I/A Series® Intelligent Temperature Transmitter
Model RTT20 Transmitter with Analog 4 to 20 mA Output, or with FoxCom or HART Communication Protocol

The Model RTT20 Intelligent Temperature Transmitter receives input signals from RTDs, thermocouples, ohms sensors, or dc mV sources. It transmits a 4 to 20 mA output (with no remote communications), a smart version with HART communications, or an intelligent version with software selectable 4 to 20 mA or FoxCom® digital for integration with I/A Series Systems. Remote communication and database configuration is provided by a hand-held communicator, a PC-based configurator, or an I/A Series System.

- 4 to 20 mA, HART, or FoxCom Digital Output
- Field-proven microprocessor-based transmitter
- Superior Accuracy
- Long-Term Stability
- Multiple Packaging Configurations offered, including Pipe or Surface Mounting, DIN Rail Mounting, Integral Bare Sensor, and Integral Sensor with Thermowell
- One Unit Configurable for all T/C, RTD, mV, Ohm, and Dew Point Inputs. Custom Inputs can also be accommodated.
- Available as a Basic Unit, or in Aluminum or 316 ss Enclosure. Enclosure is Explosionproof and meets NEMA 4X and IEC IP66.
- Automatic Self-Diagnostics and Self-Calibration
- Configurable Failsafe Value
- Optional Three-Line Integral, Plug-in LCD Indicator/Configurator
- Wide Selection of Thermowell Configurations
- RFI, Voltage Surge, and Reverse Polarity Protection
- Conforms to Applicable European Union Directives (Product marked with “CE” Logo)
- NAMUR Compliant Failure Current
- Transmitter complies with EMC (ElectroMagnetic Compatibility) Directives
- Approved/Certified by many Testing Agencies for Hazardous Area Installations
- Standard 2-Year Warranty
GENERAL DESCRIPTION
The RTT20 provides a wide range of packaging, sensor types, and options along with three choices of output signals, 4 to 20 mA, smart HART, and Intelligent, making this transmitter suitable for virtually all temperature measurement applications. The microprocessor-based electronics eliminates 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.

INTELLIGENT TRANSMITTER FAMILY
The RTT20 Temperature Transmitter is designed for single measurements, but can be configured for dual 2-wire RTDs. However, for dual thermocouples, or dual 3- or 4-wire RTDs, the Model RTT25 is the correct choice. The Model RTT25 Temperature Transmitter is available with FOUNDATION Fieldbus Communication Protocol (refer to PSS 2A-1F4 C).

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

MULTIPLE PACKAGING CONFIGURATIONS
The transmitter (Figure 1) is suitable for use in a variety of applications. Transmitters with integrally mounted sensor have an environmentally protected enclosure and are mounted directly to the process. Surface- and pipe-mounted configurations allow the transmitter to be mounted remotely from the process. The transmitter is also available with DIN-mounting hardware, and as a basic transmitter package. Built-in protection from vibration and radio frequency interference (RFI) are also provided.

REMOTE COMMUNICATIONS
This high-performance temperature transmitter can be ordered with or without remote communications, making it ideal for use in new process applications and for upgrading existing applications. Remote communication is available in either Intelligent FoxCom or HART communication protocols.

INPUT TYPES
This RTT20 Intelligent Temperature Transmitter can be used with a wide variety of temperature sensors, including two, three, and four-wire RTDs, all popular thermocouples, and other resistance and millivolt input devices. The following is a general list of transmitter input types:
- Platinum RTDs
- Nickel RTDs
- Copper RTDs
- Differential RTDs
- Thermocouples
- Millivolts
- Ohms
- Dew Point
- Custom

OUTPUT TYPES AND REMOTE CONFIGURATION
The transmitter provides a 4 to 20 mA or digital output linear with temperature (°F, °C, K, or °R), linear with input (mV, ohms, or mA), or linear with Dew Point. The internal, or an external Cold Junction (CJ) sensor automatically compensates thermocouple measurements. When configured for FoxCom digital or with HART output, up to three FoxCom or four HART outputs can be provided to the host control system. The HART output can be configured for Burst Mode or Multidrop operation. The transmitter can be locally or remotely reconfigured as follows:
- **4 to 20 mA:** Local configuration via optional integral three-line LCD Indicator/Configurator. No remote communications.
- **4 to 20 mA with HART Communication Protocol:** Local configuration via optional integral three-line LCD Indicator/Configurator. Remote configuration using HART Communicator or Foxboro PC-based Configurator.
- **Intelligent FoxCom:** Configurable for 4 to 20 mA or FoxCom digital output. Local configuration via the optional integral three-line LCD Indicator/Configurator. Remote configuration via a PC-based Configurator or I/A Series System.

![Figure 1. Multiple Packaging Configurations](image)
LCD INDICATOR/CONFIGURATOR OPTION

This versatile three-line Indicator plugs into the top of the transmitter (see Figure 2) and provides the following features:

- **Local Configuration** – Indicator has two pushbuttons to rerange or reconfigure the transmitter database without using a separate configurator. Menu messages are configurable in English, French, German, or Spanish.

- **Highly Accurate** – Indicator is microprocessor driven, thereby eliminating any D/A conversion error caused by the 4 to 20 mA output signal.

- **Non-Interactive** – Transmitter output is unaffected whether inserting or removing the indicator, reading parameters, or downloading data; or by indicator failure.

- **Portable** – A single indicator can be used for multiple transmitters. No tools are required to install or remove it. Simply plug it in, make desired readings and/or adjustments to the transmitter, unplug the indicator, and install it in the next transmitter.

- **One Indicator** – The same indicator is used regardless of transmitter output.

- **Custody Transfer/Security** – Provided for both FoxCom and HART versions, the pushbuttons can be disabled via the remote configurators.

- **Highly Visible Measurement Display** – Top line of this 3-Line Indicator has six 8 mm (0.31 in) high digits. The indicator displays negative values with a minus sign.

- **Innovative 3-Line Indicator** – The second line of this indicator is an eleven-segment bargraph that displays readings in percent of calibrated range. Temperatures outside the calibrated range are indicated by a left-pointing (underrange) or right-pointing (overrange) arrow. The third line displays a user-configurable tag number on a 6 mm (0.25 in) high, seven-character, alphanumeric display. This line also automatically displays the following fault messages:
  - FAILSAFE – transmitter or sensor failure
  - D FAIL (Display FAIL) – temperature exceeds the limit of the display

- **Configurable Display** – The top line of the Indicator displays the output in any one of five different ways:
  - Engineering Units (EGU)
  - mA, or mA and EGU
  - %, or % and EGU

**AUTOMATIC SELF-CALIBRATION**

This transmitter has an advanced automatic self-calibration routine that greatly extends the time between recalibrations. Every three seconds, 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 non-volatile EEPROM memory. Any necessary adjustments are made automatically without interrupting the output signal.

**NAMUR COMPLIANT FAILURE CURRENT**

The transmitter’s current output is linear between 3.8 to 20.75 mA. But the failsafe current is adjustable between 3.6 to 3.8 mA for a failsafe-low condition, or from 20.75 to 23 mA for a failsafe-high condition. By having the failsafe current different from the out-of-range current, determining whether the transmitter is in a failsafe condition, or just the process temperature is beyond the calibrated range, is quick and easy without the use of a configurator tool.
INSTALLATION ASSISTANT
Let Invensys Foxboro be your Installation Assistant. When you order a transmitter with an integral sensor and thermowell, everything is assembled, tagged, wired, calibrated, and configured to your specifications. Just open the shipping container and install. This feature is ordered by specifying Model Code Package Configuration Code “L” or “M,” along with Option “-D2.” See Figure 3.

REAL WORLD PERFORMANCE
The transmitter nonvolatile memory stores many coefficients to eliminate errors. Every transmitter is factory tested from -40 to +85°C (-40 to +185°F) ambient temperature, and the error coefficients, along with the curves for all sensor types, are stored in the nonvolatile memory. Therefore, the accuracy specification is applicable merely by choosing the sensor type and calibrated range, without the need for any calibration equipment. In addition, the internal cold junction sensor not only compensates for a thermocouple measurement, but its temperature is used to compensate any ambient temperature error, no matter what sensor type is selected.

FAILSAFE MODE
Transmitter failsafe operation is user-configurable as either ON or OFF. The failsafe output is userconfigurable for any value between 3.60 and 3.80 mA (downscale failsafe) or 20.75 and 23.00 mA (upscale failsafe). Every three seconds, the transmitter checks for open or shorted sensor leads and for internal transmitter faults. If two successive faults are reported while failsafe is ON, the transmitter output will default to the configured failsafe value. The transmitter underrange and overrange currents have been set to 3.80 and 20.75 mA, respectively, which are inside the failsafe value. This makes troubleshooting quick and easy because the mA failsafe current will be different than an out-of-range condition.

With HART communication, the transmitter reset mode is also user-configurable. When configured for AUTO reset, the transmitter automatically returns to normal operation after the fault has been eliminated. With LATCHED reset, transmitter power must be turned off, then back on to return to normal operation.

CONFiguration storage
All configurable parameters are stored in nonvolatile EEPROM memory and retained when power is removed from the transmitter. The transmitter is ready for immediate use when repowered.

Configured data from the Intelligent version can also be stored offline in a Hand-Held Terminal Memory Pak, on a floppy disk (using PC-based configurator software), or in an I/A Series system allowing other transmitters to be easily cloned or configured. This data can be factory-customized by ordering Option Code “-C2”. It can also be supplied on a floppy disk by ordering Option Code “-C3”.

INTELLIGENT SMOOTHING
Innovative Intelligent Smoothing automatically eliminates noise while maintaining fast response to rapid input changes. It provides a highly accurate and smooth output signal without the need for excessive damping. A digital filtering algorithm (signal conditioner) is active over a band of input fluctuations. Any noise (process or electrical) is eliminated while the conditioned signal reacts immediately to any input change that exceeds the smoothing band. This allows the transmitter to be used in a wide variety of electrically noisy installations.

When there is a rapid signal change, the smoothing band is immediately exceeded, and the output of the signal conditioner uses this change as the basis for the output signal. As long as the input fluctuates or moves at a rate that is outside the smoothing band, the output instantly tracks the input signal. Once the input settles at a new value, the filtering algorithm is automatically reactivated, eliminating noise and producing an accurate and stable output.
OPERATING, STORAGE, AND TRANSPORTATION CONDITIONS

<table>
<thead>
<tr>
<th>Influence</th>
<th>Reference Operating Conditions</th>
<th>Operative Limits</th>
<th>Storage and Transportation Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient Temperature</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without Integral Display</td>
<td>24 ±2°C (75 ±3°F)</td>
<td>-40 and +85°C (a)</td>
<td>-54 and +85°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-40 and +185°F) (a)</td>
<td>(-65 and +185°F)</td>
</tr>
<tr>
<td>With Integral Display</td>
<td>24 ±2°C (75 ±3°F)</td>
<td>-29 and +70°C (a)</td>
<td>-54 and +85°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-20 and +158°F) (a)</td>
<td>65 and +185°F</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>50 ±10%</td>
<td>0 and 100% (noncondensing)</td>
<td>0 and 100% (noncondensing)</td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>30 ±0.5 V dc</td>
<td>12 and 42 V dc</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Vibration</td>
<td>Negligible</td>
<td>19 mm (0.75 in)</td>
<td>107 mm (42 in) Drop in Shipping Container</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Double Amplitude</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>from 5 to 9 Hz</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 to 30 m/s² (0 to 3 “g”) (b)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>from 9 to 500 Hz</td>
<td></td>
</tr>
</tbody>
</table>

(a) Refer to Electrical Safety Specifications section for a restriction in ambient temperature with certain electrical certifications.
(b) 10 m/s (1g) maximum with Package Configuration Code M, T, or Y.

PERFORMANCE SPECIFICATIONS
(Under Reference Operating Conditions Unless Otherwise Specified)

Accuracy
Refer to Table 1. The accuracy specification is applicable merely by choosing a sensor type and calibrated range without the need for any calibration equipment.

Repeatability and Linearity
Included in accuracy.

Long-Term Stability
DIGITAL OUTPUT:
<0.05% of input reading (mV or Ω) per year
4 to 20 mA OUTPUT:
Digital Stability plus 0.043% of span per year.

Vibration Effect
<0.05% at 30 m/s² (3 g)

Ambient Temperature Effect
Error is less than 1/2 the reference accuracy plus 0.1°C per 28°C (50°F)

Relative Humidity Effect
<0.01% of calibrated span from 0 to 100% RH, noncondensing.

Mounting Position Effect
None

Supply Voltage Effect
DIGITAL OUTPUT: None
4 to 20 mA OUTPUT: ±0.005% per volt

Output Load Effect
DIGITAL OUTPUT: None
4 to 20 mA OUTPUT: ±0.005% per volt

PHYSICAL SPECIFICATIONS

Basic Transmitter (Package Code B)
Enclosed in polycarbonate material

Enclosure Construction
HOUSING (Package Codes S, W, L):
Epoxy-coated, low-copper aluminum
HOUSING (Package Codes T, Y, M):
316 ss (CF-8M/UNS-J92900)
HOUSING COVER O-RING
UV Stabilized Buna-N

Union Coupling for Thermowell Mount
- Zinc-Plated Steel for Foxboro Code “L” housing, or with user-supplied thermowell option “-D5” (Codes “L” or “M” housing). See Model Code.
- Stainless Steel for Foxboro Code “M” housing, or with Option “-H2”. See Model Code.

Environmental Protection
Housing: NEMA 4X, IP66

Mounting Options
<table>
<thead>
<tr>
<th>Option</th>
<th>Code</th>
<th>Bracket</th>
<th>Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting Set</td>
<td>-M1</td>
<td>Epoxy-Coated Steel</td>
<td>Plated Steel</td>
</tr>
<tr>
<td></td>
<td>-M2</td>
<td>Stainless Steel</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>DIN Rail</td>
<td>-D1</td>
<td>Aluminum and Plastic</td>
<td>Plated Steel</td>
</tr>
</tbody>
</table>

Approximate Transmitter Mass
BASIC: 0.13 kg (0.28 lb)
SURFACE MOUNT (Aluminum): 1.47 kg (3.25 lb)
SURFACE MOUNT (316 ss): 3.25 kg (7.25 lb)
WITH 1-LINE INDICATOR: Add 0.02 kg (0.05 lb)
WITH 3-LINE INDICATOR: Add 0.06 kg (0.13 lb)
**FUNCTIONAL SPECIFICATIONS**

**Input Types and Range Limits**
See Table 1 and Table 2.

**Input Impedance (in mV Input Mode)**
>10 MΩ

**Span Limits**
MINIMUM: 5°C (10°F)
MAXIMUM: See Table 1.

**Engineering Units**
The transmitter electronic database can be configured for ohms, mV, mA, °F, °C, K, or Dew Point.

**Output Types**
- 4 to 20 mA
- Smart HART
- Intelligent (4 to 20 mA or FoxCom Digital)

**Output**
RANGING:
Zero and span adjustment are non-interacting.

FAILSAFE (User-Configurable):
- **Downscale**: 3.6 to 3.8 mA
- **Upscale**: 20.75 to 23.0 mA

UNDERRANGE CURRENT: 3.8 mA
OVERRANGE CURRENT: 20.75 mA
ACTION: Direct or Reverse

---

### Table 1. Range Limits, Maximum Span, and Accuracy(a)

<table>
<thead>
<tr>
<th>Input Type</th>
<th>Model Code</th>
<th>See Note</th>
<th>Range Limits</th>
<th>Maximum Span</th>
<th>Digital Accuracy (b,q)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>°C</td>
<td>°F</td>
<td>°C</td>
</tr>
<tr>
<td>RTD (2, 3, or 4 wire)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pt100 DIN/IEC</td>
<td>Q</td>
<td>c</td>
<td>-200 and +850</td>
<td>-328 and +1562</td>
<td>1050</td>
</tr>
<tr>
<td>Pt100 DIN/IEC</td>
<td>A</td>
<td>d</td>
<td>-200 and +850</td>
<td>-328 and +1562</td>
<td>1050</td>
</tr>
<tr>
<td>Pt100 SAM A</td>
<td>P</td>
<td>e</td>
<td>-200 and +650</td>
<td>-328 and +1202</td>
<td>850</td>
</tr>
<tr>
<td>Ni 200</td>
<td>D</td>
<td>f,n</td>
<td>-130 and +315</td>
<td>-202 and +599</td>
<td>445</td>
</tr>
<tr>
<td>Ni 120, Minco</td>
<td>G</td>
<td>n</td>
<td>-80 and +320</td>
<td>-112 and +608</td>
<td>400</td>
</tr>
<tr>
<td>Ni 100</td>
<td>I</td>
<td>g,n</td>
<td>-60 and +250</td>
<td>-76 and +482</td>
<td>310</td>
</tr>
<tr>
<td>Cu 10</td>
<td>F</td>
<td>h,n</td>
<td>-70 and +150</td>
<td>-94 and +302</td>
<td>220</td>
</tr>
<tr>
<td>Thermocouple</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type B</td>
<td>B</td>
<td>k,r</td>
<td>0 and +1820</td>
<td>+32 and +3308</td>
<td>1820</td>
</tr>
<tr>
<td>Type C</td>
<td>C</td>
<td>k,p</td>
<td>0 and +2320</td>
<td>+32 and +4208</td>
<td>2320</td>
</tr>
<tr>
<td>Type E</td>
<td>E</td>
<td>k</td>
<td>-270 and +1000</td>
<td>-454 and +1832</td>
<td>1270</td>
</tr>
<tr>
<td>Type J</td>
<td>J</td>
<td>k</td>
<td>-210 and +1200</td>
<td>-346 and +2129</td>
<td>1410</td>
</tr>
<tr>
<td>Type K</td>
<td>K</td>
<td>k</td>
<td>-270 and +1372</td>
<td>-454 and +2502</td>
<td>1642</td>
</tr>
<tr>
<td>Type L</td>
<td>L</td>
<td>m</td>
<td>-200 and +900</td>
<td>-328 and +1652</td>
<td>1100</td>
</tr>
<tr>
<td>Type N</td>
<td>N</td>
<td>k</td>
<td>-270 and +1300</td>
<td>-454 and +2372</td>
<td>1570</td>
</tr>
<tr>
<td>Type R</td>
<td>R</td>
<td>k</td>
<td>-50 and +1768</td>
<td>-58 and +3214</td>
<td>1818</td>
</tr>
<tr>
<td>Type S</td>
<td>S</td>
<td>k</td>
<td>-50 and +1768</td>
<td>-58 and +3214</td>
<td>1818</td>
</tr>
<tr>
<td>Type T</td>
<td>T</td>
<td>k</td>
<td>-270 and +400</td>
<td>-454 and +752</td>
<td>670</td>
</tr>
<tr>
<td>Type U</td>
<td>U</td>
<td>m</td>
<td>-200 and +600</td>
<td>-328 and -1112</td>
<td>800</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Millivolt</td>
<td>M</td>
<td></td>
<td>-15 and +115 mV dc</td>
<td></td>
<td>130 mV dc</td>
</tr>
<tr>
<td>Resistance</td>
<td>O</td>
<td></td>
<td>1 and 500 Ω</td>
<td></td>
<td>500 Ω</td>
</tr>
<tr>
<td>Dew Point</td>
<td>W</td>
<td>n</td>
<td>-45 and +60°C (-50 and +140°F)</td>
<td>105°C (190°F)</td>
<td>±0.05°C (0.09°F)</td>
</tr>
<tr>
<td>Custom</td>
<td>Z</td>
<td>n</td>
<td>2- to 22-point user-configurable curve</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(a) For 4 to 20 mA output accuracy, add ±0.05% of span to digital accuracy.
(b) Digital accuracy is either the listed value or ±0.01% of span, whichever is greater. For thermocouples only, add the applicable cold junction error to digital accuracy:
   - Integral: ±0.2°C (±0.5°F)
   - Remote: Depends on accuracy of remote sensor.
(c) IEC/DIN 751; alpha = 0.00385 (1984) ASTM-B Standard Accuracy
(d) IEC/DIN 751; alpha = 0.00385 (1984) ASTM-A High Accuracy
(e) SAMA Standard RC 21-4; alpha = 0.003923.
(f) Foxboro NR 226/227. Refer to TI 005-24a.
(g) DIN 43760.
(h) Foxboro CR 228/229. Refer to TI 005-25a.
(k) NIST Monogram 125, DIN IEC 584.
(l) Not accessible with optional LCD Indicator/Configurator.
(m) DIN 43710 (1985).
(n) May exhibit a decrease in performance at temperatures below 43°C (109°F).
FUNCTIONAL SPECIFICATIONS (Cont.)

Table 2. Input Types

<table>
<thead>
<tr>
<th>Single Sensor Type</th>
<th>Analog, 4 to 20 mA Output Code “-I”</th>
<th>Intelligent FoxCom Output Code “-D”</th>
<th>HART Output Code “-T”</th>
</tr>
</thead>
<tbody>
<tr>
<td>T/C Type B, C, E, J, K, L, N, R, S, T, U</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>RTD (2, 3, or 4 wire) 100 ohm DIN or SAMA</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>RTD (2, 3, or 4 wire) 100, 120, or 200 ohm nickel</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>RTD (2, 3, or 4 wire) 10 ohm copper</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Millivolt</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Ohms (2, 3, or 4 wire)</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Dew Point</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>2 to 22 Point Custom Curve</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

Input Response Time
With minimum damping, the 90% response time for an 80% input step is 1.2 seconds.

Isolation
500 V ac, rms

RFI Protection
Susceptibility radiated
- IN METAL HOUSING
  30 V/m Peak; 26-1000 MHz; 80% A @ 1k Hz
  30 V/m Peak; 900 MHz; 50% duty cycle; 200 Hz repetition rate
- BASIC TRANSMITTER
  10 V/m Peak; 26-1000 MHz; 80% A @ 1k Hz
  10 V/m Peak; 900 MHz; 50% duty cycle; 200 Hz repetition rate

Two-Wire Transmitter
The same two wires are used for input power, output signal, and remote communication.

Turn On Time
TWO-WIRE SENSOR: 3.5 seconds
THREE- AND FOUR-WIRE SENSORS: 7 seconds

Minimum Power Supply Current
35 mA

Electronic Damping
4 to 20 mA VERSION:
  1.2 seconds
INTELLIGENT VERSION:
  Damping is configurable to settings of 0.25, 0.50, 1, 2, 4, 8, 16, and 32 seconds.
HART VERSION:
  Damping is set as a floating decimal point value between 0 and 32 seconds.

Tagging - Hardware and Software
The permanently embossed stainless steel data plate and the transmitter electronic tag number are factory configured, at no charge, using the customer supplied tagging information.

Supply Voltage Requirements and External Loop Load Limitations (Figure 4)

NOTE (See Figure 4)
1. Minimum load with HART communicator or PC-Based Configurator connected is 250 Ω
2. Connecting PC-based Configurator or HART Communicator while operating below the minimum specified load may cause communication problems.

Output Update Rate
4 to 20 mA: 6 times per second (all output versions)
HART DIGITAL: 2 times per second
FoxCom DIGITAL: 10 times per second
FUNCTIONAL SPECIFICATIONS (Cont.)

Configurators
4 TO 20 mA VERSION CODE -I:
All configurable parameters can only be changed using the optional one-line or three-line indicator/configurators (Option Code -L1 or -L3).

INTELLIGENT VERSION CODE -D:
All parameters are configurable via a PC-based Configurator, or any I/A Series Workstation. The integral indicator/configurator (Option -L3) can also be used to reconfigure the common parameters. Refer to MI 020-461 for details on the optional indicator/configurators.

HART VERSION CODE -T:
All parameters are configurable via the HART Communicator or the Foxboro PC-Based Configurator. The integral indicator/configurators (Option -L3) can also be used to reconfigure the common parameters. Refer to MI 020-461 for details on the optional indicator/configurator.

Configurable Parameters (by the User) (Cont.)

DESCRIPTORS
- Tag Number
- Tag Name
- Location
- Device Name
- Message

OUTPUT
- Output Type
- Engineering Units (EGU)(1)
- Burst Mode (HART Only)
- Linearization Mode

INTEGRAL LCD INDICATOR/CONFIGURATOR
- Pushbuttons (Enable/Disable)
- Language(1)
- Output Display Units (EGU, %, mA, Alternating EGU/mA, or Alternating %/mA)

RTT20 Transmitter Functional Block Diagram
Refer to Figure 5.

(1) Accessible with the Optional LCD Indicator/Configurator.
ELECTRICAL SAFETY SPECIFICATIONS

<table>
<thead>
<tr>
<th>Testing Laboratory, Type of Protection, and Area Classification</th>
<th>With Package Config. Codes</th>
<th>Application Conditions</th>
<th>Electrical Safety Design Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATEX (FM) flameproof, II 1/2 G, Ex d, IIC.</td>
<td>S, T, L, M</td>
<td>Temperature Class T6. Ta = -40 to +70°C</td>
<td>ED</td>
</tr>
<tr>
<td>ATEX (FM) flameproof, II 2 G, Ex d, IIC.</td>
<td>W, Y</td>
<td>Temperature Class T6. Ta = -40 to +70°C</td>
<td></td>
</tr>
<tr>
<td>ATEX (FM) flameproof, II 2 D.</td>
<td>S, T, L, M, W, Y</td>
<td>T85°C, Ta = 70°C maximum ambient.</td>
<td></td>
</tr>
<tr>
<td>CENELEC (KEMA) intrinsically safe</td>
<td>All</td>
<td>Temperature Class T4 - T6.</td>
<td>EA</td>
</tr>
<tr>
<td>CENELEC (KEMA) Nonsparking/nonincendive, Ex N IIC</td>
<td>All</td>
<td>Temperature Class T4 - T6.</td>
<td></td>
</tr>
<tr>
<td>CSA intrinsically safe, Class I, Division 1, Groups A, B, C, and D.</td>
<td>B</td>
<td>Temperature Class T4 at 85°C and T6 at 40°C maximum ambient.</td>
<td></td>
</tr>
<tr>
<td>CSA intrinsically safe, Class I, Division 1, Groups A, B, C, and D; dust-ignitionproof, Class II, Division 1, Groups E, F, and G; and Class III, Division 1.</td>
<td>S, T, L, M, W, Y</td>
<td>Temperature Class T4 at 85°C and T6 at 40°C maximum ambient.</td>
<td>CA</td>
</tr>
<tr>
<td>CSA Class I, Division 2, Groups A, B, C, and D.</td>
<td></td>
<td>Temperature Class T4 at 85°C and T6 at 40°C maximum ambient.</td>
<td></td>
</tr>
<tr>
<td>CSA explosionproof, Class I, Division 1, Groups B, C, and D; dust-ignitionproof, Class II, Division 1, Groups E, F, and G; and Class III, Division 1.</td>
<td>S, T, L, M, W, Y</td>
<td>Connect to source not exceeding 42 V.</td>
<td>CD (a)</td>
</tr>
<tr>
<td>CSA Class I, Division 2, Groups A, B, C, and D.</td>
<td></td>
<td>Temperature Class T4 at 85°C and T6 at 40°C maximum ambient.</td>
<td></td>
</tr>
<tr>
<td>CSA Class I, Division 2, Groups A, B, C, and D.</td>
<td>All</td>
<td>Temperature Class T4 at 85°C and T6 at 40°C maximum ambient.</td>
<td>CN</td>
</tr>
<tr>
<td>FM intrinsically safe, Class I, Division 1, Groups A, B, C, and D.</td>
<td>B</td>
<td>Temperature Class T6; T4 at 85°C maximum ambient.</td>
<td></td>
</tr>
<tr>
<td>FM intrinsically safe, Class I, Division 1, Groups A, B, C, and D; dust-ignitionproof, Class II, Division 1, Groups E, F, and G; and Class III, Division 1.</td>
<td>S, T, L, M, W, Y</td>
<td>Temperature Class T6; T4 at 85°C maximum ambient.</td>
<td>FA</td>
</tr>
<tr>
<td>FM nonincendive, Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G; and Class III, Division 2.</td>
<td></td>
<td>Temperature Class T4 at 85°C and T6 at 40°C maximum ambient.</td>
<td></td>
</tr>
<tr>
<td>FM explosionproof, Class I, Division 1, Groups B, C, and D; dust-ignitionproof, Class II, Division 1, Groups E, F, and G; and Class III, Division 1.</td>
<td>S, T, L, M, W, Y</td>
<td>Temperature Class T4 at 85°C and T6 at 40°C maximum ambient.</td>
<td>FD (a)</td>
</tr>
<tr>
<td>FM nonincendive, Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G; and Class III, Division 2.</td>
<td>B</td>
<td>Temperature Class T4 at 85°C and T6 at 40°C maximum ambient.</td>
<td>FN</td>
</tr>
<tr>
<td>FM nonincendive, Class I, Division 2, Groups A, B, C, and D.</td>
<td>S, T, L, M, W, Y</td>
<td>Temperature Class T4 at 85°C and T6 at 40°C maximum ambient.</td>
<td></td>
</tr>
<tr>
<td>IECEx flameproof, Ex d IIC.</td>
<td>S, T, L, M, W, Y</td>
<td>Temperature Class T6 at 70°C.</td>
<td>VV</td>
</tr>
</tbody>
</table>

(a) FM approval and CSA certification of the Model RTT20 for the explosionproof rating listed above included pressure piling tests with various lengths of conduit to ensure that conduit seals per NEC 501-5(a)1 within 457 mm (18 inches) of the housing are not required.
## MODEL CODES

Model Code - Basic Unit Transmitter - Remote Sensors not provided with these Transmitters

<table>
<thead>
<tr>
<th>Description</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/A Series Intelligent Temperature Transmitter</td>
<td>RTT20</td>
</tr>
</tbody>
</table>

### Output Signal and Communication Protocol

- 4 to 20 mA only; no Remote Communication (a) –I
- 4 to 20 mA or FoxCom Digital Communication (b) –D
- 4 to 20 mA with HART Communication (c) –T

### Input Configuration

Single Input Channel 1

### Package Configuration and Housing Material (Remote Mounted Sensor)

- Basic Unit (used for Panel Mount, DIN Rail, or Replacement) B

### Sensor Length

None (Not Applicable to Transmitters with Remote Mounted Sensors) N

### Measurement Input Type (Software Selectable)

- None - Specified Factory Default to Code Q
- Thermocouple, Type B, Platinum - 30% Rhodium vs. Platinum - 6% Rhodium B
- Thermocouple, Type C, Tungsten - 5% Rhenium vs. Tungsten - 26% Rhenium C
- Thermocouple, Type E, Nickel-Chromium vs. Copper-Nickel (Chromel-Constantan) E
- Thermocouple, Type J, Iron vs. Copper-Nickel (Iron-Constantan) J
- Thermocouple, Type K, Nickel-Chromium vs. Nickel-Aluminum (Chromel-Alumel) K
- Thermocouple, Type L, Iron vs. Copper-Nickel L
- Thermocouple, Type N, Nicrosil vs. Nisil (Nicrosil-Nisil) N
- Thermocouple, Type R, Platinum - 13% Rhodium vs. Platinum R
- Thermocouple, Type S, Platinum - 10% Rhodium vs. Platinum S
- Thermocouple, Type T, Copper vs. Copper-Nickel (Copper-Constantan) T
- Thermocouple, Type U, Copper vs. Copper-Low Nickel U
- RTD, Platinum, DIN, 100 Ω IEC 751 (ASTM-B Standard Accuracy) Q
- RTD, Platinum, DIN, 100 Ω IEC 751 (ASTM-A High Accuracy) A
- RTD, Platinum, 100 Ω SAMA P
- RTD, Nickel, 200 Ω Foxboro NR 226/227 D
- RTD, Nickel, 120 Ω Minco G
- RTD, Nickel, 100 Ω DIN 43760 I
- RTD, Copper, 10 Ω Foxboro CR 228/229 F

- Millivolt Input M
- Ohms Input O
- Dew Point Input W
- Custom Input Z

### Electrical Safety (Also see “Electrical Safety Specifications” section for further details)

- CSA, Intrinsically Safe CA
- CSA, Division 2 CN
- CENELEC (KEMA) Intrinsically Safe EA
- FM, Intrinsically Safe and nonincendive FA
- FM, Nonincendive FN
- CENELEC (KEMA) nonsparking/nonincendive KN

### Optional Selections

Refer to “Optional Selections” Codes further in document

(a) With Output Code “-I”, transmitter adjustment and output reconfiguration is possible only via an LCD Indicator/Configurator (Optional Selection “-L3”) which is easily transportable between transmitters. Remote communication is not available.

(b) Remote configuration with Foxboro PC-based Configurator or I/A Series system.

(c) Remote configuration with HART Communicator, Foxboro PC-based Configurator, and/or Foxboro ABO991 software.
# MODEL CODES (Cont.)

## Model Code - Surface or Pipe Mount Transmitter - Remote Sensors not provided with these Transmitters

<table>
<thead>
<tr>
<th>Description</th>
<th>Model Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/A Series Intelligent Temperature Transmitter</td>
<td>RTT20</td>
</tr>
</tbody>
</table>

### Output Signal and Communication Protocol
- 4 to 20 mA only; no Remote Communication (a) –I
- 4 to 20 mA or FoxCom Digital Communication (b) –D
- 4 to 20 mA with HART Communication (c) –T

### Input Configuration
- Single Input Channel 1

### Package Configuration and Housing Material (Remote Mounted Sensor)
- Surface or Pipe Mount, Aluminum Housing with 1/2 NPT Conduit Thread (Explosionproof) S
- Surface or Pipe Mount, 316 ss Housing with 1/2 NPT Conduit Thread (Explosionproof) T

### Sensor Length
- None (Not Applicable to Transmitters with Remote Mounted Sensors) N

### Measurement Input Type (Software Selectable)
- None - Specified Factory Default to Code Q X
- Thermocouple, Type B, Platinum - 30% Rhodium vs. Platinum - 6% Rhodium B C
- Thermocouple, Type C, Tungsten - 5% Rhenium vs. Tungsten - 26% Rhenium C E
- Thermocouple, Type E, Nickel-Chromium vs. Copper-Nickel (Chromel-Constantan) E J
- Thermocouple, Type J, Iron vs. Copper-Nickel (Iron-Constantan) J K
- Thermocouple, Type K, Nickel-Chromium vs. Nickel-Aluminum (Chromel-Alumel) K L
- Thermocouple, Type L, Iron vs. Copper-Nickel L N
- Thermocouple, Type N, Nicrosil vs. Nisil (Nicrosil-Nisil) N R
- Thermocouple, Type R, Platinum - 13% Rhodium vs. Platinum R S
- Thermocouple, Type S, Platinum - 10% Rhodium vs. Platinum S T
- Thermocouple, Type T, Copper vs. Copper-Nickel (Copper-Constantan) T U
- RTD, Platinum, DIN, 100 Ω IEC 751 (ASTM-B Standard Accuracy) Q A
- RTD, Platinum, DIN, 100 Ω IEC 751 (ASTM-A High Accuracy) A P
- RTD, Platinum, 100 Ω SAMA P D
- RTD, Nickel, 200 Ω Foxboro NR 226/227 G I
- RTD, Nickel, 120 Ω Minco I F
- RTD, Nickel, 100 Ω DIN 43760 I F
- RTD, Copper, 10 Ω Foxboro CR 228/229 I F
- Millivolt Input M
- Ohms Input O
- Dew Point Input W
- Custom Input Z

### Electrical Safety (Also see “Electrical Safety Specifications” section for further details)
- CSA, Intrinsically Safe CA
- CSA, Explosionproof CD
- CSA, Division 2 CN
- CENELEC (KEMA) Intrinsically Safe EA
- ATEX, flameproof ED
- FM, Intrinsically Safe and nonincendive FA
- FM, Explosionproof FD
- FM, Nonincendive FN
- CENELEC (KEMA) nonsparking/nonincendive KN
- IECEx flameproof, Ex D IIC VV

### Optional Selections
Refer to “Optional Selections” Codes further in document

(a) With Output Code “-I”, transmitter adjustment and output reconfiguration is possible only via an LCD Indicator/Configurator (Optional Selection “-L3”) which is easily transportable between transmitters. Remote communication is not available.
(b) Remote configuration with Foxboro PC-based Configurator or I/A Series system.
(c) Remote configuration with HART Communicator, Foxboro PC-based Configurator, and/or Foxboro ABO991 software.
MODEL CODES (Cont.)

Model Code - Transmitter with Integrally Mounted Bare Sensor

<table>
<thead>
<tr>
<th>Description</th>
<th>Model Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/A Series Intelligent Temperature Transmitter</td>
<td>RTT20</td>
</tr>
</tbody>
</table>

**Output Signal and Communication Protocol (a)**

- 4 to 20 mA only; no Remote Communication (a)
  - Code: –I
- 4 to 20 mA or FoxCom Digital Communication (b)
  - Code: –D
- 4 to 20 mA with HART Communication (c)
  - Code: –T

**Input Configuration**

Single Input Channel

**Package Configuration and Housing Material (Integrally Mounted Bare Sensor)**

<table>
<thead>
<tr>
<th>Sensor Length</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 in (50 mm)</td>
<td>Bare Sensor Mounted to Aluminum Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>2.5 in (64 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>3 in (76 mm)</td>
<td>Bare Sensor Mounted to Aluminum Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>3.5 in (89 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>4 in (102 mm)</td>
<td>Bare Sensor Mounted to Aluminum Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>4.5 in (114 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>5 in (127 mm)</td>
<td>Bare Sensor Mounted to Aluminum Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>5.5 in (140 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>6 in (152 mm)</td>
<td>Bare Sensor Mounted to Aluminum Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>7 in (178 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>8 in (203 mm)</td>
<td>Bare Sensor Mounted to Aluminum Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>9 in (229 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>10 in (254 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>11 in (279 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>12 in (305 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>13 in (330 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>14 in (355 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>15 in (381 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>16 in (406 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>17 in (432 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>18 in (457 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>19 in (483 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>20 in (508 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>21 in (533 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>22 in (559 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>23 in (584 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>24 in (609 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>25 in (635 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>26 in (660 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>27 in (686 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>28 in (711 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>29 in (736 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>30 in (762 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>31 in (787 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>32 in (813 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>33 in (838 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>34 in (864 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>35 in (889 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>36 in (914 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>37 in (935 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>38 in (961 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>39 in (986 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
<tr>
<td>40 in (1016 mm)</td>
<td>Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)</td>
</tr>
</tbody>
</table>

**Measurement Input Type (Software Selectable)**

- Thermocouple, Type E
  - Code: E
- Thermocouple, Type J
  - Code: J
- Thermocouple, Type K
  - Code: K
- Thermocouple, Type T
  - Code: T
- RTD, Platinum, DIN, 100 Ω IEC 751 (ASTM-B Standard Accuracy)
  - Code: Q
- RTD, Platinum, DIN, 100 Ω IEC 751 (ASTM-A High Accuracy)
  - Code: A
- RTD, Platinum, 100 Ω SAMA
  - Code: P

**Electrical Safety (Also see “Electrical Safety Specifications” Section for further details)**

- CSA, Intrinsically Safe
  - Code: CA
- CSA, Explosionproof
  - Code: CD
- CSA, Division 2
  - Code: CN
- CENELEC (KEMA) Intrinsically Safe
  - Code: EA
- ATEX, flameproof
  - Code: ED
- FM, Intrinsically Safe, ia
  - Code: FA
- FM, Explosionproof, d
  - Code: FD
- FM, Nonincendive, n
  - Code: FN
- CENELEC (KEMA) nonsparking/nonincendive
  - Code: KN
- IECEx flameproof, Ex d IIC
  - Code: VV

**Optional Selections**

Refer to “Optional Selection” Codes further in document

(a) With Output Code “–I”, transmitter adjustment and output reconfiguration is possible only via an LCD Indicator/Configurator (Optional Selection “–L3”) which is easily transportable between transmitters. Remote communication is not available.

(b) Remote configuration with Foxboro PC-based Configurator or I/A Series system.

(c) Remote configuration with HART Communicator, Foxboro PC-based Configurator, and/or Foxboro ABO991 software.
### Model Code - Transmitter with Thermowell Mount - Integrally Mounted Sensors

<table>
<thead>
<tr>
<th>Description</th>
<th>Model Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/A Series Intelligent Temperature Transmitter</td>
<td>RTT20</td>
</tr>
</tbody>
</table>

#### Output Signal and Communication Protocol (a)

- 4 to 20 mA only; no Remote Communication (a) -I
- 4 to 20 mA or FoxCom Digital Communication (b) -D
- 4 to 20 mA with HART Communication (c) -T

#### Input Configuration

- Single Input Channel 1

#### Package Configuration and Housing Material (Integrally Mounted Sensor in Thermowell)

- Thermowell Mounted to Aluminum Housing; 1/2 NPT Conduit Threads (Explosionproof) L
- Thermowell Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof) M

#### Sensor Length

<table>
<thead>
<tr>
<th>Length</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 in (50 mm)</td>
<td>A</td>
</tr>
<tr>
<td>2.5 in (64 mm)</td>
<td>B</td>
</tr>
<tr>
<td>3 in (76 mm)</td>
<td>C</td>
</tr>
<tr>
<td>3.5 in (89 mm)</td>
<td>D</td>
</tr>
<tr>
<td>4 in (102 mm)</td>
<td>E</td>
</tr>
<tr>
<td>4.5 in (114 mm)</td>
<td>F</td>
</tr>
<tr>
<td>5 in (127 mm)</td>
<td>G</td>
</tr>
<tr>
<td>5.5 in (140 mm)</td>
<td>H</td>
</tr>
<tr>
<td>6 in (152 mm)</td>
<td>J</td>
</tr>
<tr>
<td>7 in (178 mm)</td>
<td>K</td>
</tr>
<tr>
<td>8 in (203 mm)</td>
<td>L</td>
</tr>
<tr>
<td>9 in (229 mm)</td>
<td>M</td>
</tr>
<tr>
<td>10 in (254 mm)</td>
<td>P</td>
</tr>
<tr>
<td>11 in (279 mm)</td>
<td>Q</td>
</tr>
<tr>
<td>12 in (305 mm)</td>
<td>R</td>
</tr>
<tr>
<td>18 in (457 mm)</td>
<td>S</td>
</tr>
<tr>
<td>24 in (610 mm)</td>
<td>T</td>
</tr>
<tr>
<td>30 in (762 mm)</td>
<td>U</td>
</tr>
<tr>
<td>36 in (914 mm)</td>
<td>V</td>
</tr>
<tr>
<td>Custom Length per Sales Order – 120 in (3 m) maximum</td>
<td>X</td>
</tr>
</tbody>
</table>

#### Measurement Input Type (Software Selectable)

- Thermocouple, Type E E
- Thermocouple, Type J J
- Thermocouple, Type K K
- Thermocouple, Type T T
- RTD, Platinum, DIN, 100 Ω IEC 751 (ASTM-B Standard Accuracy) Q
- RTD, Platinum, DIN, 100 Ω IEC 751 (ASTM-A High Accuracy) A
- RTD, Platinum, 100 Ω SAMA P

#### Electrical Safety (Also see “Electrical Safety Specifications” Section for further details)

- CSA, Intrinsically Safe CA
- CSA, Explosionproof (d) CD
- CSA, Division 2 CN
- CENELEC (KEMA) Intrinsically Safe EA
- ATEX, flameproof (d) ED
- FM, Intrinsically Safe, ia FA
- FM, Explosionproof, d (d) FD
- FM, Nonincendive, n FN
- CENELEC (KEMA) nonsparking/nonincendive KN
- IECEx flameproof, Ex d IIC (d) VV

#### Optional Selections

Refer to “Optional Selection” Codes further in document

---

((a) With Output Code “-I”, transmitter adjustment and output reconfiguration is possible only via an LCD Indicator/Configurator (Optional Selection “-L3”) which is easily transportable between transmitters. Remote communication is not available.

(b) Remote configuration with Foxboro PC-based Configurator or I/A Series system.

(c) Remote configuration with HART Communicator, Foxboro PC-based Configurator, and/or Foxboro ABO991 software.

(d) Must have Options -D2 with all explosionproof and flameproof approvals/certifications.)
### Optional Selection Codes

<table>
<thead>
<tr>
<th>Option Description</th>
<th>Used with Package Configuration Code:</th>
<th>Option Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Custody Transfer Lock and Seal</td>
<td>B Yes S Yes T Yes W Yes Y Yes L Yes M Yes</td>
<td>-A1</td>
</tr>
<tr>
<td>Metric Conduit Adapter (1/2 NPT to M20) (b)</td>
<td>B Yes S Yes T – W – Y – L – M –</td>
<td>-A3</td>
</tr>
<tr>
<td>Configured for FoxCom Digital (c)</td>
<td>B Yes S Yes T Yes W Yes Y Yes L Yes M Yes</td>
<td>-C1</td>
</tr>
<tr>
<td>Custom Database Configuration</td>
<td>B Yes S Yes T Yes W Yes Y Yes L Yes M Yes</td>
<td>-C2</td>
</tr>
<tr>
<td>DIN Rail Mounting Hardware (d)</td>
<td>B Yes S – T – W – Y – L – M –</td>
<td>-D1</td>
</tr>
<tr>
<td>Retrofit Kit - Adapts RTT20 to older Transmitters (f)</td>
<td>B Yes S – T – W – Y – L – M –</td>
<td>-D3</td>
</tr>
<tr>
<td>Thermowell, 3/4 NPT (Foxboro Std.); Supplied by User (g)</td>
<td>B – S – T – W – Y – L – M –</td>
<td>-D4</td>
</tr>
<tr>
<td>Delete Instruction Book</td>
<td>B Yes S Yes T Yes W Yes Y Yes L Yes M Yes</td>
<td>-K1</td>
</tr>
<tr>
<td>Three-Line LCD Indicator/Configurator</td>
<td>B Yes S Yes T Yes W Yes Y Yes L Yes M Yes</td>
<td>-L3</td>
</tr>
<tr>
<td>Mounting Set, Epoxy-Coated Steel</td>
<td>B – S Yes T – W – Y – L – M –</td>
<td>-M1</td>
</tr>
<tr>
<td>Inconel Sheath on RTDs or TCs</td>
<td>B – S – T Yes W Yes Y Yes L Yes M Yes</td>
<td>-S1</td>
</tr>
<tr>
<td>Dual Element Sensor (j)</td>
<td>B – S – T Yes W Yes Y Yes L Yes M Yes</td>
<td>-S2</td>
</tr>
<tr>
<td>4-Wire RTD Sensor</td>
<td>B – S – T Yes W Yes Y Yes L Yes M Yes</td>
<td>-S4</td>
</tr>
<tr>
<td>Examples: RTT20-D1SNJFA-A1C1C2M1; RTT20-T1WLPCA-A1S1S4; RTT20-D1LPEFD-C1C3D2S2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(a) PG 13.5 Conduit Thread not available with Option “-A3”.
(b) Not available with Electrical Safety Codes CD or FD. Also not available with Option “-A2”.
(c) Available with Output Code “-D” only. Transmitter digital output to be connected to FBM18, 39, 43, or 44.
(d) Hardware only; DIN rail is provided by user.
(e) Required selection with Electrical Safety Codes CD or FD when Package Code L or M is used.
(f) The optional “-D3” retrofit kit provides an adapter plate and hardware to substitute an RTT20 into installations currently using an older type RTT10, 893, E93, and E94 Temperature Transmitter.
(g) Not available with Electrical Safety Codes CD or FD.
(h) For mounting transmitter to surface, or DN 50 or 2-in pipe.
(j) Two 2-wire RTDs in one sheath. Available with Output Codes “-D” and “-T” only, and with Sensor Input Types “Q” and “P”.

**NOTE**

For further information relating to options, accessories, and services available with the RTT20 Temperature Transmitter, refer to PSS 2A-1Z9 F.
SUGGESTED RFQ SPECIFICATIONS

The manufacturer shall provide a microprocessor-based temperature transmitter with 4 to 20 mA or digital output which is linear to the measured temperature as follows:

Electronics: Sealed Against Moisture
Sensors: All Popular RTDs and Thermocouples
Self Calibration: Automatic with No Prompt Required
Span Rangeability: At Least 200:1
Enclosure: Suitable for Remote or Integral Sensor Mounting (NEMA 4X and IP66)
Electrical Classification: Intrinsically Safe or Explosionproof
Communications: Must Not Interfere with Output
Configurators: Integral and Remote Required
LCD Indicator: Must Display Faults and Tag Number, and have Configuration Pushbuttons
Accuracy: 0.1°C for a 100 W Pt RTD at 0 to 100°C Span
Model Code: Foxboro Model RTT20, or Equivalent

ALTERNATE SUGGESTED RFQ SPECIFICATIONS

The vendor shall furnish the following instrument for sensing temperature and transmitting a 4 to 20 mA or digital output signal. The instrument shall measure a temperature of ____ to ____°C using a thermocouple or RTD. Range is to be fully adjustable with span rangeability of at least 200:1 for each sensor. The transmitter shall be microprocessor-based with automatic self-calibration to virtually eliminate drift and ambient temperature errors. All diagnostic messages must be automatic and transmitted to a local display or remote configurators.

The transmitter housing should be suitable for integral or remote mounting of the sensor and shall be approved for use in hazardous locations (intrinsically safe and/or explosionproof). The basic transmitter shall be sealed and protected against moisture and other contaminants. The transmitter shall be a Foxboro I/A Series Temperature Transmitter, Model RTT20, or approved equivalent.
NOTE: For additional details, refer to Dimensional Print (DP 020-460).

BASIC UNIT - PACKAGE CONFIGURATION CODE "B"

WITHOUT INDICATOR

CONNECTION CLIPS FOR
REMOTE CONFIGURATORS
(OUTPUT CODES -T AND
-D ONLY)

BASIC UNIT
WITHOUT INDICATOR

BASIC UNIT
WITH 3-LINE INDICATOR

BASIC UNIT WITH DIN MOUNTING HARDWARE

DIN RAIL
(BY USER)

SHOWN WITH PLUG-IN
INDICATOR/CONFIGURATOR
DIMENSIONS – NOMINAL

SURFACE OR PIPE MOUNT TRANSMITTER WITH REMOTE SENSOR (PACKAGE CODE "S OR T")

<table>
<thead>
<tr>
<th>HOUSING MATERIAL</th>
<th>DIMENSION X (NOTE 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WITHOUT INDICATOR</td>
</tr>
<tr>
<td>316 ss</td>
<td>87</td>
</tr>
<tr>
<td>ALUMINUM</td>
<td>87</td>
</tr>
</tbody>
</table>

NOTES
1. ALLOW 51 mm (2 in) CLEARANCE FOR COVER REMOVAL.
2. EXTERNAL COVER LOCK AND GROUND SCREW LOCATION, WHEN APPLICABLE.

TRANSMITTER WITH INTEGRAL SENSOR (PACKAGE CODE "L, M, W, OR Y")

NOTE:
A = ELEMENT INSERTION LENGTH
U = THERMOWELL INSERTION LENGTH
T = THERMOWELL LAGGING LENGTH
ORDERING INSTRUCTIONS

1. Model Number
2. Calibrated Range
3. Thermowell Part Number or Model, if required.  
   (See PSS 3-3C1 A for W-Series Wells, and  
   PSS 3-3D1 A for T-Series Wells)
4. Remote Configurator, if required  
   – Foxboro PC-Based Configurator (FoxCom)  
   – I/A Series System (FoxCom)  
   – HART Communicator  
   – Foxboro ABO991 Software (HART)
5. Tag Information

OTHER M&I PRODUCTS

Invensys Foxboro provides a broad range of measurement and instrument products, including solutions for pressure, flow, analytical, positioners, temperature, controlling and recording. For a listing of these offerings, visit the Invensys Foxboro web site at:

www.foxboro.com/instrumentation