

# Технические характеристики на передатчик температуры Moore Industries STZ

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## Functional Safety Dual Input Smart HART® Temperature Transmitter



*Mounting choices include field enclosures with display, no display compact connection heads and a high-density DIN-style housing.*

### Description

Part of Moore Industries' **FS Functional Safety Series**, the SIL 2 and SIL 3 capable STZ Functional Safety Dual Input Smart HART® Temperature Transmitters for your SIS (Safety Instrumented System) configures quickly and easily to accept a single or dual input from a wide array of sensors and analog devices:

- **14 RTD Types**
- **9 Thermocouple Types**
- **Resistance and Potentiometer Devices**
- **Direct Millivolt Sources**

These 2-wire (loop-powered) transmitters provide an isolated and linear 4-20mA output proportional to the input. This signal is ready for direct interface with HART or non-HART based Safety System, DCS, PLC and other computer-based SCADA systems. FMEDA (Failure Mode Effects and Diagnostic Analysis) reports are available with the required safety data to ensure that the STZ meets the requirements of each Safety Instrumented Function (SIF).

### Features

- **exida certified to IEC 61508:2010.** Certified by exida to IEC 61508 for systematic integrity up to SIL 3 and for random integrity up to SIL 2. This means that an STZ is approved for single use in Safety Instrumented Systems (SIS) up to SIL 2 and in a redundant architecture (1oo2, 2oo3, etc.) up to SIL 3.
- **Comprehensive FMEDA certified safety data.** Upon request, exida-certified FMEDA data is available for a functional safety practitioner to use in determining the STZ's applicability in specific safety-related applications.
- **Dual sensor input** for Backup and Failover Protection, Average and Differential measurement and Low or High Select.
- **Device Intelligence** including Sensor Drift and Corrosion Detection, Smart Range Alarms, High-availability option, and Input Simulation capability.
- **HART 7 compliant** with exception-based reporting and dynamic variable mapping.
- **HART Access Control.** To prevent unauthorized or accidental reconfiguration of the STZ while it's performing it's safety function, it has an added security feature to allow users to set HART communication into a Read Only or Off mode.
- **Input-to-output analog accuracy of up to  $\pm 0.014^{\circ}\text{C}$  ( $\pm 0.025^{\circ}\text{F}$ )\*** is the absolute best in the industry.
- **20-bit input resolution delivers exceptional digital accuracy** of  $\pm 0.1^{\circ}\text{C}$  ( $\pm 0.18^{\circ}\text{F}$ ) with all Pt RTDs or up to  $\pm 0.05^{\circ}\text{C}$  ( $\pm 0.09^{\circ}\text{F}$ )\* for Pt1000 RTDs.
- **HART & DTM Programmable with user-oriented basic configuration** for fast and accurate setup. HART configurable via any HART handheld configurator or HART compatible host. Additionally program or monitor with any FDT compliant host or program, such as PACTware, utilizing our DTM.
- **Long-term stability** provides up to 5 years between scheduled calibrations.

**Certifications (see Page 16 for details)**



**IEC  
61508**



**IECEx**



**ANZEx**

All product names are registered trademarks of their respective companies. HART® is a registered trademark of FieldComm Group.

\*High-accuracy measurements are achieved by using a 4-wire, 1000 ohm platinum RTD with a span of 100°F (50°F minimum) calibrated in our sensor-matching calibration bath.

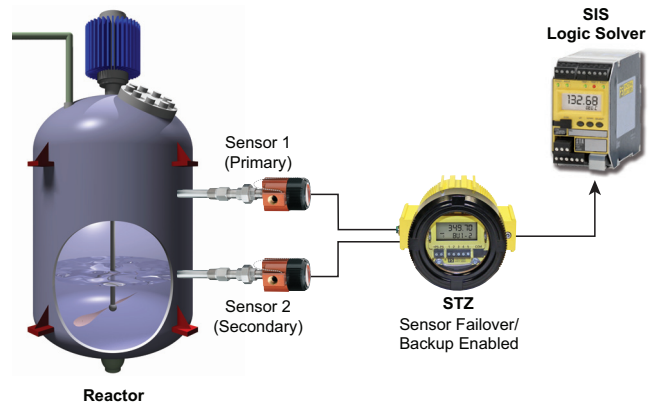
## Functional Safety Dual Input Smart HART® Temperature Transmitter

### Dual Sensor Input Gives You Expanded Measurement Capability and Protection for your Safety Systems

With Dual Input sensors, the SIL 2 and SIL 3 capable STZ has advanced features that give you far more control over temperature measurements (see Figure 1) in your traditional loops and Safety Instrumented Systems (SIS). Each sensor is individually selectable and programmable.

- **Backup and Fail-Over Protection** allows either of the sensors or inputs to be designated as the primary measurement, with the secondary input acting as the backup sensor in case of primary sensor failure.
- **Average and Differential Measurement** allows you to average the two input measurements or select the differential (A-B or B-A) or absolute differential between the two inputs.
- **High-Select and Low-Select Feature** enables the transmitter to continuously monitor two separate inputs and designate either the highest or lowest input to represent the analog output.
- **Dynamic Variable Mapping** permits the user to assign either input or the calculated result of inputs to any of the four HART variables (PV, SV, TV or QV) that can be read by any HART-compatible host system.

**Figure 1.** Temperature is often a critical measurement in reactors, especially processes with the potential for thermal runaways due to exothermic reactions. Utilizing the failover/backup feature with dual sensor input on the STZ can help your Safety Instrumented System (SIS) mitigate potentially dangerous situations.

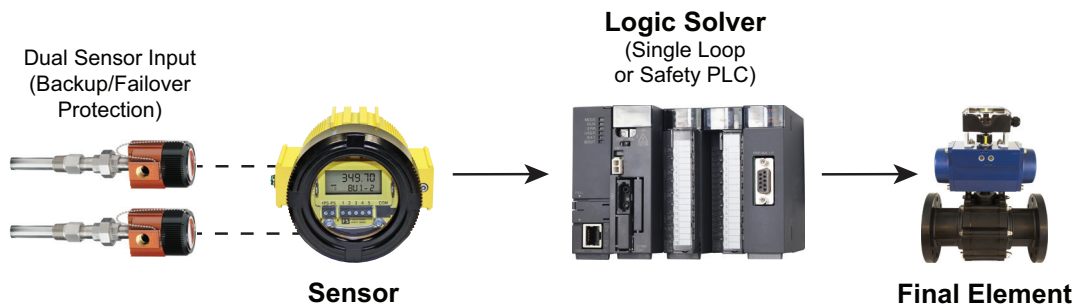


### Certified to IEC 61508

The STZ has been certified, by exida to IEC61508 for systematic integrity up to SIL 3 and for single use in Safety Instrumented Systems (SIS) up to SIL 2. It has been designed and developed in strict compliance with IEC 61508 standards to provide the highest level of system integrity and reliability. Internal diagnostics provide protection against dangerous failures during operation.

Approval by exida means that you can have confidence when selecting the STZ that is the right instrument for your safety needs. You don't have to worry about documenting and tracking Proven-In-Use data as you would with non-IEC 61508-approved instruments.

**Figure 2.** The STZ can be applied as the temperature sensor/transmitter in a typical SIS loop.



## Functional Safety Dual Input Smart HART® Temperature Transmitter

### Total Sensor Diagnostics

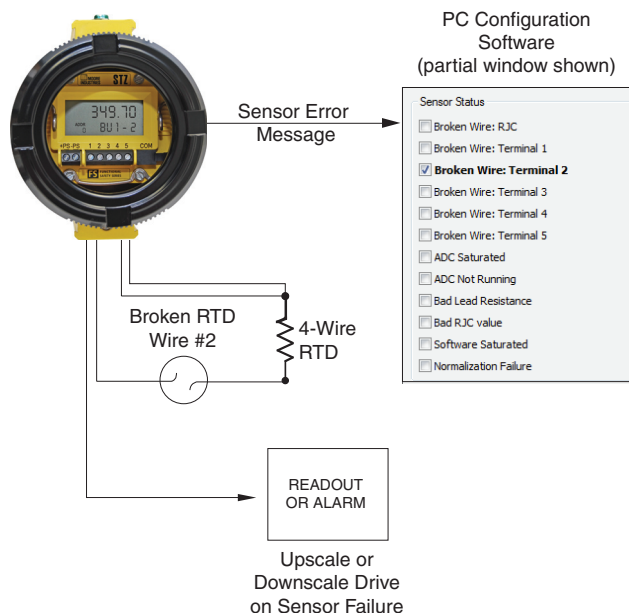
These transmitters perform continuous sensor diagnostics (Figure 3). This patented Moore Industries feature can save you from costly lost production time and hours of troubleshooting. If the sensor breaks or otherwise stops sending a signal during operation, the transmitter sends the output upscale or downscale to warn of trouble, and provides a HART digital error message that can be read by a HART communicator, computer-based system or PC. If the sensor being utilized is a RTD, the STZ instantly displays the type and location of the error.

### Trims to Respond to Specific Sensor Curve Segments

Most transmitters' zero and full values can be calibrated to measure a specific range within a sensor's overall curve capability. However, for even greater measurement accuracy, our transmitter trim capabilities go much further.

The STZ can be trimmed with two data points within the selected zero and full measurement range. This advantage allows a complete process range to be monitored, while placing measurement emphasis on a specific segment of the range most critical to the process.

**Figure 3.** Patented Total Sensor Diagnostics saves troubleshooting time.



In the Figure 4 (below), the actual sensor curve is used in place of the ideal RTD curve between 20°C and 27°C. This provides incredible precision over a limited portion of span, while measuring the remainder of the span with the STZ's usual outstanding accuracy.

### Program 128-Point Custom Curves

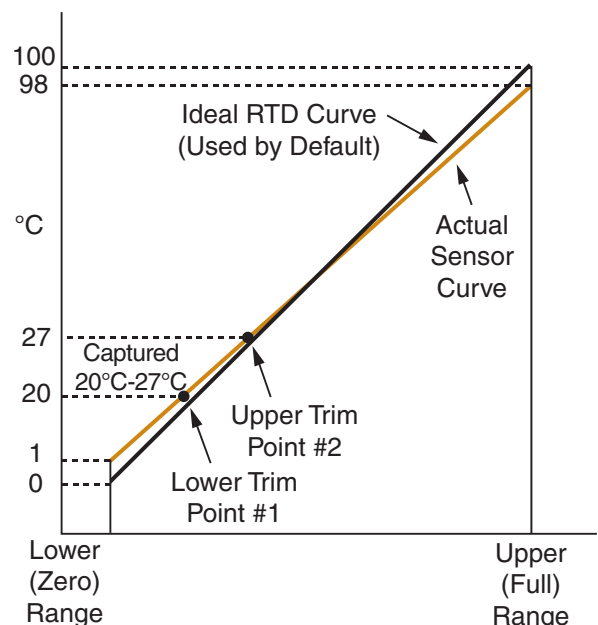
Beyond trimming curves, you can create up to four custom curves and apply them to any available device variables in the STZ. You can program several properties for each curve including:

- The number of active points in the custom curve
- Units of the inbound data to be processed by the curve (X values)
- Units of the outbound data that is the result of processing by the curve (Y values)

### Precise Linearization and RJC

The STZ uses an advanced linearization method to minimize the conformance error. Its Reference (Cold) Junction Compensation techniques produce stable readings even in fluctuating ambient temperature conditions. For non-linear inputs, you can create custom linearization curves using our DTM with any FDT-compliant host.

**Figure 4.** The STZ can be set to measure the segment most critical to the process.



## Functional Safety Dual Input Smart HART® Temperature Transmitter

### HART Master/Slave Structure

To implement two-way communications between the transmitter and the device configuring or receiving its information, the transmitter operates in a HART Master/Slave structure.

The STZ is a Slave (or Slaves in a multidrop network). There can be two Masters per system: a Primary Master and a Secondary Master. In the majority of applications, the Primary Master is a HART-based host or control system and the Secondary Master is typically a hand-held configurator. Operating in HART's Poll/Response (Normal) Mode, the HART Master polls the transmitter two times per second to access the current process variable status, send setup data to the transmitter, or remotely view its identification, configuration and diagnostic data.

### Device Intelligence for Smarter Monitoring and Control

The advanced features we have built into the STZ give you the ability to simulate sensor input before you commit to installation, alert you to faulty sensor conditions and prevent unwanted alarms which help increase your process uptime and availability.

- **Sensor Drift and Corrosion Detection** checks and alerts you when the sensor is drifting out of your preset range or when sensor resistance levels drastically change, which can be an early indication of sensor failure.
- **Smart Range Alarms** offer four HART alarms set to any input or calculated input that detect when the variable is within or outside user preset limits.

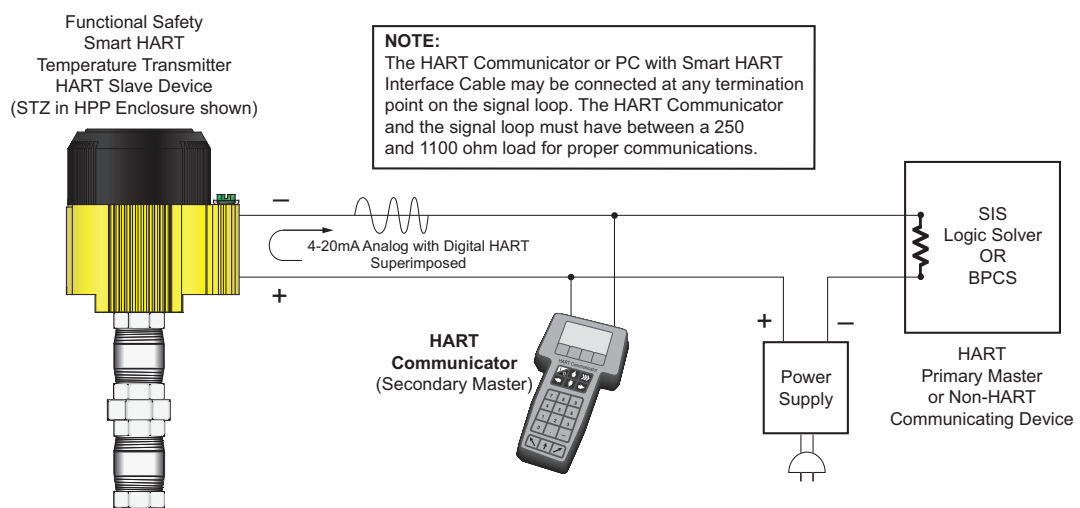
- **High Availability Option** enables the user to select how the AO behaves when there is an input failure or out-of-range value detected by the transmitter. This prevents nuisance alarms on startups or batch process shutdowns.
- **Input Simulation Capability** allows the user to manually input a direct or calculated value, in effect simulating a real input to test the AO or any HART diagnostic and range alarms.

### Set Up with HART Host, Communicator or FDT-Compliant Host or Program (No HART Modem Required)

The STZ Functional Safety Smart HART Transmitters are HART and DTM programmable. They can be programmed quickly and easily and interrogated at any time from anywhere on the 4-20mA loop (see Figure 5). You can use a standard hand-held HART Communicator, a HART compatible host, or you can program or monitor with any FDT compliant host or program such as PACTware utilizing our DTM.

- **HART Communications Security Feature** sets HART communications to Read Only Mode (STZ responds to HART commands to access device variables and diagnostic status but does not allow changes to the unit's configuration) or Off Mode (no HART messages are sent from the STZ and all HART message sent to the unit are ignored). This security feature prevents unauthorized or accidental reconfiguration of the STZ while it is performing safety functions.
- **Program Input Type and Range**—Full, zero and input type values are all programmable.

**Figure 5.** From any termination point on the 4-20mA loop, you can view, test and change the transmitter's operating parameters using a HART Communicator or from a PC using our DTM with PACTware or other FDT compliant program (a HART modem is not required for PC setup).





## Functional Safety Dual Input Smart HART® Temperature Transmitter

### Set Up (Continued)

- **Adjust Sensor Trim Offset**—Set an offset to compensate for measurement errors that are caused when a temperature sensor is not performing to its rated curve specifications.
- **Set Damping Time**—Eliminate imprecise readings caused by noise and other insignificant process fluctuations by setting a damping time between 0-60 seconds.
- **View Real-Time Process Values**—View the existing process value (in the appropriate engineering unit), zero and full range values, actual output current and output current as a percentage of output span.
- **Choose Sensor Failure Mode**—If the input is lost, you have the choice of the output going upscale (to 23.6mA), downscale (to 3.6mA) or holding its last value. For safety applications, the STZ default is to fail low.
- **Select Device Identification and Data**—Tag number (Long Tags up to 32 characters supported in HART 7), configuration date, unit location code (16 characters), a message (32 characters) and polling address (0-63) are selectable.
- **Fix Output Current (Loop Test)**—To assist in calibrating your system, the transmitter's current output can be fixed to a known value so you can check it against the value being read by your receiving device.

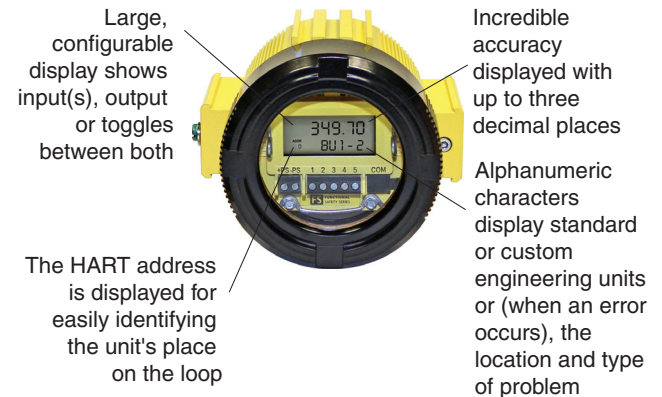
### Non-Volatile Memory

If power to the transmitter is lost, the unit resumes normal operation using the parameters that were configured, upon reapplication of power.

### Point-to-Point Loops Deliver Analog Simplicity with Remote Programmability

In the majority of applications, the STZ is installed on a point-to-point 4-20mA process loop like a regular analog transmitter (see Figure 5). A HART Communicator, HART-based system or PC is used to configure and view the transmitter's operating parameters and diagnostic data from any point on the loop.

**Figure 6.** The STZ features a standard process display that shows input(s), output or toggles intermittently between both.



### Easy-to-Read, Customizable Display

The STZ transmitter comes standard with a large display that features easy-to-read alphanumeric characters. Set the display to show input status, output status or toggle between both. It can even be custom-scaled to display an engineering unit of your choice (see Figure 6).

### STZ Device Description (DD)

Moore Industries' Device Description (DD) is the device-specific programming information that is loaded into a standard HART Communicator or Host. It allows access to all of the unit's programming functions except the custom linearization table function.

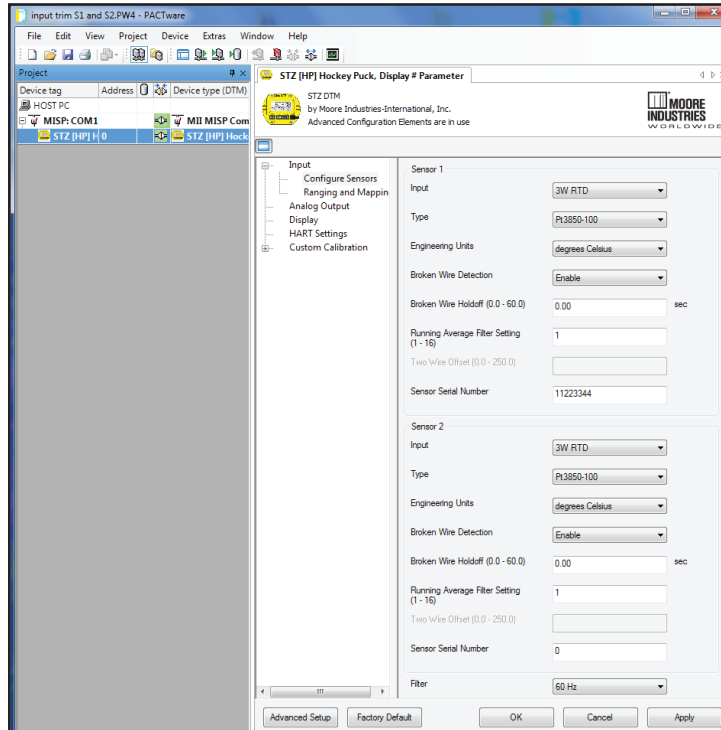
### How to Determine if Your HART Communicator Has a STZ Device Description

Hand-held HART Communicators typically feature a list of companies in a DD library. The letters "STZ" will appear under Moore Industries if you have the proper DD installed. If the handheld does not have the proper DD, contact the nearest regional sales and service office.

### Also Programs with the Generic HART DD

Even if your communicator is not up to date, most of the important programming features can be accessed without the STZ DD by using the "Generic" HART DD available on HART Communicators. Or you can order the unit factory-configured by Moore Industries.

## Quick and Intuitive Setup



### FREE PACTware Configuration Software with Versatile Programming Options

Download PACTware software for FREE from our website which allows you to set up all transmitter settings utilizing our DTM easy to use pull down menus.

**No HART Modem Required**—Using the Moore Industries PC Interface Cable, the transmitter is programmed via a communication port located on the front of the unit. A HART modem is not required to connect the PC to the transmitter.

**Remote PC Programming With a HART Modem With PACTware**—For programming from any access point on the loop, a HART-to-USB Smart Interface Cable (modem) can be purchased separately (see Ordering Information for details) to access the STZ programming options. The HART modem can also be connected directly to the transmitter.

Once a setup is created, it can be downloaded to multiple transmitters. Just a few of the time saving and performance enhancing features include:

**Set Up Safeguards**—It is nearly impossible to make incompatible configuration selections.

**Quick Transmitter/Configuration Upload/Download**—PACTware offers one button uploading and downloading of transmitter configuration.

**Toolbar for Frequently Used Commands**—A conveniently located toolbar provides quick access to often used configuration functions.

**Real-Time Process Readout**—The process measurement and the communication status between the transmitter and PACTware can be viewed in a one-page window.

**Precise Digital Output Trimming**—This essentially eliminates the impact of measurement errors introduced by inaccurate readout devices.

**Selectable Under Range, Over Range and Sensor Failure Values**—By setting different default values for each condition, you can distinguish between the failure modes when they occur.

**Store, E-mail, Download and Print Files**—The configuration record you've created may be downloaded to any number of transmitters, saved, e-mailed, or printed for record keeping.

## Specifications

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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| <b>HART Specifications</b><br><b>Address Range:</b> 0-63 (1-63 are for multidrop loops)<br><b>Transmission Speed:</b> 1200 bps<br><b>Character Format:</b><br>1 Start Bit - 8 Data Bits -<br>1 Odd Parity Bit - 1 Stop Bit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Performance (Continued)</b><br><b>Ripple:</b> 10mVp-p measured across a 250 ohm load resistor at frequencies up to 120Hz<br><b>Input Over-voltage Protection:</b> ±3Vdc peak to peak, maximum<br><b>Digital Input Filter:</b> User-programmable; 50/60Hz<br><b>Power Supply Effect:</b> ±0.002% of span per 1V change<br><b>Load Effect:</b> Negligible within specified power limits<br><b>Load Capability:</b> (500 ohms@24V)                                                                                                                                                                                                                                                                                                               | <b>Display Type:</b> Top Row, 10mm (0.4 in) high black digits on a reflective background; Bottom Row, 6mm (0.225 in) high digits on a reflective background; Two-digit HART address indicator<br><b>Format:</b> Two rows of five alphanumeric characters<br><b>Decimal Points:</b> Allowed decimal places: Auto, 1, 2 or 3<br><b>Range:</b> -99999 to 99999<br><b>Minimum Display Span:</b> 1.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Performance</b><br><b>Input Accuracy:</b> Refer to Table 1<br><b>Output Range:</b> 4-20mA<br><b>Analog Output Accuracy:</b> 3µA (0.019% of 4-20mA Span)<br><b>Overall Accuracy:</b> The overall accuracy of the unit is the combined input and output accuracy. It includes the combined effects of linearity, hysteresis, repeatability and adjustment resolution. It does not include ambient temperature effect. For T/C input only, add the Reference Junction Compensation error<br><b>Reference (Cold) Junction Compensation:</b> ±0.25°C (±0.45°F); DIN ±0.45°C (±0.81°F)<br><b>Stability:</b> Refer to Table 2<br><b>Isolation:</b> STZ HPP, DIN and DIN –RF: 500Vrms input-to-output continuous; will withstand a 1350Vac dielectric strength test for one minute with no breakdown input-to-output to case; STZ HP: 500Vrms input-to-output continuous, will withstand a 500Vac dielectric strength test for one minute with no breakdown input-to-output to case.<br><b>Response (Rise) Time:</b> 100msec maximum for the output to change from 10% to 90% for an input step change of 0% to 100%<br><b>Step Response Time:</b> 460msec (single), 650msec (dual) typical from the time an input is applied until the output reaches 90% of its final value | $\frac{\text{Supply Voltage} - 12\text{V}}{0.024\text{A}} = \text{Ohms}$<br><b>Burnout Protection:</b> User-programmable, Upscale 23.6mA; Downscale 3.6mA; preset value or hold-last output<br><b>Output Current Limiting:</b> User-programmable, 3.6 to 4.0mA and 20 to 23.6mA for input under/over range; 24mA, maximum (hardware limit)<br><b>T/C Input Impedance:</b> 40Mohms, nominal<br><b>RTD &amp; Ohms Excitation:</b> 250 microamps, ±10%<br><b>RTD Lead Wire Resistance Maximum:</b> RTD resistance + 2X lead wire resistance < 4000 ohms;<br><b>Damping:</b> User set; 0-60 seconds<br><b>Resolution:</b> Input, 20-bit; Output, 16-bit<br><b>Power Supply Requirement:</b> 12-30Vdc for I.S. version; 12-42Vdc for standard version | <b>Ambient Temperature</b><br><b>Operating Range:</b> -40°C to +85°C (-40°F to +185°F)<br><b>Storage Range:</b> -40°C to +85°C (-40°F to +185°F)<br><b>Relative Humidity:</b> 0-95%, non-condensing<br><b>Ambient Temperature Effect:</b> See Table 3<br><b>Effect on Reference (Cold) Junction Compensation:</b> ±0.005% per °C change of ambient temperature<br><b>Startup Time:</b> The system output reaches 90% of its value based on input in less than 5 seconds after power up<br><b>Noise Rejection:</b> Common mode, 100dB@50/60Hz; Normal Mode: Refer to Table 4<br><b>RFI/EMI Immunity:</b> 20 V/m @ 80-1000 MHz, 1kHz AM for STZ HP and STZ DIN and 10 V/m @ 80-1000 MHz, 1kHz AM for STZ HPP when tested according to IEC61000-4-3<br><br><b>Weight</b><br><b>STZ DIN:</b> 221g (7.9 oz)<br><b>STZ HPP:</b> 91g (3.2 oz)<br><b>STZ HPP in LH2:</b> 644g (22.9 oz)<br><b>STZ HP:</b> 182g (6.4 oz)<br><b>STZ HP in BH:</b> 1.4kg (50.2 oz)<br><b>STZ HP in SB:</b> 3.2kg (113 oz) |



## Functional Safety Dual Input Smart HART® Temperature Transmitter

**Table 1.** Input and Accuracy Table (RTD, T/C, Ohm, mV and Potentiometer Input Model)

| Input | Type              | $\alpha^*$ | Ohms                           | Conformance Range                | Minimum Span   | Input Accuracy                                           | Maximum Range                      | Sensor-to-Transmitter Matching                                                                                                                                                                                                                                                                                                   |
|-------|-------------------|------------|--------------------------------|----------------------------------|----------------|----------------------------------------------------------|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RTD   | Platinum          | 0.003850   | 100                            | -200 to 850°C<br>-328 to 1562°F  | 10°C<br>(18°F) | $\pm 0.1^\circ\text{C}$<br>( $\pm 0.18^\circ\text{F}$ )  | -240 to 960°C<br>-400 to 1760°F    | Up to $\pm 0.014^\circ\text{C}$<br>( $\pm 0.025^\circ\text{F}$ ) system accuracy*.<br><br>*High-accuracy measurements are achieved by using a 4-wire 1000 ohm platinum RTD with a span of 100°F (50°F minimum) calibrated in our sensor-matching calibration bath. See page 9 or contact our factory for additional information. |
|       |                   |            | 200                            |                                  |                |                                                          |                                    |                                                                                                                                                                                                                                                                                                                                  |
|       |                   |            | 300                            |                                  |                |                                                          |                                    |                                                                                                                                                                                                                                                                                                                                  |
|       |                   |            | 400                            |                                  |                |                                                          |                                    |                                                                                                                                                                                                                                                                                                                                  |
|       |                   |            | 500                            |                                  |                |                                                          |                                    |                                                                                                                                                                                                                                                                                                                                  |
|       |                   |            | 1000                           |                                  |                |                                                          |                                    |                                                                                                                                                                                                                                                                                                                                  |
|       |                   | 0.003902   | 100                            | -100 to 650°C<br>-148 to 1202°F  |                | -150 to 720°C<br>-238 to 1328°F                          |                                    |                                                                                                                                                                                                                                                                                                                                  |
|       |                   |            | 200                            |                                  |                |                                                          |                                    |                                                                                                                                                                                                                                                                                                                                  |
|       |                   |            | 400                            |                                  |                |                                                          |                                    |                                                                                                                                                                                                                                                                                                                                  |
|       |                   |            | 500                            |                                  |                |                                                          |                                    |                                                                                                                                                                                                                                                                                                                                  |
|       |                   |            | 1000                           |                                  |                |                                                          |                                    |                                                                                                                                                                                                                                                                                                                                  |
|       |                   | 0.003916   | 100                            | -200 to 510°C<br>-328 to 950°F   |                | -240 to 580°C<br>-400 to 1076°F                          |                                    |                                                                                                                                                                                                                                                                                                                                  |
|       | Nickel            | 0.00672    | 120                            | -80 to 320°C<br>-112 to 608°F    |                | -100 to 360°C<br>-148 to 680°F                           |                                    |                                                                                                                                                                                                                                                                                                                                  |
|       | Copper            | 0.00427    | 9.035                          | -50 to 250°C<br>-58 to 482°F     |                | $\pm 0.85^\circ\text{C}$<br>( $\pm 1.53^\circ\text{F}$ ) | -65 to 280°C<br>-85 to 536°F       |                                                                                                                                                                                                                                                                                                                                  |
| Ohms  | Direct Resistance | n/a        | 0-4000 ohms                    | 0-4000 ohms                      | 10 ohms        | $\pm 0.4$ ohms                                           | 0-4095 ohms                        |                                                                                                                                                                                                                                                                                                                                  |
|       | Potentiometer     |            | 125, 250, 500, 1k, 2k, 4k ohms | 0-100%                           | 10%            | $\pm 0.1\%$                                              | 0-100%                             |                                                                                                                                                                                                                                                                                                                                  |
| T/C   | J                 | n/a        | n/a                            | -180 to 760°C<br>-292 to 1400°F  | 35°C<br>63°F   | $\pm 0.25^\circ\text{C}$<br>( $\pm 0.45^\circ\text{F}$ ) | -210 to 770°C<br>-346 to 1418°F    |                                                                                                                                                                                                                                                                                                                                  |
|       | K                 | n/a        | n/a                            | -150 to 1370°C<br>-238 to 2498°F | 40°C<br>72°F   | $\pm 0.3^\circ\text{C}$<br>( $\pm 0.54^\circ\text{F}$ )  | -270 to 1390°C<br>-454 to 2534°F   |                                                                                                                                                                                                                                                                                                                                  |
|       | E                 | n/a        | n/a                            | -170 to 1000°C<br>-274 to 1832°F | 35°C<br>63°F   | $\pm 0.2^\circ\text{C}$<br>( $\pm 0.36^\circ\text{F}$ )  | -270 to 1013°C<br>-454 to 1855.4°F |                                                                                                                                                                                                                                                                                                                                  |
|       | T                 | n/a        | n/a                            | -170 to 400°C<br>-274 to 752°F   | 35°C<br>63°F   | $\pm 0.25^\circ\text{C}$<br>( $\pm 0.45^\circ\text{F}$ ) | -270 to 407°C<br>-454 to 764.6°F   |                                                                                                                                                                                                                                                                                                                                  |
|       | R                 | n/a        | n/a                            | 0 to 1760°C<br>32 to 3200°F      | 50°C<br>90°F   | $\pm 0.55^\circ\text{C}$<br>( $\pm 0.99^\circ\text{F}$ ) | -50 to 1786°C<br>-58 to 3246.8°F   |                                                                                                                                                                                                                                                                                                                                  |
|       | S                 | n/a        | n/a                            | 0 to 1760°C<br>32 to 3200°F      | 50°C<br>90°F   | $\pm 0.55^\circ\text{C}$<br>( $\pm 0.99^\circ\text{F}$ ) | -50 to 1786°C<br>-58 to 3246.8°F   |                                                                                                                                                                                                                                                                                                                                  |
|       | B                 | n/a        | n/a                            | 400 to 1820°C<br>752 to 3308°F   | 75°C<br>135°F  | $\pm 0.75^\circ\text{C}$<br>( $\pm 1.35^\circ\text{F}$ ) | 200 to 1836°C<br>392 to 3336.8°F   |                                                                                                                                                                                                                                                                                                                                  |
|       | N                 | n/a        | n/a                            | -130 to 1300°C<br>-202 to 2372°F | 45°C<br>81°F   | $\pm 0.4^\circ\text{C}$<br>( $\pm 0.72^\circ\text{F}$ )  | -270 to 1316°C<br>-454 to 2400.8°F |                                                                                                                                                                                                                                                                                                                                  |
|       | C                 | n/a        | n/a                            | 0 to 2300°C<br>32 to 4172°F      | 100°C<br>180°F | $\pm 0.8^\circ\text{C}$<br>( $\pm 1.44^\circ\text{F}$ )  | 0 to 2338°C<br>32 to 4240.4°F      |                                                                                                                                                                                                                                                                                                                                  |
| mV    | DC                | n/a        | n/a                            | -50 to 1000mV                    | 4mV            | 30 microvolts                                            | -50 to 1000mV                      |                                                                                                                                                                                                                                                                                                                                  |

**Table 2.** Long-Term Stability Table (RTD, T/C, Ohm, mV and Potentiometer Input Model)

| Stability (% of maximum span) | Input to Output |       |       | Input to HART |       |       |
|-------------------------------|-----------------|-------|-------|---------------|-------|-------|
|                               | 1 yr            | 3 yrs | 5 yrs | 1 yr          | 3 yrs | 5 yrs |
| T/C, mV                       | 0.08            | 0.14  | 0.18  | 0.008         | 0.015 | 0.019 |
| RTD, Ohm, Potentiometer       | 0.09            | 0.16  | 0.21  | 0.047         | 0.081 | 0.104 |

**Table 3.** Ambient Temperature Effects Table (RTD, T/C, Ohm, mV and Potentiometer Input Model)

| Sensor Type | Digital Accuracy per 1°C (1.8°F) change in Ambient | Analog Accuracy per 1°C (1.8°F) change in Ambient |
|-------------|----------------------------------------------------|---------------------------------------------------|
| RTD         | 0.003°C                                            | 0.001% of span (16mA)                             |
| All T/C     | 0.0003°C + 0.0015% of reading                      | 0.001% of span (16mA)                             |
| T/C: B      | 0.003°C + 0.0015% of reading                       | 0.001% of span (16mA)                             |
| Millivolt   | 0.0005mV + 0.0015% of reading                      | 0.001% of span (16mA)                             |
| Ohm         | 0.002 ohms + 0.0015% of reading                    | 0.001% of span (16mA)                             |

**Table 4.** Normal Mode Rejection Ratio Table (RTD, T/C, Ohm, mV and Potentiometer Input Models)

| Sensor Type                    | Max. p-p Voltage Injection for 70dB at 50/60Hz |
|--------------------------------|------------------------------------------------|
| T/C E                          | 120mV                                          |
| T/C J, K, N, C                 | 60mV                                           |
| T/C T, R, S, B                 | 30mV                                           |
| 100 ohm Pt RTD                 | 120mV                                          |
| 200 ohm Pt RTD                 | 200mV                                          |
| 300, 400, 500, 1000 ohm Pt RTD | 400mV                                          |
| 1000 ohm Pt RTD                | 800mV                                          |
| 120 ohm Ni RTD                 | 200mV                                          |
| 9.03 ohm Cu RTD                | 30mV                                           |
| Resistance 4Kohm/mV 1000mV     | 800mV                                          |
| Resistance 2Kohm/mV 500mV      | 400mV                                          |
| Resistance 1Kohm/mV 250mV      | 200mV                                          |
| Resistance 500ohm/mV 125mV     | 120mV                                          |
| Resistance 250ohm/mV 62.5mV    | 50mV                                           |
| Resistance 125ohm/mV 31.25mV   | 30mV                                           |

## Complete Temperature Assemblies

Free yourself from the hassle of looking around for pieces and parts by ordering a complete assembly.

To complement our high-quality transmitters, we carry complete lines of RTDs, thermocouples, thermowells, connection heads and fittings. Get the quality you need and the options you require with the ease of just one ordering number!

For the best accuracy, have your transmitter and sensor calibrated together in our sensor-matching calibration bath.

**See our Ready-to-Install Temperature Transmitter Assemblies data sheets for details.**

## Sensor-to-Transmitter Matching

Our sensor matching process starts by immersing the temperature sensor into stabilized temperature baths in our calibration lab. The transmitter captures two points from the sensor and stores them in non-volatile memory. It then uses them to compensate for deviations between a sensor's stated linearization curve and its actual measurements.

Sensor matching provides you with incredible accuracy at an affordable price. Accuracy varies with the sensor, so contact the factory for information on your sensor type.

## Functional Safety Dual Input Smart HART® Temperature Transmitter

### Versatile Housing, Enclosure and Mounting Choices

| Model                                                                                                                                                                                                                                                                                                   | Features                                                                                                                                                                                                                                                                                                                                                                                                                                | Dimensions |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
|  <p><b>STZ in HPP</b><br/>Encapsulated Housing</p>                                                                                                                                                                     | <ul style="list-style-type: none"> <li>Small size and protected, encapsulated electronics make this model ideal for integrating into industrial machinery, machine tools, facility monitoring systems and similar production and process equipment.</li> <li>For retrofit applications, standard diameter and mounting hole dimensions allow easy integration into installed thermowell and remote-mounted connection heads.</li> </ul> | Page 13    |
|  <p><b>STZ in LH2</b><br/>Aluminum Connection Head Field-Mount Enclosure</p>                                                                                                                                           | <ul style="list-style-type: none"> <li>Compact, lightweight connection head mounts right on the thermowell/sensor assembly, or in a convenient remote location from the sensor.</li> <li>Encapsulated electronics resist the harmful effects of moisture and humidity that enter through the conduit connections.</li> <li>Explosion-proof/Flameproof, NEMA 4X, IP66 rated.</li> </ul>                                                  | Page 13    |
|  <p><b>STZ in BH</b><br/>Aluminum Field-Mount Enclosure</p>  <p><b>STZ in SB</b><br/>316 Stainless Steel Field-Mount Enclosure</p> | <ul style="list-style-type: none"> <li>Perfect choice when reliable field protection and on site indication are required.</li> <li>Modular transmitter electronics can be rotated 360 degrees to accommodate any viewing angle and easily removed without disturbing the enclosure or sensor assembly.</li> <li>Explosion-proof/Flameproof, NEMA 4X, IP66 rated.</li> </ul>                                                             | Page 14    |
|  <p><b>STZ in DIN</b><br/>Rail Mount Housing</p>                                                                                                                                                                     | <ul style="list-style-type: none"> <li>Only 25mm (1-inch) wide, this compact model is perfect for mounting in a control room, high-density instrument cabinet or field-mounted enclosure.</li> <li>Mounting bracket easily snaps on and off of 35mm Top Hat DIN-rails and standard relay tracks.</li> </ul>                                                                                                                             | Page 14    |
|  <p><b>STZ in HP</b><br/>Hockey-Puck Housing with Display</p>                                                                                                                                                        | <ul style="list-style-type: none"> <li>Mounts on a surface, G-type or top hat rails and on relay track when on site display is needed in a control room, cabinet or enclosure.</li> <li>Replacement transmitter installs in a Moore Industries BH or SB housings.</li> </ul>                                                                                                                                                            | Page 14    |

## Functional Safety Dual Input Smart HART® Temperature Transmitter

### Ordering Information

#### Field Mount Unit

| Unit                                                                          | Input                                                                                                                                                                                                                                                                                                                                                                                           | Output                                       | Power                                                                                                                                                    | Options     | Housing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>STZ</b><br>Functional Safety Dual Input Smart HART Temperature Transmitter | <b>PRG</b><br>Programmable with standard HART communicator or HART compatible host; program or monitor with any FDT compliant host or program, such as PACTware, utilizing our DTM.<br><br><b>RTD</b><br>2-, 3-, 4-Wire Platinum, Copper, Nickel<br><br><b>Thermocouple</b><br>(J, K, E, T, R, S, B, N, C)<br><br>0-4000 ohms<br><br>-50-1000mV<br><br>(see Table 1 for additional information) | <b>4-20MA</b><br>Scalable to narrower ranges | <b>12-42DC*</b><br><br><b>12-30DC</b><br>Intrinsically-Safe (I.S.) applications<br><br><small>* Non-incendive (Class 1 Div 2, Zone 2) by default</small> | <b>None</b> | <b>HPP</b> Hockey-puck housing for mounting in standard connection heads<br><br><b>LH2NS(*)</b> or (‡) Aluminum Explosion-proof/Flameproof connection head with two entry ports: ½-inch NPT cable and process—black metal cover<br><br><b>LH2MS(*)</b> or (‡) Aluminum Explosion-proof/Flameproof connection head with two entry ports: M20 cable and ½-inch NPT process—black metal cover<br><br><small>* Either <b>A</b> or <b>E</b> suffix (comes supplied with 2" pipe mount hardware)<br/> <b>A</b> suffix indicates ANZEx/TestSafe (Ex d) Flameproof approvals (i.e. LH2NSA)<br/> <b>E</b> suffix indicates ATEX (Ex d and tD) Flameproof approvals (i.e. LH2NSE)<br/> <b>‡ P</b> suffix indicates enclosure comes equipped with base plate and U-bolts for mounting on a 2-inch pipe (i.e. LH2NSP)<br/>           See LH datasheet for additional information.</small> |

**To order, specify:** Unit / Input / Output / Power / [Housing]

**Model Number Example:** STZ / PRG / 4-20MA / 12-30DC / [LH2NS]

#### DIN-Style Mount Unit

| Unit                                                                          | Input                                                                                                                                                                                                                                                                                                                                                                                           | Output                                       | Power          | Options     | Housing                                                                                                                                      |
|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|----------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>STZ</b><br>Functional Safety Dual Input Smart HART Temperature Transmitter | <b>PRG</b><br>Programmable with standard HART communicator or HART compatible host; program or monitor with any FDT compliant host or program, such as PACTware, utilizing our DTM.<br><br><b>RTD</b><br>2-, 3-, 4-Wire Platinum, Copper, Nickel<br><br><b>Thermocouple</b><br>(J, K, E, T, R, S, B, N, C)<br><br>0-4000 ohms<br><br>-50-1000mV<br><br>(see Table 1 for additional information) | <b>4-20MA</b><br>Scalable to narrower ranges | <b>12-42DC</b> | <b>None</b> | <b>DIN</b> DIN-style aluminum housing mounts on 35mm Top Hat (EN50022) rails<br><br><b>FLB</b> Flange bracket with top/bottom mounting holes |

**To order, specify:** Unit / Input / Output / Power / [Housing]

**Model Number Example:** STZ / PRG / 4-20MA / 12-42DC / [DIN]

## Functional Safety Dual Input Smart HART® Temperature Transmitter

### Ordering Information

#### Field Mount Unit With Display

| Unit                                                                          | Input                                                                                                                                                                                                                                                                                                                                                                                                        | Output                                       | Power                                                                                                                                                   | Options | Housing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>STZ</b><br>Functional Safety Dual Input Smart HART Temperature Transmitter | <b>PRG</b><br>Programmable with standard HART communicator or HART compatible host; program or monitor with any FDT compliant host or program, such as PACTware, utilizing our DTM.<br><br><b>RTD</b><br>2-, 3-, 4-Wire Platinum, Copper, Nickel<br><br><b>Thermocouple</b><br>(J, K, E, T, R, S, B, N, C)<br><br>0-4000 ohms<br><br>-50-1000mV<br><br>(see Table 1 in Section 7 for additional information) | <b>4-20MA</b><br>Scalable to narrower ranges | <b>12-42DC*</b><br><br><b>12-30DC</b><br>Intrinsically-Safe (I.S.) applications<br><br><small>*Non-Incendive (Class 1 Div 2, Zone 2) by default</small> | None    | <b>HP</b> Hockey puck housing and spring clips<br><br><b>DN</b> Snap-in mounting for HP case on TS-32 DIN-rail<br><br><b>FL</b> Mounting flanges on HP for relay track or screw mounting<br><br><b>FLD</b> Mounting flanges on HP for 3½" relay track mounting<br><br><b>BH2NG</b> (*) or (‡) Aluminum Explosion-proof/Flameproof enclosure with two 1/2-inch NPT entry ports and a glass cover<br><br><b>BH2TG</b> (*) or (‡) Aluminum Explosion-proof/Flameproof enclosure with two 3/4-inch NPT entry ports and a glass cover<br><br><b>BH2MG</b> (*) or (‡) Aluminum Explosion-proof/Flameproof enclosure with two M20 x 1.5 NPT entry ports and a glass cover<br><br><b>BH3NG</b> (*) or (‡) Aluminum Explosion-proof/Flameproof enclosure with three 1/2-inch NPT entry ports |

#### Additional Parts

The communications cables must be purchased separately:

**P/N 804-030-26**—Non-Isolated Fuse Protected USB Communication Cable (required by IECEx and ATEX for products installed in Intrinsically-Safe areas)

**P/N 803-040-26**—Non-Isolated Serial Configuration Cable for 2-Wire Instruments

**P/N 804-021-26**—HART-to-USB Smart Interface Cable with HART Modem.

**To order, specify:** Unit / Input / Output / Power / [Housing]

**Model Number Example:** STZ / PRG / 4-20MA / 12-42DC / [BH2NGP]

**BH3TG** (\*) or (‡) Aluminum Explosion-proof/Flameproof enclosure with two 3/4-inch side-entry NPT ports, one 1/2" bottom port, and a glass cover

**BH3MG** (\*) or (‡) Aluminum Explosion-proof/Flameproof enclosure with two, M20 x 1.5 side-entry ports, one 1/2" bottom-entry port, and a glass cover

**SB2NG** (\*) or (‡) 316 Stainless Steel 2-Hub, Explosion-proof/Flameproof enclosure with two, ½-inch NPT entry ports and a glass cover

**SB2MG** (\*) or (‡) 316 Stainless Steel 2-Hub, Explosion-proof/Flameproof enclosure with two, M20 x 1.5 entry ports and a glass cover

\* Either **A** or **E** suffix

**A** suffix indicates ANZEx/TestSafe (Ex d)

Flameproof approvals (i.e. BH2MGA)

**E** suffix indicates ATEX (Ex d and tD) Flameproof approvals (i.e. BH2MGE)

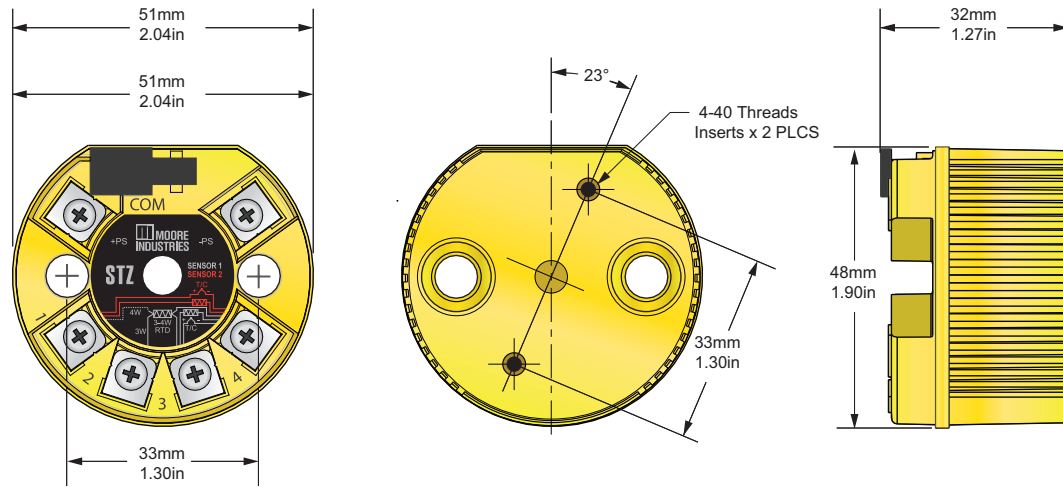
‡ **P** suffix indicates enclosure comes equipped with base plate and U-bolts for mounting on a 2-inch pipe (i.e. BH2NGP)

See BH and SB datasheets for additional information.

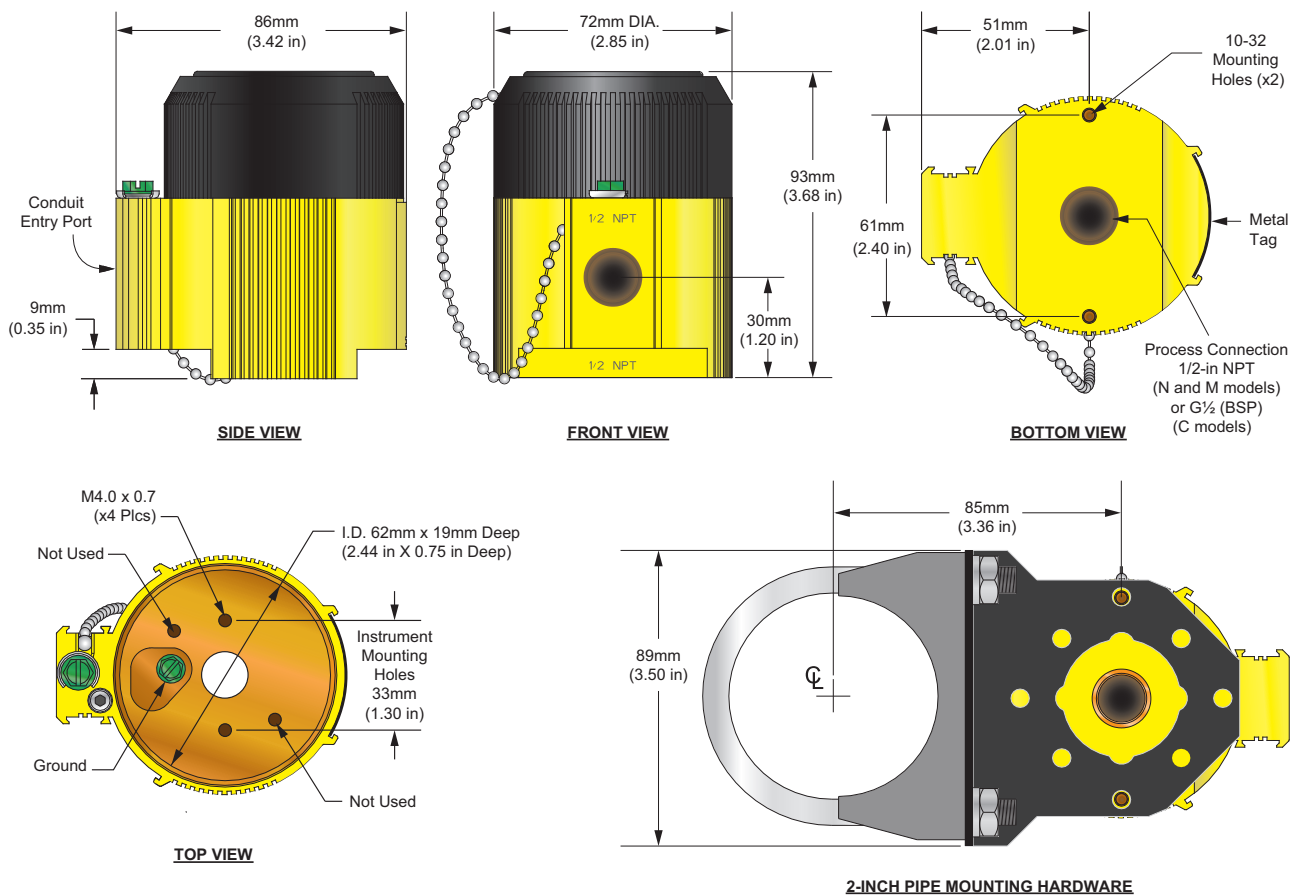


# Functional Safety Dual Input Smart HART® Temperature Transmitter

**Figure 7.** Dimensions for the STZ in the HPP hockey-puck housing.



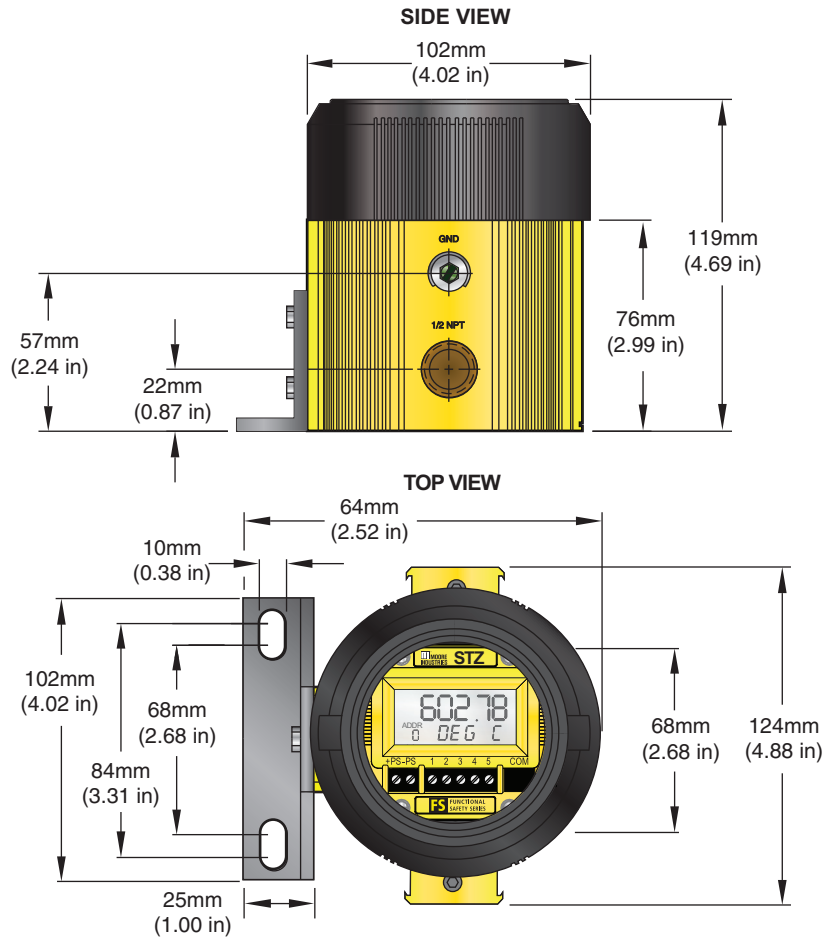
**Figure 8.** Dimensions for the STZ in the LH2 connection head.



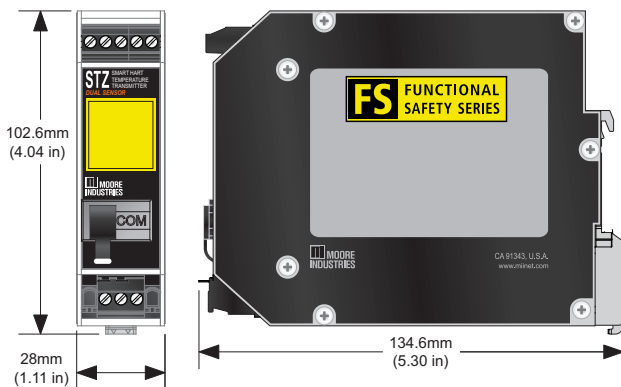
*Note: Make sure to calibrate and bench check the instruments prior to installation. Also, install all instruments in their intended application and on their rail before making any electrical connections. Allow enough room for pivoting instruments vertically on the rail for removal in applications involving multiple banks of STZ transmitters.*

## Functional Safety Dual Input Smart HART® Temperature Transmitter

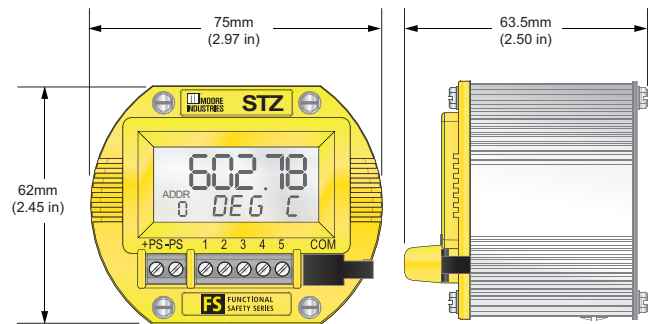
**Figure 9.** Dimensions for the STZ in BH field-mount enclosure.



**Figure 10.** Dimensions for the STZ in an aluminum DIN housing.



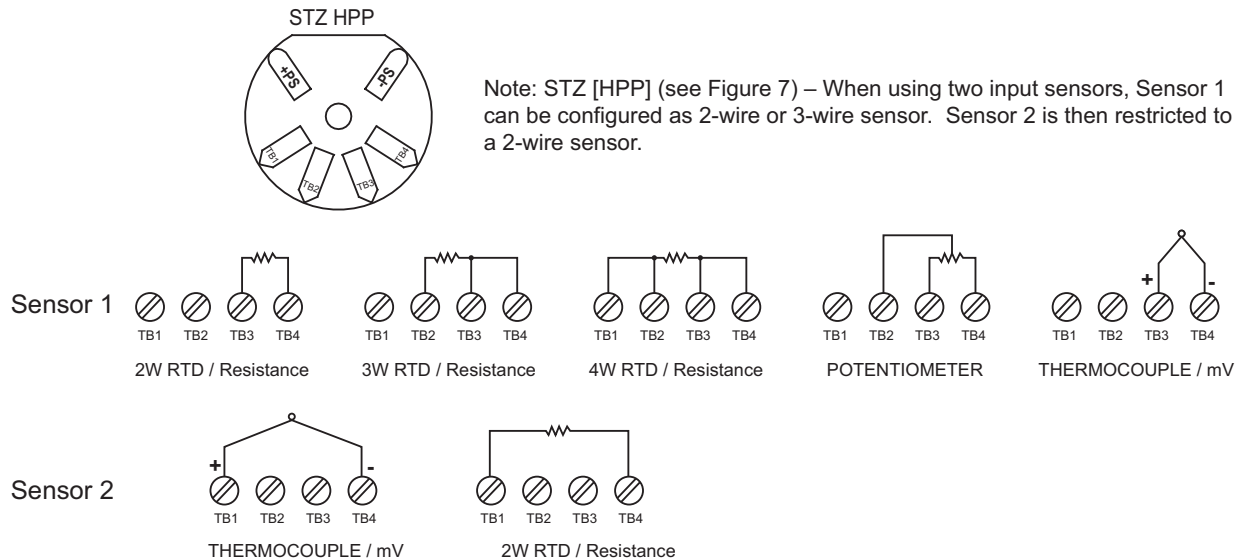
**Figure 11.** Dimensions for the STZ in an aluminum HP display housing.



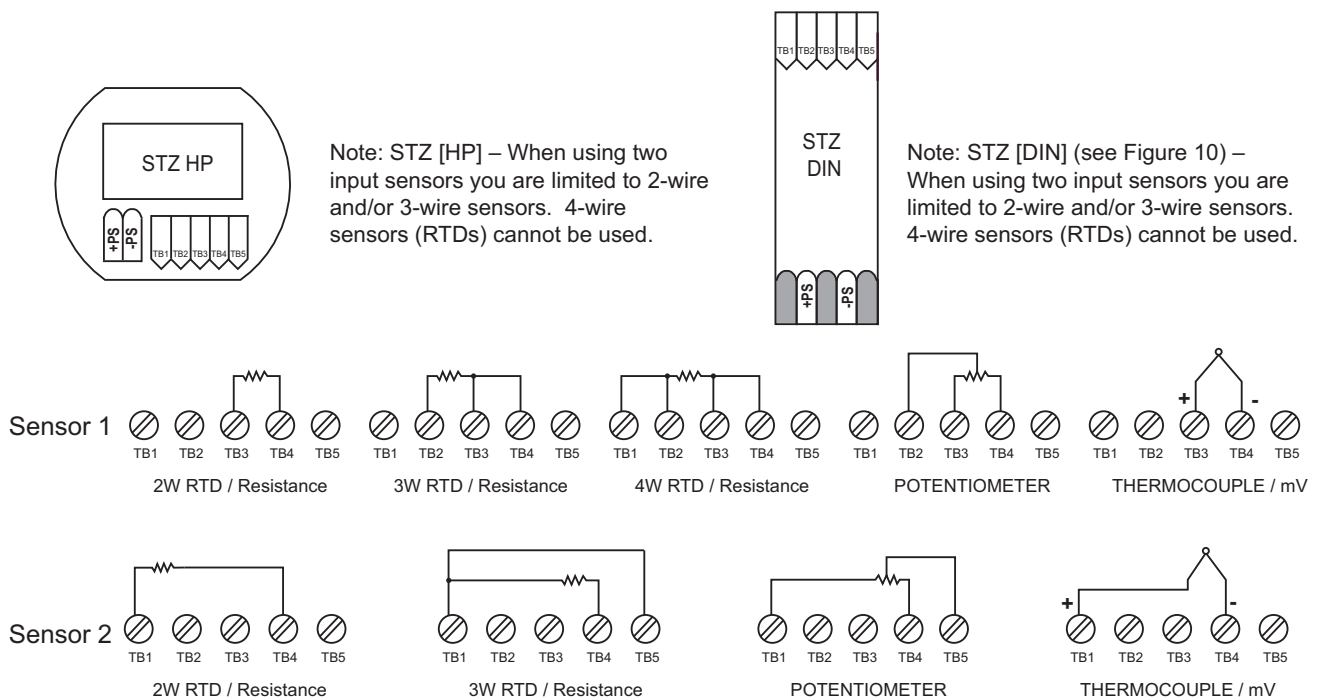
# Functional Safety Dual Input Smart HART® Temperature Transmitter

**Figure 12.** Terminal designations for all units (While terminal placement may differ from unit to unit, all models use identical numeric designations.)

## STZ HPP (4 Terminals) Input Connections



## STZ HP and STZ DIN (5 Terminals) Input Connections



## Functional Safety Dual Input Smart HART® Temperature Transmitter

### Certifications

**STZ-HPP**  
**Factory Mutual (US/Canada):**  
**Intrinsically-Safe**  
Class I, Division 1, Groups A, B, C & D  
Class I, Zone 0, AEx ia IIC  
**Non-Incendive**  
Class I, Division 2, Groups A, B, C & D  
Class I, Zone 2, AEx nA IIC

**ATEX Directive 2014/34/EU (FM Approvals):**  
**Intrinsically-Safe and Type "n"**  
Ex II 1G Ex ia IIC Ga  
Ex II 3G Ex nA IIC Gc

**IECEX** **IECEX System (FM Approvals):**  
**Intrinsically-Safe and Type "n"**  
Ex ia IIC Ga  
Ex nA IIC Gc

**Temperature Codes:**  
T4 @ 85°C Maximum Operating Ambient  
T5 @ 85°C Maximum Operating Ambient  
T6 @ 60°C Maximum Operating Ambient

**STZ-HP**  
**Factory Mutual (US/Canada):**  
**Intrinsically-Safe**  
Class I, Division 1, Groups A, B, C & D  
Class I, Zone 0, AEx ia IIC  
**Non-Incendive**  
Class I, Division 2, Groups A, B, C & D  
Class I, Zone 2, AEx nA IIC

**ATEX Directive 2014/34/EU (FM Approvals):**  
**Intrinsically-Safe and Type "n"**  
Ex II 1G Ex ia IIC Ga  
Ex II 3G Ex nA IIC Gc

**IECEX** **IECEX System (FM Approvals):**  
**Intrinsically-Safe and Type "n"**  
Ex ia IIC Ga  
Ex nA IIC Gc

**Temperature Codes:**  
T4 @ 85°C Maximum Operating Ambient

**STZ-HPP in LH2 Housing**  
**FM Global Group (FM Approvals):**  
**Explosion-Proof & Dust-Ignition Proof**  
Class I, Division 1, Groups A, B, C & D  
Class II & III, Division 1, Groups E, F & G  
**Environmental Protection: Type 4X & IP66**  
Ambient Temperature Range: -20°C to +60°C

**CSA Group (Canadian Standards Association):**  
**Explosion-Proof**  
Class I, Division 1, Groups A\*, B, C & D  
Class II, Groups E, F & G  
Class III, IP66  
Ambient Temperature Range: -20°C to +60°C; T6  
*\*For Group A applications, seal all conduits within 18"*

**ATEX Directive 2014/34/EU (ISSeP):**  
**Explosion-Proof/Flameproof**  
Ex II 2 G D  
Ex d IIC T6 Gb  
Ex tb IIIC Db T85°C IP66

**ANZEx** **ANZEx (TestSafe):**  
**Explosion-Proof/Flameproof**  
Ex d IIC T6 (Tamb 60°C) IP66

**STZ-HP in BH or SB2 Housing**  
**Factory Mutual Approvals (FM Global Group):**  
**Explosion-Proof & Dust-Ignition Proof**  
Class I, Division 1, Groups A\*, B, C & D  
Class II & III, Division 1, Groups E, F & G  
**Environmental Protection: Type 4X & IP66**  
T6 @ 60°C Maximum Operating Ambient  
*\*For Group A applications, seal all conduits within 18"*

**CSA Group (Canadian Standards Association):**  
**Explosion-Proof**  
Class I, Division 1, Groups A\*, B, C & D  
Class II, III, Groups E, F & G  
Type 4X, IP66  
Ambient Temp. Range: -20°C to +85°C; T4  
*\*For U.S. Group A applications, seal all conduits within 18"*

**ATEX Directive 2014/34/EU (ISSeP):**  
**Explosion-Proof/Flameproof**  
Ex II 2 G D  
Ex d IIC T6 Gb  
Ex tb IIIC Db T85°C IP66

**STZ-DIN**  
**Factory Mutual (US/Canada):**  
**Non-Incendive**  
Class I, Division 2, Groups A, B, C & D

**Temperature Codes:**  
T4 @ 85°C Maximum Operating Ambient

**ANZEx** **ANZEx (TestSafe):**  
**Explosion-Proof/Flameproof**  
Ex d IIC T6 (Tamb 60°C) IP66

**CE** **STZ-HPP, STZ-HP and STZ-DIN**  
**CE Conformant – EMC Directive 2014/30/EU –**  
EN 61326



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| Тюмень (3452)66-21-18          | Ульяновск (8422)24-23-59       | Уфа (347)229-48-12              |
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