Rosemount 3144P Temperature Transmitter

- Sensor Drift Alert and Hot Backup® features improve measurement reliability while the Transmitter-Sensor Matching feature improves temperature measurement accuracy.
- Communicates using either 4-20 mA/HART® or FOUNDATION™ fieldbus protocol
- The integral LCD Display (optional) conveniently displays sensor values and transmitter diagnostics information.
- Capable of single-sensor and dual-sensor inputs. Differential and average temperature measurement increases system flexibility.
- Dual-compartment housing provides the highest reliability in harsh industrial environments.
- Safety certified to IEC 61508 by TÜViT

Content
The Ultimate Temperature Transmitter for Critical Control and Safety Applications . . . . . page 2
Specifications
- HART and FOUNDATION Fieldbus Specifications ........................................ page 3
- HART / 4-20 mA Specifications ................................................................. page 6
- FOUNDATION Fieldbus Specifications ......................................................... page 7
Product Certifications ................................................................. page 8
Dimensional Drawings ................................................................. page 12
Ordering Information ................................................................. page 16
Configuration Data Sheet
- HART / 4-20 mA Transmitter ................................................................. page 20
- FOUNDATION Fieldbus Transmitter ......................................................... page 22

www.rosemount.com
The Ultimate Temperature Transmitter for Critical Control and Safety Applications

The Rosemount 3144P Temperature Transmitter provides superior accuracy, stability, and reliability – making it the industry-leading temperature transmitter used in critical control and safety applications. The 3144P can be ordered with either 4–20 mA/HART or a completely digital FOUNDATION fieldbus protocol. It has the capability to accept either single-sensor or dual-sensor inputs. This dual-sensor input capability allows the transmitter to accept simultaneous input from two independent sensors, enabling measurement of differential temperatures, averaging temperature, or redundant temperature measurement. The transmitter can be configured for a variety of sensor inputs: RTD, thermocouple, millivolt, or ohm. The 3144P (HART) is approved for use in Safety Instrumented Systems (third party validated metrics are available for the 3144P. Testing done per IEC 61508 for Safety Instrumented Systems).

Best in Class Accuracy and Reliability
The transmitter provides industry-leading five-year stability, which reduces maintenance costs. The Transmitter-Sensor Matching feature eliminates interchangeability error, which improves accuracy by 75%. Sensor Drift Alert enables continuous monitoring of the differential temperature for two sensors. When one sensor drifts, the differential of the sensors will increase. If this difference exceeds defined limits, the user is alerted of an unreliable measurement. The Hot Backup feature can reduce the risk of losing important temperature measurements by 80% when the measurement automatically switches to the backup sensor if the primary sensor fails.

Reliable Transmitter Performance
Meeting the NAMUR NE 21 recommendations, the 3144P ensures top transmitter performance in harsh EMC environments. In addition, the 3144P HART transmitter meets NAMUR NE 43 and NE 89 recommendations.

FOUNDATION Fieldbus and HART Protocols
High performance and advanced diagnostics are available with HART or FOUNDATION fieldbus communication. These transmitters offer diagnostics that provide continuous measurement status (good, bad, or uncertain), as well as sensor failure indication. Both transmitters provide performance information to AMS.

Integral LCD Display
Local indication of temperature measurement and diagnostics provides immediate and accurate verification of process conditions.

Measurement Flexibility
The 3144P is capable of single-sensor or dual-sensor input. This also allows for configuration of differential or average temperature measurements.

Designed for Harsh Environments
The 3144P is designed with a dual-compartment housing that provides the highest reliability in harsh environments. The dual-compartment housing provides isolation between the electronics and terminal compartments. The large terminal block allows for easier wire installation. Enhanced EMI rejection and filtering result in unmatched stability in process measurement.

Certified for use in SIS Applications
The 3144P is certified by TÜViT to IEC61508 for non-redundant use in SIL 1 and 2 Safety Instrumented Systems and redundant use in SIL 3 Safety Instrumented Systems. In allowable installations, the 3144P HART electronics can be upgraded to safety certified electronics.

Advanced Temperature Diagnostics
The advanced 3144P powers PlantWeb® by communicating important temperature diagnostics and PlantWeb alerts to ensure process health and enable multi-sensor architecture.

Rosemount Temperature Solutions

Rosemount 644 Temperature Transmitter
Head mount styles available with HART or FOUNDATION fieldbus protocol. Rail mount style available for HART protocol.

Rosemount 848T Eight Input Temperature Transmitter
Eight input transmitter available with FOUNDATION fieldbus protocol.

Rosemount 3420 Fieldbus Interface Module
Provides an interface between FOUNDATION fieldbus instruments and systems without fieldbus capability using standard interface protocols.

Rosemount 248 Temperature Transmitter
Head mount style (DIN B) and Rail mount style with HART protocol and complete temperature assembly.

Rosemount sensors, thermowells, and extensions
Rosemount has a broad offering of RTD and thermocouples that are designed to meet plant requirements.

Rosemount 144 Temperature Transmitter
Head mount style (DIN B) PC-programmable transmitter
Specifications

**HART® AND FOUNDATION™ FIELDBUS**

**Functional**

**Inputs**
User-selectable. See “Accuracy” on page 4 for sensor options.

**Output**
2-wire device with either 4–20 mA/HART, linear with temperature or input, or completely digital output with FOUNDATION fieldbus communication (ITK 4.6 compliant).

**Isolation**
Input/output isolation tested up to 500 V ac (707 V dc) at 50/60 Hz.

**Humidity Limits**
0–100% relative humidity.

**Update Time**
Approximately 0.5 seconds for a single sensor (1 second for dual sensors).

**Physical**

**Conduit Connections**
The standard field mount housing has ½–14 NPT conduit entries. Additional conduit entry type are available, including PG13.5 (PG11), M20 x 1.5 (CM20), or JIS G ½. When any of these additional entry types are ordered, adapters are placed in the standard field housing so these alternative conduit types fit correctly. See “Dimensional Drawings” on page 12 for dimensions.

**Materials of Construction**

- **Electronics Housing**
  - Low-copper aluminum or CF-8M (cast version of 316 Stainless Steel)
  - Paint
  - Polyurethane

- **Cover O-rings**
  - Buna-N

**Mounting**
Transmitters may be attached directly to the sensor. Optional mounting brackets (codes B4 and B5) allow for remote mounting. See “Optional Transmitter Mounting Brackets” on page 13.

**Weight**

<table>
<thead>
<tr>
<th>Material</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aluminum</strong></td>
<td>3.1 lb (1.4 kg)</td>
</tr>
<tr>
<td><strong>Stainless Steel</strong></td>
<td>7.8 lb (3.5 kg)</td>
</tr>
</tbody>
</table>

(1) Add 0.5 lb (0.2 kg) for meter or 1.0 lb (0.5 kg) for bracket options.

**Enclosure Ratings**
NEMA 4X, CSA Enclosure Type 4X, IP66, and IP68.

**Stability**

- RTDs - ±0.1% of reading or 0.1 °C, whichever is greater, for 24 months.
- Thermocouples - ±0.1% of reading or 0.1 °C, whichever is greater, for 12 months.

**5 Year Stability**

- RTDs - ±0.25% of reading or 0.25 °C, whichever is greater, for 5 years.
- Thermocouples - ±0.5% of reading or 0.5 °C, whichever is greater, for 5 years.

**Vibration Effect**
Tested to the following with no effect on performance:

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Acceleration</th>
</tr>
</thead>
<tbody>
<tr>
<td>10–60 Hz</td>
<td>0.21 mm peak displacement</td>
</tr>
<tr>
<td>60–2000 Hz</td>
<td>3 g</td>
</tr>
</tbody>
</table>

**Self Calibration**
The analog-to-digital measurement circuitry automatically self-calibrates for each temperature update by comparing the dynamic measurement to extremely stable and accurate internal reference elements.

**RFI Effect**
Worst case RFI effect is equivalent to the transmitter’s nominal accuracy specification, according to Table on page 4, when tested in accordance with IEC 61000-4-3, 30 V/m (HART) / 10 V/m (FOUNDATION fieldbus), 80 to 1000 MHz, with unshielded cable.

**CE Electromagnetic Compatibility Compliance Testing**
The 3144P meets or exceeds all requirements listed under IEC 61326: Amendment 1, 1998.

**External Ground Screw Assembly**
The external ground screw assembly can be ordered by specifying code G1 when an enclosure is specified. However, some approvals include the ground screw assembly in the transmitter shipment, hence it is not necessary to order code G1. The table below identifies which approval options include the external ground screw assembly.

<table>
<thead>
<tr>
<th>Approval Type</th>
<th>External Ground Screw Assembly Included?</th>
<th>Code G1 Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA, E5, K5, K6, KB</td>
<td>No–Order option code G1</td>
<td>No</td>
</tr>
</tbody>
</table>
| N1, E1, I1, ND, K1, E7, N7, I7, K7, KA, I2 and E4 | Yes | Code G1 is also included with Integral Protector option code T1 does not need to be ordered separately.

(1) Code G1 is also included with Integral Protector option code T1 does not need to be ordered separately.
**Hardware Tag**

- No charge
- 2 lines of 28 characters (56 characters total)
- Tags are stainless steel
- Permanently attached to transmitter
- Character height is $\frac{1}{16}$-in. (1.6mm)
- A wire-on tag is available upon request. 5 lines of 12 characters (60 characters total)

**Software Tag**

- HART transmitter can store up to 8 characters. FOUNDATION fieldbus transmitters can store up to 32 characters.
- Can be ordered with different software and hardware tags.
- If no software tag characters are specified, the first 8 characters of the hardware tag are the default.

**Accuracy**

**Reference Accuracy Example (HART only)**

When using a Pt 100 ($\alpha = 0.00385$) sensor input with a 0 to 100 °C span: Digital Accuracy would be ±0.10 °C, D/A accuracy would be ±0.02% of 100 °C or ±0.02 °C, Total = ±0.12 °C.

**Differential Capability Exists Between Any Two Sensor Types (dual-sensor option)**

For all differential configurations, the input range is X to Y where:

- $X = $ Sensor 1 minimum – Sensor 2 maximum and
- $Y = $ Sensor 1 maximum – Sensor 2 minimum.

**Sensor Options**

<table>
<thead>
<tr>
<th>Sensor Reference</th>
<th>Input Ranges</th>
<th>Digital Accuracy</th>
<th>D/A Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2-, 3-, 4-wire RTDs</strong></td>
<td>°C</td>
<td>°F</td>
<td>°C</td>
</tr>
<tr>
<td>Pt 100, IEC 751, 1995 ($\alpha = 0.00385$)</td>
<td>-200 to 850</td>
<td>-328 to 1562</td>
<td>10</td>
</tr>
<tr>
<td>Pt 100, JIS 1604, 1981 ($\alpha = 0.003916$)</td>
<td>-200 to 645</td>
<td>-328 to 1193</td>
<td>10</td>
</tr>
<tr>
<td>Pt 200, IEC 751, 1995 ($\alpha = 0.00385$)</td>
<td>-200 to 850</td>
<td>-328 to 1562</td>
<td>10</td>
</tr>
<tr>
<td>Pt 500, IEC 751, 1995 ($\alpha = 0.00385$)</td>
<td>-200 to 850</td>
<td>-328 to 1562</td>
<td>10</td>
</tr>
<tr>
<td>Pt 1000, IEC 751, 1995 ($\alpha = 0.00385$)</td>
<td>-200 to 850</td>
<td>-328 to 1562</td>
<td>10</td>
</tr>
<tr>
<td>Ni 120, Edison Curve No. 7</td>
<td>-70 to 300</td>
<td>-94 to 572</td>
<td>10</td>
</tr>
<tr>
<td>Cu 10, Edison Copper Winding No. 15</td>
<td>-50 to 250</td>
<td>-58 to 482</td>
<td>10</td>
</tr>
</tbody>
</table>

**Thermocouples**

- **Type B**
  - NIST Monograph 175, IEC 584
  - 100 to 1820 | 212 to 3308 | ± 0.75 | ± 1.35 | ±0.02% of span |

**Total Analog accuracy is the sum of digital and D/A accuracies.**

**Digital accuracy for thermocouple measurement: sum of digital accuracy +0.15 °C (0.25 °F) (cold junction accuracy).**

**Digital accuracy for NIST Type B is ±3.0 °C (±5.4 °F) from 100 to 300 °C (212 to 572 °F).**

- **Type E**
  - NIST Monograph 175, IEC 584
  - -50 to 1000 | -58 to 1832 | ± 0.20 | ± 0.36 | ±0.02% of span |

**Digital accuracy for NIST Type K is ±0.50 °C (±0.9 °F) from –180 to –90 °C (–292 to –130 °F).**

**Type J**

- NIST Monograph 175, IEC 584
- -180 to 760 | -292 to 1400 | ± 0.25 | ± 0.45 | ±0.02% of span |

**Type K**

- NIST Monograph 175, IEC 584
- 0 to 1768 | 32 to 3214 | ± 0.50 | ± 0.90 | ±0.02% of span |

**Type N**

- NIST Monograph 175, IEC 584
- 0 to 1768 | 32 to 3214 | ± 0.50 | ± 0.90 | ±0.02% of span |

**Type R**

- NIST Monograph 175, IEC 584
- 0 to 1768 | 32 to 3214 | ± 0.50 | ± 0.90 | ±0.02% of span |

**Type S**

- NIST Monograph 175, IEC 584
- 0 to 1768 | 32 to 3214 | ± 0.50 | ± 0.90 | ±0.02% of span |

**Type T**

- NIST Monograph 175, IEC 584
- 0 to 1768 | 32 to 3214 | ± 0.50 | ± 0.90 | ±0.02% of span |

**Type W5Re/W26Re**

- ASTM E 988-96
- 0 to 2000 | 32 to 3632 | ± 0.70 | ± 1.26 | ±0.02% of span |

**Millivolt Input**

<table>
<thead>
<tr>
<th>Range</th>
<th>Digital Accuracy</th>
<th>D/A Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>-10 to 100 mV</td>
<td>±0.015 mV</td>
<td>±0.02% of span</td>
</tr>
<tr>
<td>3 mV</td>
<td>±0.35 ohm</td>
<td>±0.02% of span</td>
</tr>
</tbody>
</table>

**2-, 3-, 4-wire Ohm Input**

<table>
<thead>
<tr>
<th>Range</th>
<th>Digital Accuracy</th>
<th>D/A Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 2000 ohms</td>
<td>±0.015 mV</td>
<td>±0.02% of span</td>
</tr>
<tr>
<td>20 ohm</td>
<td>±0.35 ohm</td>
<td>±0.02% of span</td>
</tr>
</tbody>
</table>

(1) No minimum or maximum span restrictions within the input ranges. Recommended minimum span will hold noise within accuracy specification with damping at zero seconds.

(2) Digital accuracy: Digital output can be accessed by the 375 Field Communicator.

(3) Applies to HART / 4-20 mA devices.

(4) Total Analog accuracy is the sum of digital and D/A accuracies.

(5) Total digital accuracy for thermocouple measurement: sum of digital accuracy +0.15 °C (0.25 °F) (cold junction accuracy).

(6) Total digital accuracy for NIST Type B is ±3.0 °C (±5.4 °F) from 100 to 300 °C (212 to 572 °F).

(7) Total digital accuracy for NIST Type K is ±0.50 °C (±0.9 °F) from –180 to –90 °C (–292 to –130 °F).
Ambient Temperature Effect

Transmitters may be installed in locations where the ambient temperature is between –40 and 85 °C (–40 and 185 °F).

To maintain excellent accuracy performance, each transmitter is individually characterized over this ambient temperature range at the factory.

Temperature Effects Example

When using a Pt 100 (α = 0.00385) sensor input with a 0 to 100 °C span at 30 °C ambient temperature, the following statements would be true:

**Digital Temp Effects**
- \[
\frac{0.0015°C}{°C} \times (30° - 20°) = 0.015°C
\]

**D/A Effects (HART / 4-20 mA only)**
- \[
0.01% / °C \times (30 - 20) = 0.01°C
\]

Transmitters may be installed in locations where the ambient temperature is between –40 and 85 °C (–40 and 185 °F).

To maintain excellent accuracy performance, each transmitter is individually characterized over this ambient temperature range at the factory.

Worst Case Error
- Digital + D/A + Digital Temp Effects + D/A Effects = 0.10 °C + 0.02 °C + 0.015 °C + 0.01 °C = 0.145 °C

Total Probable Error
- \[
\sqrt{0.10^2 + 0.02^2 + 0.015^2 + 0.01^2} = 0.10°C
\]
**HART / 4–20 MA SPECIFICATIONS**

**Power Supply**
External power supply required. Transmitters operate on 12.0 to 42.4 V dc transmitter terminal voltage (with 250 ohm load, 18.1 V dc power supply voltage is required). Transmitter power terminals rated to 42.4 V dc.

**Wiring Diagram**
See Figure 1 on page 14.

**Alarms**
Custom factory configurations of alarm and saturation levels are available for valid values with option code C1. These values can also be configured in the field using a 375 Field Communicator.

**Transient Protection (option code T1)**
The transient protector helps to prevent damage to the transmitter from transients induced on the loop wiring by lightning, welding, heavy electrical equipment, or switch gears. The transient protection electronics are contained in an add-on assembly that attaches to the standard transmitter terminal block. The external ground lug assembly (code G1) is included with the Transient Protector. The transient protector has been tested per the following standard:

- IEEE C62.41-1991 (IEEE 587)/ Location Categories B3. 6kV/3kA peak (1.2 × 50 μS Wave 8 × 20 μS Combination Wave)
- 6kV/0.5kA peak (100 kHz Ring Wave)
- EFT, 4kVpeak, 2.5kHz, 5*50nS
- Loop resistance added by protector: 22 ohms max.
- Nominal clamping voltages: 90 V (common mode), 77 V (normal mode)

**Local Display**
Optional five-digit LCD display includes 0–100% bar graph. Digits are 0.4 inches (8 mm) high. Display options include engineering units (°F, °C, °R, K, ohms, and millivolts), percent, and milliamperes. The display can also be set to alternate between engineering units/milliamperes, Sensor 1/Sensor 2, Sensor 1/Sensor 2/Differential Temperature, and Sensor 1/Sensor2/Average Temperature. All display options, including the decimal point, may be reconfigured in the field using a 375 Field Communicator or AMS.

**Turn-on Time**
Performance within specifications is achieved less than 5 seconds (6 seconds for Safety Certified transmitter) after power is applied to the transmitter when the damping value is set to 0 seconds.

**Power Supply Effect**
Less than ±0.005% of span per volt.

**SIS Safety Transmitter Failure Values**
TÜV IEC 61508 Safety Certified SIL 2 and SIL 3 Claim Limit
- Safety accuracy: 2.0%\(^{(1)}\) or 2 °C (3.6 °F), whichever is greater
- Safety response time: 5 seconds
- Safety specifications and FMEDA Report available at www.rosemount.com/safety

\(^{(1)}\) A 2% variation of the transmitter mA output is allowed before a safety trip. Trip values in the DCS or safety logic solver should be derated by 2%.
**FOUNDATION FIELDBUS SPECIFICATIONS**

**Power Supply**
Powered over FOUNDATION Fieldbus with standard fieldbus power supplies. Transmitters operate on 9.0 to 32.0 V dc, 11 mA maximum. Transmitter power terminals are rated to 42.4 V dc.

**Wiring Diagram**
See Figure 2 on page 14.

**Alarms**
The AI function block allows the user to configure the alarms to HIGH-HIGH, HIGH, LOW, or LOW-LOW with a variety of priority levels and hysteresis settings.

**Transient Protection (option code T1)**
The transient protector helps to prevent damage to the transmitter from transients induced on the loop wiring by lightning, welding, heavy electrical equipment, or switch gears. The transient protection electronics are contained in an add-on assembly that attaches to the standard transmitter terminal block. The transient terminal block is not polarity insensitive. The transient protector has been tested to the following standard:

- **IEEE C62.41-1991** (IEEE 587)/ Location Categories B3. 6kV/3kA peak (1.2 × 50 μS Wave 8 × 20 μS Combination Wave)
- 6kV/0.5kA peak (100 kHz Ring Wave)
- EFT, 4kVpeak, 2.5kHz, 5*50μS
- Loop resistance added by protector: 22 ohms max.
- Nominal clamping voltages: 90 V (common mode), 77 V (normal mode)

**Local Display**
Displays all DS_65 measurements in the Transducer and Function Blocks including Sensor 1, Sensor 2, differential and terminal temperatures. The display alternates up to four selected items. The meter can display up to five digits in engineering units (°F, °C, °R, K, Ω, and millivolts). Display settings are configured at the factory according to the transmitter configuration (standard or custom). These settings can be reconfigured in the field using a custom. The LCD provides the ability to display DS_65 parameters from other devices. In addition to the configuration of the meter, sensor diagnostic data is displayed. If the measurement status is Good, the measured value is shown. If the measurement status is Uncertain, the status indicating uncertain is shown in addition to the measured value. If the measurement status is Bad, the reason for the bad measurement is shown.

**Backup Link Active Scheduler (LAS)**
The transmitter is classified as a device link master, which means it can function as a Link Active Scheduler (LAS) if the current link master device fails or is removed from the segment. The host or other configuration tool is used to download the schedule for the application to the link master device. In the absence of a primary link master, the transmitter will claim the LAS and provide permanent control for the H1 segment.

**Function Blocks**

- **Resource Block**
  - Contains physical transmitter information including available memory, manufacture identification, device type, software tag, and unique identification.
  - PlantWeb Alerts enable the full power of the PW digital architecture by diagnosing instrumentation issues, communicating the details, and recommending a solution.

- **Transducer Block**
  - Contains the actual temperature measurement data, including sensor 1, sensor 2, and terminal temperature.
  - Includes information about sensor type and configuration, engineering units, linearization, range, damping, and diagnostics.

- **LCD Block (when an LCD display is used)**
  - Configures the local display.

- **Analog Input (AI)**
  - Processes the measurement and makes it available on the fieldbus segment.
  - Allows filtering, engineering unit, and alarm changes.

- **PID Block (provides control functionality)**
  - Performs single loop, cascade, or feedforward control in the field.

**Schedule Entries Parameters**

<table>
<thead>
<tr>
<th>Schedule Entries</th>
<th>25 (max.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Links</td>
<td>30 (max.)</td>
</tr>
<tr>
<td>Virtual Communications Relationships (VCR)</td>
<td>20 (max.)</td>
</tr>
</tbody>
</table>

**Turn-on Time**
Performance within specifications is achieved less than 20 seconds after power is applied to the transmitter when the damping value is set to 0 seconds.

**Status**
If self-diagnostics detect a sensor burnout or a transmitter failure, the status of the measurement will be updated accordingly. The status may also send the PID output to a safe value.

**Resource Block Execution Time**

<table>
<thead>
<tr>
<th>Block</th>
<th>Execution Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource</td>
<td>–</td>
</tr>
<tr>
<td>Transducer</td>
<td>–</td>
</tr>
<tr>
<td>LCD Block</td>
<td>–</td>
</tr>
<tr>
<td>Advanced Diagnostics</td>
<td>–</td>
</tr>
<tr>
<td>Analog Input 1, 2, 3</td>
<td>60 milliseconds</td>
</tr>
<tr>
<td>PID 1 and 2 with Autotune</td>
<td>90 milliseconds</td>
</tr>
<tr>
<td>Input Selector</td>
<td>65 milliseconds</td>
</tr>
<tr>
<td>Signal Characterizer</td>
<td>45 milliseconds</td>
</tr>
<tr>
<td>Arithmetic</td>
<td>60 milliseconds</td>
</tr>
<tr>
<td>Output Splitter</td>
<td>60 milliseconds</td>
</tr>
</tbody>
</table>
Product Certifications

ROSEMOUNT 3144P WITH HART / 4–20 mA

Approved Manufacturing Locations
Rosemount Inc. – Chanhassen, Minnesota, USA
Rosemount Temperature GmbH – Germany
Emerson Process Management Asia Pacific – Singapore

European Union Directive Information
The EC declaration of conformity for all applicable European Directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting an Emerson Process Management representative.

ATEX Directive (94/9/EC)
Rosemount Inc. complies with the ATEX Directive.

Electro Magnetic Compatibility (EMC)
(89/336/EEC)
EN 50081-1: 1992; EN 50082-2:1995; EN 61326-1:1997 – Industrial

Hazardous Locations Installations

North American Certifications

Factory Mutual (FM) Approvals

i5  FM Intrinsic Safety and Non-incendive:
   Intrinsically Safe for Class I/II/III, Division 1, Groups A, B, C, D, E, F, and G.
   Temperature codes: T4A ($T_{amb} = –60$ to $60 {^\circ}C$),
   $T5$ ($T_{amb} = –60$ to $50{^\circ}C$)
   Zone Marking: Class I, Zone 0, AEx ia IIC
   T4 ($T_{amb} = –50$ to $60{^\circ}C$) Intrinsically Safe when installed in accordance with control
drawing 03144-0321.
   Non-incendive for use in Class I, Division 2, Groups A, B, C, and D. Suitable for use in Class II / III, Division 2, Groups F and G. Non-incendive when installed in accordance with Rosemount drawings 03144-0321.
   Temperature codes: $T6$ ($T_{amb} = –60$ to $60{^\circ}C$),
   $T5$ ($T_{amb} = –60$ to $85{^\circ}C$)

E5  Explosion Proof for Class I, Division 1, Groups A, B, C, and D. Dust Ignition-Proof for use in Class II/III, Division 1, Groups E, F, and G. Explosion-Proof and Dust Ignition-Proof when installed in accordance with Rosemount drawing 03144-0320. Indoor and outdoor use. NEMA Type 4X.
   Temperature code: $T5$ ($T_{amb} = –50$ to $85{^\circ}C$)


NOTE
For Group A, seal all conduits within 18 inches of enclosure; otherwise, conduit seal not required for compliance with NEC 501-5a(1).

Non-incendive for use in Class I, Division 2, Groups A, B, C, and D. Suitable for use in Class II/III, Division 2, Groups F and G. Non-incendive when installed in accordance with Rosemount drawing 03144-0321.
   Temperature codes: $T5$ ($T_{amb} = –60$ to $85{^\circ}C$),
   $T6$ ($T_{amb} = –60$ to $60{^\circ}C$)

Canadian Standards Association (CSA) Approvals

I6  CSA Intrinsic Safety and Division 2
   Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1; Suitable for Class I, Division 2, Groups A, B, C, and D. Intrinsically Safe and Division 2 when installed per Rosemount drawing 03144–0322.

K6  Combination of I6 and the following:
   Explosion Proof for Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1 hazardous locations. Factory sealed.

European Certifications

E1  ATEX Flameproof Approval (Zone 1)
   Certificate Number: KEMA01ATEX2181
   ATEX Category Marking: II 2 G
   EEx d IIC T6 ($T_{amb} = –40$ to $70 {^\circ}C$)
   EEx d IIC T5 ($T_{amb} = –40$ to $80 {^\circ}C$)
   Max supply voltage: 55 Vdc

ND  ATEX Dust Ignition Proof Approval
   Certificate Number: KEMA01ATEX2205
   ATEX Category Marking: II 1 D
   T95 °C ($T_{amb} = –40$ to $85 {^\circ}C$)
   Max supply voltage: 55 Vdc

N1  ATEX Type n Approval (Zone 2)
   Certificate Number: BAS01ATEX3432X
   ATEX Category Marking: II 3 G
   EEx nL IIC T6 ($T_{amb} = –40$ to $50{^\circ}C$)
   EEx nL IIC T5 ($T_{amb} = –40$ to $75 {^\circ}C$)
   $U_i = 55V$

Special Conditions for Safe Use (X):
The transmitter is not capable of withstanding the 500 v insulating test required by Clause 9.1 of EN50021:1999. This condition must be taken into account during installation.

I1  ATEX Intrinsic Safety Approval (Zone 0)
   Certificate Number: BAS01ATEX1431X
   ATEX Category Marking: II 1 G
   EEx ia IIC T6 ($T_{amb} = –60$ to $50{^\circC}$)
   EEx ia IIC T5 ($T_{amb} = –60$ to $75 {^\circC}$)

TABLE 3. Input Entity Parameters

<table>
<thead>
<tr>
<th>Power/Loop</th>
<th>Sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>$U_i = 30$ V dc</td>
<td>$C_i = 5$ nF</td>
</tr>
<tr>
<td>$I_i = 300$ mA</td>
<td>$L_i = 0$</td>
</tr>
<tr>
<td>$P_i = 1.0$ W</td>
<td>$P_o = 190$ mW</td>
</tr>
</tbody>
</table>

Special Conditions for Safe Use (x):
The transmitter is not capable of withstanding the 500V insulation test as defined in Clause 6.4.12 of EN50020. This condition must be taken into account during installation.
**Australian Certifications**

*Standard Australia Quality Assurance Services (SAA)*

**E7 Flameproof Approval**
- Certificate Number: AUS Ex 02.3813X
- Ex d IIC T6 (T\(_{\text{amb}}\) = –20 to 60 °C)
- IP66

**Special Conditions for Safe Use (x):**
1. Apparatus must be installed in accordance to Rosemount drawing 03144-0325.
2. If the sensor is intended to be remote mounted, it should be installed in a suitable Standards Australia certified Flame-Proof enclosure and installed in accordance with Rosemount drawing 03144-0325.
3. Standards Australia certified cable glands or conduit adapters must be used when connecting to external circuits. Where only one conduit entry is used for connection to external circuits, the unused entry is to be closed by means of a blanking plug supplied by Rosemount or by a suitable Standards Australia certified blanking plug.

**N7 Type N Approval**
- Certificate Number: AUS Ex 02.3794X
- Ex n IIC T6 (T\(_{\text{amb}}\) = –60 to 50 °C)
- Ex n IIC T5 (T\(_{\text{amb}}\) = –60 to 75 °C)
- IP66
- \( U_\text{n} = 55 \text{ V} \)
- \( P_\text{n} = 1.3 \text{ W} \)

**I7 Intrinsic Safety Approval**
- Certificate Number: AUS Ex 02.3794X
- Ex ia IIC T6 (T\(_{\text{amb}}\) = –60 to 50 °C)
- Ex ia IIC T5 (T\(_{\text{amb}}\) = –60 to 75 °C)

**TABLE 4. Input Entity Parameters**

<table>
<thead>
<tr>
<th>Power/Loop</th>
<th>Sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>( U_\text{i} = 30 \text{ V dc} )</td>
<td>( C_\text{i} = 0.005 \mu \text{F} )</td>
</tr>
<tr>
<td>( I_\text{i} = 300 \text{ mA} )</td>
<td>( L_\text{i} = 20 \mu \text{H} )</td>
</tr>
<tr>
<td>( P_\text{i} = 1.0 \text{ W} )</td>
<td>( P_\text{o} = 0.66 \mu \text{F} )</td>
</tr>
<tr>
<td>( U_\text{o} = 13.6 \text{ V} )</td>
<td>( C_\text{o} = 0.66 \mu \text{F} )</td>
</tr>
<tr>
<td>( I_\text{o} = 100 \text{ mA} )</td>
<td>( L_\text{o} = 1.9 \text{ mH} )</td>
</tr>
<tr>
<td>( P_\text{o} = 80 \text{ mW} )</td>
<td></td>
</tr>
</tbody>
</table>

**Special Conditions for Safe Use (x):**
1. For options using the transient protection board, the apparatus should be connected to earth with a copper conductor of 4 mm\(^2\) or greater.
2. For the label with more than one type of marking on it, upon completion of commissioning the apparatus the irrelevant marking code(s) shall be permanently scribed off.

**Japanese Certifications**

*Japanese Industrial Standard (JIS) Flameproof Certification*

**E4 Without sensor: Ex d IIB T6 (T\(_{\text{amb}}\) = –20 to 55 °C)**
- With sensor: Ex d IIB T4 (T\(_{\text{amb}}\) = –20 to 55 °C)

**Combination Certifications**

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

**KA Combination of K1 and K6**
**KB Combination of K5 and K6**
**K1 Combination of E1, N1, and I1**
**K7 Combination of E7, N7, and I7**
**K5 Combination of I5 and E5**

**Additional Certifications**

*American Bureau of Shipping (ABS) Type Approval*

ABS Type Approval for temperature measurements in hazardous locations on ABS Classed Vessels, Marine and Offshore Installations. Type Approval is based on Factory Mutual (FM) Approvals; therefore, specify order code K5. Please contact an Emerson Process Management representative if a copy of the certification is required.

*Det Norske Veritas (DNV) Type Approval for Shipboard and Offshore Installations*

DNV rules for classifications of ships and mobile offshore units for temperature measurements in the following locations:

**TABLE 5. Applications / Limitations**

<table>
<thead>
<tr>
<th>Location</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>D</td>
</tr>
<tr>
<td>Humidity</td>
<td>B</td>
</tr>
<tr>
<td>Vibration</td>
<td>B/C</td>
</tr>
<tr>
<td>Enclosure</td>
<td>D</td>
</tr>
</tbody>
</table>

**NOTE**

The transient protector (option code T1) is required when requesting DNV Type Approval. Additionally, hazardous locations approvals may be required (based on shipboard location) and will need to be specified by the Hazardous Locations option code.

Please contact an Emerson Process Management representative if a copy of the certification is required.

**GOSTANDART**

Tested and approved by Russian Metrological Institute
ROSEMONDTM 3144P WITH FOUNDATION FIELDBUS

Approved Manufacturing Locations
Rosemount Inc. – Chanhassen, Minnesota, USA
Rosemount Temperature GmbH – Germany
Emerson Process Management Asia Pacific – Singapore

European Union Directive Information
The EC declaration of conformity for all applicable European Directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting an Emerson Process Management representative.

ATEX Directive (94/9/EC)
Rosemount Inc. complies with the ATEX Directive.

Electro Magnetic Compatibility (EMC)
(89/336/EEC)
EN 50081-1: 1992; EN 50082-2:1995; EN 61326-1:1997 – Industrial

Canadian Standards Association (CSA) Approvals
I6 CSA Intrinsic Safety / FISCO and Non-incendive
Intrinsically Safe / FISCO for use in Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1.
Temperature Class: T4 (T_{amb} = – 50 °C to 60 °C)
Suitable for Class I, Division 2, Groups A, B, C, and D.
Temperature Class: T5 (T_{amb} = – 60 °C to 85 °C);
T6 (T_{amb} = – 60 °C to 60 °C)
Intrinsic Safety / FISCO and Division 2 when installed per Rosemount drawing 03144-5076.

K6 Combination of I6 and the following:
Explosion Proof for Class I, Division 2, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1 hazardous locations. Factory sealed.

European Certifications
E1 ATEX Flameproof Approval (Zone 0)
Certificate Number: KEMA01ATEX2181
ATEX Category Marking  II 2 G
EEx d IIC T6 (T_{amb} = –40 to 70 °C)
EEx d IIC T5 (T_{amb} = –40 to 80 °C)
Max supply voltage: 55 Vdc

ND ATEX Dust Ignition Proof Approval
Certificate Number: KEMA01ATEX2205
ATEX Category Marking  II 1 D
T95 °C (T_{amb} = –40 to 85 °C)
Max supply voltage: 55 Vdc

N1 ATEX Type n Approval (Zone 2)
Certificate Number: Baseefa03ATEX0709
ATEX Category Marking  II 3 G
EEx nA nL IIC T5 (T_{amb} = –40 to 75 °C)
U_i = 42.4 V maximum

I1 ATEX Intrinsic Safety / FISCO Approval (Zone 0)
Certificate Number: Baseefa03ATEX0708X
ATEX Category Marking  II 1 G
EEx ia IIC T4 (T_{amb} = –60 to 60 °C)

TABLE 6. Input Entity Parameters

<table>
<thead>
<tr>
<th>Power/Loop</th>
<th>FISCO Power/Loop</th>
<th>Sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>U_i = 30 V dc</td>
<td>U_i = 17.5 V dc</td>
<td>U_o = 13.9 V</td>
</tr>
<tr>
<td>I_i = 300 mA</td>
<td>I_i = 300 mA</td>
<td>I_o = 23 mA</td>
</tr>
<tr>
<td>P_i = 1.3 W</td>
<td>P_i = 5.32 W</td>
<td>P_i = 79 mW</td>
</tr>
<tr>
<td>C_i = 2.1 nF</td>
<td>C_i = 2.1 nF</td>
<td>C_j = 7.7 nF</td>
</tr>
<tr>
<td>L_i = 0</td>
<td>L_i = 0</td>
<td>L_i = 0</td>
</tr>
</tbody>
</table>

Special Conditions for Safe Use (x):
1. The apparatus enclosure may contain light metals. The apparatus must be installed in such a manner as to minimize the risk of impact or friction with other metal surfaces.
2. A transient protection device can be fitted as an option, in which the equipment will not pass the 500V test.
Australian Certifications

Standard Australia Quality Assurance Services (SAA)

E7 Flameproof Approval
Certificate Number: AUS Ex 02.3813X
Ex d IIC T6 (T_{amb} = -20 to 60 °C)
IP66

Special Conditions for Safe Use (x):
1. Apparatus must be installed in accordance to Rosemount drawing 03144-0325.
2. If the sensor is intended to be remote mounted, it should be installed in a suitable Standards Australia certified Flame-Proof enclosure and installed in accordance with Rosemount drawing 03144-0325.
3. Standards Australia certified cable glands or conduit adapters must be used when connecting to external circuits. Where only one conduit entry is used for connection to external circuits, the unused entry is to be closed by means of a blanking plug supplied by Rosemount or by a suitable Standards Australia certified blanking plug.

N7 Type n Approval (Zone 2)
Certificate Number: AUS Ex 02.3794X
Ex n IIC T5 (T_{amb} = -60°C to 75°C)
Ex n IIC T6 (T_{amb} = -60°C to 50°C)
IP66

Special Conditions for Safe Use:
1. For the lightning protection board, the apparatus should be bonded to earth with a copper conductor of 4mm² or greater.
2. Input/Output parameters for non-sparking protection model Ex n: Maximum input voltage U_n = 55V. Maximum input power P_n = 1.3W.

Japanese Certifications

Japanese Industrial Standard (JIS) Flameproof Certification
E4 Consult factory for availability.

Russian GOST Certification

Intrinsically Safe and Explosion-proof (Flameproof)

PPC BA-13006:
1 Ex d IIC T5, T6
0 Ex ia IIC T5, T6
0 Ex ia IIC T4

Combination Certifications

Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

KA Combination of K1 and K6
KB Combination of K5 and K6
K1 Combination of E1, N1, and I1
K7 Combination of E7, N7, and I7
K5 Combination of I5 and E5.
## Dimensional Drawings

### Transmitter Exploded View

- Cover with Wiring Diagram Label
- Nameplate
- Electronics Module
- LCD Display
- Housing with Permanent Terminal Block
- Meter Cover

### Switch Location

- Switches(1)

(1) Alarm and Write Protect (HART), Simulate and Write Protect (FOUNDATION Fieldbus)

### LCD Display Faceplate

![LCD Display Faceplate](image)

### Transmitter Dimensional Drawing

#### Top View

- Conduit Entry
- Meter Cover
- 2.0 (51)
- Label

#### Side View

- 5.2 (132) with LCD Display
- 4.4 (112)
- Conduit Entry
- 3/8-16 UN-2B

Dimensions are in inches (millimeters)
Transmitter Dimensional Drawing for Conduits with M20 x 1.5, PG 13.5, and JIS G\(\frac{1}{2}\) Entries

**Top View**

- 5.20 (132)
- 4.40 (112)
- 0.85 (21.6)*

- *Clearance required to remove cover*

- 4.4 (112)
- 2.0 (50.8)
- \(\frac{3}{8}\)-16 UN-2B

**Front View**

- 4.00 (102)
- 0.5 (12.7)
- 0.21 (5.3)

- 4.40 (112)
- 1.17 (29.8)

**Adapters for M20 x 1.5, PG 13.5, and JIS G\(\frac{1}{2}\) entries**

**Optional Transmitter Mounting Brackets**

**Option Code B4 Bracket**

- 1.04 (26)
- 3.65 ±0.06 (92)
- 1.55 (39)

**Option Code B5 Bracket**

- 2.81 ±0.03 (71)
- 0.41 (10) Diameter

- 0.375 (10) Diameter (2 Places)

- 2 (51) Diameter Washer (Provided)

- 6.4 (162.6)
- 7.15 (181.6)
- 2.81 (71.4)

**Dimensions are in inches (millimeters)**

---

* Clearance required to remove cover*
**Rosemount 3144P**

**FIGURE 1. HART / 4–20 mA**

<table>
<thead>
<tr>
<th>3144P Single-Sensor Connections Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-wire RTD and Ohms</td>
</tr>
<tr>
<td>3-wire RTD and Ohms**</td>
</tr>
<tr>
<td>4-wire RTD and Ohms</td>
</tr>
<tr>
<td>T/Cs and Millivolts</td>
</tr>
<tr>
<td>RTD with Compensation Loop*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3144P Dual-Sensor Connections Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>ΔT/Hot Backup/Dual Sensor with 2 RTDs**</td>
</tr>
<tr>
<td>ΔT/Hot Backup/Dual Sensor with 2 Thermocouples</td>
</tr>
<tr>
<td>ΔT/Hot Backup/Dual Sensor with RTDs/Thermocouples**</td>
</tr>
<tr>
<td>ΔT/Hot Backup/Dual Sensor with 2 RTDs with Compensation Loop*</td>
</tr>
</tbody>
</table>

* Transmitter must be configured for a 3-wire RTD in order to recognize an RTD with a compensation loop.
** Emerson Process Management provides 4-wire sensors for all single-element RTDs. Use these RTDs in 3-wire configurations by leaving the unneeded leads disconnected and insulated with electrical tape.
*** Typical wiring configuration of a Rosemount dual-element RTD is shown (R=Red, W=White, G=Green, B=Black)

**FIGURE 2. FOUNDATION Fieldbus**

<table>
<thead>
<tr>
<th>3144P Single-Sensor Connections Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-wire RTD and Ohms</td>
</tr>
<tr>
<td>3-wire RTD and Ohms**</td>
</tr>
<tr>
<td>4-wire RTD and Ohms</td>
</tr>
<tr>
<td>T/Cs and Millivolts</td>
</tr>
<tr>
<td>RTD with Compensation Loop*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3144P Dual-Sensor Connections Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>ΔT/Hot Backup/Dual Sensor with 2 RTDs**</td>
</tr>
<tr>
<td>ΔT/Hot Backup/Dual Sensor with 2 Thermocouples</td>
</tr>
<tr>
<td>ΔT/Hot Backup/Dual Sensor with RTDs/Thermocouples**</td>
</tr>
<tr>
<td>ΔT/Hot Backup/Dual Sensor with 2 RTDs with Compensation Loop*</td>
</tr>
</tbody>
</table>

* Transmitter must be configured for a 3-wire RTD in order to recognize an RTD with a compensation loop.
** Emerson Process Management provides 4-wire sensors for all single-element RTDs. Use these RTDs in 3-wire configurations by leaving the unneeded leads disconnected and insulated with electrical tape.
*** Typical wiring configuration of a Rosemount dual-element RTD is shown (R=Red, W=White, G=Green, B=Black)
### Ordering Information

<table>
<thead>
<tr>
<th>Model</th>
<th>Product Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3144P</td>
<td>Temperature Transmitter</td>
</tr>
</tbody>
</table>

#### Transmitter Housing Type/Conduit Entry
- **D1**: Field Mount Housing (Dual-Compartment), Aluminum, 1\(\frac{1}{2}\)–14 NPT
- **D2**: Field Mount Housing (Dual-Compartment), Aluminum, M20 x 1.5 (CM20)
- **D3**: Field Mount Housing (Dual-Compartment), Aluminum, PG 13.5 (PG11)
- **D4**: Field Mount Housing (Dual-Compartment), Aluminum, JIS G 1\(\frac{1}{2}\)
- **D5**: Field Mount Housing (Dual-Compartment), Stainless Steel, 1\(\frac{1}{2}\)–14 NPT
- **D6**: Field Mount Housing (Dual-Compartment), Stainless Steel, M20 x 1.5 (CM20)
- **D7**: Field Mount Housing (Dual-Compartment), Stainless Steel, PG 13.5 (PG11)
- **D8**: Field Mount Housing (Dual-Compartment), Stainless Steel, JIS G 1\(\frac{1}{2}\)

#### Code | Output
--- | ---
A | 4–20 mA with Digital Signal based on HART protocol
B | 4–20 mA Safety Certified with digital signal based on HART protocol
F | FOUNDATION fieldbus digital signal (includes 3 AI function blocks and Backup Link Active Scheduler)

#### Code | Measurement Type Configuration
--- | ---
1 | Single-Sensor Input
2 | Dual-Sensor Input

#### Code | Product Certifications
--- | ---
NA | No Approval
E5 | FM explosion-proof and non incendive approval
I5\(^{(1)}\) | FM intrinsic safety and non-incendive (includes standard I.S. and FISCO for fieldbus units)
K5\(^{(1)}\) | FM intrinsic safety, non-incendive, and explosion-proof combination (includes standard I.S. and FISCO for fieldbus units)
K6\(^{(1)}\) | FM and CSA intrinsic safety, explosion-proof & non-incendive combination (includes standard IS and FISCO for fieldbus units)
I6\(^{(1)}\) | CSA intrinsic safety and FISCO Division 2 (includes standard IS and FISCO for fieldbus units)
K6\(^{(1)}\) | CSA intrinsic safety, FISCO Division 2, and explosion-proof combination (includes standard IS and FISCO for fieldbus units)
E1 | ATEX flameproof approval
N1 | ATEX type n approval
I1\(^{(1)}\) | ATEX intrinsic safety (includes standard I.S. and FISCO for fieldbus units)
K1\(^{(1)}\) | ATEX intrinsic safety, flameproof, and Type n approval combination (includes standard IS and FISCO for fieldbus units)
ND | ATEX dust ignition proof approval
KA\(^{(1)}\) | ATEX and CSA intrinsic safety and explosion-proof combination (includes standard I.S. and FISCO for fieldbus units)
E7 | SAA flameproof approval
N7 | SAA type n approval
I7\(^{(1)}\)(2) | SAA intrinsic safety
K7\(^{(1)}\)(2) | SAA intrinsic safety, flameproof, and type n combination
I2\(^{(2)}\) | CEPEL intrinsic safety approval
E4\(^{(2)}\) | JIS flameproof approval (requires either housing code D4 or D8)

#### Code | Options
--- | ---
A01 | Regulatory control suite: PID with autotune, arithmetic, signal characterizer, input selector – FOUNDATION fieldbus only

**PlantWeb Control**
- A01: Regulatory control suite: PID with autotune, arithmetic, signal characterizer, input selector – FOUNDATION fieldbus only

**PlantWeb Diagnostics**
- D01: Diagnostics suite: SPM diagnostics, drift alert – FOUNDATION fieldbus only

**Mounting Bracket**
- B4: Universal mounting bracket for 2-inch pipe and panel mounting—SST bracket and bolts
- B5: Universal “L” mounting bracket for 2-inch pipe mounting—SST bracket and bolts

**Meter**
- M5: LCD display

**External Ground Lug**
- G1: External ground lug assembly (See “External Ground Screw Assembly” on page 3.)

**Transient Protector**
- T1: Integral Transient Protector
### Custom Software Configuration Request

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1(3)</td>
<td>Factory enters date, descriptor, and message fields (CDS required with order)</td>
</tr>
</tbody>
</table>

### 50 Hz Line Voltage Filter Enabled

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F5</td>
<td>50 Hz line voltage filter</td>
</tr>
</tbody>
</table>

### NAMUR Compliant Alarm Failure

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Analog output levels compliant with NAMUR recommendation NE-43, June 1996. Alarm configuration high – HART only</td>
</tr>
<tr>
<td>CN</td>
<td>Analog output levels compliant with NAMUR recommendation NE-43, June 1996. Alarm configuration low – HART only</td>
</tr>
</tbody>
</table>

### Low Alarm

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C8</td>
<td>Analog output levels compliant with Rosemount standard. Alarm configuration low – HART only</td>
</tr>
</tbody>
</table>

### Transmitter-Sensor Matching

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2</td>
<td>Transmitter-Sensor Matching–trim to specific Rosemount RTD calibration schedule</td>
</tr>
<tr>
<td>C7</td>
<td>Trim to special non-standard sensor (special sensor–customer must provide sensor information)</td>
</tr>
</tbody>
</table>

### Five Point Calibration Data

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C4</td>
<td>5-point calibration (use option code Q4 to generate a calibration certificate)</td>
</tr>
</tbody>
</table>

### Calibration Certification

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q4</td>
<td>Calibration certificate (3-point standard; use code C4 with Q4 option for a five point calibration certificate)</td>
</tr>
<tr>
<td>QP</td>
<td>Calibration certificate and tamper evident seal</td>
</tr>
</tbody>
</table>

### Dual-Input Custom Configuration (only with measurement type option code 2)

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>U1(4)</td>
<td>Hot Backup</td>
</tr>
<tr>
<td>U2(5)</td>
<td>Average temperature with Hot Backup and Sensor Drift Alert – warning mode</td>
</tr>
<tr>
<td>U3(5)(6)</td>
<td>Average temperature with Hot Backup and Sensor Drift Alert – alarm mode</td>
</tr>
<tr>
<td>U4</td>
<td>Two independent sensors</td>
</tr>
<tr>
<td>U5</td>
<td>Differential temperature</td>
</tr>
<tr>
<td>U6(4)</td>
<td>Average temperature</td>
</tr>
<tr>
<td>U7(4)</td>
<td>First good temperature</td>
</tr>
<tr>
<td>U8(4)</td>
<td>Minimum temperature – FOUNDATION fieldbus only</td>
</tr>
<tr>
<td>U9(4)</td>
<td>Maximum temperature – FOUNDATION fieldbus only</td>
</tr>
</tbody>
</table>

### Special Certifications

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>QS</td>
<td>Quality Documentation for Safety Instrumented Systems – HART only</td>
</tr>
</tbody>
</table>

### Conduit Electrical Connector

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GE(7)</td>
<td>M12, 4-pin, Male Connector (eurofast®)</td>
</tr>
<tr>
<td>GM(7)</td>
<td>A size Mini, 4-pin, Male Connector (minifast®)</td>
</tr>
</tbody>
</table>

### Assembly

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>XA</td>
<td>Sensor specified separately and assembled to transmitter</td>
</tr>
</tbody>
</table>

### Typical Model Number: 3144P D1 A 1 E5 B4 M5

---

(1) When IS approval is ordered on a FOUNDATION fieldbus, both standard IS and FISCO IS approvals apply. The device label is marked appropriately.

(2) Consult factory for availability when ordering with HART or FOUNDATION fieldbus models.

(3) Consult factory for availability when ordering with FOUNDATION fieldbus models.

(4) Codes U1 and U6 for HART transmitters will not have drift alert enabled; option codes U1, U6, U7, U8, and U9 for Foundation fieldbus transmitters will have drift alert enabled.

(5) Not available for FOUNDATION Fieldbus.

(6) Available only on Safety Certified transmitter output code B.

(7) Available with Intrinsically Safe approvals only. For FM Intrinsically Safe or non-incendive approval (option code I5), install in accordance with Rosemount drawing 03151-1009 to maintain NEMA 4X rating.
Standard Configuration
Both standard and custom configuration settings may be changed. Unless specified, the transmitter will be shipped as follows:

<table>
<thead>
<tr>
<th>Standard Configuration</th>
<th>Requirements/Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 mA value / Lower Range (HART / 4–20 mA) Measurement Point LO (FOUNDATION Fieldbus)</td>
<td>0 °C</td>
</tr>
<tr>
<td>20 mA value / Upper Range (HART / 4–20 mA) Measurement Point HI (FOUNDATION Fieldbus)</td>
<td>100 °C</td>
</tr>
<tr>
<td>Damping</td>
<td>5 seconds</td>
</tr>
<tr>
<td>Output</td>
<td>Linear with temperature / FOUNDATION Fieldbus</td>
</tr>
<tr>
<td>Failure Mode (HART / 4–20 mA)</td>
<td>High</td>
</tr>
<tr>
<td>Line Voltage Filter</td>
<td>60 Hz</td>
</tr>
<tr>
<td>Software Tag</td>
<td>See “Tagging”</td>
</tr>
<tr>
<td>Optional Integral Meter</td>
<td>Units and mA / Sensor 1 units</td>
</tr>
</tbody>
</table>

Single Sensor option

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>4-wire Pt 100 α = 0.00385 RTD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Variable (HART / 4–20 mA)</td>
<td>AI 1400 (FOUNDATION Fieldbus)</td>
</tr>
<tr>
<td>Secondary Variable AI 1600 (FOUNDATION Fieldbus)</td>
<td></td>
</tr>
<tr>
<td>Tertiary Variable</td>
<td>Not Available</td>
</tr>
<tr>
<td>Quaternary Variable</td>
<td>Not Available</td>
</tr>
</tbody>
</table>

Dual-Sensor option

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>Two 3-wire Pt 100 α = 0.00385 RTD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Variable (HART / 4–20 mA)</td>
<td>AI 1400 (FOUNDATION Fieldbus)</td>
</tr>
<tr>
<td>Secondary Variable AI 1500 (FOUNDATION Fieldbus)</td>
<td></td>
</tr>
<tr>
<td>Tertiary Variable AI 1600 (FOUNDATION Fieldbus)</td>
<td></td>
</tr>
<tr>
<td>Quaternary Variable</td>
<td>Not Used</td>
</tr>
</tbody>
</table>

Custom Configuration

The 3144P transmitter can be ordered with custom configuration. The table below lists the requirements necessary to specify a custom configuration.

<table>
<thead>
<tr>
<th>Option Code</th>
<th>Requirements/Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1: Factory Data(1)</td>
<td>Date: day/month/year</td>
</tr>
<tr>
<td></td>
<td>Descriptor: 16 alphanumeric character</td>
</tr>
<tr>
<td></td>
<td>Message: 32 alphanumeric character</td>
</tr>
<tr>
<td></td>
<td>Custom Alarm Levels can be specified for configuration at the factory.</td>
</tr>
<tr>
<td>C2: Transmitter Sensor Matching</td>
<td>The transmitters are designed to accept Callendar-van Dusen constants from a calibrated RTD schedule and generate a custom curve to match any specific sensor curve. Specify a Series 68, 65, or 78 RTD sensor on the order with a special characterization curve (V or X8Q4 option). These constants will be programmed into the transmitter with this option.</td>
</tr>
<tr>
<td>C4: Five Point Calibration</td>
<td>Will include five-point calibration at 0, 25, 50, 75, and 100% analog and digital output points.</td>
</tr>
<tr>
<td></td>
<td>Use with option code Q4 to obtain a Calibration Certificate.</td>
</tr>
<tr>
<td>C7: Special Sensor</td>
<td>Used for non-standard sensor, adding a special sensor or expanding input.</td>
</tr>
<tr>
<td></td>
<td>Customer must supply the non-standard sensor information. Additional special curve will be added to sensor curve input choices.</td>
</tr>
<tr>
<td>A1: NAMUR-Compliant, high alarm</td>
<td>Analog output levels compliant with NAMUR. Alarm is set to fail high.</td>
</tr>
<tr>
<td>CN: NAMUR-Compliant, low alarm</td>
<td>Analog output levels compliant with NAMUR. Alarm is set to fail low.</td>
</tr>
<tr>
<td>C8: Low Alarm</td>
<td>Analog output levels compliant with Rosemount standard. Alarm is set to fail low</td>
</tr>
<tr>
<td>F5: 50 Hz Line Filter</td>
<td>Calibrated to 50 Hz line voltage filter.</td>
</tr>
</tbody>
</table>

(1) CDS required
To custom configure the 3144P with the dual-sensor option transmitter for one of the applications described below, indicate the appropriate option code in the model number. If a sensor type is not specified, the transmitter will be configured for two 3-wire Pt 100 ($\alpha = 0.00385$) RTDs if any of the following option codes are selected.

**Option Code U1: Hot Backup**

<table>
<thead>
<tr>
<th>Primary Usage</th>
<th>Primary usage sets the transmitter to automatically use sensor 2 as the primary input if sensor 1 fails. Switching from sensor 1 to sensor 2 is accomplished without any effect on the analog signal.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Variable</td>
<td>1st good</td>
</tr>
<tr>
<td>Secondary Variable</td>
<td>Sensor 1</td>
</tr>
<tr>
<td>Tertiary Variable</td>
<td>Sensor 2</td>
</tr>
<tr>
<td>Quaternary Variable</td>
<td>Terminal Temperature</td>
</tr>
</tbody>
</table>

**Option Code U2: Average Temperature with Hot Backup and Sensor Drift Alert – Warning Mode**

<table>
<thead>
<tr>
<th>Primary Usage</th>
<th>Critical applications, such as safety interlocks and control loops. Outputs the average of two measurements and alerts if temperature difference exceeds the set maximum differential (Sensor Drift Alert – warning mode). If a sensor fails, an alert will be sent digitally. The primary variable will be reported as the remaining working sensor value.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Variable</td>
<td>Sensor Average</td>
</tr>
<tr>
<td>Secondary Variable</td>
<td>Sensor 1</td>
</tr>
<tr>
<td>Tertiary Variable</td>
<td>Sensor 2</td>
</tr>
<tr>
<td>Quaternary Variable</td>
<td>Terminal Temperature</td>
</tr>
</tbody>
</table>

**Option Code U3: Average temperature with Hot Backup and Sensor Drift Alert – Alarm Mode**

<table>
<thead>
<tr>
<th>Primary Usage</th>
<th>Critical applications, such as safety interlocks and control loops. Outputs the average of two measurements and alarms if temperature difference exceeds the set maximum differential (Sensor Drift Alert – alarm mode). If a sensor fails, an alert will be sent digitally. The primary variable will be reported as the remaining working sensor value.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Variable</td>
<td>Sensor Average</td>
</tr>
<tr>
<td>Secondary Variable</td>
<td>Sensor 1</td>
</tr>
<tr>
<td>Tertiary Variable</td>
<td>Sensor 2</td>
</tr>
<tr>
<td>Quaternary Variable</td>
<td>Terminal Temperature</td>
</tr>
</tbody>
</table>

**Option Code U4: Two Independent Sensors**

<table>
<thead>
<tr>
<th>Primary Usage</th>
<th>Used in non-critical applications where the digital output is used to measure two separate process temperatures.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Variable</td>
<td>Sensor 1</td>
</tr>
<tr>
<td>Secondary Variable</td>
<td>Sensor 2</td>
</tr>
<tr>
<td>Tertiary Variable</td>
<td>Terminal Temperature</td>
</tr>
<tr>
<td>Quaternary Variable</td>
<td>Not Used</td>
</tr>
</tbody>
</table>

**Option Code U5: Differential Temperature**

<table>
<thead>
<tr>
<th>Primary Usage</th>
<th>The differential temperature of two process temperatures is configured as the primary variable.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Variable</td>
<td>Differential Temperature</td>
</tr>
<tr>
<td>Secondary Variable</td>
<td>Sensor 1</td>
</tr>
<tr>
<td>Tertiary Variable</td>
<td>Sensor 2</td>
</tr>
<tr>
<td>Quaternary Variable</td>
<td>Terminal Temperature</td>
</tr>
</tbody>
</table>

**Option Code U6: Average Temperature**

<table>
<thead>
<tr>
<th>Primary Usage</th>
<th>When average measurement of two different process temperatures is required. If a sensor fails, an alert will be sent and the primary variable will use the measurement of the working sensor.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Variable</td>
<td>Sensor Average</td>
</tr>
<tr>
<td>Secondary Variable</td>
<td>Sensor 1</td>
</tr>
<tr>
<td>Tertiary Variable</td>
<td>Sensor 2</td>
</tr>
<tr>
<td>Quaternary Variable</td>
<td>Terminal Temperature</td>
</tr>
</tbody>
</table>
**Configuration Data Sheet**

**HART® / 4–20 mA / AND SAFETY CERTIFIED TRANSMITTER**

* = Default Configuration

### Customer Information

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer</td>
<td></td>
</tr>
<tr>
<td>Model No.</td>
<td></td>
</tr>
<tr>
<td>P.O. No.</td>
<td></td>
</tr>
<tr>
<td>Line Item</td>
<td></td>
</tr>
</tbody>
</table>

### Sensor

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>No. of Leads</th>
<th>Sensor 1</th>
<th>No. of Leads</th>
<th>Sensor 2 (dual-sensor option)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pt 100 α = 0.00385</td>
<td>2-Wire</td>
<td>Pt 100 α = 0.00385</td>
<td>2-Wire</td>
<td></td>
</tr>
<tr>
<td>Pt 100 α = 0.003916</td>
<td>3-Wire</td>
<td>Pt 100 α = 0.003916</td>
<td>3-Wire</td>
<td></td>
</tr>
<tr>
<td>Pt 200 α = 0.00385</td>
<td>4-Wire</td>
<td>Pt 200 α = 0.00385</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pt 500 α = 0.00385</td>
<td></td>
<td>Pt 500 α = 0.00385</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pt 1000 α = 0.00385</td>
<td></td>
<td>Pt 1000 α = 0.00385</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cu 10</td>
<td></td>
<td>Cu 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ni 120</td>
<td></td>
<td>Ni 120</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Transmitter Sensor Matching (C2 Option):
- Nonstandard (C7 Option), Attach Calibration Schedule
- Ohms
- NIST Type B T/C
- NIST Type S T/C
- NIST Type E T/C
- NIST Type T T/C
- NIST Type J T/C
- mV
- DIN Type L T/C
- DIN Type U T/C
- Type W5Re/W26Re T/C

Transmitter Sensor Matching (C2 Option):
- Nonstandard (C7 Option), Attach Calibration Schedule
- Ohms
- NIST Type B T/C
- NIST Type S T/C
- NIST Type E T/C
- NIST Type T T/C
- NIST Type J T/C
- mV
- DIN Type L T/C
- DIN Type U T/C
- Type W5Re/W26Re T/C

**Note:** A nonstandard sensor type can only be used for Sensor 1 or Sensor 2, not both.

### 4 mA Value

<table>
<thead>
<tr>
<th>Temperature</th>
<th>°C</th>
<th>°F</th>
<th>°R</th>
<th>°mV</th>
<th>°K</th>
<th>Ohms</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 20 mA Value

<table>
<thead>
<tr>
<th>Temperature</th>
<th>°C</th>
<th>°F</th>
<th>°R</th>
<th>°mV</th>
<th>°K</th>
<th>Ohms</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Damping

- 5 Seconds
- Other ___________ (Value must be less than 32 seconds)

### Tagging

- Hardware Tag ____________________________________________
- Software Tag ____________________________ (8 characters maximum)

### Transmitter Information

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integral Meter (if ordered)</td>
<td>Alternating mA and Engineering Units</td>
</tr>
<tr>
<td>Engineering Units</td>
<td>mA  Alternating Sensor 1 and Sensor 2</td>
</tr>
<tr>
<td>Percent</td>
<td>Sensor 1 Engineering Units</td>
</tr>
<tr>
<td>Percent</td>
<td>Differential Engineering Units</td>
</tr>
<tr>
<td>Percent</td>
<td>Sensor 2 Engineering Units</td>
</tr>
<tr>
<td>Average Engineering Units</td>
<td></td>
</tr>
<tr>
<td>Alternating Differential Temperature, Sensor 1, and Sensor 2</td>
<td></td>
</tr>
</tbody>
</table>

### Descriptor (C1 Option)

- ___________ (16 characters maximum)

### Message (C1 Option)

- ___________ (32 characters maximum)

### Date (C1 Option)

- Day __ __ (numeric)
- Month __ __ (alphabetic)
- Year __ __ (numeric)

### Jumper Selection

- Failure Mode
  - High
  - Low
- Software Security
  - Off
  - On
Signal Selection

4-20 mA with simultaneous digital signal based on HART protocol

- Burst Mode of HART digital process variable
- Burst Mode output options:
  - Primary variable in engineering units
  - Primary variable in percentage of range
  - All dynamic variables in engineering units and the primary variable mA value
- Multidrop communication (Not applicable for Safety Certified transmitter.)
  - Note: This option fixes the transmitter’s analog output at 4 mA.
  - Choose transmitter address for each transmitter (1 - 15) ________________
  - Note: Default transmitter address is 1 if multidrop communication is selected.

Alarm and Saturation Values

- Rosemount Standard
- NAMUR-compliant. Available with option code A1 or CN.
- Custom (option code C1).

- High Alarm Level: __________ mA (must be between 21.0 and 23.0 mA)
- Low Alarm Level: __________ mA (must be between 3.5 and 3.75 mA)
- High Saturation Level: __________ mA (must be between 20.5 mA and the High Alarm Value minus 0.1 mA, 20.5 to 20.9 mA for safety certified)
- Low Saturation Level: __________ mA (must be between the Low Alarm Value plus 0.1 mA and 3.9 mA, minimum 3.7 mA for safety certified)