

November 2015



*Averaging Assembly, Duct-Mount Assembly,
Duct-Mount with Display and Wall-Mount Unit*

Moore Industries' Temperature Measurement Solutions and Temperature Application Engineers are dedicated to providing temperature and humidity solutions for industries such as:

- **Semiconductor**
- **Pharmaceuticals**
- **Biotech**

Our facility and process temperature monitoring systems deliver the performance you need to stay on top, at prices that will fit your budget. Our application engineers are trained to meet your technical, service and delivery needs.

We Measure Temperature and Humidity in:

- Air Handling Systems
- Chillers
- Ducts to Clean Rooms
- Wall-Mounts to Clean Rooms
- HVAC

You Get:

- **Superior Accuracy.** Our highly accurate and intelligent transmitters, combined with our precision 4-wire platinum RTD sensors and sensor trimming, assure you'll achieve unbeatable total system accuracy.
- **Long Term Stability for Minimal Maintenance.** Reliable, long-term stability reduces scheduled calibrations and the maintenance costs associated with them.
- **Excellent Cross-Sectional Average Temperature in Large Air Handlers.** Receive a highly accurate reading of ambient temperatures in large air handlers with our specially designed averaging RTD sensor.
- **Extensive Experience.** Moore Industries has decades of experience helping customers achieve the best measurements in environments where high accuracy is critical.

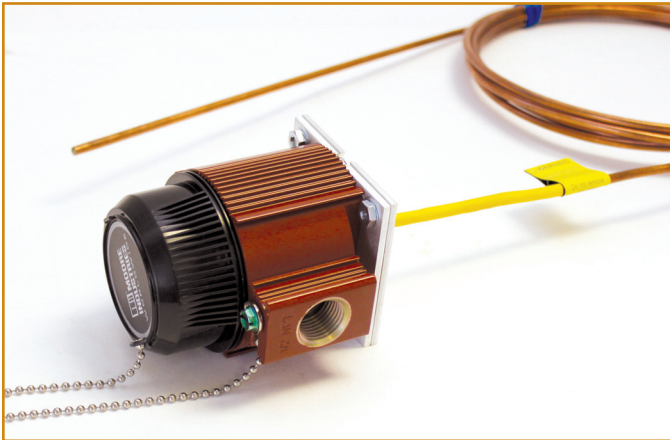
Moore Industries Always Gives You:

- **Fast and Easy Calibration.** You can select all operating parameters, including any two calibration points, and we factory configure and calibrate your assembly.
- **Reduced Troubleshooting Time.** Our systems detect a sensor problem and alert you if there's trouble. Messages displayed on our PC Configuration Software help you identify what the problem is and where it has occurred.

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HART is a registered trademark of FieldComm Group.

Temperature Monitoring Solutions for High-Tech Facilities and Processes

Surface-Mount Air Duct Averaging Temperature Monitoring System

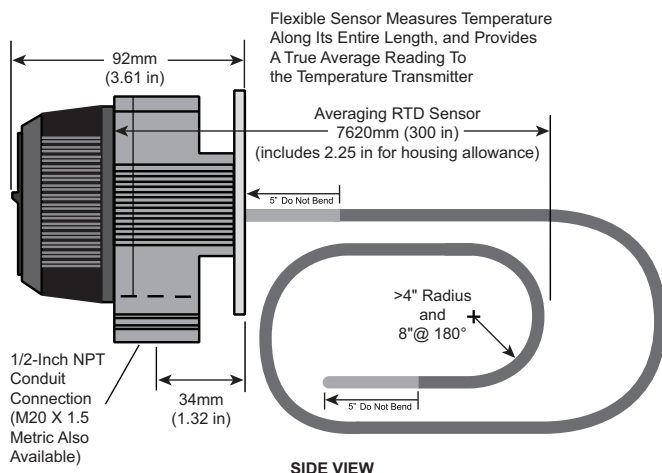


The averaging sensor is a unique design that is constructed as a continuous RTD sensor, not ten 100 ohm sensors wired in series. With this design the entire sensor, along the 300" or 480" sheath, measures temperature making it a true averaging sensor.

RTD Averaging Sensor Installation Instructions

Form the sensor into the desired shape with the following precautions:

1. Do not bend the first 5-inches of each end of the sensor.
2. Do not bend the sensor in a radius smaller than 4-inches. (As shown below - not to scale)
3. 180° bend should not be tighter than 8-inches.



Standard Factory Calibration (-VTD)

To save you installation time, our Standard Factory Calibration includes calibrating the transmitter with zero and span values that you supply using a precise simulated sensor input. *NIST traceable test data is supplied with each system.*

Specifications

Accuracy: $\pm 1\%$ of span within -18 to 93°C (0 to 200°F)
For the most commonly selected ranges from -20 to 40°C (-4 to 104°F) the accuracy is typically $\pm 0.5^{\circ}\text{C}$ ($\pm 0.9^{\circ}\text{F}$).

System Includes:

- Loop-Powered Temperature Transmitter with 4-20mA output; rangeable using PC Configuration Software or, in the case of the THZ³/TDZ³, HART/DTM tools.
- Flexible averaging RTD Sensor (300-inch or 480-inch) measures temperature along its entire length, and provides a TRUE average reading to the temperature transmitter. Sensor is a 4-wire, platinum, 1000ohm, alpha = 0.00385, with a copper sheath to facilitate flexibility during installation.
- NEMA 4X, IP66 transmitter connection head with surface mounting plate.

When Ordering, Specify:

For 300" Sensor Length:

? / CL300 / D18 / CU / -PT104 -AVG -VTD [????]

For 480" Sensor Length:

? / CL480 / D18 / CU / -PT104 -AVG -VTD [????]

Replace ? with Transmitter Type:

TRY Isolated, PC-Programmable Transmitter
TRX Non-Isolated, PC-Programmable Transmitter
TDY Indicating, Isolated, PC-Programmable Transmitter
THZ³ Isolated, Smart HART[®] and DTM Programmable Transmitter
TDZ³ Indicating, Isolated, Smart HART[®] and DTM Programmable Transmitter

Replace ???? with Mounting Type:

LH1NX Connection Head, Mounting Plate Screws to Duct (for TRY, TRX, THZ³)
LH1NZ Connection Head, Secondary Mounting Plate Allows Removal Using Wing-Nuts (for TRY, TRX, THZ³)
 See Page 3 for more details.
D2LCX Connection Head, Mounting Plate Screws to Duct (for TDY, TDZ³)

(See TRY/TRX/TDY/THZ³/TDZ³ data sheets for detailed transmitter specifications)

Model Number Example:

TRX / CL300 / D18 / CU / -PT104 -AVG -VTD [LH1NZ]

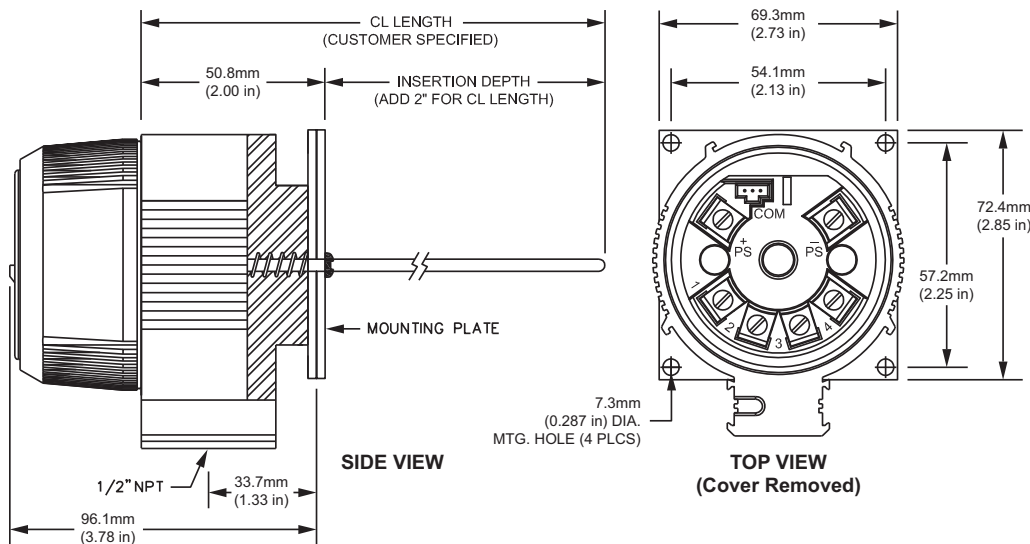
Temperature Monitoring Solutions for High-Tech Facilities and Processes

Duct-Mount Temperature Assembly for Monitoring Clean Rooms and Air Ducts

The duct-mount assembly is designed with a straight sensor to provide accurate air temperature measurements and where an averaging sensor is not required or practical. This is often used in clean rooms and smaller air ducts.

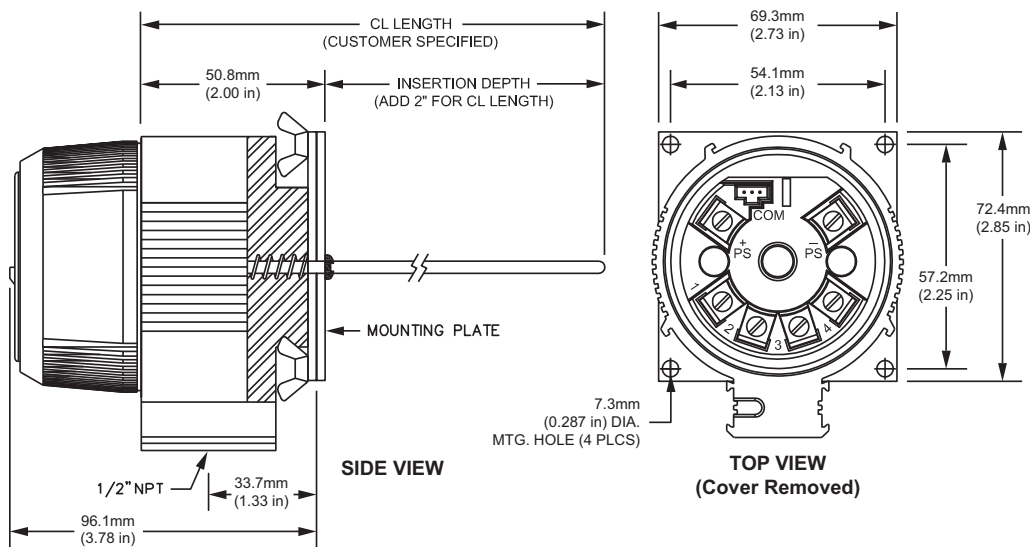


[LH1NX]



Four screws hold the [LH1NX] assembly onto the duct. Each time the assembly has to be recalibrated the four screws have to be removed and then replaced. This repeated process may enlarge the holes in the duct to the point where new holes have to be created. As a result some prefer the [LH1NZ] below.

[LH1NZ]



With the [LH1NZ] mounting there are two mounting plates. The first gets permanently mounted to the duct with four screws. The temperature assembly then attaches to the first using four wing nuts. When this configuration is removed for recalibration, only the four wing nuts and temperature assembly is removed. The permanent mounting plate stays attached to the duct, so the duct mounting holes never get enlarged.

Temperature Monitoring Solutions for High-Tech Facilities and Processes

Duct-Mount Temperature Assembly for Monitoring Clean Rooms and Air Ducts (continued)



The Duct-Mount Temperature Assembly is available with two housing cover types and multiple transmitter choices. The TDY and TDZ³, both indicating transmitters, mount under a clear housing cover for easy on-location reading (above). The non-indicating TRY, TRX, and THZ³ transmitters come with a blind housing cover (previous page) when local indication is not required.

Specifications

System Accuracy: $\pm 0.05\%$ of span within -18 to 93°C (0 to 100°F) and with -VTB option.

System Includes:

- Loop-Powered Temperature Transmitter with 4-20mA output; rangeable using PC Configuration Software or, in the case of the THZ³/TDZ³, HART/DTM tools
- High accuracy (Class A; $R_0 \pm 0.06\%$) RTD, 4-wire, platinum, 1000 ohm, $\alpha = 0.00385$, SS316 sheath material
- NEMA 4X, IP66 transmitter connection head with surface mounting plate

When Ordering, Specify:

? / CL?? / D25 / S316 / -PT104 -.06 ??? [????]

Replace ? with Transmitter Type:

TRY Isolated, PC-Programmable Transmitter
TRX Non-Isolated, PC-Programmable Transmitter
TDY Indicating, Isolated, PC-Programmable Transmitter
THZ³ Isolated, Smart HART[®] and DTM Programmable Transmitter
TDZ³ Indicating, Isolated, Smart HART[®] and DTM Programmable Transmitter

Replace ?? with Sensor Length (9-24 inch lengths are Standard):

Specify in 0.25-inch increments (e.g., CL9, CL11.25, CL12, CL15.75, CL18)

Replace ??? with Factory Calibration Option (leave blank if factory calibration is not required):

-VTB High Accuracy Factory Calibration (See Page 6)
-VTD Standard Factory Calibration

Replace ???? with Mounting Type:

LH1NX Connection Head, Mounting Plate Screws to Duct (for TRY, TRX, THZ³)
LH1NZ Connection Head, Secondary Mounting Plate Allows Removal Using Wing-Nuts (for TRY, TRX, THZ³) See Page 3 for more details.
D2LCX Connection Head, Mounting Plate Screws to Duct (for TDY, TDZ³)

(See TRY/TRX/TDY/THZ³/TDZ³ data sheets for detailed transmitter specifications)

Model Number Example:

TRX / CL18 / D25 / S316 / -PT104 -.06 -VTB [LH1NZ]

Temperature Monitoring Solutions for High-Tech Facilities and Processes

Wall-Mount Room Air Temperature Monitoring System

The wall-mount room air temperature monitor provides room air measurement using TRX, TRY and THZ³, but is housed in a lower profile surface-mount package suitable for more general applications and locations.



Left: Exterior of Wall-Mount



Right: Internal: Transmitter and RTD

Specifications

System Accuracy: $\pm 0.3\%$ for typical room spans of 10 to 40°C (50 to 104°F)

System Includes:

- Loop-Powered Temperature Transmitter with 4-20mA output; rangeable using PC Configuration Software or, in the case of the THZ³, HART/DTM tools
- High accuracy (Class A; R0 $\pm 0.06\%$) RTD, 4-wire, platinum, 1000 ohm, alpha = 0.00385

TRY/TRX/THZ³

When Ordering, Specify:

? / CL1 / D18 / POLY / -PT104 -.06 -VTD [DWB]

Replace ? with Transmitter Type:

TRY Isolated, PC-Programmable Transmitter

TRX Non-Isolated, PC-Programmable Transmitter

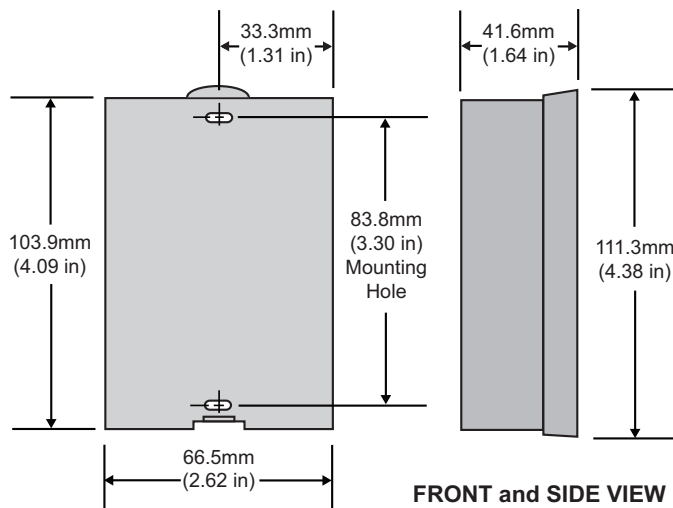
THZ³ Isolated, Smart HART[®] and DTM Programmable Transmitter

(See TRY/TRX/THZ³ data sheets for detailed transmitter specifications)

Model Number Example:

TRX / CL1 / D18 / POLY / -PT104 -.06 -VTD [DWB]

Wall-Mount Dimensions



Standard Factory Calibration (-VTD Option)

To save you installation time, our Standard Factory Calibration includes calibrating the transmitter with zero and span values you supply using a precise simulated sensor input. *NIST traceable test data is supplied with each system.*

Temperature Monitoring Solutions for High-Tech Facilities and Processes

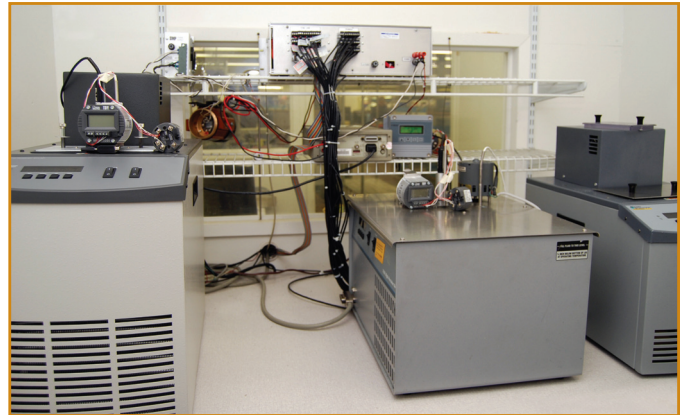
Bath Calibration

Factory Calibration Delivers Precision Accuracy, Saves Set Up Time

High Accuracy Factory Calibration (-VTB Option)

When applications demand exceptional accuracy, we recommend our **Sensor-to-Transmitter Trimming** factory calibration. Performed in our state-of-the-art Calibration Suite, we immerse the system's sensor in a precision calibration bath. Then, the sensor's true readings are captured by our transmitter. This method effectively compensates for errors caused by inherent sensor inaccuracies. The system is delivered configured, calibrated, and ready for installation. *National Institute of Standards and Technology (NIST) traceable test data is supplied with each system.*

This procedure eliminates the final "as built" RTD error in a process where the transmitter is part of the calibration/sensor matching process. By using just a single bath calibration process, the resulting NIST traceable report of uncertainty includes the combined accuracy of the transmitter plus the RTD. An example of such a report follows.



High Accuracy Factory Calibration in Our "Calibration Suite" assures that our sensors and transmitters are calibrated together to deliver an exceptionally precise representation of actual process conditions. A NIST traceable test report is supplied with each factory-calibrated system.

Input		Actual Output in V	Calculated Output in V	Linearity Error %	Ideal End Points (V): Zero: 1.0000 Span: 5.0000
Temp: C°	Actual				
0	-0.0001	0.9998	0.9998	REF	Acceptable Specification/Linearity 0.0700 % OUTPUT CURRENT VALUES ARE IN VOLTS DC BY MEASURING VOLTAGE DROP ACROSS A PRECISION 250 Ohm RESISTOR
100	99.998	3.0011	3.0003	0.0202	
200	200.002	5.0009	5.0009	REF	
Non-Linearity:		0.0202 %	<input checked="" type="checkbox"/> Accept <input type="checkbox"/> Reject		
Zero Error:		-0.0050 %	<input checked="" type="checkbox"/> Accept <input type="checkbox"/> Reject		
Span Error:		0.0225 %	<input checked="" type="checkbox"/> Accept <input type="checkbox"/> Reject		
Other Tests/Notes:					

For this NIST report sample the worst case error is at the full span point of 200°C (392°F) which is ±.0225% of span. The combined uncertainty of the transmitter plus the sensor at 200°C (392°F) is 0.045°C (0.081°F).

Your selection of the bath calibration trim points controls where your measurement will be most accurate. Let's create an example of a transmitter that is ranged 0-200°F with an operating region (where you want

the best accuracy) from 125°-145°F. If you select the transmitter range limits (0°F and 200°F) to be your bath trim points, the center of the range (100°F) will have the highest amount of error even though it is a very small error. For your application, it would be better to choose 125° and 145°F as your trim points or even a single point trim at 135°F. Should you need application assistance in this area, please contact us.

Temperature Monitoring Solutions for High-Tech Facilities and Processes

Humidity and Temperature

HTZ Smart HART® Humidity, Temperature and Dewpoint Transmitter

The HTZ Smart HART® Transmitter simultaneously measures humidity and temperature in industrial, commercial, manufacturing and HVAC applications. Based on the humidity and temperature values, the HTZ also provides a dew point measurement as a calculated variable.

The 2-wire (loop-powered) HTZ features dual isolated and scalable 4-20mA outputs proportional to two of the following (user-selectable): relative humidity (RH), ambient temperature or dew point calculation. The analog output signals are ready for direct interface with HART or non-HART based DCS, PLC and other computer-based systems.

Get the HTZ Humidity and Temperature Transmitter Data Sheet at www.miinet.com.



Process Temperature Measurement Assembly

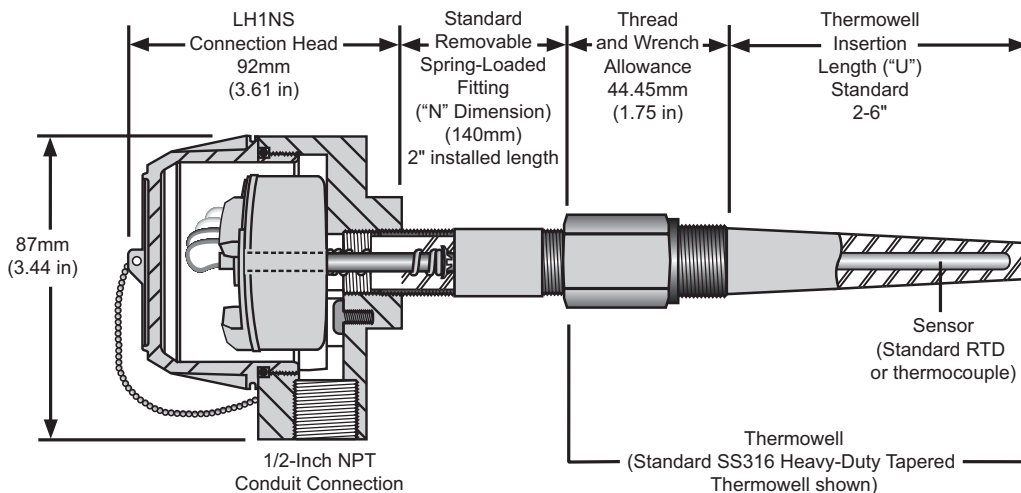
System Accuracy: $\pm 0.03\%$ of span within -18 to 93°C (0 to 200°F) and with $-VTB$ option.

System includes:

- Loop-Powered Temperature Transmitter with 4-20mA output; rangeable using PC Configurable Software or, in the case of the THZ³/TDZ³, HART/DTM tools
- High accuracy (Class A, $R_0 \pm 0.06\%$) RTD, 4-wire, platinum, 1000 ohm, $\alpha = 0.00385$
- Stainless steel thermowell and fittings
- NEMA 4X, IP66 transmitter connection head



(See RTI-1 data sheet for detailed specifications)



NOTE: Standard models with fixed immersion sensors are also available. Ask for details.

Temperature Monitoring Solutions for High-Tech Facilities and Processes

Temperature Transmitter Assembly Selection Resources



The WORM Flexible Sensors for Thermowell Temperature Assemblies

In both new and retrofit applications, the WORM® Flexible Sensors for Thermowell Temperature Assemblies replace restrictive straight sensor probes with a universal sensor that will save you time and money. With straight sensors, you have to remove the connection head, and sometimes the thermowell assembly components, to get the sensor into the thermowell. The WORM bends right through the top of face of the enclosure, slides through the conduit port, and into or out of the thermowell without having to remove the enclosure or any assembly components.

- High accuracy measurements
- Trims to desired length
- One sensor to stock for multiple thermowell types and lengths

Ready-to-Install Process Temperature Transmitter Assemblies

Why waste valuable time searching for temperature assembly pieces and parts? We have developed a spectrum of assemblies from temperature transmitter to sensor tip encompassing process applications for straight thermowells or for flexible sensors. These data sheets will save you time by guiding you through selecting and ordering the temperature measurement assembly that best fits your application.



RTI-1 Ready to Install TRY, TRX, THZ3 & STZ Temperature Transmitter Assemblies

The RTI-1 data sheet guides you through ordering ready-to-install standard temperature transmitter assemblies where no display is needed with a sensor and thermowell or with a fixed-immersion sensor. It features the TRY, TRX, THZ3 temperature transmitters, and the STZ, our FS Functional Safety Series temperature transmitter.



RTI-2 Ready to Install TDY, TDZ3, STZ, TFZ, THZ, TPZ, RIY, & TIY Temperature Transmitter & Display Assemblies

The RTI-2 data sheet guides you through ordering ready-to-install standard temperature transmitter assemblies with a display, and with a sensor and thermowell or with a fixed-immersion sensor. It features the TDY, THZ3, TFZ, THZ, TPZ, RIY, & TIY temperature transmitters, and the STZ FS Functional Safety Series temperature transmitter.



RTI-3 Ready to Install WORM Surface Mount Temperature Assemblies

The RTI-3 data sheet guides you through ordering ready-to-install temperature transmitter assemblies for surface measurements. It features our innovative WORM Flexible Sensor and provides methods for mounting directly to tanks, pipes, motors, compressors, valves or anywhere else a surface temperature measurement is needed. It includes the TDY, TDZ3, THZ3, TFZ, TPZ, TRY, TRX, temperature transmitters, and the STZ FS Functional Safety Series temperature transmitter.



RTI-4 Flexible Sensor Temperature Assemblies

The RTI-4 data sheet guides you through ordering ready-to-install temperature transmitter assemblies for indoor or outdoor open air and fluid applications, or hard-to-reach applications where a flexible sensor can make measurements that rigid sensors can't. It features the WORM Flexible sensor, the TDY, TDZ3, THZ3, TFZ, TPZ, TRY, TRX, temperature transmitters, and the STZ FS Functional Safety Series temperature transmitter.



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