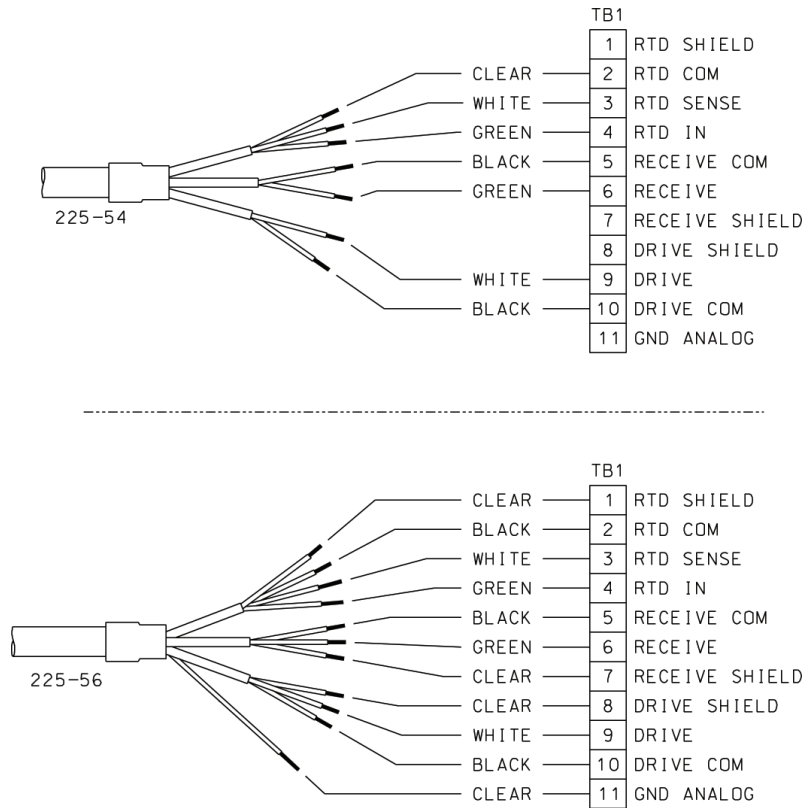


Figure 7. Wiring for 225-54 and 225-56 sensors to 1066 transmitter

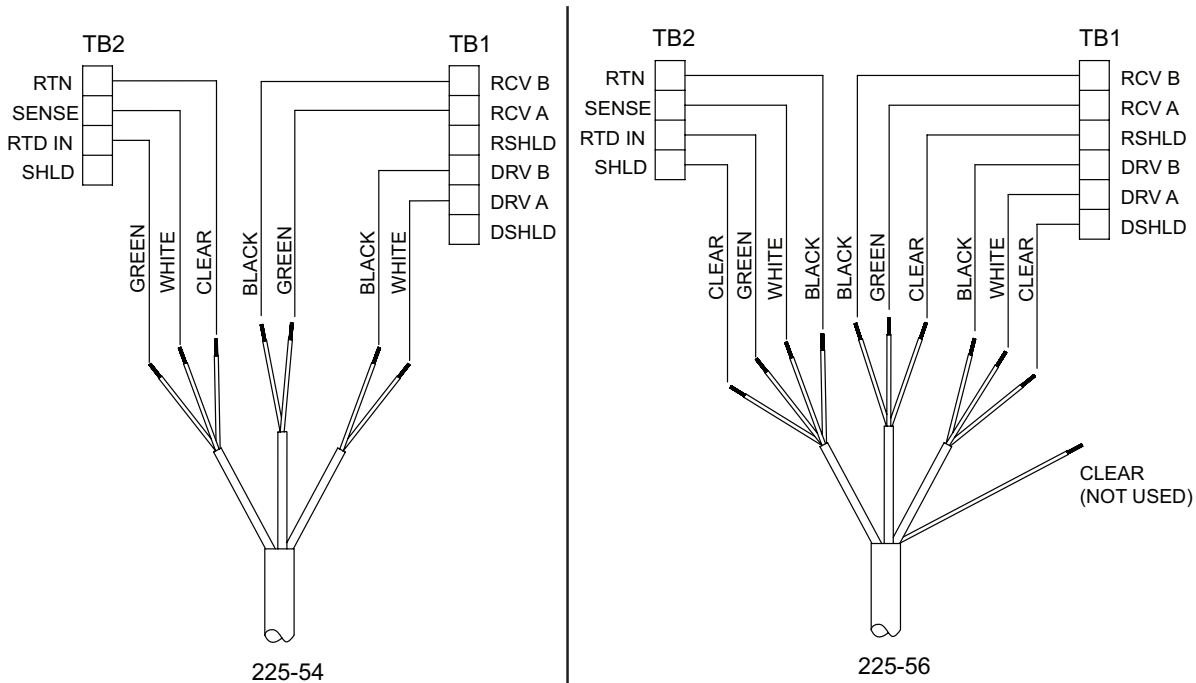


Figure 8. Wiring for 225-54 and 225-56 sensors to 5081-T transmitter

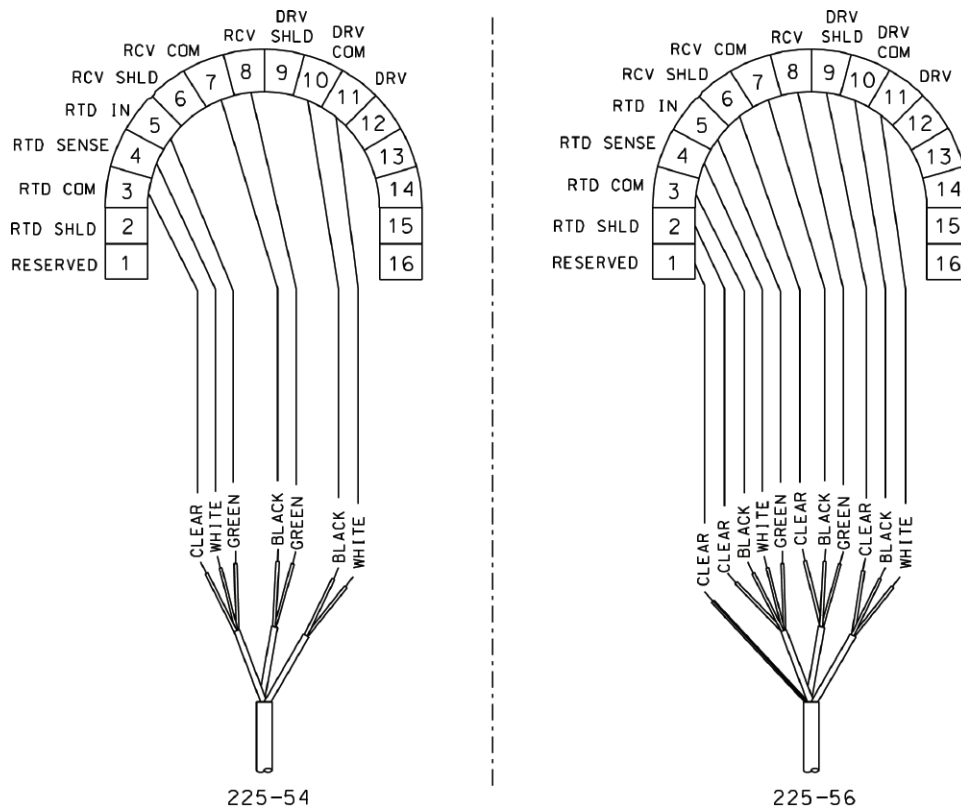


Figure 9. Wiring sensors through a remote junction box

Wire sensors point to point. For wiring at the analyzer end, refer to the appropriate analyzer wiring diagram. For interconnecting cable 23294-00, use the 225-54 wiring diagram. For interconnecting cable 23294-04 and 23294-05, use the 225-56 wiring diagram.

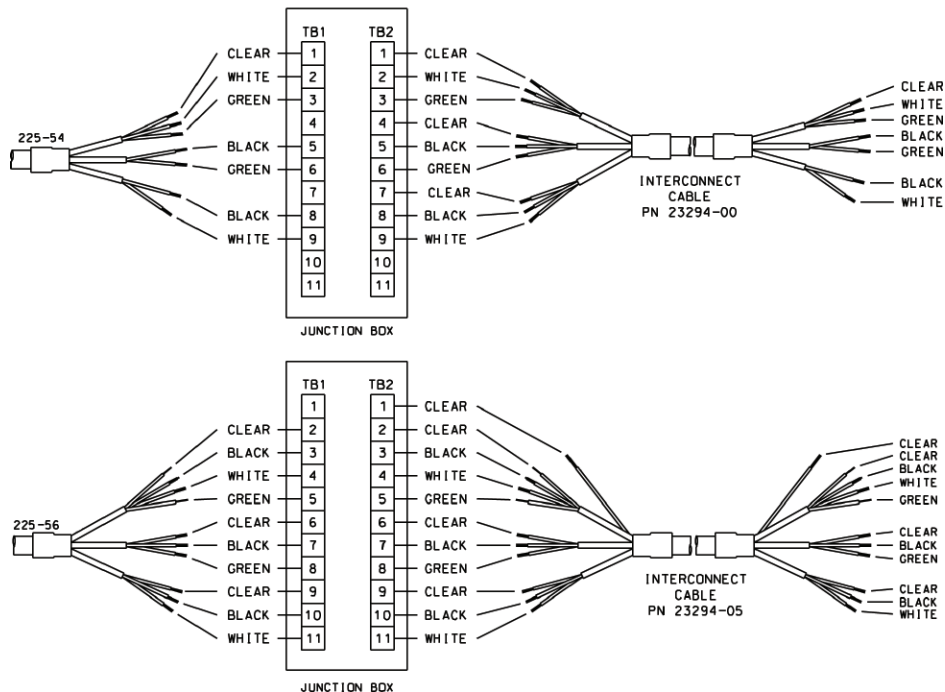
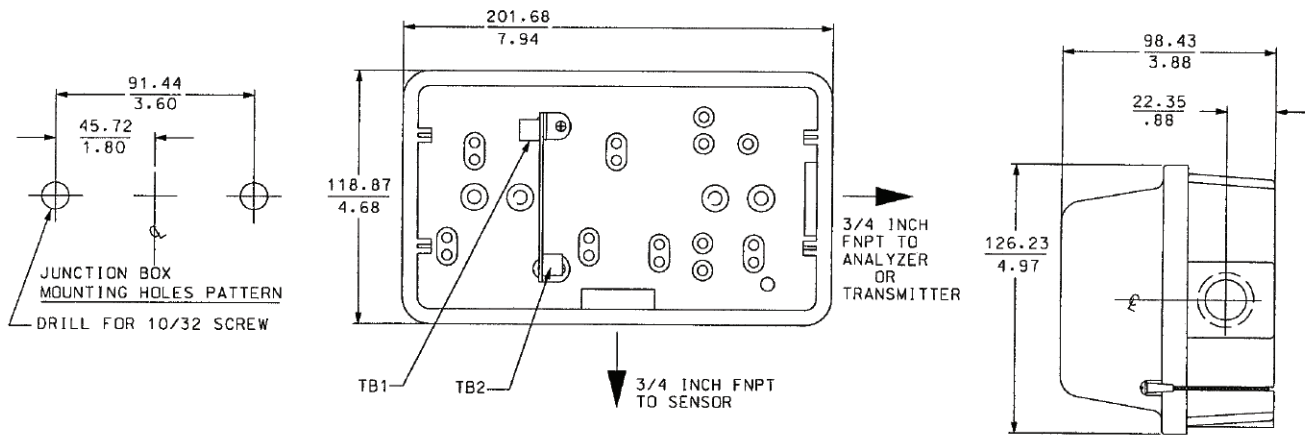


Figure 10. Remote Junction Box (PN 23550-00)



Calibration

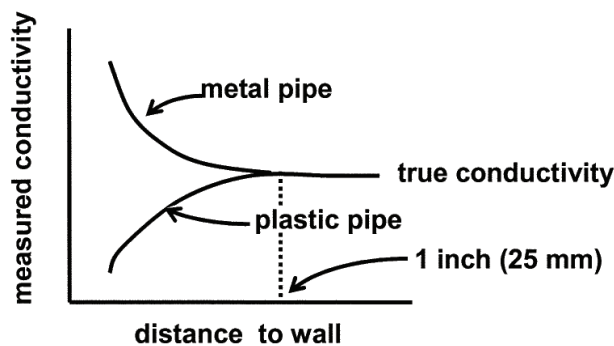
The nominal cell constant of the 225 sensor is 2.7/cm. The error in the cell constant is about $\pm 10\%$, so conductivity readings made using the nominal cell constant will have an error of at least $\pm 10\%$. Wall effects, discussed below, will likely make the error greater. For higher accuracy, the sensor must be calibrated.

Wall effects arise from the interaction between the current induced in the sample by the sensor and nearby pipe or vessel walls. As Figure 11 shows, the measured conductivity can either increase or decrease depending on the wall material. Because wall effects do not disappear until the 225 sensor is at least 1 inch (25 mm) away from the nearest wall, wall effects are present in most installations. Correcting for them is an important part of calibration.

Conductivity sensors are calibrated against a solution of known conductivity (a standard) or against a previously calibrated referee sensor and analyzer. If wall effects are present, calibrating a toroidal sensor with a standard solution is possible only if the vessel holding the standard has exactly the same dimensions as the process piping. 225 sensors are often installed in sanitary flange tees, so an appropriate calibration vessel is another tee with blank flanges on the ends. If removing the sensor from the process piping for calibration is impractical, calibrate the sensor in place against a referee sensor and analyzer while both sensors are simultaneously measuring the process liquid. If this is not practical the sensor can also be calibrated against the results of a measurement made on a grab sample.

For more information about calibrating toroidal conductivity sensors, refer to application sheet ADS 43-025 available on the Rosemount Analytical website.

Figure 11. Measured conductivity as a function of clearance between sensor and walls.



Maintenance

CAUTION

Be sure sensor has been cleaned of process liquid before handling.

Generally, the only maintenance required is to keep the opening of the sensor clear of deposits. Cleaning frequency is best determined by experience.

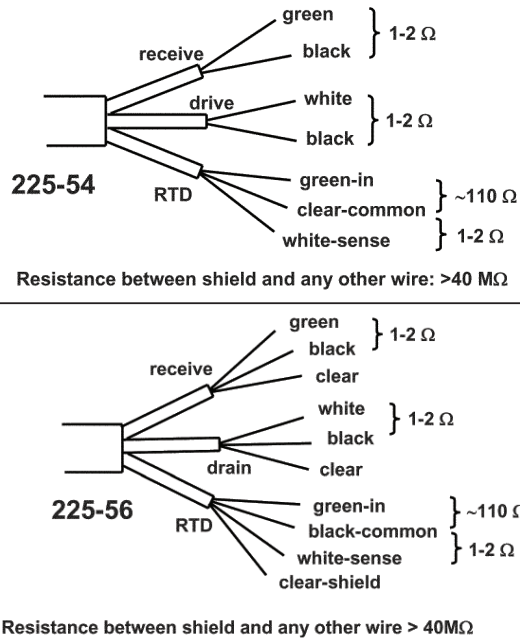
Troubleshooting





Problem	Probable Cause	Solution
Off-scale reading	Wiring is wrong.	Verify and correct wiring.
	RTD is open or shorted.	Check the RTD for open or short circuits See Figure 12.
	Sensor is not in process stream.	Confirm that the sensor is fully submerged in the process stream. See installation section.
	Sensor is damaged.	Perform isolation checks. See Figure 12.
Noisy reading	Sensor is improperly installed in process stream.	Confirm that the sensor is fully submerged in the process stream. See installation section.
	Sensor cable is run near high voltage process stream.	Move cable away from high voltage conductors.
	Sensor cable is moving.	Keep sensor cable stationary.
Reading seems wrong (lower or higher than expected)	Bubbles are trapped in the sensor, particularly in the toroid opening.	Install the sensor in a vertical pipe run with the flow against the toroid opening. Increase flow if possible.
	Sensor is not completely submerged in the process stream.	Confirm that the sensor is fully submerged in the process stream. See installation section.
	Cell constant is wrong. Wall effects are present.	Calibrate the sensor in place in the process piping. See calibration section.
	Wrong temperature correction algorithm is being used.	Check that the temperature correction is appropriate for the sample. See analyzer manual for more information.
	Temperature reading is inaccurate.	Disconnect the RTD leads (Figure 12) and measure the resistance between the in and common leads. Resistance should be close to the value in Table 1.
	Slow temperature response to sudden changes in temperature.	Use an RTD in a metal thermowell for temperature compensation.
Sluggish response	Sensor is installed in a dead area in the piping	Move sensor to a location more representative of the process liquid.
	Slow temperature response to sudden changes in temperature.	Use an RTD in a metal thermowell for temperature compensation.

Table 1.

Temperature	Resistance
10 °C	103.9 Ω
20 °C	107.8 Ω
25 °C	109.7 Ω
30 °C	111.7 Ω
40 °C	115.5 Ω
50 °C	119.4 Ω

Figure 12. Resistance check. Disconnect leads from analyzer before measuring resistances.



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