

Model RTT15S Optical Temperature Transmitter OTTPlus



The Model RTT15S is a microprocessor-based temperature transmitter that uses the HART[®] communication protocol. It receives input signals from thermocouples, RTDs, ohm, or millivolt sources. It is available as a basic module, or in an explosion-proof housing with optional display and optical buttons for local configuration.

FEATURES

- ▶ Optional LCD display with selectable, programmable red or white backlight.
- ▶ Optional optical buttons for local configuration in seven languages.
- ▶ User-selectable HART versions 5 and 7.
- ▶ IP66 housing with explosion-proof glass window.
- ▶ Basic module can mount to surface or DIN rail.
- ▶ One unit configurable for TC, RTD, mV, and ohm.
- ▶ Supports 2-, 3-, or 4-wire RTDs.
- ▶ Allows average or difference measurement using 2-wire inputs.
- ▶ TC cold junction compensation.
- ▶ Galvanic isolation for both input and output.
- ▶ Automatic self-diagnostics and self-calibration.
- ▶ Wide selection of sensors and thermowells.
- ▶ Configurable failsafe mA value.
- ▶ FMEDA report in support of SIL applications.
- ▶ Conforms to applicable European Union Directives (product marked with “CE” logo).
- ▶ EMC immunity per EU Directive 2014/30/EU.
- ▶ Compliant with NAMUR NE 21 criterion for burst.
- ▶ Meets many testing agency requirements for hazardous area installations.
- ▶ Standard 5-year warranty.

GENERAL DESCRIPTION

The RTT15S provides a wide range of packaging, sensor types, and other options, making this transmitter suitable for most temperature measurement applications. The microprocessor-based electronics minimizes ambient temperature effects and results in high accuracy, repeatability, and linearization of the sensor signal. Ease of mounting and installation makes these transmitters an extremely attractive offering.

INPUT TYPES

This RTT15S Transmitter can be used with a wide variety of temperature sensors, including 2-, 3-, and 4-wire RTDs, most popular thermocouples, and other resistance and millivolt input devices. The following is a general list of transmitter input types:

- ▶ Platinum RTDs, 2-, 3-, and 4-wire
- ▶ Nickel RTD, 3-wire
- ▶ Thermocouples
- ▶ Millivolt
- ▶ Ohm
- ▶ Average or difference measurement with two 2-wire RTDs, two TCs, or two mV inputs.

EFFICIENT AND DURABLE

Industrial-grade integrated circuits and sealed electronics combine to make this microprocessor-based transmitter an efficient and durable device.

REMOTE COMMUNICATIONS

Remote digital communication is provided with the HART communication protocol.

4 to 20 mA with HART 7 or HART 5 communications allows direct analog connection to common receivers while still providing full intelligent digital communications using a HART communicator or PC-based configurator.

HART 7 provides the familiar features of HART 5 as well as features introduced in HART 6 and 7, including long tag support, multivariable support and variable mapping, extended device status, individual sensor calibration, burst mode with event triggers, and trend reporting with time stamps.

HART Device Descriptors (DDs) are available from the Schneider Electric website for download. They are also part of the DD library available to registered Model 475 users.

RUGGED AND RELIABLE SENSORS

Foxboro sensors are of high quality and rugged construction, and provide maximum accuracy and longevity. Sensors designed for use with wells include a spring loading mechanism that ensures continuous contact between the sensor tip and well.

GALVANIC ISOLATION

Galvanic isolation is provided for input and output.

AUTOMATIC SELF-CALIBRATION

This transmitter has an advanced automatic self-calibration routine. Several times per minute, the transmitter checks the zero and full scale output against highly accurate and stable internal voltage signals that are referenced back to the factory calibration stored in nonvolatile EEPROM memory. Any necessary adjustments are made automatically without interrupting the output signal.

OUT-OF-RANGE AND FAILURE CURRENT

Low out-of-range and high out-of-range output values are user configurable between 3.5 and 23 mA. A configuration selection for NAMUR 43 (3.8 and 20.5 mA) is also provided.

The transmitter can also be configured for sensor error detection. Output values are independently configurable between 3.5 and 23 mA for both shorted and open sensor conditions. Configuration selections are also provided for direct selection of NAMUR 43 low (3.5 mA) and NAMUR 43 high (23 mA), both independently selectable for either shorted or open sensor conditions. Shorted sensor detection not applicable for thermocouples.

OPTIONAL DISPLAY AND OPTICAL BUTTONS

The transmitter is available with an optional, 96x64 pixel LCD display with a backlight that flashes if an error occurs. Both the normal backlight and the flashing error backlight can be configured as red or white, or turned off completely.

The display is available both with and without optical buttons that can be used for operating and programming the transmitter, even when the cover window is in place. The buttons can be operated either with or without gloves, and can adapt to wear and smudges left on the surface.

The optical buttons are also immune to interference from ambient light sources and other panel meters, such as other RTT15S transmitters mounted nearby.

Figure 1. Monitoring View

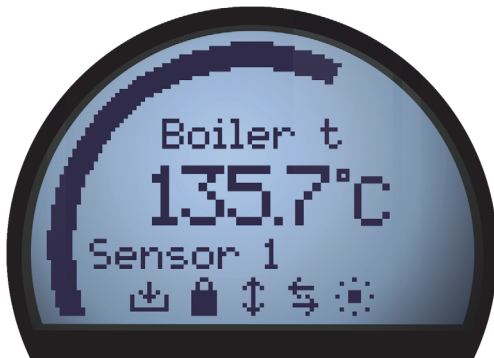


Figure 2. Programming View

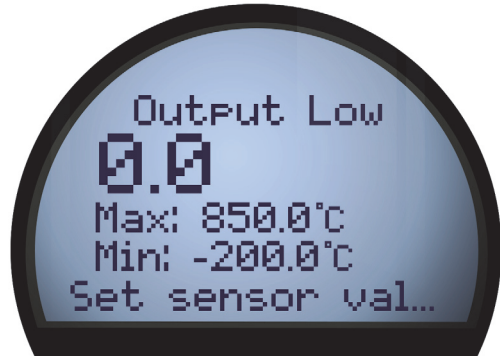
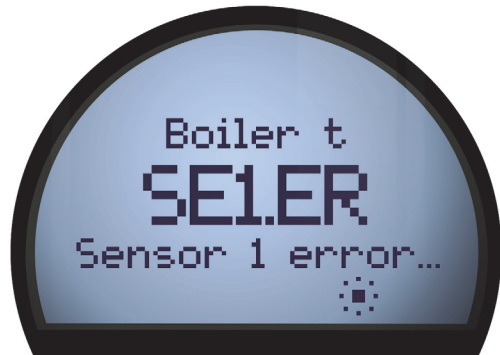


Figure 3. Diagnostics View



OPERATING, TRANSPORTATION, AND STORAGE CONDITIONS (A)

Influence	Operative Limits	Transportation and Storage Limits
Ambient Temperature (b) (c)	-40 and +85°C (-40 and +185°F) for housing with silicone o-ring, or no housing -20 and +85°C (-40 and +185°F) for housing with FKM o-ring	-40 and +85°C (-40 and +185°F)
Relative Humidity	< 95%, non-condensing with no housing 0 and 100%, condensing with housing	< 95%, non-condensing with no housing 0 and 100%, condensing with housing
Supply Voltage	No housing: 8 to 30 V dc With housing, certified as intrinsically safe: 10 to 30 V dc (12 to 30 V dc with optional display) With housing, certified as other: 10 to 35 V dc (12 to 35 V dc with optional display)	Not Applicable
Vibration	1.6 mm from 2 to 25 Hz 4 g from 25 to 100 Hz (IEC 60068-2-6:2007)	1070 mm (42 in) Drop in Shipping Container

- a. To ensure proper operation, the ambient temperature limits at the housing should not be exceeded. This is particularly relevant when sensors/wells are direct-connected to the housing and very high process temperatures are being measured. The transfer of heat from the process to the housing can be minimized by use of thermowell extensions, or in extreme cases, by using a remote housing installation.
- b. Reduced LCD performance below -20°C and above +70°C (-4°F and +158°F).
- c. Calibration temperature range is 20 to 28°C (68 to 82°F).

PERFORMANCE SPECIFICATIONS

All performance specifications apply to the transmitter only. Any errors associated with the thermocouple or RTD sensors, or any other millivolt or resistance sensors, are cumulative. For performance specifications on Foxboro RTDs and thermocouples, refer to PSS 3-3E1 A, PSS 1-1B6 A, and PSS 1-1B1 A.

Transmitter Accuracy and Ambient Temperature Effect are determined by selecting the greater of the general or basic values listed.

Accuracy

Accuracy is the larger value from Table 1 or Table 2.

Table 1. General Values

Input Type	Absolute Accuracy	Temperature Coefficient
All	$\leq \pm 0.05\%$ of span	$\leq \pm 0.005\%$ of span/ $^{\circ}\text{C}$

Table 2. Basic Values

Input Type	Basic Accuracy	Temperature Coefficient
Pt100	$\leq \pm 0.1^{\circ}\text{C}$	$\leq \pm 0.005^{\circ}\text{C}/^{\circ}\text{C}$
Ni100	$\leq \pm 0.2^{\circ}\text{C}$	$\leq \pm 0.005^{\circ}\text{C}/^{\circ}\text{C}$
Resistance	$\leq \pm 0.1 \Omega$	$\leq \pm 5 \text{ m}\Omega/^{\circ}\text{C}$
Volt	$\leq \pm 10 \mu\text{V}$	$\leq \pm 0.5 \mu\text{V}/^{\circ}\text{C}$
TC type E, J, K, L, N, T, U	$\leq \pm 0.5^{\circ}\text{C}$	$\leq \pm 0.025^{\circ}\text{C}/^{\circ}\text{C}$
TC type B ¹ , R, S, W3, W5	$\leq \pm 1^{\circ}\text{C}$	$\leq \pm 0.1^{\circ}\text{C}/^{\circ}\text{C}$
TC type B ²	$\leq \pm 3^{\circ}\text{C}$	$\leq \pm 0.3^{\circ}\text{C}/^{\circ}\text{C}$
TC type B ³	$\leq \pm 8^{\circ}\text{C}$	$\leq \pm 0.8^{\circ}\text{C}/^{\circ}\text{C}$
TC type B ⁴	not specified	not specified

Thermocouple Accuracy Specification Ranges

- ▶ **TC B¹:** > 400 $^{\circ}\text{C}$
- ▶ **TC B²:** > 160 $^{\circ}\text{C}$ < 400 $^{\circ}\text{C}$
- ▶ **TC B³:** > 85 $^{\circ}\text{C}$ < 160 $^{\circ}\text{C}$
- ▶ **TC B⁴:** < 85 $^{\circ}\text{C}$

TC Cold Junction Compensation

< $\pm 1.0^{\circ}\text{C}$

Maximum Offset on Input Signal

50% of selected maximum value

EMC Immunity Influence

< $\pm 0.1\%$ of span

NAMUR NE 21, A Burst Criterion

< $\pm 1\%$ of span

FUNCTIONAL SPECIFICATIONS

RTD Input Specifications

Cable resistance per wire (max): 5 Ω (up to 50 Ω per wire is possible with reduced measurement accuracy)

Sensor current: Nom. 0.2 mA

Table 3. RTD Range Limits and Span

RTD	Range Limits	Min. Span	Standard
Pt100	-200 and +850°C -328 and +1,562°F	10°C (18°F)	IEC 60751
Ni100	-60 and +250°C -76 and +482°F	10°C (18°F)	DIN 43760

Thermocouple Input Specifications

Cold junction compensation: Constant, internal, or external via a Pt100 or Ni100 sensor

Table 4. Thermocouple Range Limits and Span

TC	Range Limits	Min. Span	Standard
B	0 and 1,820°C (32 and 3,308°F)	100°C (180°F)	IEC584
E	-100 and +1,000°C (-148 and +1,832°F)	50°C (90°F)	IEC584
J	-100 and +1,200°C (-148 and +2,192°F)	50°C (90°F)	IEC584
K	-180 and +1,372°C (-292 and +2,502°F)	50°C (90°F)	IEC584
L	-200 and +900°C (-328 and +1,652°F)	50°C (90°F)	DIN 43710
N	-180 and +1,300°C (-292 and +2,372°F)	50°C (90°F)	IEC584
R	-50 and +1,760°C (-58 and +3,200°F)	100°C (180°F)	IEC584
S	-50 and +1,760°C (-58 and +3,200°F)	100°C (180°F)	IEC584
T	-200 and +400°C (-328 and +752°F)	50°C (90°F)	IEC584
U	-200 and +600°C (-328 and 1,112°F)	50°C (90°F)	DIN 43710

Table 4. Thermocouple Range Limits and Span (Continued)

TC	Range Limits	Min. Span	Standard
W3	0 and 2,300°C (32 and 4,172°F)	100°C (180°F)	ASTM E988-90
W5	0 and 2,300°C (32 and 4,172°F)	100°C (180°F)	ASTM E988-90

Millivolt Input Specifications

Table 5. Millivolt Input Range Limits and Span

Range Limits	Min. Span	Input Resistance
-800 and +800 mV	2.5 mV	10 MΩ

Ohms Resistance Input Specifications

Table 6. Ohms Resistance Input Range Limits and Span

Range Limits	Min. Span
0 and 7,000 Ω	25 Ω

Response Time

1 to 60 s, configurable

Updating Time - Single Input

440 ms

Thermocouple Cold Junction Compensation

TC cold junction compensated via internal measurement, user-entered constant, or external RTD (2-wire) provided by Pt100 or Ni100.

RTD Cable Resistance Compensation – Transmitter-to-Sensor

4-Wire RTD

Transmitter compensates for cable resistance changes due to ambient temperature changes.

3-Wire RTD

Transmitter compensates for cable resistance changes due to temperature, as long as cables are exposed to the same ambient temperature.

2-Wire RTD

Transmitter compensates for constant cable resistance. User may enter resistance value, or transmitter will measure it during setup.

Sensor Error Detection

Available for RTD, TC, and Ohms Inputs (open and shorted for RTD and Ohms inputs, and open for TC inputs).

Input Resistance

10 M Ω

Resistance Temperature Detectors (RTDs)⁽¹⁾

RTD Type

Pt100; 3-wire; ASTM-B Standard Accuracy, alpha = 0.00385

Pt100; 3- and 4-wire; ASTM-A High Accuracy, alpha = 0.00385

Ni100; 3-wire; DIN 43760

RTD Sheath Temperature Limits

316 ss: -200 and +480°C (-320 and +900°F)
Inconel: -200 and +650°C (-320 and +1200°F)

Sheath Sealant

Epoxy compound applied at open end of sheath to prevent entry of moisture

Minimum Immersion

90 mm (3.5 in) is recommended to minimize thermal conduction errors

Response Time

5 s maximum for a 63% recovery; based on a step change in temperature of bare sensor starting at room temperature of 25°C (77°F) to immersion in 100°C (212°F) water stirred at 1 m/s (3 ft/s)

External Connecting Wire

Color coded leads; stranded 0.50 mm² or 22 AWG; PTFE insulation

Thermocouples (TCs)⁽²⁾

TC Type (Foxboro TCs per ASTM E608)

Base metal types E, J, K, L, N, T, and U
Platinum metal types B, R, and S
Tungsten metal types W3 and W5

TC Sheath Temperature Limits

316 ss: -200 and +900°C (-320 and +1650°F)
Inconel: -200 and +1150°C (-320 and +2100°F)

Sheath Sealant

Epoxy compound applied at open end of sheath to prevent entry of moisture

Minimum Immersion

90 mm (3.5 in) is recommended to minimize thermal conduction errors

Response Time

5 s maximum for a 63% recovery; based on a step change in temperature of bare sensor starting at room temperature of 25°C (77°F) to immersion in 100°C (212°F) water stirred at 1 m/s (3 ft/s)

External Connecting Wire

Color coded leads; stranded 0.080 mm² or 20 AWG; fiberglass insulation

1. RTDs listed are available assembled to RTT15S Transmitter. The transmitter can also be configured for 2-wire and Pt1000 RTDs.

2. TCs listed are available assembled to RTT15S Transmitter. The transmitter can also be configured for other TC types.

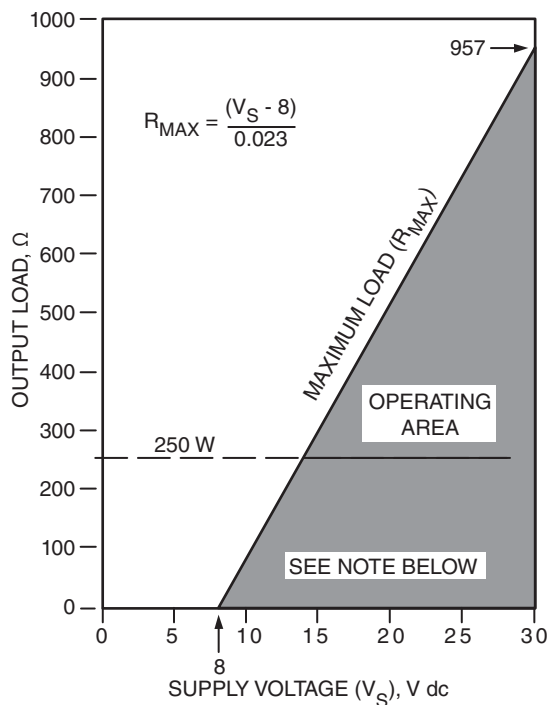
Supply Voltage Requirements and External Loop Load Limitations

Nominal minimum supply voltage for HART 4 to 20 mA output with a superimposed digital signal is 8 V dc, for transmitters without a display. For transmitters that have the optional display, the minimum is 10 V dc if backlight is not used, or 12 V dc when backlight is in use.

The maximum supply voltage is 30 V dc for transmitters certified/approved as intrinsically safe; 35 V dc otherwise.

See Figure 4 for a plot of supply voltage vs. output load.

Figure 4. HART 4 to 20 mA Output Supply Voltage vs. Output Load



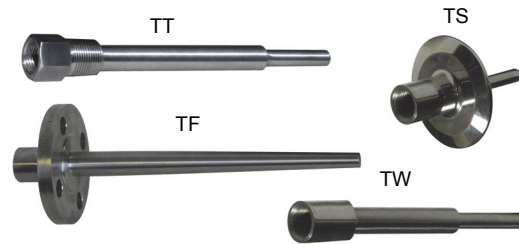
NOTE

The transmitter will function with an output load less than 250 Ω provided that a HART Communicator or PC-based Configurator is not connected to it. Use of a HART Communicator or PC-based Configurator requires 250 Ω minimum load.

Thermowells

The wells listed in the Model Code are popular selections for industrial use. In addition, other high quality, polished wells in a variety of configurations, materials, and sizes are offered. Most application requirements can be met by choosing from the wide selection offered. Specify Thermowell Code TK and see PSS 3-3D1 A for Type T Thermowells (see Figure 5). Specify Thermowell Code TX to select a custom thermowell, or contact Global Customer Support.

Figure 5. Typical T-Series Thermowells



HART Communications

4 to 20 mA Analog Mode

Analog output signal is updated 30 times per second. A minimum loop load of 250 ohms is required. See Table 7 for communication parameters.

Multidrop Mode (Fixed Current)

This mode supports communications with up to 64 transmitters with HART 7, or up to 15 transmitters with HART 5 on a single pair of signal/power wires. The output signal is updated 4 times/second. A minimum loop load of 250 ohms is required. See Table 7 for communication parameters.

Functional Block Diagrams and Installation Topologies

Refer to Figure 6 and Figure 7.

Figure 6. HART 4 to 20 mA Output Block Diagram (One Transmitter)

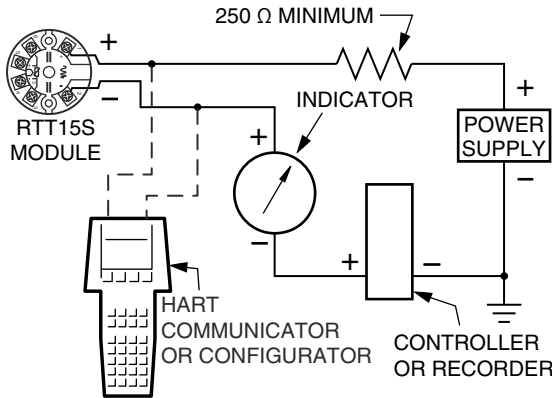


Figure 7. HART Multidrop Block Diagram (Up to Fifteen Transmitters)

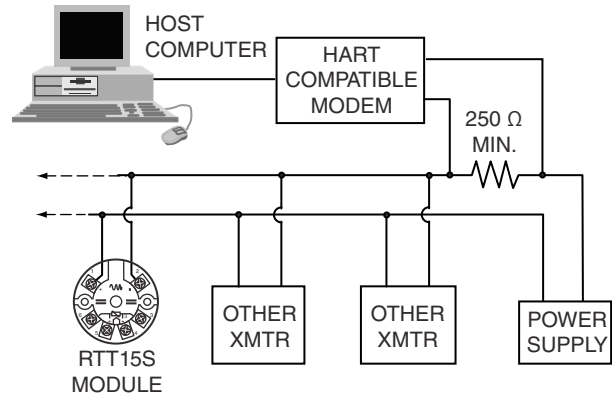


Table 7. Communication Parameters

Parameter	Analog Mode	Multidrop Mode
Remote Configurator	HART communicator or PC-based configurator	
Communication Rate	1,200 baud	1,200 baud
Communication Distance (Rated)	3,050 m (10,000 ft)	1,525 m (5,000 ft)

PHYSICAL SPECIFICATIONS

Mounting

The basic transmitter module can be mounted to a DIN rail using the optional mounting clip and self-tapping screw. The basic module can also be mounted to a surface using user-supplied hardware. See “Dimensions - Nominal” on page 18. Care should be taken to provide adequate environmental protection.

The transmitter housing (without sensor) can be remote mounted to a surface or nominal DN 50 or 2-in pipe using the optional mounting bracket. See “Dimensions - Nominal” on page 18.

Electrical Connections

There are six terminals on the transmitter module for input and output connections. Four terminals are for RTD, TC, ohm, or mV sensor inputs, and two terminals (marked + and –) are for measurement output.

Dimensions

Refer to “Dimensions - Nominal” on page 18. Also refer to Dimensional Print DP 020-470.

Approximate Mass

1.3 kg (2.9 lbs) for transmitter with housing;
50 g (1.8 oz) for transmitter without housing.

ELECTRICAL SAFETY SPECIFICATIONS

These transmitters have been designed to meet the electrical safety descriptions listed in the tables below when installed in accordance with MI 020-524. For detailed information or status of testing laboratory approvals/certifications, contact Global Customer Support.

Table 8. Electrical Safety Specifications - Transmitter with Housing

Agency Certification, Type of Protection, and Area Classification	Application Conditions	Electrical Safety Design Code
ATEX intrinsic safe II 1 G Ex ia IIC T6...T4 Ga II 1 D Ex ia IIIC T100°C Da	T4: $-40 \leq Ta \leq 85^{\circ}\text{C}$ T100°C (RTT15S-T...1, RTT15S-T...2) T4: $-40 \leq Ta \leq 80^{\circ}\text{C}$ T100°C (RTT15S-T...3, RTT15S-T...4) T5: $-40 \leq Ta \leq 60^{\circ}\text{C}$ T75°C T6: $-40 \leq Ta \leq 45^{\circ}\text{C}$ T60°C	AA
ATEX non sparking II 3 G Ex nA IIC T6...T4 Gc II 3 G Ex ic IIC T6...T4 Gc II 3 D Ex ic IIIC T100°C Dc Zone 2, 22	For Ex nA: O-Ring Sealing: Silicone T4: $-40 \leq Ta \leq 85^{\circ}\text{C}$ T4 (RTT15S-T...1, RTT15S-T...2) T4: $-40 \leq Ta \leq 80^{\circ}\text{C}$ T4 (RTT15S-T...3, RTT15S-T...4) T6: $-40 \leq Ta \leq 60^{\circ}\text{C}$ T6 O-Ring Sealing: FKM T4: $-20 \leq Ta \leq 85^{\circ}\text{C}$ (RTT15S-T...1, RTT15S-T...2) T4: $-20 \leq Ta \leq 80^{\circ}\text{C}$ (RTT15S-T...3, RTT15S-T...4) T6: $-20 \leq Ta \leq 60^{\circ}\text{C}$ For Ex ic: T4: $-40 \leq Ta \leq 85^{\circ}\text{C}$ T100°C (RTT15S-T...1, RTT15S-T...2) T4: $-40 \leq Ta \leq 80^{\circ}\text{C}$ T100°C (RTT15S-T...3, RTT15S-T...4) T6: $-40 \leq Ta \leq 60^{\circ}\text{C}$ T85°C	AN
ATEX Ex d (flameproof) II 2 G Ex d IIC T6...T4 Gb II 2 D Ex tb IIIC T100°C Db Zone 1, 2, 21, 22	For Ex d: T4, T5: $-40 \leq Ta \leq 85^{\circ}\text{C}$ (RTT15S-T...1, RTT15S-T...2) T4, T5: $-40 \leq Ta \leq 80^{\circ}\text{C}$ (RTT15S-T...3, RTT15S-T...4) T6: $-40 \leq Ta \leq 70^{\circ}\text{C}$ For Ex tb: O-Ring Sealing: Silicone $-40 \leq Ta \leq 85^{\circ}\text{C}$ T100°C (RTT15S-T...1, RTT15S-T...2) $-40 \leq Ta \leq 80^{\circ}\text{C}$ T100°C (RTT15S-T...3, RTT15S-T...4) $-40 \leq Ta \leq 70^{\circ}\text{C}$ T85°C O-Ring Sealing: FKM $-20 \leq Ta \leq 85^{\circ}\text{C}$ T100°C (RTT15S-T...1, RTT15S-T...2) $-20 \leq Ta \leq 80^{\circ}\text{C}$ T100°C (RTT15S-T...3, RTT15S-T...4) $-20 \leq Ta \leq 70^{\circ}\text{C}$ T85°C	AD
CSA intrinsic safe Class I, Division 1, Groups ABCD; Class II, Group EFG; Class III, Division 1. Class I, Zone 0, IIC Ex/AEx ia IIC Ga	T4: $-40 \leq Ta \leq 85^{\circ}\text{C}$ T100°C (RTT15S-T...1, RTT15S-T...2) T4: $-40 \leq Ta \leq 80^{\circ}\text{C}$ T100°C (RTT15S-T...3, RTT15S-T...4) T5: $-40 \leq Ta \leq 60^{\circ}\text{C}$ T75°C T6: $-40 \leq Ta \leq 45^{\circ}\text{C}$ T60°C	CA

Table 8. Electrical Safety Specifications - Transmitter with Housing (Continued)

Agency Certification, Type of Protection, and Area Classification	Application Conditions	Electrical Safety Design Code
CSA explosion proof Class I, Division 1, Groups ABCD; Class II, Division 1, Groups EFG; Class III Ex d IIC, Class I, Zone 1 (a)	T4,T5: $-20/-40 \leq Ta \leq 85^{\circ}\text{C}$ T100°C T6: $-20/-40 \leq Ta \leq 70^{\circ}\text{C}$ T85°C Silicone o-ring: $-40^{\circ}\text{C} \leq Ta \leq +85^{\circ}\text{C}$ FKM o-ring: $-20^{\circ}\text{C} \leq Ta \leq +85^{\circ}\text{C}$	CD
EAC intrinsic safe, Ex ia, Ex ic	Contact Global Customer Support	RA
EAC non sparking, Ex nA	Contact Global Customer Support	RN
EAC Ex d (flameproof)	Contact Global Customer Support	RD
FM intrinsic safe Class I, II, III, Division 1, Groups ABCDEFG Class I, Zone 0, IIC, Zone 20	T4: $-40 \leq Ta \leq 85^{\circ}\text{C}$ T5: $-40 \leq Ta \leq 60^{\circ}\text{C}$ T6: $-40 \leq Ta \leq 40^{\circ}\text{C}$ Zone 20 Temperature Class: T4: $-40 \leq Ta \leq 85^{\circ}\text{C}$ T100°C T5: $-40 \leq Ta \leq 60^{\circ}\text{C}$ T75°C T6: $-40 \leq Ta \leq 40^{\circ}\text{C}$ T60°C	FA
FM nonincendive Class I, II, III, Division 2, Groups ABCDFG Class I, Zone 2, IIC	T4: $-20/-40 \leq Ta \leq 85^{\circ}\text{C}$ T6: $-20/-40 \leq Ta \leq 60^{\circ}\text{C}$ T60°C Silicone o-ring: $-40^{\circ}\text{C} \leq Ta \leq +85^{\circ}\text{C}$ FKM o-ring: $-20^{\circ}\text{C} \leq Ta \leq +85^{\circ}\text{C}$	FN
FM explosion proof, dust ignition proof Class I, II, III, Division 1, Groups ABCDEFG Class I Zone 1, Ex/AEx d IIC T6	T6: $-20/-40 \leq Ta \leq 70^{\circ}\text{C}$ T5,T4: $-20/-40 \leq Ta \leq 85^{\circ}\text{C}$ Silicone o-ring: $-40^{\circ}\text{C} \leq Ta \leq +85^{\circ}\text{C}$ FKM o-ring: $-20^{\circ}\text{C} \leq Ta \leq +85^{\circ}\text{C}$	FD
IECEx intrinsic safe Ex ia IIC T6...T4 Ga, Ex ia IIIC T100°C Da	T4: $-40 \leq Ta \leq 85^{\circ}\text{C}$ T100°C (RTT15S-T...1, RTT15S-T...2) T4: $-40 \leq Ta \leq 80^{\circ}\text{C}$ T100°C (RTT15S-T...3, RTT15S-T...4) T5: $-40 \leq Ta \leq 60^{\circ}\text{C}$ T75°C T6: $-40 \leq Ta \leq 45^{\circ}\text{C}$ T60°C	EA
IECEx non sparking Ex nA IIC T6...T4 Gc Ex ic IIC T6...T4 Gc Ex ic IIIC T100°C Dc Zone 2, 22	For Ex nA: O-Ring Sealing: Silicone T4: $-40 \leq Ta \leq 85^{\circ}\text{C}$ T4 (RTT15S-T...1, RTT15S-T...2) T4: $-40 \leq Ta \leq 80^{\circ}\text{C}$ T4 (RTT15S-T...3, RTT15S-T...4) T6: $-40 \leq Ta \leq 60^{\circ}\text{C}$ T6 O-Ring Sealing: FKM T4: $-20 \leq Ta \leq 85^{\circ}\text{C}$ (RTT15S-T...1, RTT15S-T...2) T4: $-20 \leq Ta \leq 80^{\circ}\text{C}$ (RTT15S-T...3, RTT15S-T...4) T6: $-20 \leq Ta \leq 60^{\circ}\text{C}$ For Ex ic: T4: $-40 \leq Ta \leq 85^{\circ}\text{C}$ T100°C (RTT15S-T...1, RTT15S-T...2) T4: $-40 \leq Ta \leq 80^{\circ}\text{C}$ T100°C (RTT15S-T...3, RTT15S-T...4) T6: $-40 \leq Ta \leq 60^{\circ}\text{C}$ T85°C	EN

Table 8. Electrical Safety Specifications - Transmitter with Housing (Continued)

Agency Certification, Type of Protection, and Area Classification	Application Conditions	Electrical Safety Design Code
<p>IECEx Ex d (flameproof) Ex d IIC T6...T4 Gb Ex tb IIIC T100°C Db Zone 1, 2, 21, 22</p>	<p>For Ex d: T4, T5: $-40 \leq Ta \leq 85^{\circ}\text{C}$ (RTT15S-T...1, RTT15S-T...2) T4, T5: $-40 \leq Ta \leq 80^{\circ}\text{C}$ (RTT15S-T...3, RTT15S-T...4) T6: $-40 \leq Ta \leq 70^{\circ}\text{C}$</p> <p>For Ex tb: O-Ring Sealing: Silicone $-40 \leq Ta \leq 85^{\circ}\text{C}$ T100°C (RTT15S-T...1, RTT15S-T...2) $-40 \leq Ta \leq 80^{\circ}\text{C}$ T100°C (RTT15S-T...3, RTT15S-T...4) $-40 \leq Ta \leq 70^{\circ}\text{C}$ T85°C O-Ring Sealing: FKM $-20 \leq Ta \leq 85^{\circ}\text{C}$ T100°C (RTT15S-T...1, RTT15S-T...2) $-20 \leq Ta \leq 80^{\circ}\text{C}$ T100°C (RTT15S-T...3, RTT15S-T...4) $-20 \leq Ta \leq 70^{\circ}\text{C}$ T85°C</p>	ED
<p>INMETRO intrinsic safe Ex ia IIC T6...T4 Ga Ex ia IIIC T100°C Da</p>	<p>T4: $-40 \leq Ta \leq 85^{\circ}\text{C}$ T100°C (RTT15S-T...1, RTT15S-T...2) T4: $-40 \leq Ta \leq 80^{\circ}\text{C}$ T100°C (RTT15S-T...3, RTT15S-T...4) T5: $-40 \leq Ta \leq 60^{\circ}\text{C}$ T100°C T6: $-40 \leq Ta \leq 45^{\circ}\text{C}$ T100°C</p>	BA
<p>INMETRO non sparking Ex nA IIC T6...T4 Gc Ex ic IIC T6...T4 Gc Zone 2</p>	<p>For Ex nA: O-Ring Sealing: Silicone T4: $-40 \leq Ta \leq 85^{\circ}\text{C}$ T4 (RTT15S-T...1, RTT15S-T...2) T4: $-40 \leq Ta \leq 80^{\circ}\text{C}$ T4 (RTT15S-T...3, RTT15S-T...4) T6: $-40 \leq Ta \leq 60^{\circ}\text{C}$ T6 O-Ring Sealing: FKM T4: $-20 \leq Ta \leq 85^{\circ}\text{C}$ (RTT15S-T...1, RTT15S-T...2) T4: $-20 \leq Ta \leq 80^{\circ}\text{C}$ (RTT15S-T...3, RTT15S-T...4) T6: $-20 \leq Ta \leq 60^{\circ}\text{C}$</p> <p>For Ex ic: T4: $-40 \leq Ta \leq 85^{\circ}\text{C}$ (RTT15S-T...1, RTT15S-T...2) T4: $-40 \leq Ta \leq 80^{\circ}\text{C}$ (RTT15S-T...3, RTT15S-T...4) T6: $-40 \leq Ta \leq 60^{\circ}\text{C}$</p>	BN
<p>INMETRO Ex d (flameproof) Ex d IIC T6...T4 Gb Ex tb IIIC T100°C Db Zone 1, 2, 21, 22</p>	<p>For Ex d: T4, T5: $-40 \leq Ta \leq 85^{\circ}\text{C}$ (RTT15S-T...1, RTT15S-T...2) T4, T5: $-40 \leq Ta \leq 80^{\circ}\text{C}$ (RTT15S-T...3, RTT15S-T...4) T6: $-40 \leq Ta \leq 70^{\circ}\text{C}$</p> <p>For Ex tb: O-Ring Sealing: Silicone $-40 \leq Ta \leq 85^{\circ}\text{C}$ T100°C (RTT15S-T...1, RTT15S-T...2) $-40 \leq Ta \leq 80^{\circ}\text{C}$ T100°C (RTT15S-T...3, RTT15S-T...4) $-40 \leq Ta \leq 70^{\circ}\text{C}$ T100°C O-Ring Sealing: FKM $-20 \leq Ta \leq 85^{\circ}\text{C}$ T100°C (RTT15S-T...1, RTT15S-T...2) $-20 \leq Ta \leq 80^{\circ}\text{C}$ T100°C (RTT15S-T...3, RTT15S-T...4) $-20 \leq Ta \leq 70^{\circ}\text{C}$ T100°C</p>	BD

Table 8. Electrical Safety Specifications - Transmitter with Housing (Continued)

Agency Certification, Type of Protection, and Area Classification	Application Conditions	Electrical Safety Design Code
NEPSI intrinsic safe Ex ia IIC T6...T4 Ga, Ex ia IIIC T100°C Da	T6: -20/-40 ≤ Ta ≤ 70°C T5,T4: -20/-40 ≤ Ta ≤ 85°C Silicone o-ring: -40°C ≤ Ta ≤ +85°C FKM o-ring: -20°C ≤ Ta ≤ +85°C	NA
NEPSI non sparking Ex nA IIC T6...T4 Gc Ex ic IIC T6...T4 Gc Ex ic IIIC T100°C Dc Zone 2, 22	T4: -40 ≤ Ta ≤ 85°C T100°C (RTT15S-T...1, RTT15S-T...2) T4: -40 ≤ Ta ≤ 80°C T100°C (RTT15S-T...3, RTT15S-T...4) T5: -40 ≤ Ta ≤ 60°C T75°C T6: -40 ≤ Ta ≤ 45°C T60°C	NN
NEPSI Ex d (flameproof) Ex d IIC T6...T4 Gb Ex tb IIIC T100°C Db Zone 1, 2, 21, 22	For Ex nA: O-Ring Sealing: Silicone T4: -40 ≤ Ta ≤ 85°C T4 (RTT15S-T...1, RTT15S-T...2) T4: -40 ≤ Ta ≤ 80°C T4 (RTT15S-T...3, RTT15S-T...4) T6: -40 ≤ Ta ≤ 60°C T6 O-Ring Sealing: FKM T4: -20 ≤ Ta ≤ 85°C (RTT15S-T...1, RTT15S-T...2) T4: -20 ≤ Ta ≤ 80°C (RTT15S-T...3, RTT15S-T...4) T6: -20 ≤ Ta ≤ 60°C For Ex ic: T4: -40 ≤ Ta ≤ 85°C T100°C (RTT15S-T...1, RTT15S-T...2) T4: -40 ≤ Ta ≤ 80°C T100°C (RTT15S-T...3, RTT15S-T...4) T6: -40 ≤ Ta ≤ 60°C T85°C	ND
Ex protection method marking by user		MM
No certification (non-hazardous area)		ZZ

a. Not available with Housing Type Codes 3 or 4.

Table 9. Electrical Safety Specifications - Transmitter Module without Housing

Agency Certification, Type of Protection, and Area Classification	Application Conditions	Electrical Safety Design Code
ATEX intrinsic safe II 1 G Ex ia IIC T6...T4 Ga II 1 D Ex ia IIIC Da	T4: $-40 \leq Ta \leq 85^{\circ}\text{C}$ T6: $-40 \leq Ta \leq 45^{\circ}\text{C}$	AA
CSA intrinsic safe Ex/AEx ia IIC Ga Class I, Division1, Groups ABCD;	T4: $-40 \leq Ta \leq 85^{\circ}\text{C}$ T6: $-40 \leq Ta \leq 60^{\circ}\text{C}$	CA
EAC intrinsic safe, Ex ia, Ex ic	Contact Global Customer Support	RA
FM intrinsic safe Class I, Division 1, Groups ABCD Class I, Zone 0, IIC	T4: $-40 \leq Ta \leq 85^{\circ}\text{C}$ T6: $-40 \leq Ta \leq 60^{\circ}\text{C}$	FA
FM nonincendive Class I, Division 2, Groups ABCD Class I, Zone 2, IIC	T4: $-40 \leq Ta \leq 85^{\circ}\text{C}$ T6: $-40 \leq Ta \leq 60^{\circ}\text{C}$	FN
IECEx intrinsic safe Ex ia IIC T6...T4 Ga Ex ia IIIC Da	T4: $-40 \leq Ta \leq 85^{\circ}\text{C}$ T6: $-40 \leq Ta \leq 45^{\circ}\text{C}$	EA
NEPSI intrinsic safe Ex ia IIC T6...T4 Ga Ex ia IIIC Da	T4: $-40 \leq Ta \leq 85^{\circ}\text{C}$ T6: $-40 \leq Ta \leq 45^{\circ}\text{C}$	NA

MODEL CODE

Description	Model
RTT15S Optical Temperature Transmitter OTTPlus	RTT15S
Output	
4 to 20 mA with HART® 5 and 7 digital communications	-T
Input/Output Configuration	
Configured for single sensor input	1
Configured for dual sensor input - PV is Sensor 1 (a)	2
Configured for dual sensor input - PV is the average of Sensor 1 and Sensor 2 (a)	3
Configured for dual sensor input - PV is the difference between Sensor 1 and Sensor 2 (a)	4
Housing and Sensor Mounting	
Basic module for DIN rail or surface mounting, or module replacement (b) (c)	BB
Explosion-proof housing with remote sensor (c)	SA
Explosion-proof housing with sensor mounted (d) (e)	SB
Explosion-proof housing with sensor and thermowell mounted (d) (e)	SC
Housing Type	
No housing; select with Housing and Sensor Mounting code BB (b)	N
Aluminum, with 1/2 FNPT conduit	1
Aluminum, with M20 female conduit	2
Input Measurement Type	
Thermocouple, Type B (f)	B
Thermocouple, Type E	E
Thermocouple, Type J	J
Thermocouple, Type K	K
Thermocouple, Type L (f)	L
Thermocouple, Type N	N
Thermocouple, Type R (f)	R
Thermocouple, Type S (f)	S
Thermocouple, Type T	T
Thermocouple, Type U (f)	U
Thermocouple, Type W3 (f)	3
Thermocouple, Type W5 (f)	5
RTD, Platinum, 2-wire, 100 Ω, IEC 751 (ASTM-B Standard Accuracy) (f)	2
RTD, Platinum, 3-wire, 100 Ω, IEC 751 (ASTM-B Standard Accuracy) (g)	Q
RTD, Platinum, 4-wire, 100 Ω, IEC 751 (ASTM-B Standard Accuracy) (g)	4
RTD, Platinum, 3-wire, 100 Ω, IEC 751 (ASTM-A High Accuracy) (g)	A
RTD, Platinum, 4-wire, 100 Ω, IEC 751 (ASTM-A High Accuracy) (g)	6
RTD, Nickel, 3-wire, 100 Ω, DIN 43760, 316 ss Sheath (f) (g)	F
Ohm input	P
Millivolt input	M
Other (factory configuration for Input Measurement Type not listed above) (h)	Z
Thermowell Assembled to Housing	
No well, or well supplied separately	NA
Thermowell Series TT, TF, TS, or TW assembled to housing; specify child thermowell (e) (i)	TK
Custom; specify in Tag Field or contact Global Customer Support	TX

MODEL CODE (CONTINUED)

Description	Model
Electrical Safety (see Electrical Safety Specifications section in PSS or MI for details)	
ATEX Intrinsic Safe	AA
ATEX Non Sparking (j)	AN
ATEX Flame Proof (j)	AD
CSA Intrinsic Safe	CA
CSA Explosion Proof (j)	CD
EAC Intrinsic Safe	RA
EAC Non Sparking (j)	RN
EAC Flame Proof (j)	RD
FM Intrinsic Safe	FA
FM Nonincendive	FN
FM Explosion Proof, Dust Ignition Proof (j)	FD
IECEX Intrinsic Safe	EA
IECEX Non Sparking (j)	EN
IECEX Flame Proof (j)	ED
INMETRO Intrinsic Safe (j)	BA
INMETRO Non Sparking (j)	BN
INMETRO Flame Proof (j)	BD
NEPSI Intrinsic Safe	NA
NEPSI Non Sparking (j)	NN
NEPSI Flame Proof (j)	ND
Ex protection marking by user (j)	MM
No certification (non-hazardous area) (j)	ZZ
Optional Selections	
Display Options	
Integral local display with configurator (j)	-L1
Integral local display only (j)	-L2
Housing Options	
Aluminum, 1/2 NPT conduit plug (k)	-P1
Aluminum, M20 conduit plug (l)	-P3
Temperature Options	
Silicone o-rings, rated to -40°C	-A4
Housing and Sensor Mounting Options	
Stainless steel union and fittings (m)	-S3
Mounting Set Options (select only one)	
Mounting set, painted carbon steel	-M1
Includes clip for DIN rail mounting the basic module (n)	-D1
Other Options	
Custom database configuration (o)	-C2
HART 5 configuration	-H5
Omit FoxDoc DVD-ROM	-K1
Cleaned and prepared for oxygen service (p)	-C5
Example: RTT15S-T1SB1ENAFAL1	

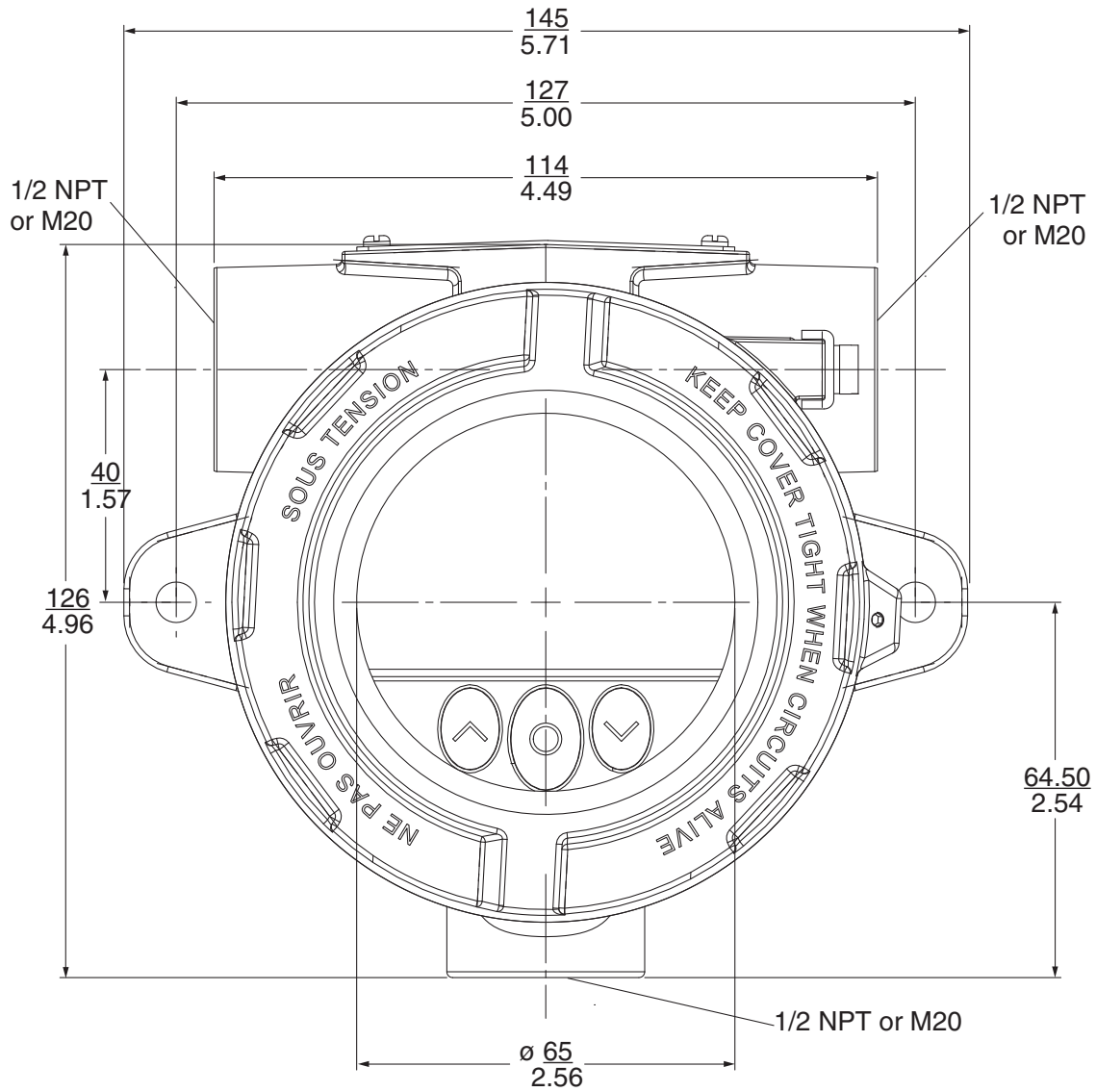
- a. Input Measurement Type must be the same for both sensors. Both inputs of a duplex 3- or 4-wire RTD sensor cannot be connected to the RTT15S at the same time. Only Input 1 can be configured for 3- or 4-wire RTD.
- b. Housing and Sensor Mounting code BB and Housing Type code N must be selected together.
- c. Sensor must be ordered separately.
- d. Initiates Model Code PRMTA (10137EF).

- e. Not available with Housing Type 2.
- f. Not available with Housing and Sensor Mounting Codes SB, SC (factory-mounted sensor options).
- g. Not available with Input/Output Configuration 2, 3, or 4.
- h. This option requires selection of the Custom Database Configuration option (-C2).
- i. Initiates thermowell codes TT, TF, TS, and TW.
- j. Not available with Housing and Sensor Mounting Code BB.
- k. Only with Housing Type 1.
- l. Only with Housing Type 3.
- m. Already included in Housing and Sensor Mounting code SC, if ATEX, IECEx, or MM Hazardous Area certifications are selected.
- n. Housing and Sensor Mounting Code BB only.
- o. Requires C2 Form (available at website) with all data specified.
- p. Not available with Housing and Sensor Mounting code BB or SA.

DIMENSIONS - NOMINAL

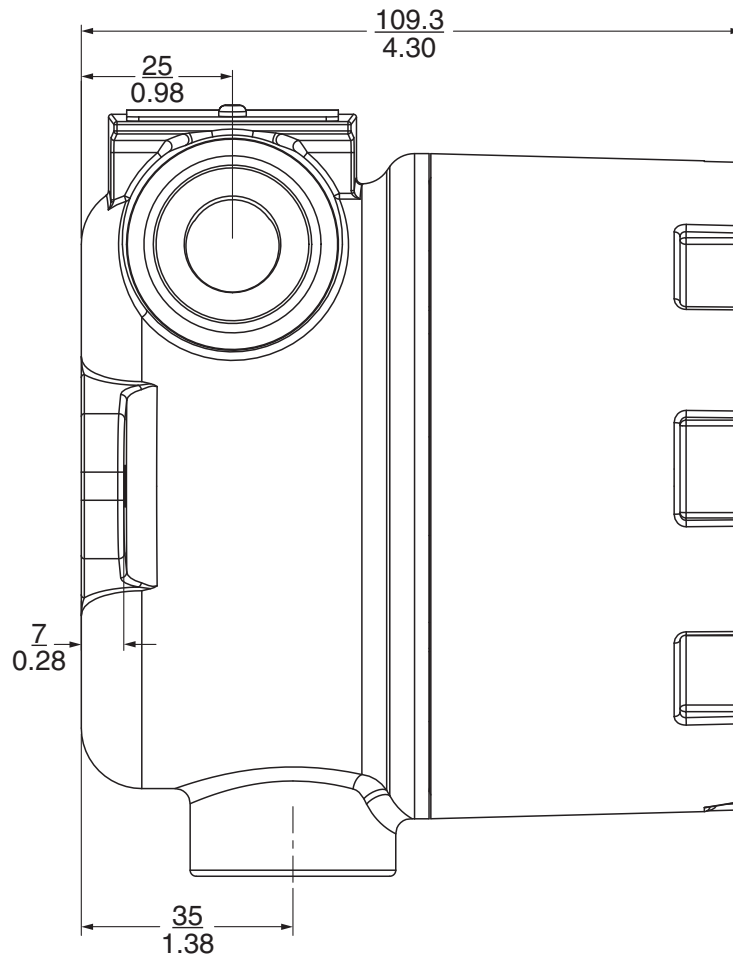
TRANSMITTER WITH HOUSING - FRONT VIEW

mm
in



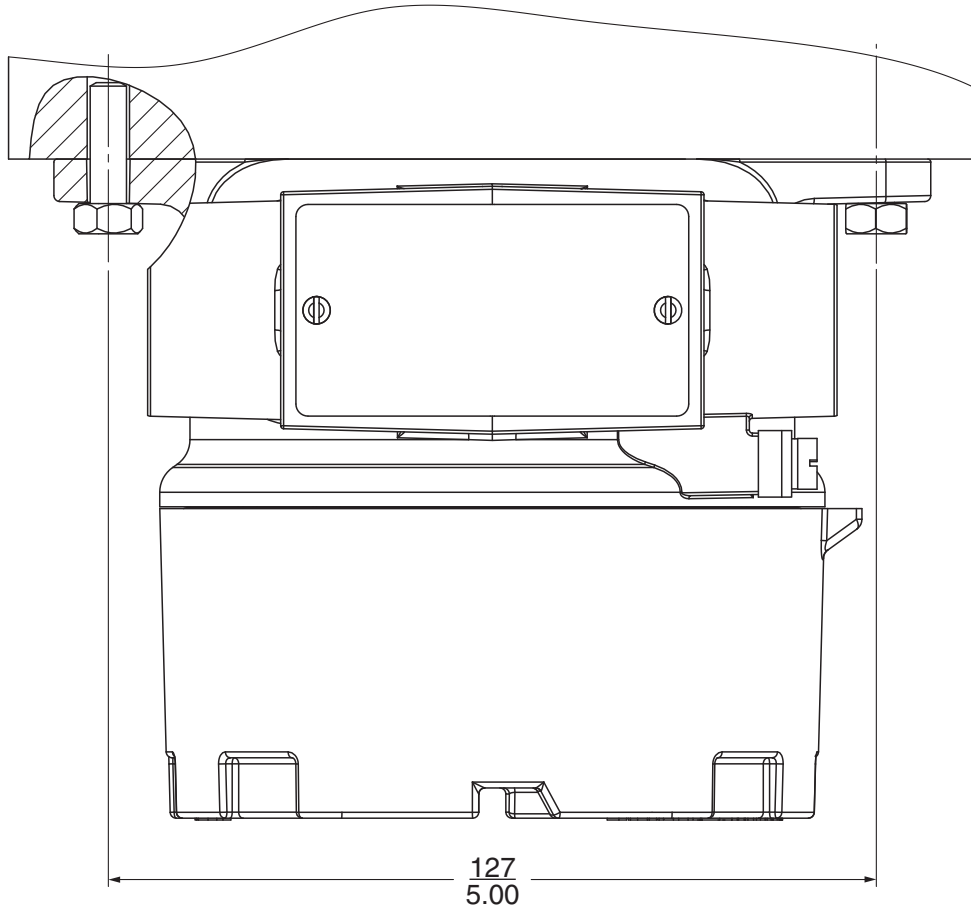
TRANSMITTER WITH HOUSING - SIDE VIEW

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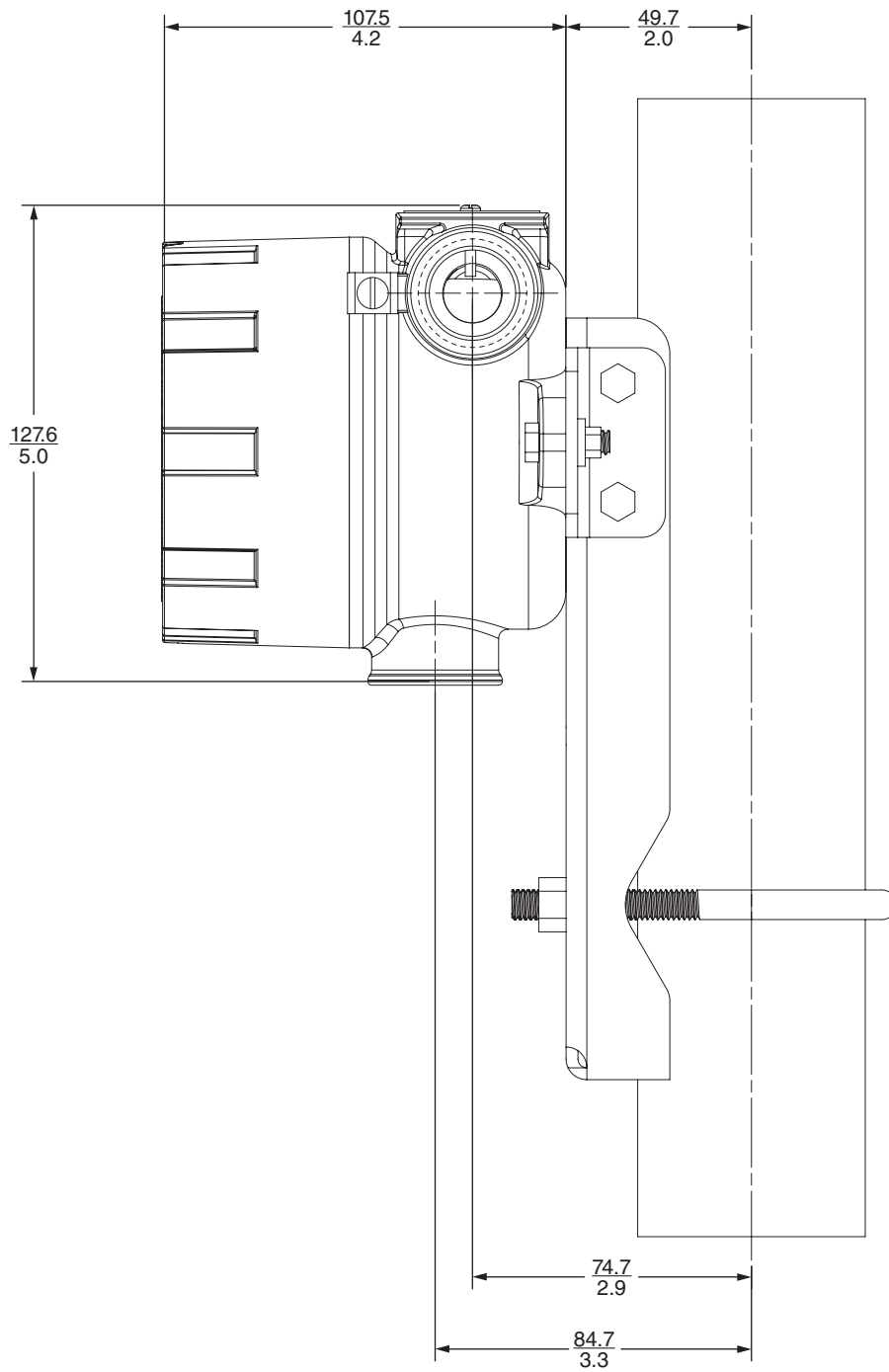
TRANSMITTER WITH HOUSING - WALL MOUNT - TOP

mm
in



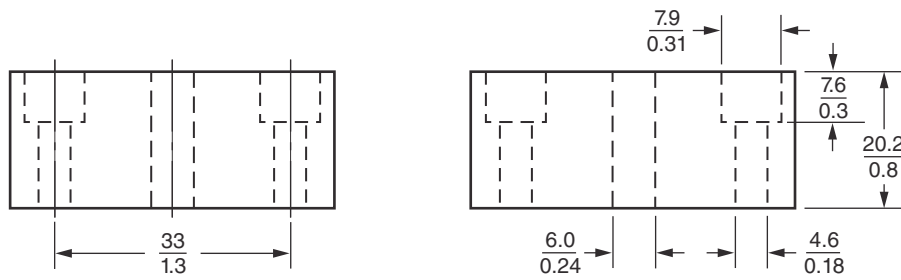
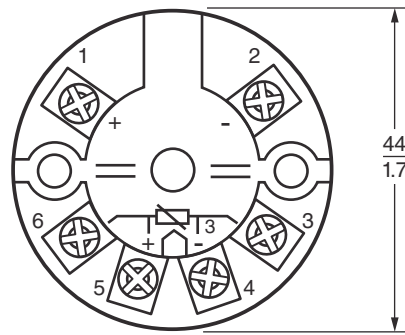
TRANSMITTER WITH HOUSING - PIPE MOUNT - SIDE

mm
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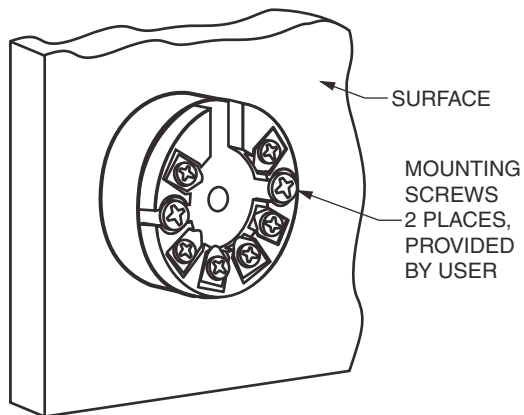


BASIC TRANSMITTER MODULE - NO HOUSING

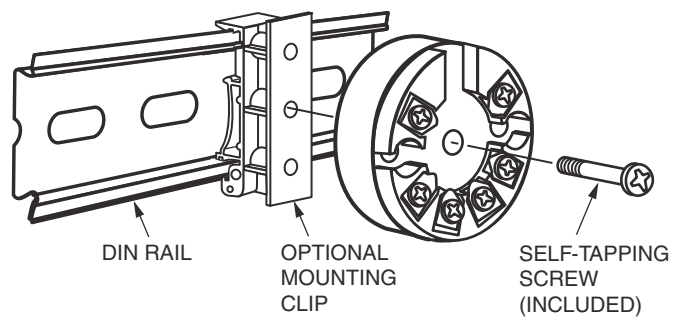
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SURFACE MOUNT



DIN RAIL MOUNT



NOTES

ORDERING INSTRUCTIONS

1. Model Number
2. Configured Range
3. Tag Number

OTHER FOXBORO PRODUCTS

The Foxboro product lines offer a broad range of measurement and instrument products, including solutions for pressure, flow, analytical, temperature, positioning, controlling, and recording.

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