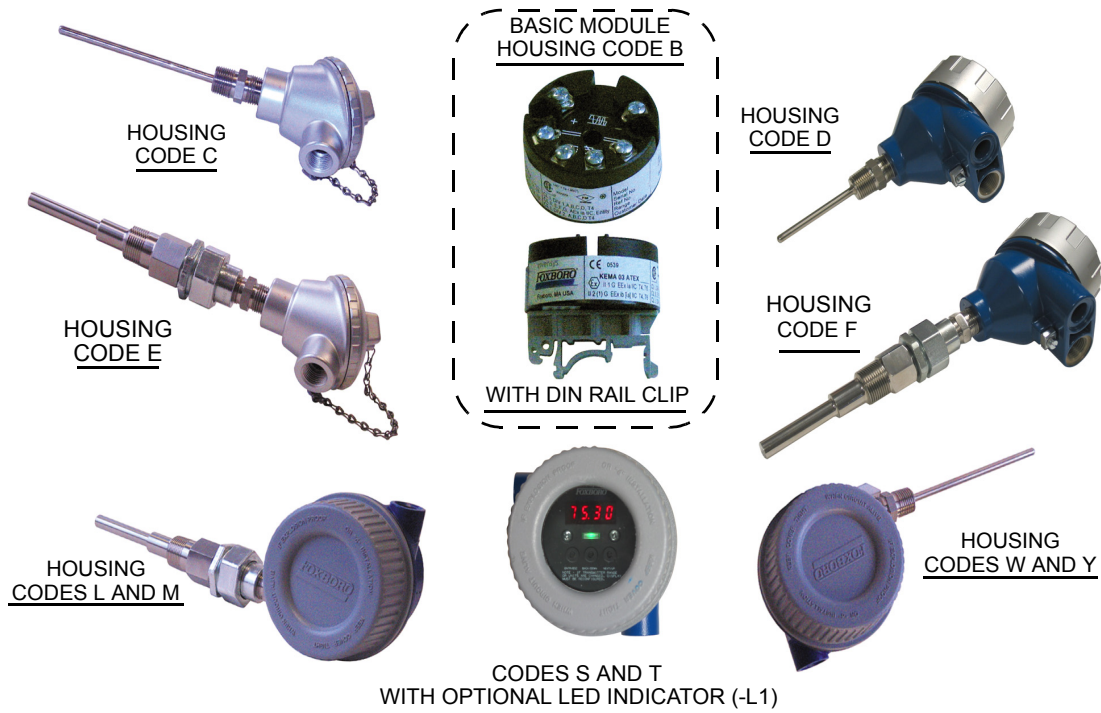


**Model RTT15**  
**I/A Series® Temperature Transmitters with HART, FOUNDATION Fieldbus, or Profibus Protocol**



The Foxboro® brand Model RTT15 is available from Invensys Process Systems (IPS). It is a microprocessor based temperature transmitter with HART, FOUNDATION Fieldbus H1, or Profibus PA Communication Protocol. It receives input signals from thermocouples, RTDs, ohm, or millivolt sources. It is available as a basic module, or in numerous housing configurations.

**FEATURES**

- ▶ Superior accuracy and long term stability from microprocessor-based technology.
- ▶ One unit configurable for TC, RTD, mV, and ohm.
- ▶ Supports 2-, 3-, or 4-wire RTDs.
- ▶ HART version allows average or difference measurement; Fieldbus/Profibus version allows average, difference, or redundant measurement.
- ▶ TC cold junction compensation.
- ▶ Galvanic isolation for both input and output.
- ▶ Automatic self-diagnostics and self-calibration.
- ▶ LED Indicator Options offered with HART.
- ▶ Basic module can mount to surface or DIN rail.
- ▶ Wide selection of bare sensors and thermowells.
- ▶ Numerous weatherproof and explosionproof housings for remote mounting, and integral sensor and well mounting.
- ▶ FOUNDATION Fieldbus with an LAS (Link Access Scheduler), PID (Proportional, Integral, Derivative) function block, and FISCO/FNICO Protection.

- ▶ Configurable failsafe mA value (HART).
- ▶ FMEDA report in support of SIL applications available for HART versions.
- ▶ Maximum/minimum temperature logging.
- ▶ Conforms to applicable European Union Directives (product marked with “CE” logo).
- ▶ EMC immunity per EU Directive 89/336/EEC.
- ▶ Compliant with NAMUR NE 21 criterion for burst.
- ▶ Meets many testing agency requirements for hazardous area installations.
- ▶ Standard 5-year warranty.

**GENERAL DESCRIPTION**

The RTT15 provides a wide range of packaging, sensor types, and options along with a choice of HART, FOUNDATION Fieldbus H1, or Profibus PA communication protocols, thus 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.

**I/A Series INTELLIGENT TEMPERATURE TRANSMITTER FAMILY**

The RTT15 is part of the Foxboro intelligent temperature transmitter family, which also includes Models RTT20 and RTT25. Table 1 below lists a few parameters relating to each transmitter model, and the applicable PSSs which give specifications and a more complete description.

**MULTIPLE PACKAGING CONFIGURATIONS**

The transmitter is suitable for use in a variety of applications. A transmitter with an integrally mounted sensor (and well, if desired) is mounted directly to the

**Table 1. Temperature Transmitter Family Comparison**

PSS No. or Parameter	Temperature Transmitter		
	RTT15	RTT20	RTT25
PSS Number	2A-1F5 A	2A-1F4 A	2A-1F4 C
HART: 4 to 20 mA and Digital	YES	YES	NO
FoxCom: 4 to 20 mA and Digital	NO	YES	NO
4 to 20 mA Analog - No Digital	NO	YES	NO
FOUNDATION Fieldbus, Digital	YES	NO	YES
Profibus, Digital	YES	NO	NO
Thermocouple Input	YES	YES	YES
RTD Input <sup>(a)</sup>	YES	YES	YES
Milliamp Input	NO	NO	YES
Millivolt Input	YES	YES	YES
Ohm Input	YES	YES	YES
Dew Point Input	NO	YES	NO
Custom Input	NO	YES	YES
Dual Inputs	YES	YES	YES
Indicator	YES <sup>(b)</sup>	YES	YES

(a) Platinum and nickel RTDs for all Models; copper RTD for RTT20 and RTT25 only.  
 (b) LED indicator available with HART version only. Intrinsically Safe and Explosionproof versions offered.

process. Surface- and pipe-mounted configurations allow the transmitter to be mounted remotely from the process. The DIN B size basic transmitter module is intrinsically safe and is offered for replacement or spare parts purposes, for mounting to a surface, or for mounting to a DIN rail using a simple clip. A selection of weatherproof and explosionproof terminal heads is offered to satisfy hazardous area installations. Built-in protection from vibration and RFI is also provided. See Figure 1 for transmitter configurations.

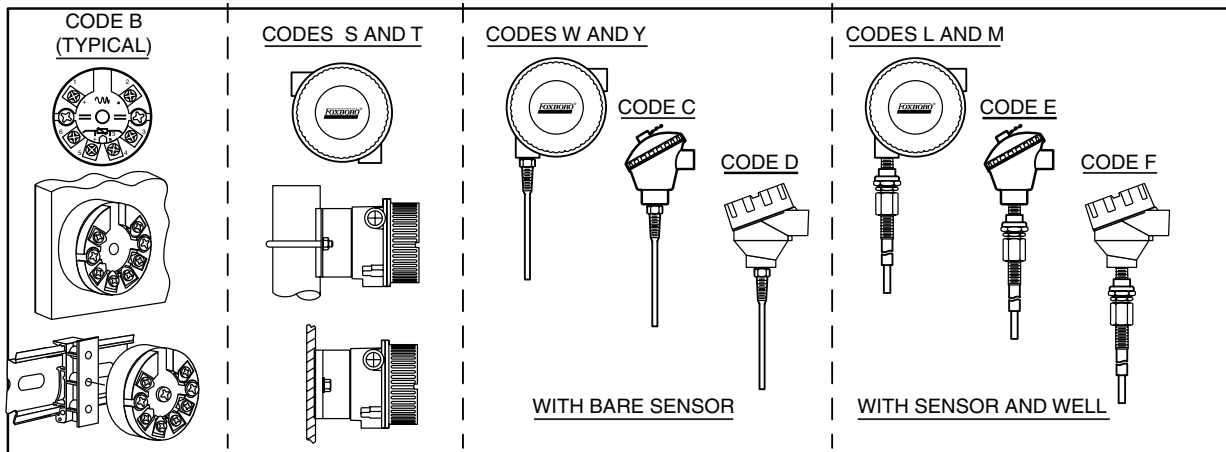


Figure 1. Multiple Packaging Configurations with Housing Codes Indicated

## EFFICIENT AND DURABLE

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

## INPUT TYPES

This RTT15 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, difference, or redundant measurement with two 2-wire RTDs, two TCs, or two mV inputs (redundant measurement with Fieldbus/Profibus version only).

## REMOTE COMMUNICATIONS

Remote digital communication is provided with either HART, FOUNDATION Fieldbus H1, or Profibus PA communication protocols. One module is used for Fieldbus/Profibus communications. It has a unique feature of recognizing both Fieldbus and Profibus communications, and automatically switching to the applied protocol. The HART electronics is in a separate basic module. See the paragraphs that follow.

### Foundation Fieldbus H1 Protocol (Version -F Electronics)

This is an all digital, serial, two-way communication system which interconnects field devices, such as transmitters, actuators, and controllers. It is a Local Area Network (LAN) with built-in capability to distribute control application across the network. Fieldbus technology consists of a Physical Layer, a Communication Stack, and User Application Blocks.

An LAS can be assigned to a device for Scheduled Communication. A PID function block contains all the standard parameters required to implement a general purpose, automatic PID control scheme.

## **REMOTE COMMUNICATIONS (CONT.)**

### **Profibus PA Protocol (Version -P Electronics)**

This is an all digital, serial, two-way communication system which interconnects field devices, such as transmitters, actuators, and controllers. It is a vendor-independent, open fieldbus standard conforming to international standards. The Profibus PA profile is used with these transmitters. Profibus technology consists of a Physical Layer, a Communication Stack, and User Application Blocks.

### **Digital HART and 4 to 20 mA dc Protocol (Version -T Electronics)**

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

Users having the HART Communicator for other devices can have them upgraded with Foxboro software to accommodate these transmitters. Also, Foxboro will make use of the HART Foundation library of registered DDs, and reload the HART Communicator if the user desires to keep another supplier's DD along with the Foxboro DD.

## **RUGGED AND RELIABLE SENSORS**

Foxboro supplied 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 both 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 (VERSION -T ELECTRONICS)**

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.

## **LED INDICATOR OPTIONS - HART ONLY**

LED Indicator Options -L1 and -L2 are offered for use with the HART Electronics Version only. These are loop powered indicators driven from the 4 to 20 mA loop current signal. Three pushbuttons allow configuration between -1999 and +9999, a decimal point position, and a units of measure selection. The display toggles continuously between measurement value and units of measure. For custom units not supported by the indicator, a "stick on" units label may be used. Refer to Figure 2 for Indicator Configuration, and to Table 2 for application and specifications for Indicator Options -L1 and -L2.

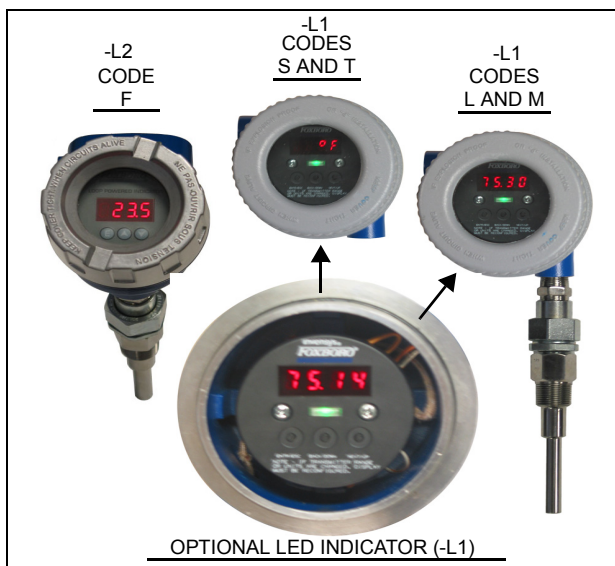


Figure 2. LED Indicator Options -L1 and -L2 Shown with Housing Codes F, L, M, S and T

Table 2. LED Indicator Options -L1 and -L2 Application and Specifications

Parameter	Option -L1	Option -L2
Used with Housing Codes	L, M, S, T, W and Y only	D, F, L, M, S, T, W, and Y only
Used with Electronics Version	HART Only	HART Only
Intrinsically Safe	Yes <sup>(a)</sup>	No
Explosionproof	No	Yes
Accuracy	±0.01 mA	±0.20 % of Span
Units of Measure	°C, °F, °K, %, and mA	°C, °F, and %
Input Signal	4 to 20 mA	
Operating Current	3.5 mA; minimum required for configuration	
Power Supply	4 V dc from the loop	
Ambient Temp. Limits	-40 and +85°C (-40 and +185°F)	-20 and +70°C (-4 and +158°F)
Relative Humidity Limits	5 and 95% (noncondensing)	25 and 95% (noncondensing)
Viewing Area	13.7 x 36.3 mm (0.54 x 1.43 in)	14 x 30 mm (0.55 x 1.18 in)

(a) Certified/Approved with ATEX and FM intrinsically safe versions of the transmitter.

**NOTE**

If the transmitter range is changed, the indicator range must also be changed to match using the indicator pushbuttons (unless the indicator is configured for 0 to 100%.)

**OPERATING, TRANSPORTATION, AND STORAGE CONDITIONS**

Influence	Operative Limits (g)	Transportation and Storage Limits
Ambient Temperature Transmitter Only w/LED Indicator Option -L1 w/LED Indicator Option -L2	-40 and +85°C (-40 and +185°F)(g) -40 and +85°C (-40 and +185°F)(g) -20 and +70°C (-4 and +158°F)(g)	-54 and +85°C (-65 and +185°F) -54 and +85°C (-65 and +185°F) -30 and +80°C (-22 and +176°F)
Relative Humidity Transmitter Only w/LED Indicator Option -L1 w/LED Indicator Option -L2	0 and 95% (Noncondensing) 5 and 95% (Noncondensing) 5 and 95% (Noncondensing)	0 and 95% (Noncondensing) 5 and 95% (Noncondensing) 5 and 95% (Noncondensing)
Supply Voltage HART (a) FOUNDATION Fieldbus (b) Profibus (b) LED Indicator	8 and 30 V dc (f) 9 and 32 V dc (c) 9 and 32 V dc (c) 4 V dc Loop Powered	Not Applicable Not Applicable Not Applicable Not Applicable
Vibration - Housing Code B	0 and 40 m/s <sup>2</sup> (0 and 4 "g") from 2 to 100 Hz (d)	107 mm (42 in) Drop in shipping container
Vibration - Housing Codes S, T, C, D, W, Y, E, F, L, and M (with or without optional Led Indicator)	19 mm (0.75 in) Double Amplitude from 5 to 9 Hz. 0 and 30 m/s <sup>2</sup> (0 and 3 "g") from 9 to 500 Hz (e)	107 mm (42 in) Drop in shipping container

- (a) Refer to Figure 3 for supply voltage vs. external loop load limitations graph.
- (b) Power supplied by a specific Fieldbus or Profibus power supply, as applicable.
- (c) For FISCO installations, the maximum voltage is 17.5 V dc.
- (d) Per Lloyd's specification number 1.
- (e) 10 m/s<sup>2</sup> (1 g) maximum with Housing Codes M, T, or Y (316 ss housings).
- (f) Not including additional voltage (4 V dc) required for optional LED Indicator. Maximum voltage not to exceed 30 V.
- (g) Refer to Electrical Safety Specifications section for a restriction in ambient temperature with certain agency approvals/certifications.

**NOTE**

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.

## PERFORMANCE SPECIFICATIONS<sup>(1)</sup>

### Transmitter Accuracy<sup>(2)</sup> - General Value

#### FIELDBUS/PROFIBUS

±0.05% of reading for all input types.

#### HART

±0.05% of span for all input types.

### Transmitter Accuracy<sup>(2)</sup>- Basic Values

#### PLATINUM RTD INPUT

±0.1°C (±0.18°F)

#### NICKEL RTD INPUT

Fieldbus/Profibus: ±0.15°C (±0.27°F)

HART: ±0.2°C (±0.36°F)

#### TC TYPE E, J, K, L, N, T, AND U INPUT

±0.5°C (±0.9°F)

#### TC TYPE B, R, S, W3, AND W5 INPUT

±1.0°C (±1.8°F)

#### LINEAR RESISTANCE INPUT

Fieldbus/Profibus: ±0.05 Ω

HART: ±0.1 Ω

#### MILLIVOLT INPUT

±10 μV

### Accuracy - Cold Junction Temperature

#### FIELDBUS/PROFIBUS

±0.5°C (±0.9°F)

#### HART

±1.0°C (±1.8°F)

### Stability

Long term drift is less than ±0.1% of span per 12 months.

### Ambient Temperature Effect - General Values<sup>(2)</sup>

#### FIELDBUS/PROFIBUS

± 0.002% of reading in °C per °C

± 0.0011% of (°F reading - 32) per °F

#### HART

± 0.005% of span in °C per °C

± 0.0028% of span in °F per °F

### Ambient Temperature Effect - Basic Values<sup>(2)</sup>

#### RTD AND THERMOCOUPLE INPUT

Fieldbus/Profibus: ±0.002°C/°C (±0.002°F/°F)

HART: ±0.005°C/°C (±0.005°F/°F)

#### TC TYPE E, J, K, L, N, T, AND U INPUT

Fieldbus/Profibus: ±0.010°C/°C (±0.010°F/°F)

HART: ±0.025°C/°C (±0.025°F/°F)

#### TC TYPE B, R, S, W3, AND W5 INPUT

Fieldbus/Profibus: ±0.025°C/°C (±0.025°F/°F)

HART: ±0.1°C/°C (±0.1°F/°F)

#### LINEAR RESISTANCE INPUT

Fieldbus/Profibus: ±0.002 Ω/°C (±0.0011 Ω/°F)

HART: ±5 mΩ/°C (±2.8 mΩ/°F)

#### MILLIVOLT INPUT

Fieldbus/Profibus: ±0.2 μV/°C (±0.11 μV/°F)

HART: ±0.5 μV/°C (±0.28 μV/°F)

### Supply Voltage Effect

The output changes < 0.005% of span for each 1 volt change within the specified voltage range.

### EMC Immunity Effect

±0.1% of reading per EU (European Union) Directive 89/336/EEC

### NAMUR NE 21 A Burst Criterion

±1% of span with a test voltage of 2 kV

(1) All performance specifications apply to the transmitter only. Any errors associated with the thermocouple or RTD sensors, any other millivolt or resistance sensors, or the optional LED Indicators are additive. For performance specifications on Foxboro thermocouples, refer to PSS 1-B6 A, and for Foxboro RTDs refer to PSS 1-1B1 A. Refer to Table 2 for LED Indicator specifications.

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

### FUNCTIONAL SPECIFICATIONS

#### Span and Range Limits - RTD Input

RTD Type	Span Limits HART (a)		Range Limits	
	°C	°F	°C	°F
Platinum, 100 Ω (b)(d)	10 and 1050	18 and 1890	-200 and +850	-328 and +1562
Nickel, 100 Ω (c)(d)	10 and 310	18 and 558	-60 and +250	-76 and +482

- (a) Span limits do not apply with digital Fieldbus or Profibus protocol.
- (b) Platinum, 100 Ω ; 2-, 3-, or 4-wire RTDs (also see Model Code).
- (c) Nickel, 100 Ω ; 3-wire RTD (also see Model Code).
- (d) Transmitter has configurable RTD factor to allow use of Pt 25 through Pt 1000 or Ni 25 through Ni 1000 RTDs (Fieldbus/Profibus version also accepts Cu 10 through Cu 1000 RTDs).

#### Span and Range Limits - TC Input

TC Type	Span Limits HART (a)		Range Limits	
	°C	°F	°C	°F
B	100 and 1420	180 and 2556	400 and 1820	752 and 3308
E	50 and 1100	90 and 1980	-100 and +1000	-148 and +1832
J	50 and 1300	90 and 2340	-100 and +1200	-148 and +2192
K	50 and 1552	90 and 2794	-180 and +1372	-292 and +2502
L	50 and 1100	90 and 1980	-200 and +900	-328 and +1652
N	50 and 1480	90 and 2664	-180 and +1300	-292 and +2372
R	100 and 1810	180 and 3258	-50 and +1760	-58 and +3200
S	100 and 1810	180 and 3258	-50 and +1760	-58 and +3200
T	50 and 600	90 and 1080	-200 and +400	-328 and +752
U	50 and 800	90 and 1440	-200 and +600	-328 and 1112
W3	100 and 2300	180 and 4140	0 and 2300	32 and 4172
W5	100 and 2300	180 and 4140	0 and 2300	32 and 4172

- (a) Span limits do not apply with digital Fieldbus or Profibus protocol.

#### Span and Range Limits - Ohm Input

Protocol	Span Limits	Range Limits
Fieldbus	(a)	0 and 10 000 Ω
Profibus	(a)	0 and 10 000 Ω
HART	25 and 7 000 Ω	0 and 7 000 Ω

- (a) Span limits do not apply with Fieldbus or Profibus protocol.

#### Span and Range Limits - Millivolt Input

Protocol	Span Limits	Range Limits
Fieldbus	(a)	-800 and +800 mV
Profibus	(a)	-800 and +800 mV
HART	2.5 and 1600 mV	-800 and +800 mV

- (a) Span limits do not apply with Fieldbus or Profibus protocol.

## FUNCTIONAL SPECIFICATIONS (CONT.)

### Current Consumption (Fieldbus/Profibus)

<11 mA

### Response Time

1 to 60 s, configurable

### Warm-Up Time

30 s

### Updating Time - Single Input

#### FIELDBUS/PROFIBUS

< 400 ms

#### HART

440 ms (660 ms for difference)

### Thermocouple Cold Junction Compensation

TC cold junction compensated via internal measurement, user-entered constant, or external RTD (2-wire for HART, and 2- or 3-wire for Fieldbus and Profibus).

### 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 $\Omega$  for Fieldbus, Profibus, and HART

### Resistance Temperature Detectors (RTDs)<sup>(3)</sup>

#### 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

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 required 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 mm<sup>2</sup> or 22 AWG; ptfе insulation

(3) RTDs listed are available assembled to RTT15 Transmitter. The transmitter can also be configured for 2-wire and Pt 1000 RTDs.

FUNCTIONAL SPECIFICATIONS (CONT.)

Thermocouples (TCs)<sup>(4)</sup>

**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**

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 required 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 mm<sup>2</sup> or 20 AWG; fiberglass insulation

Supply Voltage Requirements and External Loop Load Limitations

**FIELDBUS/PROFIBUS DIGITAL OUTPUT**

Power supplied by a specific Fieldbus or Profibus power supply connected to the bus.

**HART 4 TO 20 mA OUTPUT WITH A SUPERIMPOSED DIGITAL SIGNAL**

Nominal minimum supply voltage is 8 V dc, and maximum is 30 V dc (28 V dc for transmitters certified/approved as intrinsically safe). Note also that the Optional LED Indicator requires 4 V, in addition to the supply voltage required by the transmitter, with the upper supply voltage limit not to exceed 30 V. See Figure 3 for a plot of supply voltage vs. output load.

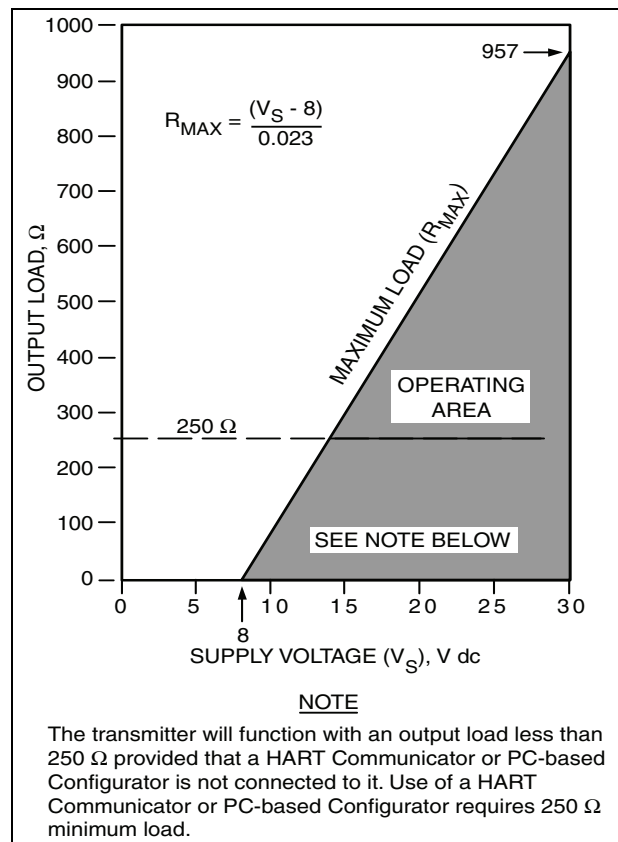


Figure 3. HART 4 to 20 mA Output Supply Voltage vs. Output Load

(4) TCs listed are available assembled to RTT15 Transmitter. The transmitter can also be configured for other TC types.

## FUNCTIONAL SPECIFICATIONS (CONT.)

### Thermowells

The wells listed in the Model Code are popular selections for industrial use. In addition, Invensys Foxboro offers other high quality, polished wells in a variety of configurations, materials, and sizes. Most application requirements can be met by choosing from the wide selection offered. Specify Thermowell Code TX and see PSS 3-3C1 A for Type W Thermowells, and PSS 3-3D1 A for Type T Thermowells, or contact IPS. See Figure 4 for a small sample of wells available.

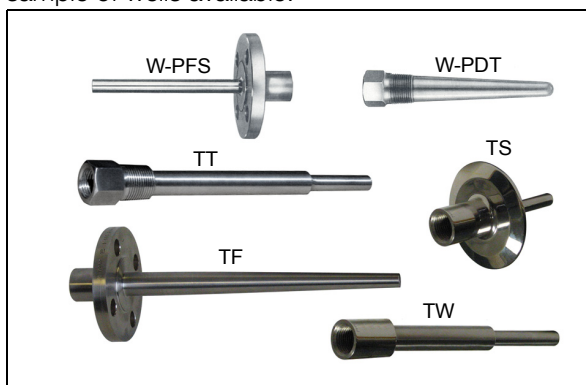


Figure 4. Typical W-Series and T-Series Thermowells Shown

### HART (Version -T) 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 3 for communication parameters.

#### MULTIDROP MODE (FIXED CURRENT)

This Mode supports communications with up to 15 transmitters 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 3 for communication parameters.

### FOUNDATION Fieldbus (Version -F) Communications

This serial, two-way communication system runs at 31.25 kbits/s. The digital output signal is superimposed on the dc power signal on the bus, and controlled by a strict cycle schedule and protocol. Supply voltage, 9 to 32 V dc, is by a specific Fieldbus power source. Current consumption is 19.5 mA. The maximum number of devices on a non-intrinsically safe bus is 32. For intrinsically safe bus systems the maximum number is 6. See Table 3 for communication parameters.

### PROFIBUS (Version -P) Communications

This all digital, serial, two-way communication systems interconnects field devices, such as transmitters, actuators, and controllers. It is a vendor-independent, open fieldbus standard conforming to international standards. The PROFIBUS Process Automation (PA) profile, used with these transmitters, defines the device parameters and behavior of typical field devices, and facilitates device interchangeability and vendor independent operation. Supply voltage is 9 to 32 V dc, with a current consumption of 19.5 mA. As with FOUNDATION Fieldbus, the maximum number of devices on a non-intrinsically safe bus is 32. For intrinsically safe bus systems, the maximum number is 6. See Table 3 for communication parameters.

### Functional Block Diagrams and Installation Topologies

Refer to Figures 5 to 8.

FUNCTIONAL SPECIFICATIONS (CONT.)

Table 3. Communication Parameters - HART, FOUNDATION Fieldbus, and Profibus Protocols

Parameter	HART		Fieldbus	Profibus
	Analog Mode	Multidrop Mode	Digital	Digital
Remote Configurator	HART Communicator or PC-based Configurator		PC or Fieldbus Host	PC or Profibus Host
Communication Rate	1200 baud	1200 baud	31.25 kbits/s	31.25 kbits/s
Communication Distance (Rated)	3050 m (10 000 ft)	1525 m (5000 ft)	1900 m (6235 ft) (a)	1900 m (6235 ft) (a)

(a) Total bus length including all spurs. Maximum spur length is 120 m (395 ft). For hybrid installations, maximum IS spur length is dependant on the field barrier used. For intrinsically safe bus installations, maximum spur length is 30 m (98 ft).

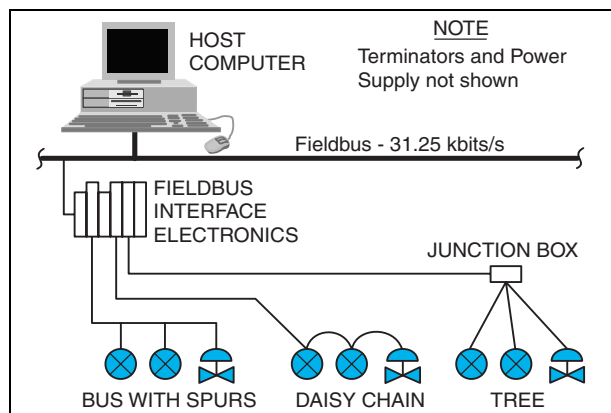


Figure 5. Typical Installation Topologies (FOUNDATION Fieldbus)

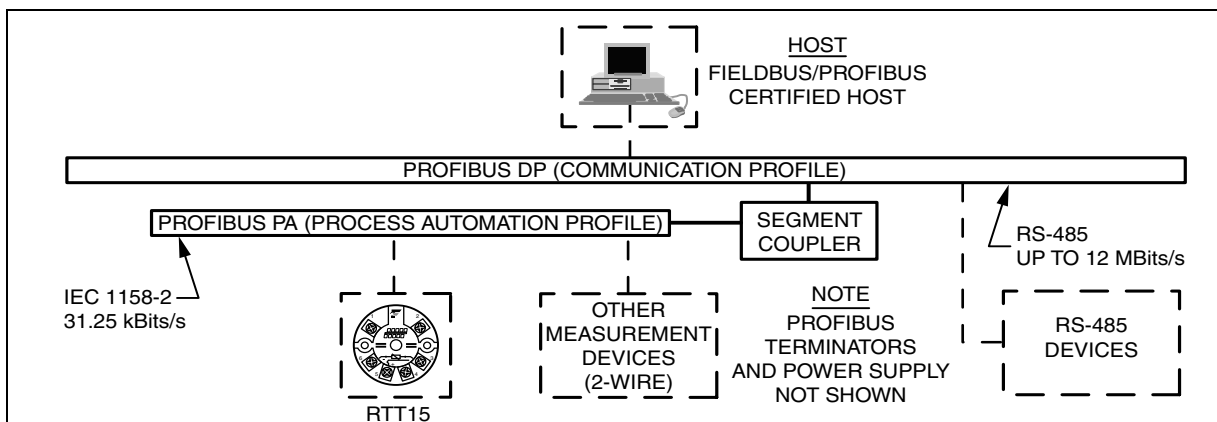


Figure 6. Typical Profibus Installation Topology

FUNCTIONAL SPECIFICATIONS (CONT.)

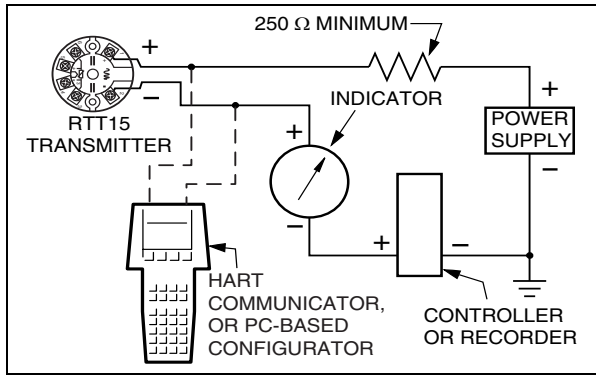


Figure 7.  
HART 4 to 20 mA Output Block Diagram (One Transmitter)

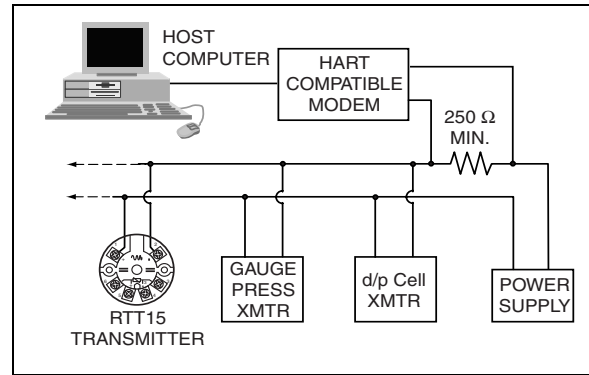


Figure 8.  
HART Multidrop Block Diagram (Up to Fifteen Transmitters)

## PHYSICAL SPECIFICATIONS

## Transmitter Housings

Housing Code	Material and Finish	IEC/NEMA Rating	Explosionproof and Flameproof	Mounting Configuration	Field Wiring Entrances on Housing	Housing Cover Gasket
B	Encapsulated plastic	N/A (a)	NO	Basic Module (b) (DIN Form B pkg.)	None	Not Applicable
C	Low copper aluminum alloy	IP65 NEMA 4	NO	Weatherproof connection head with integral bare sensor	1/2 NPT (c)	O-Ring Buna N
D	Low copper aluminum alloy; painted	IP65 NEMA 4X	YES	Explosionproof connection head with integral bare sensor	1/2 NPT (c)	Gasket Buna N
E	Low copper aluminum alloy	IP65 NEMA 4	NO	Weatherproof connection head with integral sensor and well	1/2 NPT (c)	O-Ring Buna N
F	Low copper aluminum alloy; painted	IP65 NEMA 4X	YES	Explosionproof connection head with integral sensor and well	1/2 NPT (c)	Gasket Buna N
L	Low copper aluminum alloy; epoxy coated	IP65 NEMA 4X	YES	Universal housing with integral sensor and well	1/2 NPT (c)	O-Ring Buna N
M	Stainless steel	IP65 NEMA 4X	YES	Universal housing with integral sensor and well	1/2 NPT (c)	O-Ring Buna N
S	Low copper aluminum alloy; epoxy coated	IP65 NEMA 4X	YES	Universal housing for surface or pipe mounting, remote sensor (e)	1/2 NPT (c)(d)	O-Ring Buna N
T	Stainless steel	IP65 NEMA 4X	YES	Universal housing for surface or pipe mounting, remote sensor (e)	1/2 NPT (c)(d)	O-Ring Buna N
W	Low copper aluminum alloy; epoxy coated	IP65 NEMA 4X	YES	Universal housing with integral bare sensor	1/2 NPT (c)	O-Ring Buna N
Y	Stainless steel	IP65 NEMA 4X	YES	Universal housing with integral bare sensor	1/2 NPT (c)	O-Ring Buna N

(a) Not applicable; the basic module, although encapsulates, has exposed terminals not protected from the environment.

(b) The basic module is typically used for replacement and spares purposes; it can also be mounted to a surface or to a DIN rail using a clip (Option -D1).

(c) Optional conduit threads or thread adapters available; see Model Code.

(d) Two wiring entrances on housing.

(e) Surface or pipe mounted using mounting set options -M1 or -M2.

## PHYSICAL SPECIFICATIONS (CONT.)

### Mounting

The basic transmitter module can be mounted to a DIN rail using the optional mounting clip and self-tapping screw provided by Invensys Foxboro. The basic module can also be mounted to a surface using user-supplied hardware. See DIMENSIONS - NOMINAL section.

The universal 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 section.

The connection head housings are sensor or thermowell mounted. See DIMENSIONS - NOMINAL section.

### Electrical Connections

There are six terminals on the basic module for input and output connections. Four terminals are for RTD, TC, ohm, or mV sensor inputs, and two terminals are for measurement output. With HART, the two output terminals are marked + and -; while with Fieldbus/Profibus, the two output terminals are polarity independent, and therefore not marked. Refer to DIMENSIONS - NOMINAL section.

### Dimensions

Refer to DIMENSIONS - NOMINAL section. Also refer to Dimensional Print DP 020-462.

### Approximate Transmitter Mass

Housing Code	Housing Material	Approximate Mass			
		Standard		With Optional LED (e)	
		kg	lb	kg	lb
B - Basic Module (a)	N/A	0.05	0.11	N/A	N/A
C - Weatherproof Head (c)	Aluminum	0.4	0.8	N/A	N/A
D - Explosionproof Head (c)	Aluminum	0.7	1.5	0.9	2.0 (f)
E - Weatherproof Head (d)	Aluminum	0.4	0.8	N/A	N/A
F - Explosionproof Head (d)	Aluminum	0.7	1.5	0.9	2.0 (f)
L - Universal Housing (d)	Aluminum	1.4	3.1	1.6	3.6
M - Universal Housing (d)	316 ss	3.2	7.1	3.7	8.2
S - Universal Housing (b)	Aluminum	1.4	3.1	1.6	3.6
T - Universal Housing (b)	316 ss	3.2	7.1	3.7	8.2
W - Universal Housing (c)	Aluminum	1.4	3.1	1.6	3.6
Y - Universal Housing (c)	316 ss	3.2	7.1	3.7	8.2

- (a) Basic transmitter module.
- (b) Surface or pipe mount housing; remote sensor.
- (c) Includes module, but bare sensor mass and connecting hardware not included.
- (d) Includes module, but sensor and well mass and connecting hardware not included.
- (e) Optional LED Indicator available with HART versions only.
- (f) Indicator Option -L2 only (Option -L1 not available with Housing Codes D and F).

**ELECTRICAL SAFETY SPECIFICATIONS**  
(also refer to notes below)

**NOTES**

- 1 Transmitter has been designed to meet the Electrical Safety descriptions listed in the table below. Contact IPS for information or status of testing laboratory approvals or certifications.
- 2 Refer to applicable Instruction Manual for application conditions and connectivity requirements.
- 3 The Optional LED Indicator (Option -L1) is only available as follows:
  - ▶ With HART Output Version -T.
  - ▶ With Universal Housing Codes L, M, S, T, W, and Y.
  - ▶ Certified/approved with ATEX and FM intrinsically safe versions of the transmitter.
- 4 The Optional LED Indicator (Option -L2) is only available as follows:
  - ▶ With HART Output Version -T.
  - ▶ With Universal Housing Codes D, F, L, M, S, T, W, and Y; and also Explosionproof and Flameproof Housing Codes D and F.
  - ▶ Certified/approved with ATEX, CSA, FM, and IECEx explosionproof and flameproof versions of the transmitter.

**Electronic Version -T (HART)**

Testing Laboratory, Type of Protection, and Area Classification	With Housing Codes	Application Conditions	Electrical Safety Design Code
<b>ATEX</b> (KEMA) intrinsically safe, II 1 GD, EEx ia IIC. Note (a)	C, E, D, F, L, M, S, T, W, Y	Temperature Class: T4; Ta = -40 to +85°C T6; Ta = -40 to +60°C Note (b)	E
<b>ATEX</b> (FM) flameproof, II 1/2 G, Ex d IIC.	F, L, M, S, T	Temperature Class T6. Ta = -40 to +70°C Note (c)	D
<b>ATEX</b> (FM) flameproof, II 2 G, Ex d IIC.	D, W, Y	Temperature Class T6. Ta = -40 to +70°C	
<b>ATEX</b> (FM) flameproof, II 2 D.	D, F, L, M, S, T, W, Y	T85°C, Ta = 70°C maximum ambient Note (c)	
<b>CSA</b> intrinsically safe, Class I, Division 1, Groups A, B, C, and D. Also, zone certified intrinsically safe Class I, Zone 0, Ex ia IIC.	B, C, E	Temperature Class T4 at 85°C maximum ambient.	C
<b>CSA</b> suitable for Class I, Division 2, Groups A, B, C, and D.		Temperature Class T6 at 60°C maximum ambient.	

**Electrical Safety Specifications continued on next page**

**ELECTRICAL SAFETY SPECIFICATIONS (CONT.)  
(ALSO REFER TO NOTES ABOVE)**

**Electronic Version -T (HART) (Cont.)**

Testing Laboratory, Type of Protection, and Area Classification	With Housing Codes	Application Conditions	Electrical Safety Design Code
<b>CSA</b> intrinsically safe, Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1. Also, zone certified intrinsically safe, Class I, Zone 0, Ex ia IIC.	D, F, L, M, S, T, W, Y	Temperature Class T4 at 85°C and T6 at 60°C maximum ambient.	C
<b>CSA</b> suitable for Class I, Division 2, Groups A, B, C, D, F and G. Also, zone certified Class I, Zone 2, Ex nA II.		Temperature Class T4 at 85°C, T5 at 75°C, and T6 at 60°C maximum ambient.	
<b>CSA</b> explosionproof, Class I, Division 1, Groups B, C, and D; dust-ignitionproof, Class II, Division 1, Groups E, F, and G; Class III Division 1. Also, Zone certified Class I, Zone 1, Ex d IIC.		Temperature Class T4 at 85°C and T6 at 40°C maximum ambient. Note (c)	
<b>FM</b> intrinsically safe, Class I, Division 1, Groups A, B, C, and D. (e)	L, M, S, T, W, Y	Temperature Class T4 at 85°C, and T5 at 60°C maximum ambient. (e)	F
<b>FM</b> intrinsically safe, Class I, Division 1, Groups A, B, C, and D.	B, C, E	Temperature Class T4 at 85°C, and T6 at 60°C maximum ambient.	F
<b>FM</b> zone certified intrinsically safe, Class I, Zone 0, AEx ia IIC.		Temperature Class T4 at 85°C maximum ambient.	
<b>FM</b> nonincendive, Class I, Division 2, Groups A, B, C, and D.		Temperature Class T4 at 85°C maximum ambient.	
<b>FM</b> intrinsically safe, Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1.	D, F, L, M, S, T, W, Y	Temperature Class T4 at 85°C, and T6 at 60°C maximum ambient.	F
<b>FM</b> zone certified intrinsically safe, Class I, Zone 0, AEx ia IIC.		Temperature Class T4 at 85°C maximum ambient.	
<b>FM</b> nonincendive Class I, Division 2, Groups A, B, C, and D; suitable for Class II, Division 2, Groups F and G.		Temperature Class T4 at 85°C maximum ambient.	
<b>FM</b> explosionproof, Class I, Division 1, Groups B, C, and D; dust-ignitionproof, Class II, Division 1, Groups E, F, and G; Class III Division 1. Note (d)		Temperature Class T5 at 85°C, and T6 at 70°C maximum ambient. Note (c)	
<b>IECEx</b> flameproof, Ex d IIC.	L, M, S, T, W, Y	Temperature Class T6. Ta = 70°C.	V

(a) With the -L1 Indicator Option, the type of protection is II 1 G, Ex ia IIC. Also not available with Housing Codes C, E, D, and F.

(b) With the -L1 Indicator Option, replace Temperature Class T6 with Temperature Class T5.

(c) Certifications do not apply for Housing Codes F, L, or M if well is not supplied with transmitter (Code NA).

(d) Also includes Group A for Housing Codes D and F.

(e) With -L1 Indicator Option only.

**ELECTRICAL SAFETY SPECIFICATIONS (CONT.)  
(ALSO REFER TO NOTES ABOVE)**

**Electronic Version -F and -P (FOUNDATION Fieldbus and PROFIBUS)**

Testing Laboratory, Type of Protection, and Area Classification	With Housing Codes	Application Conditions	Electrical Safety Design Code
<b>ATEX</b> (KEMA) intrinsically safe, II 1 GD or II 2 (1) GD, EEx ia IIC or EEx ib [ia] IIC.	All	Temperature Class T4 to T6. Ta = -40 to +85°C	E
<b>ATEX</b> (FM) flameproof, II 1/2 G, Ex d IIC.	F, L, M, S, T, Y	Temperature Class T6. Ta = -40 to +70°C Note (a)	D
<b>ATEX</b> (FM) flameproof, II 2 G, Ex d IIC.	D, W, Y	Temperature Class T6. Ta = -40 to +70°C Note (a)	D
<b>ATEX</b> (FM) flameproof, II 2 D.	D, F, L, M, S, T, W, Y	T85°C, Ta = 70°C maximum ambient. Note (a)	D
<b>CSA</b> intrinsically safe, Class I, Division 1, Groups A, B, C, and D. Also, zone certified intrinsically safe Class I, Zone 0, Ex ia IIC.	B, C, E	Temperature Class T4 at 85°C maximum ambient.	C
<b>CSA</b> suitable for Class I, Division 2, Groups A, B, C, and D.		Temperature Class T4 at 85°C maximum ambient.	
<b>CSA</b> intrinsically safe, Class I, Division 1, Groups A, B, C, and D; dust-ignitionproof, Class II, Division 1, Groups E, F, and G; Class III, Division 1. Also, zone certified intrinsically safe, Class I, Zone 0, Ex ia IIC, and Class I, Zone 1, Ex ib IIC.	D, F, L, M, S, T, W, Y	Temperature Class T4 at 85°C, and T6 at 60°C maximum ambient.	C
<b>CSA</b> suitable for Class I, Division 2, Groups A, B, C, D, F and G. Also, zone certified Class I, Zone 2, Ex nA II.		Temperature Class T4 at 85°C, T5 at 75°C, and T6 at 60°C maximum ambient.	
<b>CSA</b> explosionproof, Class I, Division 1, Groups B, C, and D; dust-ignitionproof, Class II, Division 1, Groups E, F, and G; Class III Division 1. Also, zone certified Class I, Zone 1, Ex d IIC.	D, F, L, M, S, T, W, Y	Temperature Class T4 at 85°C, and T6 at 40°C maximum ambient. Note (a)	C

**Electrical Safety Specifications continued on next page**

**ELECTRICAL SAFETY SPECIFICATIONS (CONT.)  
(ALSO REFER TO NOTES ABOVE)**

**Electronic Version -F and -P (FOUNDATION Fieldbus and PROFIBUS) (Cont.)**

Testing Laboratory, Type of Protection, and Area Classification	With Housing Codes	Application Conditions	Electrical Safety Design Code
<b>FM</b> FISCO field device intrinsically safe for Class I, Division 1, Groups A, B, C, and D. Also zone certified intrinsically safe Class I, Zone 0, AEx ia IIC, and Class I, Zone 1, AEx ib IIC.	B, C, E	Temperature Class T4 at 85°C maximum ambient.	F
<b>FM</b> FNICO field device nonincendive for Class I, Division 2, Groups A, B, C, and D.			
<b>FM</b> FNICO field device intrinsically safe for Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G. Also zone certified intrinsically safe Class I, Zone 0, AEx ia IIC, and Class I, Zone 1, AEx ib IIC.	D, F, L, M, S, T, W, Y	Temperature Class T4 at 85°C maximum ambient.	F
<b>FM</b> FNICO field device nonincendive for Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G; Class III, Division 2.			
<b>FM</b> explosionproof, Class I, Division 1, Groups B, C, and D; dust-ignitionproof, Class I, Division 1, Groups E, F, and G; Class III, Division 1. Also, zone certified Class I, Zone 1, AEx d IIC. Note (b)	D, F, L, M, S, T, W, Y	Temperature Class T5 at 85°C, and T6 at 70°C maximum ambient. Note (a)	F
<b>IECEx</b> flameproof, Ex d IIC	L, M, S, T, W, Y	Temperature Class T6. Ta = 70°C.	V

(a) Explosionproof/Flameproof certification not available for Housing Codes F, L, or M if well is not supplied with transmitter (Code NA).

(b) Also includes Group A for Housing Codes D and F.

MODEL CODE

Model Code - Basic Module Code B

Remote sensors not provided but can be ordered separately



HOUSING  
CODE B  
HART MODULE  
SHOWN

<u>Description</u>	<u>Model</u>
I/A Series Temperature Transmitter	RTT15
<b>Output Version</b>	
Intelligent; Digital HART and 4 to 20 mA dc (Version -T)	-T
Intelligent; Digital FOUNDATION Fieldbus H1 (Version -F)	-F
Intelligent; Digital Profibus PA (Version -P)	-P
<b>Input Configuration (a)</b>	
Single Input; Configured for One Sensor	1
Dual Input; Configured for Average of two 2-wire sensors of same type (b)	4
Dual Input; Configured for Difference of two 2-wire sensors of same type (b)	5
Dual Input; Configured for Redundancy of two 2-wire sensors of same type (b) (Not available with Output Version -T/HART)	6
<b>Housing and Sensor Mounting (Basic Module - No Housing)</b>	
Basic Module used for Surface Mount, DIN Rail Mount, or Module Replacement.	B
Material Certificate (AS Reference CERT-C) not offered with this selection.	
<b>Sensor Length</b>	
None - Sensor ordered separately	N
<b>Measurement Input Type (Software Selectable) (c)</b>	
Thermocouple, Type B, Platinum-Rhodium	B
Thermocouple, Type E, Chromel-Constantan	E
Thermocouple, Type J, Iron-Constantan	J
Thermocouple, Type K, Chromel-Alumel	K
Thermocouple, Type L, Iron-Copper/Nickel	L
Thermocouple, Type N, Nicrosil-Nisil	N
Thermocouple, Type R, Platinum-Rhodium	R
Thermocouple, Type S, Platinum-Rhodium	S
Thermocouple, Type T, Copper-Constantan	T
Thermocouple, Type U, Copper-Copper/Low Nickel	U
Thermocouple, Type W3, Tungsten - Rhenium	3
Thermocouple, Type W5, Tungsten - Rhenium	5
RTD, Platinum, 2-wire, 100 Ω, IEC 751 (ASTM-B Standard Accuracy), 316 ss Sheath	2
RTD, Platinum, 3-wire, 100 Ω, IEC 751 (ASTM-B Standard Accuracy), 316 ss Sheath (d)	Q
RTD, Platinum, 4-wire, 100 Ω, IEC 751 (ASTM-B Standard Accuracy), 316 ss Sheath (d)	4
RTD, Platinum, 3-wire, 100 Ω, IEC 751 (ASTM-A High Accuracy), 316 ss Sheath (d)	A
RTD, Platinum, 4-wire, 100 Ω, IEC 751 (ASTM-A High Accuracy), 316 ss Sheath (d)	6
RTD, Nickel, 3-wire, 100 Ω, DIN 43760, 316 ss Sheath (d)	I

Model Code continued on next page

**MODEL CODE (CONT.)**

**Model Code - Basic Module Code B**

**Remote sensors not provided but can be ordered separately (CONT.)**

<u>Description (Cont.)</u>	<u>Model</u>
Ohm Input	O
Millivolt Input	M
<b><u>Thermowell Assembled to Housing</u></b>	
No Well, or Well is supplied separately	NA
<b><u>Electrical Safety (see Electrical Safety Specifications Section for more details)</u></b>	
ATEX, Intrinsically Safe, EEx ia IIC	E
CSA, Intrinsically Safe and Division 2	C
FM, Intrinsically Safe and Division 2	F
<b><u>Optional Selections</u></b>	
Custom Database Configuration (requires C2 Form filled out with all data specified)	-C2
Clip and Self-Tapping Screw provided to mount the Basic Module to a DIN Rail (e)	-D1
Adapter Plate and Screws to allow mounting the RTT Basic Transmitter Module into existing E93, E94, 893, and RTT10 Transmitter housings.	-D3
Omit Paper Instruction Manual and CD (f)	-K1
Example: RTT15-T1BNJNAC-C2D1	

- (a) Input configuration can be changed in the field by changing wiring terminations and reconfiguring.
- (b) For Dual Input with different type sensors (Output Versions -F and -P only), specify Input Configuration Code 1 and reconfigure the transmitter after shipment, or specify the -C2 option.
- (c) Transmitter is configured for measurement type specified, whether sensor is included or not. User can change configuration to a different type using the appropriate configurator for selected protocol.
- (d) Measurement input types Q, 4, A, 6, and I not available with Dual Input Configuration Codes 4, 5, and 6. User Configuration or -C2 Option can be used for dual input of one three-wire RTD and one TC (Output Versions -F and -P only).
- (e) Basic module is attached to mounting clip with a self-tapping screw, and shipped assembled for snapping onto the DIN rail.
- (f) Standard transmitter is shipped with a paper instruction manual that describes installation, operation, and configuration, and a CD that includes all pertinent documentation such as Parts Lists, Dimensional Prints, and more detailed instructions.

MODEL CODE

Model Code - Housing Codes S and T

Remote sensors not provided but can be ordered separately

HOUSING  
CODES S AND T



<u>Description (Cont.)</u>	<u>Model</u>
I/A Series Temperature Transmitter	RTT15
<b>Output Version</b>	
Intelligent; Digital HART and 4 to 20 mA dc (Version -T)	-T
Intelligent; Digital FOUNDATION Fieldbus H1 (Version -F)	-F
Intelligent; Digital Profibus PA (Version -P)	-P
<b>Input Configuration (a)</b>	
Single Input; Configured for One Sensor	1
Dual Input; Configured for Average of two 2-wire sensors of same type (b)	4
Dual Input; Configured for Difference of two 2-wire sensors of same type (b)	5
Dual Input; Configured for Redundancy of two 2-wire sensors of same type (b)	6
(Not available with Output Version -T/HART)	
<b>Housing and Sensor Mounting (Housing for Surface or Pipe Mounting)</b>	
Universal Housing, Aluminum, for use with remote sensor	S
Remote Sensor ordered separately	
Universal Housing, 316 ss, for use with remote sensor	T
Remote Sensor ordered separately	
<b>Sensor Length</b>	
None - Sensor ordered separately	N
<b>Measurement Input Type (Software Selectable) (c)</b>	
Thermocouple, Type B, Platinum-Rhodium	B
Thermocouple, Type E, Chromel-Constantan	E
Thermocouple, Type J, Iron-Constantan	J
Thermocouple, Type K, Chromel-Alumel	K
Thermocouple, Type L, Iron-Copper/Nickel	L
Thermocouple, Type N, Nicrosil-Nisil	N
Thermocouple, Type R, Platinum-Rhodium	R
Thermocouple, Type S, Platinum-Rhodium	S
Thermocouple, Type T, Copper-Constantan	T
Thermocouple, Type U, Copper-Copper/Low Nickel	U
Thermocouple, Type W3, Tungsten - Rhenium	3
Thermocouple, Type W5, Tungsten - Rhenium	5
RTD, Platinum, 2-wire, 100 Ω, IEC 751 (ASTM-B Standard Accuracy), 316 ss Sheath	2
RTD, Platinum, 3-wire, 100 Ω, IEC 751 (ASTM-B Standard Accuracy), 316 ss Sheath (d)	Q
RTD, Platinum, 4-wire, 100 Ω, IEC 751 (ASTM-B Standard Accuracy), 316 ss Sheath (d)	4
RTD, Platinum, 3-wire, 100 Ω, IEC 751 (ASTM-A High Accuracy), 316 ss Sheath (d)	A
RTD, Platinum, 4-wire, 100 Ω, IEC 751 (ASTM-A High Accuracy), 316 ss Sheath (d)	6
RTD, Nickel, 3-wire, 100 Ω, DIN 43760 (d)	I

Model Code continued on next page

**MODEL CODE (CONT.)**

**Model Code - Housing Codes S and T**

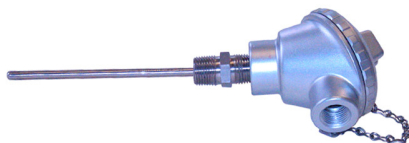
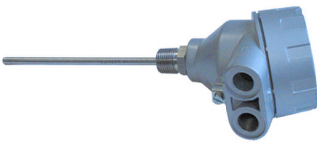
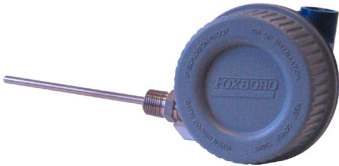
**Remote sensors not provided but can be ordered separately (CONT.)**

<u>Description (Cont.)</u>	<u>Model</u>
Ohm Input	O
Millivolt Input	M
<b><u>Thermowell Assembled to Housing</u></b>	
No Well or Well ordered separately	NA
<b><u>Electrical Safety (see Electrical Safety Specifications Section for more details)</u></b>	
ATEX, Intrinsically Safe, EEx ia IIC	E
ATEX, Flameproof, EEx d IIC (not available with Option -L1)	D
CSA Intrinsically Safe, Explosionproof, and Division 2 (not available with Option -L1)	C
FM, Intrinsically Safe, Explosionproof, and Nonincendive	F
IECEx, Flameproof, Ex d IIC (not available with Option -L1)	V
<b><u>Optional Selections - Housing Features</u></b>	
Custody Transfer Lock and Seal	-A1
PG 13.5 Conduit Thread (in lieu of 1/2 NPT) (e)	-A2
(Not available with Option -A3)	
Metric Conduit Thread Adapter (1/2 NPT to M20 x 1.5) (e)	-A3
(Not available with Option -A2)	
<b><u>Optional Selections - Mounting Sets</u></b>	
Carbon Steel (with finish) Mounting Set (f)	-M1
Stainless Steel (with finish) Mounting Set (f)	-M2
<b><u>Optional Selection - LED Indicator (with Output Version -T only)</u></b>	
Loop Powered Indicator - Intrinsically Safe (g)	-L1
With ATEX and FM intrinsically safe versions of the transmitter.	
Loop Powered Indicator - Explosionproof (g)	-L2
With ATEX, CSA, FM, and IECEx explosionproof/flameproof versions of the transmitter.	
<b><u>Optional Selections - Miscellaneous</u></b>	
Custom Database Configuration (Requires C2 Form filled out with all data specified)	-C2
Omit Paper Instruction Manual and CD (h)	-K1
Example: RTT15-T1SNJNAC-A2M2C2	

- (a) Input configuration can be changed in the field by changing wiring terminations and reconfiguring.
- (b) For Dual Input with different type sensors (Output Versions -F and -P only), specify Input Configuration Code 1 and reconfigure the transmitter after shipment, or specify the -C2 option.
- (c) Transmitter is configured for measurement type specified, whether sensor is included or not. User can change configuration to a different type using the appropriate configurator for selected protocol.
- (d) Measurement input types Q, 4, A, 6, and I not available with Dual Input Configuration Codes 4, 5, and 6. User Configuration or -C2 Option can be used for dual input of one three-wire RTD and one TC (Output Versions -F and -P only).
- (e) Options -A2 and -A3 not available with Electrical Safety Codes C and F explosionproof installations.
- (f) For mounting transmitter to a surface or nominal DN 50 or 2-in pipe.
- (g) Refer to Table 2 for Indicator applications and specifications.
- (h) Standard transmitter is shipped with a paper instruction manual that describes installation, operation, and configuration, and a CD that includes all pertinent documentation such as Parts Lists, Dimensional Prints, and more detailed instructions.

**MODEL CODE**

**Model Code - Housing Codes C, D, W, and Y**  
**Integral bare sensors provided**

<u>HOUSING CODE C</u>	<u>HOUSING CODE D</u>	<u>HOUSING CODES W AND Y</u>
		
<p><b>Description</b> I/A Series Temperature Transmitter</p> <p><b>Output Version</b> Intelligent; Digital HART and 4 to 20 mA dc (Version -T) Intelligent; Digital FOUNDATION Fieldbus H1 (Version -F) Intelligent; Digital Profibus PA (Version -P)</p> <p><b>Input Configuration (a)</b> Single Input; Configured for One Sensor</p> <p><b>Housing and Sensor Mounting (Integral Bare Sensors)</b> Weatherproof Connection Head, aluminum; with Integral Bare Sensor Explosionproof Connection Head, aluminum; with Integral Bare Sensor Universal Housing, aluminum; with Integral Bare Sensor Universal Housing, 316 ss; with Integral Bare Sensor</p> <p><b>Sensor Length - Dimension A (b)</b> 2 in (50 mm), Sensor included 2.5 in (64 mm), Sensor included 3 in (76 mm), Sensor included 3.5 in (89 mm), Sensor included 4 in (102 mm), Sensor included 4.5 in (114 mm), Sensor included  5 in (127 mm), Sensor included 5.5 in (146 mm), Sensor included 6 in (152 mm), Sensor included 7 in (178 mm), Sensor included 8 in (203 mm), Sensor included 9 in (229 mm), Sensor included 10 in (254 mm), Sensor included  11 in (279 mm), Sensor included 12 in (305 mm), Sensor included 18 in (457 mm), Sensor included 24 in (610 mm), Sensor included 30 in (762 mm), Sensor included 36 in (914 mm), Sensor included Custom Lengths between 2 and 120 in (50 mm and 3 m), Sensor included</p> <p><b>Measurement Input Type (Software Selectable) (c)</b> Thermocouple, Type E, Chromel-Constantan Thermocouple, Type J, Iron-Constantan Thermocouple, Type K, Chromel-Alumel Thermocouple, Type T, Copper-Constantan</p>		<p><b>Model</b> RTT15</p> <p>-T -F -P</p> <p>1</p> <p>C D W Y</p> <p>A B C D E F</p> <p>G H J K L M P</p> <p>Q R S T U V X</p> <p>E J K T</p>

**Model Code continued on next page**

**MODEL CODE (CONT.)**

**Model Code - Housing Codes C, D, W, and Y  
Integral bare sensors provided (CONT.)**

<u>Description (Cont.)</u>	<u>Model</u>
RTD, Platinum, 3-wire, 100 Ω, IEC 751 (ASTM-B Standard Accuracy), 316 ss Sheath	Q
RTD, Platinum, 4-wire, 100 Ω, IEC 751 (ASTM-B Standard Accuracy), 316 ss Sheath	4
RTD, Platinum, 3-wire, 100 Ω, IEC 751 (ASTM-A High Accuracy), 316 ss Sheath	A
RTD, Platinum, 4-wire, 100 Ω, IEC 751 (ASTM-A High Accuracy), 316 ss Sheath	6
Ohm Input	O
Millivolt Input	M
<b><u>Thermowell Assembled to Housing</u></b>	
No Well	NA
<b><u>Electrical Safety (see Electrical Safety Specifications Section for further details)</u></b>	
Supplied without Agency Approval/Certification (with Housing Codes C and D only)	Z
ATEX, Intrinsically Safe; EEx ia IIC	E
ATEX, Flameproof; EEx d IIC (not available with Option -L1)	D
CSA, Intrinsically Safe, Explosionproof, and Division 2 (not available with Option -L1)	C
FM, Intrinsically Safe, Explosionproof, and Nonincendive	F
IECEx, Flameproof, Ex d IIC (not available with Housing Codes C and D, or Option -L1)	V
<b><u>Optional Selections - Housing Features</u></b>	
Custody Transfer Lock and Seal (with Housing Codes W and Y only)	-A1
PG 13.5 Conduit Thread (in lieu of 1/2 NPT), (with Housing Codes W and Y only) (d) (Not available with Option -A3)	-A2
Metric Conduit Thread Adapter (1/2 NPT to M20 x 1.5) (Not available with Option -A2)	-A3
<b><u>Optional Selections - Mounting Sets for Surface or Pipe Mounting</u></b>	
Carbon Steel (with finish) Mounting Set (with Housing Codes W and Y only)	-M1
Stainless Steel (with finish) Mounting Set (with Housing Codes W and Y only)	-M2
<b><u>Optional Selection - LED Indicator (with Output Version -T only)</u></b>	
Loop Powered Indicator - Intrinsically Safe (with Housing Codes W and Y only) (f) With ATEX and FM intrinsically safe versions of the transmitter.	-L1
Loop Powered Indicator - Explosionproof (with Housing Codes D, W, and Y only) (f) With ATEX, CSA, FM, and IECEx explosionproof/flameproof versions of the transmitter.	-L2
<b><u>Optional Selections - Miscellaneous</u></b>	
Custom Database Configuration (Requires C2 Form filled out with all data specified)	-C2
Omit Paper Instruction Manual and CD (e)	-K1
Inconel Sheath on Sensor (Not available with Measurement Input Types 4 and 6) (g) Example: RTT15-T1WLJNAC-A2S1	-S1

- (a) Input configuration can be changed in the field by changing wiring terminations and reconfiguring.
- (b) Quantity of one Foxboro sensor that is listed under Measurement Input Type. Length is Dimension A as shown in the Dimensions-Nominal section. Dimension A is bare element insertion length.
- (c) Transmitter is configured for measurement type specified, whether sensor is included or not. User can change configuration to a different type using the appropriate configurator for selected protocol.
- (d) Option -A2 only available with Electrical Safety Codes D and E.
- (e) Standard transmitter is shipped with a paper instruction manual that describes installation, operation, and configuration, and a CD that includes all pertinent documentation such as Parts Lists, Dimensional Prints, and more detailed instructions.
- (f) Refer to Table 2 for Indicator applications and specifications.
- (g) Inconel sheath is 0.250 in (6.35 mm) outside diameter, and provides a moisture resistant assembly. The sheath O.D. is designed to fit into a well I.D. of 0.260 in (6.60 mm)

MODEL CODE

Model Code - Housing Codes E, F, L, and M

Housing provided with sensor and thermowell (or user-supplied thermowell)

HOUSING CODE E	HOUSING CODE F	HOUSING CODES L AND M
<p><b>Description</b> I/A Series Temperature Transmitter</p> <p><b>Output Version</b> Intelligent; Digital HART and 4 to 20 mA dc (Version -T) Intelligent; Digital FOUNDATION Fieldbus H1 (Version -F) Intelligent; Digital Profibus PA (Version -P)</p> <p><b>Input Configuration (a)</b> Single Input; Configured for One Sensor</p> <p><b>Housing and Sensor Mounting (Integral Sensor and Well)</b> Weatherproof Connection Head, aluminum; with Integral Sensor and Well Explosionproof Connection Head, aluminum; with Integral Sensor and Well Universal Housing, aluminum; with Integral Sensor and Well Universal Housing, 316 ss; with Integral Sensor and Well</p> <p><b>Sensor Length - Dimension U or U plus T (b)</b> 2 in (50 mm), Sensor included 3.5 in (89 mm), Sensor included 5 in (127 mm), Sensor included 6 in (152 mm), Sensor included  8 in (203 mm), Sensor included 9 in (229 mm), Sensor included 10 in (254 mm), Sensor included 11 in (279 mm), Sensor included  12 in (305 mm), Sensor included 18 in (457 mm), Sensor included Custom Lengths between 2 and 120 in (50 mm and 3 m), Sensor included</p> <p><b>Measurement Input Type (Software Selectable) (c)</b> Thermocouple, Type E, Chromel-Constantan Thermocouple, Type J, Iron-Constantan Thermocouple, Type K, Chromel-Alumel Thermocouple, Type T, Copper-Constantan  RTD, Platinum, 3-wire, 100 Ω, IEC 751 (ASTM-B Standard Accuracy), 316 ss Sheath RTD, Platinum, 4-wire, 100 Ω, IEC 751 (ASTM-B Standard Accuracy), 316 ss Sheath RTD, Platinum, 3-wire, 100 Ω, IEC 751 (ASTM-A High Accuracy), 316 ss Sheath RTD, Platinum, 4-wire, 100 Ω, IEC 751 (ASTM-A High Accuracy), 316 ss Sheath  Ohms Input Millivolts Input</p>		<p><b>Model</b> RTT15</p> <p>-T -F -P</p> <p>1</p> <p>E F L M</p> <p>A D G J  L M P Q  R S X</p> <p>E J K T</p> <p>Q 4 A 6</p> <p>O M</p>

Model Code continued on next page

**MODEL CODE (CONT.)**

**Model Code - Housing Codes E, F, L, and M**

**Housing provided with sensor and thermowell (or user-supplied thermowell) (CONT.)**

<u>Description</u>				<u>Model</u>
<b><u>Thermowell Assembled to Housing</u></b>				
Well	Well	Well	Available with	
<u>Type</u>	<u>Connection</u>	<u>Material</u>	<u>Sensor Length Codes</u>	
Plain	3/4 NPT External	304 ss	A, D, G, J, L, P, and R	TA
Plain	3/4 NPT External	316 ss	A, D, G, J, L, P, and R	TB
Lagging (d)	3/4 NPT External	316 ss	G, L, M, and Q	TC
Plain	1 NPT External	316 ss	A, D, G, J, and L	TD
Plain	1 NPT External	Hastelloy C	A, D, G, J, and L	TE
Lagging (d)	1 NPT External	304 ss	G, L, M, and Q	TF
Lagging (d)	1 NPT External	316 ss	G, L, M, and Q	TG
Plain	1 in ANSI Cl. 150 RF	316 ss	A, D, G, J, L, P, and R	TH
Plain	1.5 in Cl. 150 RF	316 ss	A, D, G, J, L, P, R, and S	TI
Other Types of Thermowells Assembled to Housing (e)				TX
Thermowell Supplied by User (f)				NA
<b><u>Electrical Safety (see Electrical Safety Specifications Section for further details)</u></b>				
Supplied without Agency Approval/Certification (with Housing Codes E and F only)				Z
ATEX, Intrinsically Safe, EEx ia IIC				E
ATEX, Flameproof, EEx d IIC (not available with Option -L1) (f)				D
CSA, Intrinsically Safe, Explosionproof, and Division 2 (not available with Option -L1) (f)				C
FM, Intrinsically Safe, Explosionproof, and Nonincendive (f)				F
IECEx, Flameproof, Ex d IIC (not available with Housing Codes E and F, or Option -L1)				V
<b><u>Optional Selections - Housing Features</u></b>				
Custody Transfer Lock and Seal (with Housing Codes L and M only)				-A1
PG 13.5 Conduit Thread (in lieu of 1/2 NPT), (with Housing Codes L and M only) (g) (Not available with Option -A3)				-A2
Metric Conduit Thread Adapter (1/2 NPT to M20 x 1.5) (Not available with Option -A2)				-A3
<b><u>Optional Selections - Mounting Sets for Surface or Pipe Mounting</u></b>				
Carbon Steel (with finish) Mounting Set (with Housing Codes L and M only)				-M1
Stainless Steel (with finish) Mounting Set (with Housing Codes L and M only)				-M2
<b><u>Optional Selections - Housing Connection to Well</u></b>				
Stainless Steel union and fittings, with Housing Codes E, F, and L; standard on Housing Code M				-S3
Union with 3/4 NPT External Thread instead of 1/2 NPT External Thread (h)				-D4
<b><u>Optional Selection - LED Indicator (with Output Version -T only)</u></b>				
Loop Powered Indicator - Intrinsically Safe (with Housing Codes L and M only) (j) With ATEX and FM intrinsically safe versions of the transmitter.				-L1
Loop Powered Indicator - Explosionproof (with Housing Codes F, L, and M only) (j) With ATEX, CSA, FM, and IECEx explosionproof/flameproof versions of the transmitter.				-L2

**Model Code continued on next page**

**MODEL CODE (CONT.)**

**Model Code - Housing Codes E, F, L, and M**

**Housing provided with sensor and thermowell (or user-supplied thermowell) (CONT.)**

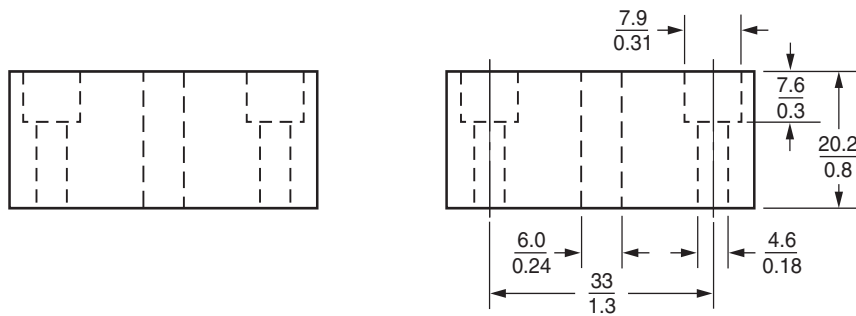
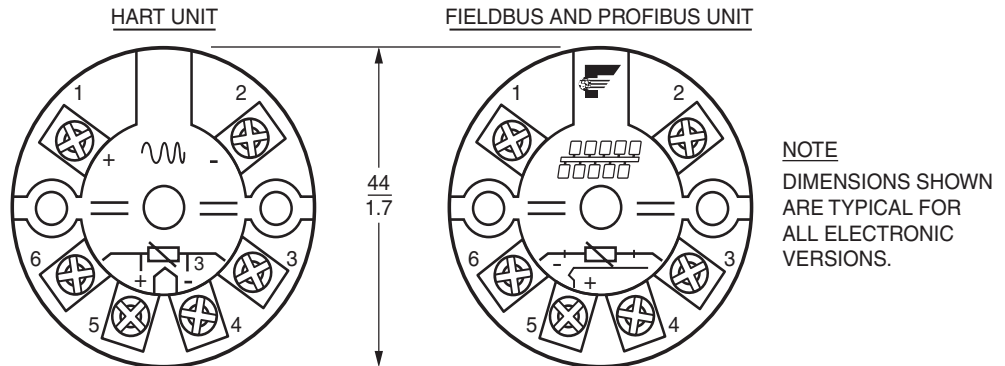
<p><b><u>Optional Selections - Miscellaneous</u></b>                  Custom Database Configuration (Requires C2 Form filled out with all data specified)                  Omit Paper Instruction Manual and CD (i)                  Inconel Sheath on Sensor (Not available with Measurement Input Types 4 and 6) (k)                  Example: RTT15-T1FGTTAF-N2C2</p>	<p>-C2                  -K1                  -S1</p>
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- (a) Input configuration can be changed in the field by changing wiring terminations and reconfiguring.
- (b) Quantity of one Foxboro sensor that is listed under Measurement Input Type. Length is Dimension U or U + T as shown in the Dimensions-Nominal section, where U is the insertion length, and T is the lagging length of 76 mm (3 in). See Note (d) below.
- (c) Transmitter is configured for measurement type specified, whether sensor is included or not. User can change configuration to a different type using the appropriate configurator for selected protocol.
- (d) Lagging wells have a lagging length T of 76 mm (3 in). If a different lagging length is required, select Code TX and specify Well Model or Part Number. Refer to PSS 3-3C1 A for W-Series Wells, PSSs 3-3D1 A and 3-3D1 B for T-Series Wells.
- (e) Specify Well Model Number or Part Number. Refer to PSS 3-3C1 A, PSS 3-3D1 A, and PSS 3-3D1 B for other well types.
- (f) Flameproof and explosionproof approvals and certifications not available with Thermowell Code NA (user-supplied thermowell).
- (g) Option -A2 only available with Electrical Safety Codes D and E.
- (h) For use with customer's thermowell having 3/4 NPT internal thread. Available only with Housing Codes E, F, L, or M, and thermowell Code NA (thermowell by others). Not available with Option -S3.
- (i) Standard transmitter is shipped with a paper instruction manual that describes installation, operation, and configuration, and a CD that includes all pertinent documentation such as Parts Lists, Dimensional Prints, and more detailed instructions.
- (j) Refer to Table 2 for Indicator applications and specifications.
- (k) Inconel sheath is 0.250 in (6.35 mm) outside diameter, and provides a moisture resistant assembly. The sheath O.D. is designed to fit into a well I.D. of 0.260 in (6.60 mm).

**DIMENSIONS - NOMINAL**

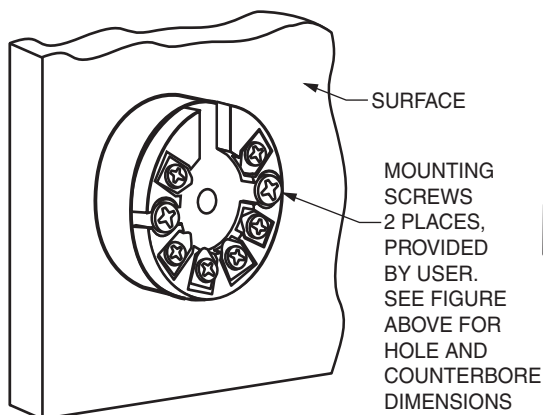
**mm**  
**in**

**BASIC TRANSMITTER MODULE - HOUSING CODE B**

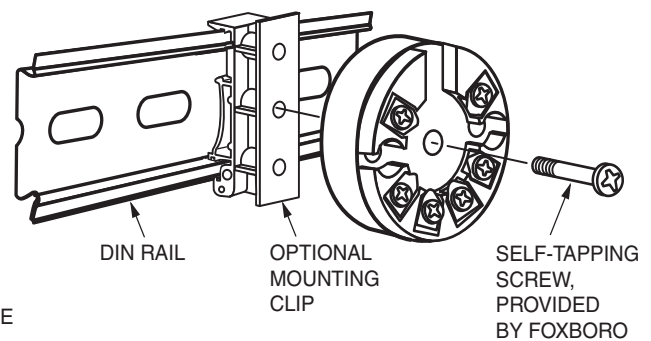


**BASIC TRANSMITTER MODULE MOUNTED TO SURFACE OR DIN RAIL**

**SURFACE MOUNT**



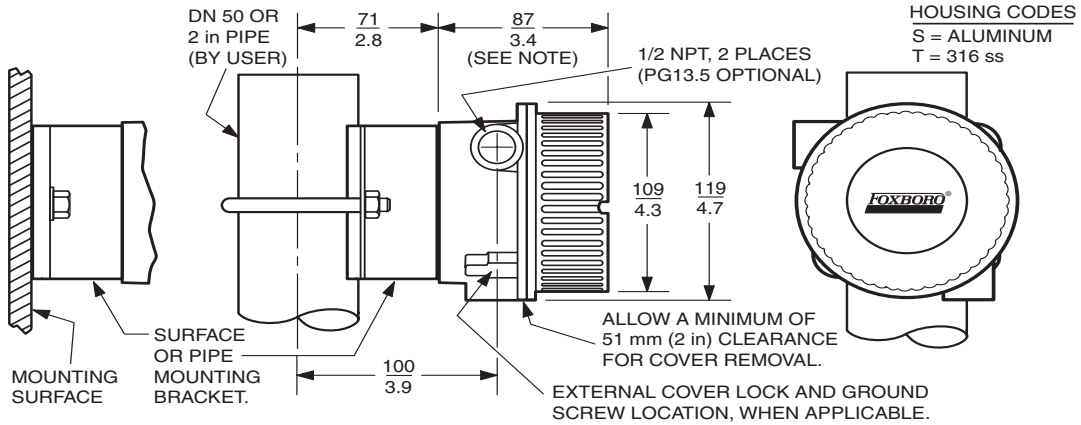
**DIN RAIL MOUNT**



**DIMENSIONS - NOMINAL (CONT.)**

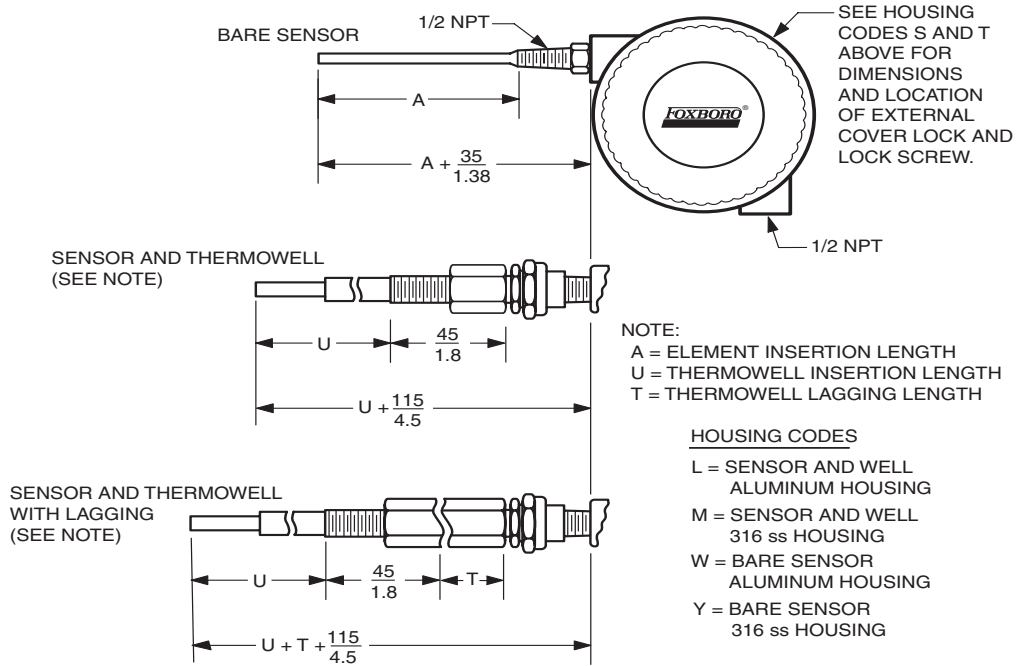
**mm**  
**in**

**UNIVERSAL HOUSING FOR SURFACE/PIPE MOUNT  
WITH REMOTE SENSOR - HOUSING CODES S AND T**



**NOTE:** When the LCD Indicator is used with the HART Version, add approximately 10 mm (0.4 in) to the dimension shown.

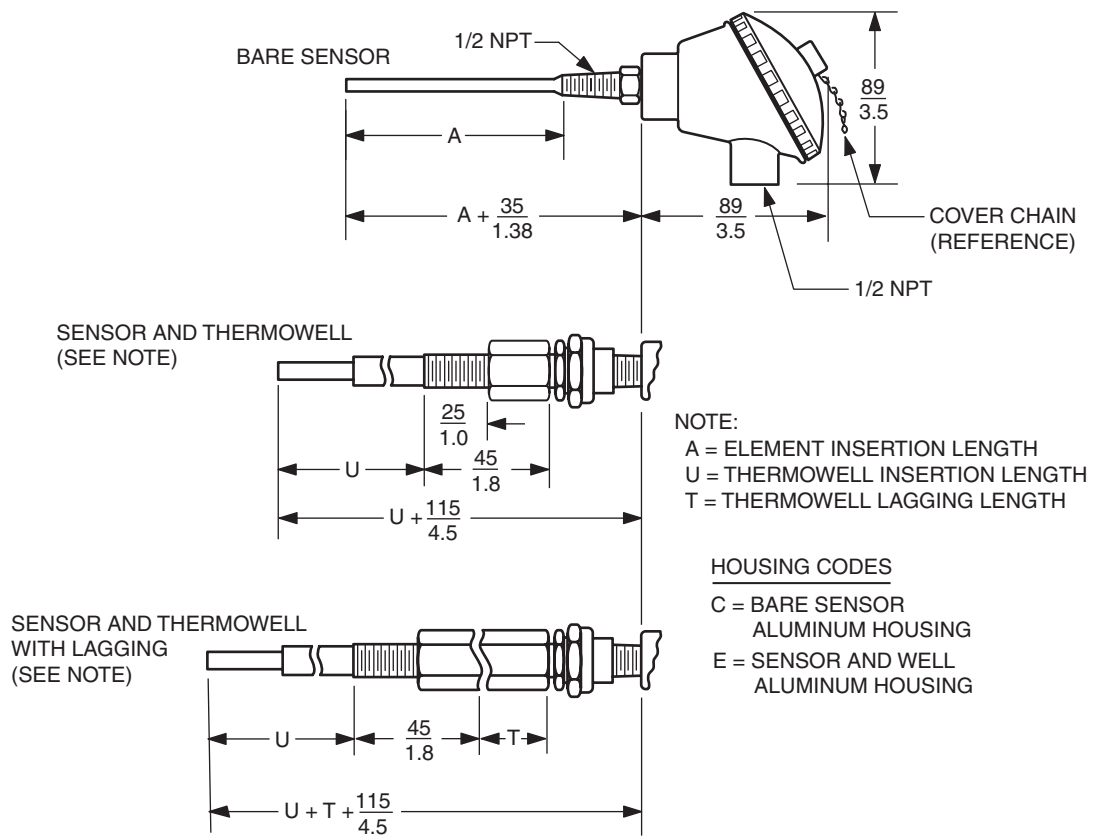
**UNIVERSAL HOUSING WITH INTEGRAL SENSOR - HOUSING CODES L, M, W, OR Y**



DIMENSIONS - NOMINAL (CONT.)

mm  
in

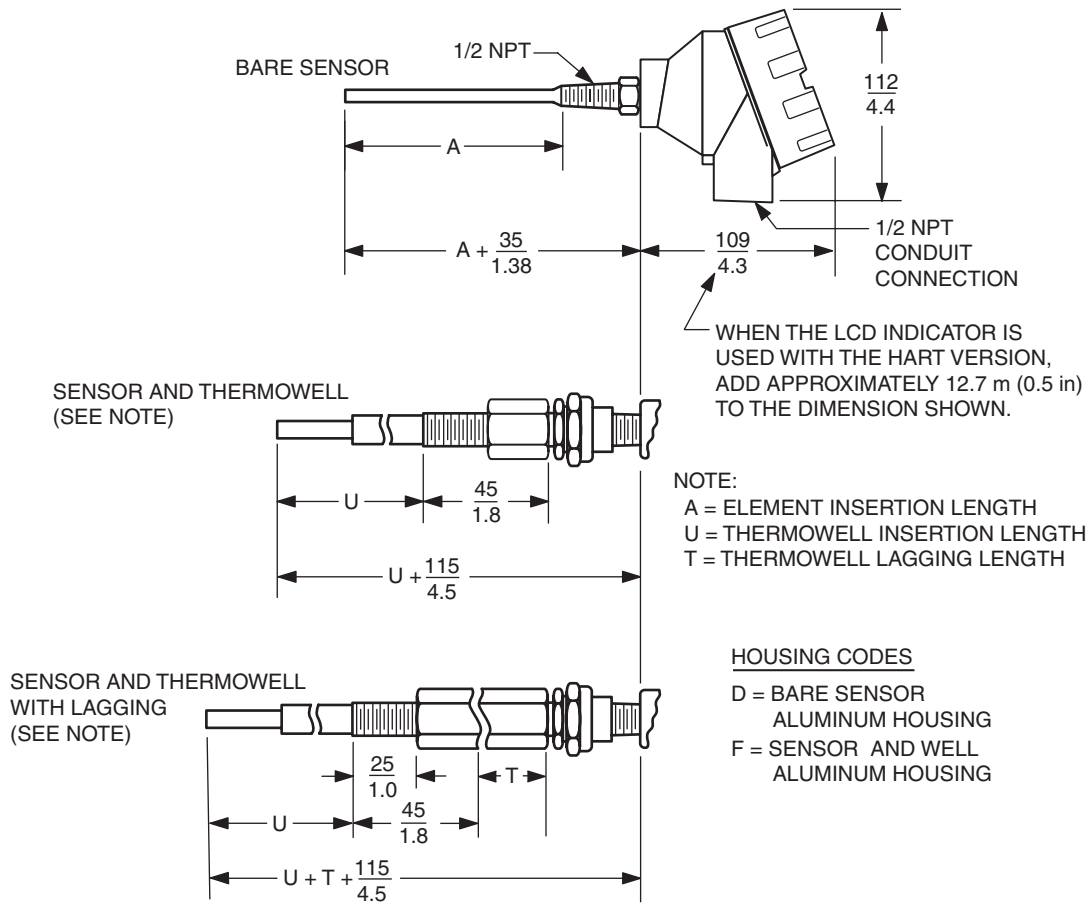
WEATHERPROOF CONNECTION HEAD WITH INTEGRAL SENSOR  
HOUSING CODES C AND E



DIMENSIONS - NOMINAL (CONT.)

**mm**  
**in**

EXPLOSIONPROOF CONNECTION HEAD WITH INTEGRAL SENSOR  
HOUSING CODES D AND F









## ORDERING INSTRUCTIONS

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

## OTHER M&I PRODUCTS

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