

# Rosemount 3144P Temperature Transmitter

- *Industry-leading temperature transmitter delivers unmatched field reliability and innovative process measurement solutions*
- *Achieve optimal efficiency with Best-in-Class product specifications and capabilities*
- *A comprehensive diagnostic offering increases measurement reliability and provides visibility into process conditions*
- *Explore the benefits of a Complete Point Solution from Rosemount Temperature*



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## Rosemount 3144P Temperature Transmitter

### Industry-leading temperature transmitter delivers unmatched field reliability and innovative process measurement solutions

- Superior accuracy and stability
- Dual and single sensor capability with universal sensor inputs (RTD, T/C, mV, ohms)
- Comprehensive sensor and process diagnostics offering
- IEC 61508 safety certification
- Dual-compartment housing
- Large LCD display
- HART/4-20 mA or FOUNDATION fieldbus protocols



### Achieve optimal efficiency with Best-in-Class product specifications and capabilities

- An industry-leading accuracy specification and five-year stability rating reduces maintenance costs
- **Transmitter-Sensor Matching** eliminates the interchangeability error of sensors, improving measurement point accuracy by 75%
- PlantWeb alerts and user-centric Device Dashboards communicate important diagnostics and ensure process health
- Local LCD display enables viewing of configuration and diagnostics from the field
- Compensation for ambient temperatures enhances transmitter performance
- Dual-compartment housing provides the highest reliability in harsh industrial environments



### A comprehensive diagnostic offering increases measurement reliability and provides visibility into process conditions

- **Thermocouple Degradation Diagnostic** monitors the health of a thermocouple loop, enabling preventative maintenance
- **Minimum and Maximum Temperature Tracking** tracks and records temperature extremes of the process sensors and the ambient environment
- **Sensor Drift Alert** detects sensor drift and alerts the user
- **Hot Backup<sup>®</sup>** provides temperature measurement redundancy

## Product Data Sheet

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November 2010

# Rosemount 3144P

### Explore the benefits of a Complete Point Solution from Rosemount Temperature

- An “Assemble To Sensor” option enables Emerson to provide a complete point temperature solution, delivering an installation-ready transmitter and sensor assembly
- Emerson offers a selection of RTDs, thermocouples, and thermowells that bring superior durability and Rosemount reliability to temperature sensing, complementing the Rosemount Transmitter portfolio



### Experience global consistency and local support from numerous worldwide Rosemount Temperature manufacturing sites



- World-class manufacturing provides globally consistent product from every factory and the capacity to fulfill the needs of any project, large or small
- Experienced Instrumentation Consultants help select the right product for any temperature application and advise on best installation practices
- An extensive global network of Emerson service and support personnel can be on-site when and where they are needed

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- Looking for a wireless temperature solution? For wireless applications that require superior performance and unmatched reliability, consider the **Rosemount 648 Wireless** temperature transmitter.
  - A demanding high temperature application requires an innovative temperature solution. Pair the 3144P Thermocouple Diagnostic with the **Rosemount 1075 High Temperature Thermocouple**.
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# Rosemount 3144P

## Rosemount 3144P Temperature Transmitter



The industry-leading Rosemount 3144P Single Point temperature transmitter delivers unmatched field reliability and innovative process measurement solutions and diagnostics

Transmitter features include:

- Dual and Single Sensor Input Capabilities
- Transmitter-Sensor Matching (Option Code C2)
- Integral Transient Protector (Option Code T1)
- IEC 61508 Safety Certificate of Compliance (Option Code QT)
- Advanced Sensor and Process Diagnostics (Option Code D01)
- Large, Easy to Read LCD Display (Option Code M5)
- “Assemble to Sensor” option (Option Code XA)

Table 1. Rosemount 3144P Temperature Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Model	Product Description			
3144P	Temperature Transmitter			
<b>Housing Style</b>		<b>Material</b>	<b>Conduit Entry Size</b>	
<b>Standard</b>				<b>Standard</b>
D1	Field Mount Housing, Dual-Compartment Housing	Aluminum	1/2-14 NPT	★
D2	Field Mount Housing, Dual-Compartment Housing	Aluminum	M20 x 1.5 (CM20)	★
D3	Field Mount Housing, Dual-Compartment Housing	Aluminum	PG 13.5 (PG11)	★
D4	Field Mount Housing, Dual-Compartment Housing	Aluminum	JIS G 1/2	★
D5	Field Mount Housing, Dual-Compartment Housing	Stainless Steel	1/2-14 NPT	★
D6	Field Mount Housing, Dual-Compartment Housing	Stainless Steel	M20 x 1.5 (CM20)	★
D7	Field Mount Housing, Dual-Compartment Housing	Stainless Steel	PG 13.5 (PG11)	★
D8	Field Mount Housing, Dual-Compartment Housing	Stainless Steel	JIS G 1/2	★
<b>Transmitter Output</b>				
<b>Standard</b>				<b>Standard</b>
A	4-20 mA with digital signal based on HART protocol			★
F	FOUNDATION fieldbus digital signal (includes 3 AI function block and Backup Link Active Scheduler)			★
<b>Measurement Configuration</b>				
<b>Standard</b>				<b>Standard</b>
1	Single-Sensor Input			★
2	Dual-Sensor Input			★
<b>Product Certifications</b>				
<b>Standard</b>				<b>Standard</b>
NA	No Approval			★
E5	FM Explosion-proof, Dust Ignition-Proof, and Non-incendive approval			★
I5 <sup>(1)</sup>	FM Intrinsically Safe and Non-incendive (includes standard IS and FISCO for fieldbus units)			★
K5 <sup>(1)</sup>	FM IS, Non-incendive & Explosion-proof combo (includes standard IS and FISCO for fieldbus units)			★
KB <sup>(1)</sup>	FM and CSA IS, Explosion-proof, and Non-incendive combo (includes standard IS and FISCO for FF units)			★
I6 <sup>(1)</sup>	CSA Intrinsically Safe/FISCO and Division 2 (includes standard IS and FISCO for fieldbus units)			★
K6 <sup>(1)</sup>	CSA IS, FISCO Division 2 and Explosion-proof combo (includes standard IS, FISCO for fieldbus units)			★
E1	ATEX Flameproof approval			★
N1	ATEX type n approval			★
I1 <sup>(1)</sup>	ATEX intrinsic safety approval (includes standard IS and FISCO for fieldbus units)			★

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K1 <sup>(1)</sup>	ATEX IS, Flameproof, Dust Ignition-Proof and type n combo (includes standard IS and FISCO for fieldbus units)	★
ND	ATEX Dust Ignition-Proof approval	★
KA <sup>(1)</sup>	ATEX/CSA intrinsic safety, Explosion-proof combo (includes standard IS and FISCO for fieldbus units)	★
E7	IECEX Flameproof approval	★
N7	IECEX Type 'n' approval	★
I7 <sup>(1)(2)</sup>	IECEX Intrinsic Safety	★
K7 <sup>(1)(2)</sup>	IECEX Intrinsic Safety, Flameproof, Dust Ignition-Proof and Type n combination	★
E2 <sup>(2)</sup>	INMETRO Flameproof	★
I2 <sup>(2)(5)</sup>	INMETRO Intrinsic safety	★
E4 <sup>(2)</sup>	TIIS Flameproof approval	★
E3 <sup>(2)</sup>	NEPSI Flameproof approval	★
I3 <sup>(1)(2)</sup>	NEPSI Intrinsic safety	★

## Options (Include with selected model number)

<b>PlantWeb Control Functionality</b>		
<b>Standard</b>		<b>Standard</b>
A01	FOUNDATION fieldbus Advanced Control Function Block Suite	★
<b>PlantWeb Advanced Diagnostic Functionality</b>		
<b>Standard</b>		<b>Standard</b>
D01	Diagnostics Suite: Statistical Process Monitoring (SPM), Thermocouple Diagnostic, Min/Max Tracking – FOUNDATION fieldbus only	★
<b>Mounting Bracket</b>		
<b>Standard</b>		<b>Standard</b>
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	★
<b>Display</b>		
<b>Standard</b>		<b>Standard</b>
M5	LCD Display	★
<b>External Ground</b>		
<b>Standard</b>		<b>Standard</b>
G1	External Ground Lug Assembly (See "External Ground Screw Assembly" on page 7.)	★
<b>Transient Protector</b>		
<b>Standard</b>		<b>Standard</b>
T1	Integral Transient Protector	★
<b>Software Configuration</b>		
<b>Standard</b>		<b>Standard</b>
C1 <sup>(3)</sup>	Custom Configuration of Date, Descriptor and Message (Requires CDS with order)	★
<b>Line Filter</b>		
<b>Standard</b>		<b>Standard</b>
F5	50 Hz Line Voltage Filter	★
<b>Alarm Level Configuration</b>		
<b>Standard</b>		<b>Standard</b>
A1	NAMUR alarm and saturation levels, high alarm	★
CN	NAMUR alarm and saturation levels, low alarm	★
<b>Low Alarm</b>		
<b>Standard</b>		<b>Standard</b>
C8	Low Alarm (Standard Rosemount Alarm and Saturation Values)	★
<b>Sensor Trim</b>		
<b>Standard</b>		<b>Standard</b>
C2	Transmitter-Sensor Matching – Trim to Specific Rosemount RTD Calibration Schedule (CVD constants)	★
<b>Expanded</b>		
C7	Trim to Non-Standard Sensor (Special Sensor—Customer must provide sensor information)	
<b>5-Point Calibration</b>		
<b>Standard</b>		<b>Standard</b>
C4	5-Point Calibration (Requires the Q4 option code to generate a Calibration Certificate)	★

HART and FOUNDATION Fieldbus

# Rosemount 3144P

Table 1. Rosemount 3144P Temperature Transmitter Ordering Information

★ The Standard offering represents the most common options. The starred options (★) should be selected for best delivery. The Expanded offering is subject to additional delivery lead time.

Calibration Certification		
<b>Standard</b>		<b>Standard</b>
Q4	Calibration Certificate (3-Point Calibration)	★
QP	Calibration Certificate and Tamper Evident Seal	★
Dual-Input Custom Configuration (only with measurement type option code 2)		
<b>Standard</b>		<b>Standard</b>
U1 <sup>(4)</sup>	Hot Backup	★
U2 <sup>(5)</sup>	Average temperature with Hot Backup and Sensor Drift Alert – warning mode	★
U3 <sup>(5)</sup>	Average temperature with Hot Backup and Sensor Drift Alert – alarm mode	★
U5	Differential temperature	★
U6 <sup>(4)</sup>	Average temperature	★
U7 <sup>(4)</sup>	First good temperature	★
<b>Expanded</b>		
U4	Two independent sensors	
Quality Certification for Safety		
<b>Standard</b>		<b>Standard</b>
QS	Prior-use certificate of FMEDA data (HART Only)	★
QT	Safety-certified to IEC 61508 with certificate of FMEDA data (HART only)	★
Conduit Electrical Connector		
<b>Standard</b>		<b>Standard</b>
GE <sup>(6)</sup>	M12, 4-pin, Male Connector ( <i>euromast</i> <sup>®</sup> )	★
GM <sup>(6)</sup>	A size Mini, 4-pin, Male Connector ( <i>minifast</i> <sup>®</sup> )	★
Assemble To Options		
<b>Standard</b>		<b>Standard</b>
XA	Sensor Specified Separately and Assembled to Transmitter	★
<b>Typical Model Number: 3144P D1 A 1 E5 B4 M5</b>		

(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 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 4X rating.

# Transmitter Specifications

## HART® AND FOUNDATION™ FIELDBUS

### Functional Specifications

#### Inputs

User-selectable. See "Transmitter Accuracy" on page 8 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 5.0.1 compliant).

#### Isolation

Input/output isolation specified to 500 Vdc (500 Vrms 707 V peak) at 50/60 Hz.

#### Humidity Limits

0–99% relative humidity.

#### Update Time

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

### Physical Specifications

#### Conduit Connections

The standard field mount housing has ½–14 NPT conduit entries. Additional conduit entry types 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 18 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 19.

#### Weight

Aluminum <sup>(1)</sup>	Stainless Steel <sup>(1)</sup>
3.1 lb (1.4 kg)	7.8 lb (3.5 kg)

<sup>(1)</sup> Add 0.5 lb (0.2 kg) for local display or 1.0 lb (0.5 kg) for bracket options.

#### Enclosure Ratings

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 per IEC 60770-1, 1999:

Frequency	Acceleration
10–60 Hz	0.21 mm peak displacement
60–2000 Hz	3 g

#### 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 8, when tested in accordance with IEC 61000-4-3, 30 V/m (HART) / 20 V/m (HART T/C) / 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: 2006.

#### External Ground Screw Assembly

The external ground screw assembly can be ordered by specifying code G1. 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.

Approval Type	External Ground Screw Assembly Included? <sup>(1)</sup>
E5, I1, I2, I5, I6, I7, K5, K6, KB, NA	No—Order option code G1
E1, E2, E3, E4, E7, K1, K7, KA, N1, N7, ND, NF	Yes

<sup>(1)</sup> The parts contained with the G1 option are included with the Integral Protector option code T1. When ordering T1, the G1 option code does not need to be ordered separately.

HART and FOUNDATION Fieldbus

# Rosemount 3144P

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HART and FOUNDATION Fieldbus

## 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.

## Transmitter Accuracy

Sensor Options	Sensor Reference	Input Ranges		Minimum Span <sup>(1)</sup>		Digital Accuracy <sup>(2)</sup>		D/A Accuracy <sup>(3)(4)</sup>
		°C	°F	°C	°F	°C	°F	
<b>2-, 3-, 4-wire RTDs</b>								
Pt 100 ( $\alpha = 0.00385$ )	IEC 751	-200 to 850	-328 to 1562	10	18	± 0.10	± 0.18	±0.02% of span
Pt 200 ( $\alpha = 0.00385$ )	IEC 751	-200 to 850	-328 to 1562	10	18	± 0.22	± 0.40	±0.02% of span
Pt 500 ( $\alpha = 0.00385$ )	IEC 751	-200 to 850	-328 to 1562	10	18	± 0.14	± 0.25	±0.02% of span
Pt 1000 ( $\alpha = 0.00385$ )	IEC 751	-200 to 300	-328 to 572	10	18	± 0.10	± 0.18	±0.02% of span
Pt 100 ( $\alpha = 0.003916$ )	JIS 1604	-200 to 645	-328 to 1193	10	18	± 0.10	± 0.18	±0.02% of span
Pt 200 ( $\alpha = 0.003916$ )	JIS 1604	-200 to 645	-328 to 1193	10	18	± 0.22	± 0.40	±0.02% of span
Ni 120	Edison Curve No. 7	-70 to 300	-94 to 572	10	18	± 0.08	± 0.14	±0.02% of span
Cu 10	Edison Copper Winding No. 15	-50 to 250	-58 to 482	10	18	±1.00	± 1.80	±0.02% of span
Pt 50 ( $\alpha=0.00391$ )	GOST 6651-94	-200 to 550	-328 to 1022	10	18	±0.20	±0.36	±0.02% of span
Pt 100 ( $\alpha=0.00391$ )	GOST 6651-94	-200 to 550	-328 to 1022	10	18	±0.10	±0.18	±0.02% of span
Cu 50 ( $\alpha=0.00426$ )	GOST 6651-94	-50 to 200	-122 to 392	10	18	±0.34	±0.61	±0.02% of span
Cu 50 ( $\alpha=0.00428$ )	GOST 6651-94	-185 to 200	-365 to 392	10	18	±0.34	±0.61	±0.02% of span
Cu 100 ( $\alpha=0.00426$ )	GOST 6651-94	-50 to 200	-122 to 392	10	18	±0.17	±0.31	±0.02% of span
Cu 100 ( $\alpha=0.00428$ )	GOST 6651-94	-185 to 200	-365 to 392	10	18	±0.17	±0.31	±0.02% of span
<b>Thermocouples<sup>(5)</sup></b>								
Type B <sup>(6)</sup>	NIST Monograph 175, IEC 584	100 to 1820	212 to 3308	25	45	± 0.75	± 1.35	±0.02% of span
Type E	NIST Monograph 175, IEC 584	-50 to 1000	-58 to 1832	25	45	± 0.20	± 0.36	±0.02% of span
Type J	NIST Monograph 175, IEC 584	-180 to 760	-292 to 1400	25	45	± 0.25	± 0.45	±0.02% of span
Type K <sup>(7)</sup>	NIST Monograph 175, IEC 584	-180 to 1372	-292 to 2502	25	45	± 0.25	± 0.45	±0.02% of span
Type N	NIST Monograph 175, IEC 584	-200 to 1300	-328 to 2372	25	45	± 0.40	± 0.72	±0.02% of span
Type R	NIST Monograph 175, IEC 584	0 to 1768	32 to 3214	25	45	± 0.60	± 1.08	±0.02% of span
Type S	NIST Monograph 175, IEC 584	0 to 1768	32 to 3214	25	45	± 0.50	± 0.90	±0.02% of span
Type T	NIST Monograph 175, IEC 584	-200 to 400	-328 to 752	25	45	± 0.25	± 0.45	±0.02% of span
DIN Type L	DIN 43710	-200 to 900	-328 to 1652	25	45	± 0.35	± 0.63	±0.02% of span
DIN Type U	DIN 43710	-200 to 600	-328 to 1112	25	45	± 0.35	± 0.63	±0.02% of span
Type W5Re/W26Re	ASTM E 988-96	0 to 2000	32 to 3632	25	45	± 0.70	± 1.26	±0.02% of span
GOST Type L	GOST R 8.585-2001	-200 to 800	-392 to 1472	25	45	± 0.25	± 0.45	±0.02% of span
<b>Other Input Types</b>								
Millivolt Input		-10 to 100 mV		3 mV		±0.015 mV		±0.02% of span
2-, 3-, 4-wire Ohm Input		0 to 2000 ohms		20 ohm		±0.35 ohm		±0.02% of span

(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 Field Communicator.

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

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

(5) Total digital accuracy for thermocouple measurement: sum of digital accuracy +0.25 °C (0.45 °F) (cold junction accuracy).

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

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



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## 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  $\pm 0.10$  °C, D/A accuracy would be  $\pm 0.02\%$  of 100 °C or  $\pm 0.02$  °C, Total =  $\pm 0.12$  °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.

## 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.

## Digital Accuracy for Differential Configurations (dual-sensor option, HART only)

- Sensor types are similar (e.g., both RTDs or both T/Cs): Digital Accuracy = 1.5 times worst case accuracy of either sensor type.
- Sensor types are dissimilar (e.g., one RTD, one T/C): Digital Accuracy = Sensor 1 Accuracy + Sensor 2 Accuracy.

Table 2. Ambient Temperature Effect on Digital Accuracy

Sensor Options	Sensor Reference	Effect per 1.0 °C (1.8 °F) Change in Ambient <sup>(1)</sup>	Input Temperature (T)	D/A Effect <sup>(2)</sup>
<b>2-, 3-, or 4- Wire RTDs</b>				
Pt 100 ( $\alpha = 0.00385$ )	IEC 751	0.0015 °C (0.0027 °F)	Entire Sensor Input Range	0.001% of span
Pt 200 ( $\alpha = 0.00385$ )	IEC 751	0.0023 °C (0.00414 °F)	Entire Sensor Input Range	0.001% of span
Pt 500 ( $\alpha = 0.00385$ )	IEC 751	0.0015 °C (0.0027 °F)	Entire Sensor Input Range	0.001% of span
Pt 1000 ( $\alpha = 0.00385$ )	IEC 751	0.0015 °C (0.0027 °F)	Entire Sensor Input Range	0.001% of span
Pt 100 ( $\alpha = 0.003916$ )	JIS 1604	0.0015 °C (0.0027 °F)	Entire Sensor Input Range	0.001% of span
Pt 200 ( $\alpha = 0.003916$ )	JIS 1604	0.0023 °C (0.00414 °F)	Entire Sensor Input Range	0.001% of span
Ni 120	Edison Curve No. 7	0.0010 °C (0.0018 °F)	Entire Sensor Input Range	0.001% of span
Cu 10	Edison Copper Winding No. 15	0.015 °C (0.027 °F)	Entire Sensor Input Range	0.001% of span
Pt 50 ( $\alpha = 0.00391$ )	GOST 6651-94	0.003 °C (0.0054 °F)	Entire Sensor Input Range	0.001% of span
Pt 100 ( $\alpha = 0.00391$ )	GOST 6651-94	0.0015 °C (0.0027 °F)	Entire Sensor Input Range	0.001% of span
Cu 50 ( $\alpha = 0.00426$ )	GOST 6651-94	0.003 °C (0.0054 °F)	Entire Sensor Input Range	0.001% of span
Cu 50 ( $\alpha = 0.00428$ )	GOST 6651-94	0.003 °C (0.0054 °F)	Entire Sensor Input Range	0.001% of span
Cu 100 ( $\alpha = 0.00426$ )	GOST 6651-94	0.0015 °C (0.0027 °F)	Entire Sensor Input Range	0.001% of span
Cu 100 ( $\alpha = 0.00428$ )	GOST 6651-94	0.0015 °C (0.0027 °F)	Entire Sensor Input Range	0.001% of span
<b>Thermocouples</b>				
Type B	NIST Monograph 175, IEC 584	0.014 °C 0.029 °C – 0.0021% of (T – 300) 0.046 °C – 0.0086% of (T – 100)	$T \geq 1000$ °C $300$ °C $\leq T < 1000$ °C $100$ °C $\leq T < 300$ °C	0.001% of span
Type E	NIST Monograph 175, IEC 584	0.004 °C + 0.00043% of T		0.001% of span
Type J	NIST Monograph 175, IEC 584	0.004 °C + 0.00029% of T 0.004 °C + 0.0020% of abs. val. T	$T \geq 0$ °C $T < 0$ °C	0.001% of span
Type K	NIST Monograph 175, IEC 584	0.005 °C + 0.00054% of T 0.005 °C + 0.0020% of abs. val. T	$T \geq 0$ °C $T < 0$ °C	0.001% of span
Type N	NIST Monograph 175, IEC 584	0.005 °C + 0.00036% of T	All	0.001% of span
Types R	NIST Monograph 175, IEC 584	0.015 °C 0.021 °C – 0.0032% of T	$T \geq 200$ °C $T < 200$ °C	0.001% of span
Types S	NIST Monograph 175, IEC 584	0.015 °C 0.021 °C – 0.0032% of T	$T \geq 200$ °C $T < 200$ °C	0.001% of span
Type T	NIST Monograph 175, IEC 584	0.005 °C 0.005 °C + 0.0036% of abs. val. T	$T \geq 0$ °C $T < 0$ °C	0.001% of span
DIN Type L	DIN 43710	0.0054 °C + 0.00029% of R 0.0054 °C + 0.0025% of abs. val. T	$T \geq 0$ °C $T < 0$ °C	0.001% of span
DIN Type U	DIN 43710	0.0064 °C 0.0064 °C + 0.0043% of abs. val. T	$T \geq 0$ °C $T < 0$ °C	0.001% of span
Type W5Re/W26Re	ASTM E 988-96	0.016 °C 0.023 °C + 0.0036% of T	$T \geq 200$ °C $T < 200$ °C	0.001% of span
GOST Type L	GOST R 8.585-2001	0.005 > 0 °C 0.005 - 0.003% < 0 °C		0.001% of span
<b>Other Input Types</b>				
Millivolt Input		0.00025 mV	Entire Sensor Input Range	0.001% of span
2-, 3-, 4-wire Ohm Input		0.007 $\Omega$	Entire Sensor Input Range	0.001% of span

(1) Change in ambient is in reference to the calibration temperature of the transmitter (20 °C [68 °F])  
(2) Applies to HART / 4-20 mA devices.

HART and FOUNDATION Fieldbus

# Rosemount 3144P

## Temperature Effects Example

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

### Digital Temp Effects

$$\bullet 0.0015 \frac{^{\circ}\text{C}}{^{\circ}\text{C}} \times (30\text{ }^{\circ}\text{C} - 20\text{ }^{\circ}\text{C}) = 0.015\text{ }^{\circ}\text{C}$$

### D/A Effects (HART / 4–20 mA only)%

- $[0.01\% / ^{\circ}\text{C of span}] \times |(\text{Ambient temp} - \text{Calibrated temp})| = \text{D/A Effects}$
- $[0.01\% / ^{\circ}\text{C} \times 100] \times |(30 - 20)| = 0.01\text{ }^{\circ}\text{C}$

## Worst Case Error

- Digital + D/A + Digital Temp Effects + D/A Effects =  $0.10\text{ }^{\circ}\text{C} + 0.02\text{ }^{\circ}\text{C} + 0.015\text{ }^{\circ}\text{C} + 0.01\text{ }^{\circ}\text{C} = 0.145\text{ }^{\circ}\text{C}$

## Total Probable Error

$$\sqrt{0.10^2 + 0.02^2 + 0.015^2 + 0.01^2} = 0.10\text{ }^{\circ}\text{C}$$

## HART / 4–20 MA SPECIFICATIONS

### Power Supply

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

### Wiring Diagram

See Figure 1 on page 20.

### 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 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 ( $1.2 \times 50\text{ }\mu\text{S}$  Wave  $8 \times 20\text{ }\mu\text{S}$  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 Field Communicator or AMS.

### Turn-on Time

Performance within specifications is achieved less than 6 seconds after power is applied to the transmitter when the damping value is set to 0 seconds.

## Power Supply Effect

Less than  $\pm 0.005\%$  of span per volt.

## SIS Safety Transmitter Failure Values

IEC 61508 Safety Certified SIL 2 and SIL 3 Claim Limit

- Safety accuracy: 2.0%<sup>(1)</sup> 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](http://www.rosemount.com/safety)
- Software suitable for SIL3 Applications

- (1) Trip values in the DCS or safety logic solver should be derated by 2%. A 2% variation of the transmitter mA output is allowed before a safety trip.

## Temperature Limits

Description	Operating Limit	Storage Limit
Without LCD	–40 to 185 °F –40 to 85 °C	–60 to 250 °F –50 to 120 °C
With LCD <sup>(1)</sup>	–4 to 185 °F –20 to 85 °C	–40 to 185 °F –40 to 85 °C

(1) LCD display may not be readable and LCD updates will be slower at temperatures below –4 °F (–20 °C).

## Field Communicator Connections

Field Communicator connections are permanently fixed to power/signal block.

## Failure Mode

The 3144P features software and hardware failure mode detection. An independent circuit is designed to provide backup alarm output if the microprocessor hardware or software fails.

The alarm level is user-selectable using the failure mode switch. If failure occurs, the position of the hardware switch determines the direction in which the output is driven (HIGH or LOW). The switch feeds into the digital-to-analog (D/A) converter, which drives the proper alarm output even if the microprocessor fails. The values at which the transmitter drives its output in failure mode depends on whether it is configured to standard, or NAMUR-compliant (NAMUR recommendation NE 43) operation. The values for standard and NAMUR-compliant operation are as follows:

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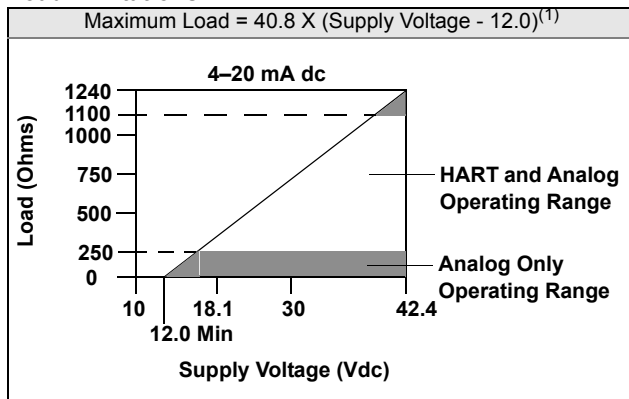
# Rosemount 3144P

Table 3. Operation Parameters

	Standard <sup>(1)</sup>	NAMUR-Compliant <sup>(1)</sup>
Linear Output:	$3.9 \leq I \leq 20.5$	$3.8 \leq I \leq 20.5$
Fail HIGH:	$21.75 \leq I \leq 23$ (default)	$21.5 \leq I \leq 23$ (default)
Fail Low:	$I \leq 3.75$	$I \leq 3.6$

(1) Measured in milliamperes

## Load Limitations



(1) Without transient protection (optional).

### NOTE

HART Communication requires a loop resistance between 250 and 1100 ohms. Do not communicate with the transmitter when power is below 12 Vdc at the transmitter terminals.

## FOUNDATION FIELDBUS SPECIFICATIONS

### Power Supply

Powered over FOUNDATION fieldbus with standard fieldbus power supplies. Transmitters operate on 9.0 to 32.0 Vdc, 12 mA maximum. Transmitter power terminals are rated to 42.4 Vdc.

### Wiring Diagram

See Figure 2 on page 20.

### 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 ( $1.2 \times 50 \mu\text{S}$  Wave  $8 \times 20 \mu\text{S}$  Combination Wave)  
6kV/0.5kA peak (100 kHz Ring Wave)  
EFT, 4kVpeak, 2.5kHz,  $5 \times 50\text{nS}$
- Loop resistance added by protector: 22 ohms maximum
- Nominal clamping voltages: 90 V (common mode), 77 V (normal mode)

### Diagnostics Suite for FOUNDATION fieldbus (Option Code D01)

The 3144P Diagnostics Suite for FOUNDATION fieldbus provides advanced functionality in the form of Statistical Process Monitoring (SPM), a thermocouple Diagnostic, and Sensor Drift Alert. SPM technology calculates the mean and standard deviation of the process variable and makes them available to the user. This may be used to detect abnormal process situations.

The Thermocouple Diagnostic enables the 3144P to measure and monitor the resistance of thermocouple loops in order to detect drift or changing wiring connections.

Sensor Drift Alert allows the user to monitor the difference in measurement between two sensors installed in one process point. A change in this differential value may indicate drifting sensors.

### 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 ( $^{\circ}\text{F}$ ,  $^{\circ}\text{C}$ ,  $^{\circ}\text{R}$ , K,  $\Omega$ , 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 Field Communicator or DeltaV. In addition, 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.

**Note:** When ordering a spare electronics module assembly, the LCD transducer block will display the default parameter.

### 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.

### FOUNDATION Fieldbus Parameters

Schedule Entries	25 (max.)
Links	30 (max.)
Virtual Communications Relationships (VCR)	20 (max.)

HART  
4-20 mA

# Rosemount 3144P

## 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.

Block	Execution Time
Resource	–
Transducer	–
LCD Block	–
Advanced Diagnostics	–
Analog Input 1, 2, 3	60 milliseconds
PID 1 and 2 with Autotune	90 milliseconds
Input Selector	65 milliseconds
Signal Characterizer	45 milliseconds
Arithmetic	60 milliseconds
Output Splitter	60 milliseconds

## 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 most recent revision of the European Union Declaration of Conformity can be found at [www.emersonprocess.com](http://www.emersonprocess.com).

#### ATEX Directive (94/9/EC)

Rosemount Inc. complies with the ATEX Directive.

#### Electro Magnetic Compatibility (EMC) (2004/108/EC)

EN 61326-2-3:2006 and EN 61326-1:2006

#### Hazardous Locations Installations

##### North American Certifications

###### Factory Mutual (FM) Approvals

- E5 FM Explosion-proof, Dust Ignition-proof and Non-Incendive  
 Certificate Number: 3012752  
 Explosion-proof for Class I, Division 1, Groups A, B, C, D.  
 Dust Ignition-Proof for use in Class II/III, Division 1, Groups E, F, and G.  
 Temperature Code: T5 ( $T_{amb} = -50$  to  $85$  °C)  
 Explosion-proof and Dust Ignition-proof when installed in accordance with Rosemount drawing 03144-0320. Indoor and outdoor use. Type 4X.

#### NOTE

For Group A, seal all conduits within 18 inches of enclosure; otherwise, conduit seal not required for compliance with NEC 501-15(A)(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.

Temperature Codes: T5 ( $T_{amb} = -60$  to  $85$  °C)  
 T6 ( $T_{amb} = -60$  to  $60$  °C)

Non-incendive when installed in accordance with Rosemount drawing 03144-0321.

- 15 FM Intrinsically Safe and Non-incendive  
 Certificate Number: 3012752  
 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  $60$  °C)  
 T5 ( $T_{amb} = -60$  to  $50$  °C)  
 Zone Marking: Class I, Zone 0, AEx ia IIC  
 Temperature Code: T4 ( $T_{amb} = -50$  to  $60$  °C)  
 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.

Temperature Codes: T6 ( $T_{amb} = -60$  to  $60$  °C)  
 T5 ( $T_{amb} = -60$  to  $85$  °C)

Intrinsically Safe and Non-incendive when installed in accordance with Rosemount drawing 03144-0321.

##### Canadian Standards Association (CSA) Approvals

- I6 CSA Intrinsically Safe and Division 2  
 Certificate Number: 1242650  
 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 (Zone 1)  
 Certificate Number: KEMA01ATEX2181X  
 ATEX Category Marking  $\text{Ex} \text{II} 2 \text{G}$   
 Ex d IIC T6 ( $T_{amb} = -40$  to  $70$  °C)  
 Ex d IIC T5 ( $T_{amb} = -40$  to  $80$  °C)  
 Maximum Supply Voltage: 42.4 Vdc

#### Special Conditions for Safe Use (X):

For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

- I1 ATEX Intrinsic Safety (Zone 0)  
 Certificate Number: BAS01ATEX1431X  
 ATEX Category Marking  $\text{Ex} \text{II} 1 \text{G}$   
 Ex ia IIC T6 ( $T_{amb} = -60$  to  $50$  °C)  
 Ex ia IIC T5 ( $T_{amb} = -60$  to  $75$  °C)

Table 4. Input Entity Parameters

Power/Loop		Sensor	
$U_i = 30$ Vdc	$C_i = 5$ nF	$U_o = 13.6$ V	$C_i = 78$ nF
$I_i = 300$ mA	$L_i = 0$	$I_o = 56$ mA	$L_i = 0$
$P_i = 1.0$ W		$P_o = 190$ mW	

#### Special Conditions for Safe Use (X):

The transmitter is not capable of withstanding the 500 V insulation test as defined in Clause 6.4.12 of EN50 020. This condition must be taken into account during installation.

- N1 ATEX Type n (Zone 2)  
 Certificate Number: BAS01ATEX3432X  
 ATEX Category Marking  $\text{Ex} \text{II} 3 \text{G}$   
 Ex nL IIC T6 ( $T_{amb} = -40$  to  $50$  °C)  
 Ex nL IIC T5 ( $T_{amb} = -40$  to  $75$  °C)  
 $U_i = 42.4$  V



**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.

- ND ATEX Dust Ignition-proof  
Certificate Number: KEMA01ATEX2205  
ATEX Category Marking  $\text{Ex}$  II 1 D  
Ex tD A20 IP66 T95 °C ( $T_{\text{amb}} = -40$  to 80 °C)  
Maximum Supply Voltage: 42.4 Vdc

**International Certifications**

*IECEX Certifications*

- E7 IECEX Flameproof  
Certificate Number: IECEX KEM 09.0035X  
Ex d IIC T6 ( $T_{\text{amb}} = -40$  to 70 °C)  
Ex d IIC T5 ( $T_{\text{amb}} = -40$  to 80 °C)  
Maximum Supply Voltage: 42.4 V

**Special Conditions for Safe Use (X):**

For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

- I7 IECEX Intrinsic Safety  
Certificate Number: IECEX BAS 07.0002X  
Ex ia IIC T6 ( $T_{\text{amb}} = -60$  to 50 °C)  
Ex ia IIC T5 ( $T_{\text{amb}} = -60$  to 75 °C)

Table 5. Input Entity Parameters

Power/Loop		Sensor	
$U_i = 30$ V	$C_i = 5$ nF	$U_o = 13.6$ V	$C_i = 78$ nF
$I_i = 300$ mA	$L_i = 0$	$I_o = 56$ mA	$L_i = 0$
$P_i = 1.0$ W		$P_o = 190$ mW	

**Special Conditions for Safe Use (X):**

When fitted with the transient terminal options, the apparatus is not capable of withstanding the 500 V electrical strength test as defined in Clause 6.4.12 of IEC 60079-11: 1999. This must be taken into account during installation.

- N7 IECEX Type n  
Certificate Number: IECEX BAS 07.0003X  
Ex nA nL IIC T6 ( $T_{\text{amb}} = -40$  to 50 °C)  
Ex nA nL IIC T5 ( $T_{\text{amb}} = -40$  to 75 °C)  
 $U_i = 42.4$  V

**Special Conditions for Safe Use (x):**

When fitted with the transient terminal options, the apparatus is not capable of withstanding the 500 V electrical strength test as defined in Clause 6.8.1 of IEC 60079-15: 2005. This must be taken into account during installation.

- NF IECEX Dust Ignition-proof  
Certificate Number: IECEX KEM 09.0036  
Ex tD A20 IP66 T95 °C ( $T_{\text{amb}} = -40$  to 80 °C)  
Maximum Supply Voltage: 42.4 Vdc  
Consult factory for NF availability

**Brazilian Certifications**

*Centro de Pesquisas de Energia Eletrica (CEPEL) Approval*

- E2 INMETRO Flameproof  
Certificate Number: CEPEL-EX-0307/2004X  
BR-Ex d IIC T6 ( $T_{\text{amb}} = -40$  to 65 °C)  
BR-Ex d IIC T5 ( $T_{\text{amb}} = -40$  to 80 °C)

**Special Conditions for Safe Use (X):**

1. The accessory of cable entries or conduit must be certified as flameproof and needs to be suitable for use conditions.
2. For ambient temperature above 60 °C, cable wiring must have minimum isolation temperature 90 °C, to be in accordance to equipment operation temperature.
3. Where electrical entry is via conduit, the required sealing device must be assembled immediately close to enclosure.

- I2 INMETRO Intrinsic Safety  
Certificate Number: CEPEL-Ex-0723/05X  
BR-Ex ia IIC T6 ( $T_{\text{amb}} = -60$  to 50 °C)  
BR-Ex ia IIC T5 ( $T_{\text{amb}} = -60$  to 75 °C)  
Enclosure: IP66W

**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 500 V test.

**Japanese Certifications**

- E4 TIIS Flameproof  
Various certificates and configurations available. Consult factory for certified assemblies.

**China (NEPSI) Certifications**

- E3 China Flameproof  
Certificate Number: GYJ06583/GYJ06584  
Ex d IIC T6

**NOTE**

For Special Conditions for Safe Use, please reference the Rosemount 3144P Product Manual or Quick Installation Guide.

- I3 China Intrinsic Safety  
Certificate Number: GYJ06586/GYJ06587  
Ex ia IIC T4

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# Rosemount 3144P

### NOTE

For Special Conditions for Safe Use, please reference the Rosemount 3144P Product Manual or Quick Installation Guide.

## 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, I1, and ND
- K7 Combination of E7, N7, and I7
- K5 Combination of I5 and E5
- K6 CSA Combination

## 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 your Emerson Process Management representative if a copy of the certification is required. Consult factory for availability.

### Bureau Veritas (BV) Type Approval Shipboard

Consult factory for availability.

### 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 6. Applications / Limitations

Location	Class
Temperature	D
Humidity	B
Vibration	B/C
Enclosure	D

### 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 your Emerson Process Management representative if a copy of the certification is required.

## GOSTANDART

Tested and approved by Russian Metrological Institute.

## Measuring Instruments Directive Parts Certification

The Rosemount 3144P Temperature Transmitter and Rosemount 0065 RTD Temperature Sensor have been certified to meet the European Union Measurement Instrument Directive (MID) for Custody Transfer metering of liquids and gases.<sup>(1)</sup> Choosing Rosemount Temperature for a MID solution ensures that critical temperature measurement equipment will meet high expectations for unmatched system accuracy and reliability. For more information, please contact your local Emerson Process Management Representative.

## ROSEMOUNT 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 most recent revision of the European Union Declaration of Conformity can be found at [www.emersonprocess.com](http://www.emersonprocess.com).

## ATEX Directive (94/9/EC)

Rosemount Inc. complies with the ATEX Directive.

## Electro Magnetic Compatibility (EMC) (2004/108/EC)

EN 61326-1:2006 / EN 61326-2-3:2006

## Hazardous Locations Installations

## North American Certifications

### Factory Mutual (FM) Approvals

- 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.
- Certificate Number: 3012752
- Temperature Code: T5 (T<sub>amb</sub> = - 50 to 85 °C)
- Explosion-proof and Dust Ignition-proof when installed in accordance with Rosemount drawing 03144-0320. Indoor and outdoor use.
- Enclosure: Type 4X

### NOTE

For Group A, seal all conduits within 18 inches of enclosure; otherwise, conduit seal not required for compliance with NEC 501-15(A)(1).

(1) Limited global availability. Consult factory for available ordering locations.

HART  
4–20 mA

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.

Temperature Codes: T5 ( $T_{amb} = -60$  to  $75$  °C),  
T6 ( $T_{amb} = -60$  to  $50$  °C)

Non-incendive when installed in accordance with Rosemount drawing 03144-5075.

- 15 FM Intrinsically Safe / FISCO and Non-incendive  
Certificate Number: 3012752  
Intrinsically Safe / FISCO for use in Class I, II, III, Division 1, Groups A, B, C, D, E, F, and G;  
Temperature code: T4 ( $T_{amb} = -60$  to  $60$  °C)  
Zone marking: Class I, Zone 0, AEx ia IIC  
Temperature Code: T4 ( $T_{amb} = -50$  to  $60$  °C)  
Non-incendive for use in Class, Division 2, Groups A, B, C and D; Suitable for use in Class II/III, Division 2, Groups F and G.  
Temperature Codes: T6 ( $T_{amb} = -60$  to  $50$  °C)  
T5 ( $T_{amb} = -60$  to  $75$  °C)  
Intrinsically safe and Non-incendive when installed in accordance with Rosemount drawing 003144-5075.

### Canadian Standards Association (CSA) Approvals

- I6 CSA Intrinsically Safe / FISCO and Division 2  
Certificate Number: 1242650  
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 Code: T4 ( $T_{amb} = -50$  to  $60$  °C)  
Suitable for Class I, Division 2, Groups A, B, C, and D.  
Temperature Codes: T5 ( $T_{amb} = -60$  to  $85$  °C)  
T6 ( $T_{amb} = -60$  to  $60$  °C)  
Intrinsically Safe / FISCO and Division 2 when installed per Rosemount drawing 03144-5076.
- 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 (Zone 1)  
Certificate Number: KEMA01ATEX2181X  
ATEX Category Marking  $\text{Ex} \text{II} 2 \text{G}$   
Ex d IIC T6 ( $T_{amb} = -40$  to  $70$  °C)  
Ex d IIC T5 ( $T_{amb} = -40$  to  $80$  °C)  
Maximum Supply Voltage: 32 Vdc

#### Special Condition for Safe Use (X):

For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

- I1 ATEX Intrinsic Safety / FISCO (Zone 0)  
Certificate Number: Baseefa03ATEX0708X  
ATEX Category Marking  $\text{Ex} \text{II} 1 \text{G}$   
Ex ia IIC T4 ( $T_{amb} = -60$  to  $60$  °C)

Table 7. Input Entity Parameters

Power/Loop	FISCO Power/Loop	Sensor
$U_i = 30$ V	$U_i = 17.5$ V	$U_o = 13.9$ V
$I_i = 300$ mA	$I_i = 380$ mA	$I_o = 23$ mA
$P_i = 1.3$ W	$P_i = 5.32$ W	$P_o = 79$ mW
$C_i = 2.1$ nF	$C_i = 2.1$ nF	$C_i = 7.7$ nF
$L_i = 0$	$L_i = 0$	$L_i = 0$

#### Special Conditions for Safe Use (X):

- 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.
  - A transient protection device can be fitted as an option, in which the equipment will not pass the 500 V test.
- N1 ATEX Type n (Zone 2)  
Certificate Number: Baseefa03ATEX0709  
ATEX Category Marking  $\text{Ex} \text{II} 3 \text{G}$   
Ex nA nL IIC T5 ( $T_{amb} = -40$  to  $75$  °C)  
 $U_i = 32$  V maximum
- ND ATEX Dust  
Certificate Number: KEMA01ATEX2205  
ATEX Category Marking  $\text{Ex} \text{II} 1 \text{D}$   
Ex tD A20 IP66 T95 °C ( $T_{amb} = -40$  to  $80$  °C)  
Maximum Supply Voltage: 32 Vdc

### International Certifications

#### IECEX Certifications

- E7 IECEX Flameproof (Zone 1)  
Certificate Number: IECEX KEM 09.0035X  
Ex d IIC T6 ( $T_{amb} = -40$  to  $70$  °C)  
Ex d IIC T5 ( $T_{amb} = -40$  to  $80$  °C)  
Maximum Supply Voltage: 32 Vdc

#### Special Condition for Safe Use (X):

For information on the dimensions of the flameproof joints the manufacturer shall be contacted.

- I7 IECEX Intrinsic Safety  
Certificate Number: IECEX BAS 07.0004X  
Ex ia IIC T4 ( $T_{amb} = -60$  to  $60$  °C)

Power/Loop	FISCO Power/Loop	Sensor
$U_i = 30$ Vdc	$U_i = 17.5$ Vdc	$U_o = 13.9$ Vdc
$I_i = 300$ mA	$I_i = 380$ mA	$I_o = 23$ mA
$P_i = 1.3$ W	$P_i = 5.32$ W	$P_o = 79$ mW
$C_i = 2.1$ nF	$C_i = 2.1$ nF	$C_i = 7.7$ nF
$L_i = 0$	$L_i = 0$	$L_i = 0$

#### Special Condition for Safe Use (X):

When fitted with the transient terminal options, the apparatus is not capable of withstanding the 500 V electrical strength test as defined in Clause 6.8.1 of IEC 60079-15: 2005. This must be taken into account during installation.



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N7 IECEx Type n (Zone 2)  
Certificate Number: IECEx BAS 07.0005X  
Ex ia IIC T4 ( $T_{amb} = -40$  to  $75$  °C)  
Maximum Supply Voltage: 32 V  
Enclosure: IP66

NF IECEx Dust Ignition-proof  
Certificate Number: IECEx KEM 09.0036  
Ex tD A20 IP66 T95 °C ( $T_{amb} = -40$  to  $80$  °C)  
Maximum Supply Voltage: 32 Vdc  
Consult factory for NF availability

## Brazilian Certifications

*Centro de Pesquisas de Energia Eletrica (CEPEL) Approval*

E2 INMETRO Flameproof  
Certificate Number: CEPEL-EX-0307/2004X  
BR-Ex d IIC T6 ( $T_{amb} = -40$  to  $65$  °C)  
BR-Ex d IIC T5 ( $T_{amb} = -40$  to  $80$  °C)

### Special Conditions for Safe Use (x):

1. The accessory of cable entries or conduit must be certified as flameproof and needs to be suitable for use conditions.
2. For ambient temperature above 60 °C, cable wiring must have minimum isolation temperature 90 °C, to be in accordance to equipment operation temperature.
3. Where electrical entry is via conduit, the required sealing device must be assembly immediately close to enclosure.

I2 INMETRO Intrinsic Safety  
Certificate Number: CEPEL-Ex-0723/05X  
BR-Ex ia IIC T6 ( $T_{amb} = -60$  to  $50$  °C)  
BR-Ex ia IIC T5 ( $T_{amb} = -60$  to  $75$  °C)  
Enclosure: IP66W

### 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 500 V test.

## Japanese Certifications

E4 TIIS Flameproof  
Various certificates and configurations available. Consult factory for certified assemblies.

## China (NEPSI) Certifications

E3 China Flameproof  
Certificate Number: GYJ06583/GYJ06584  
Ex d IIC T6

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### NOTE

For Special Conditions for Safe Use, please reference the Rosemount 3144P Product Manual or Quick Installation Guide.

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I3 China Intrinsic Safety  
Certificate Number: GYJ06586/GYJ06587  
Ex ia IIC T4

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### NOTE

For Special Conditions for Safe Use, please reference the Rosemount 3144P Product Manual or Quick Installation Guide.

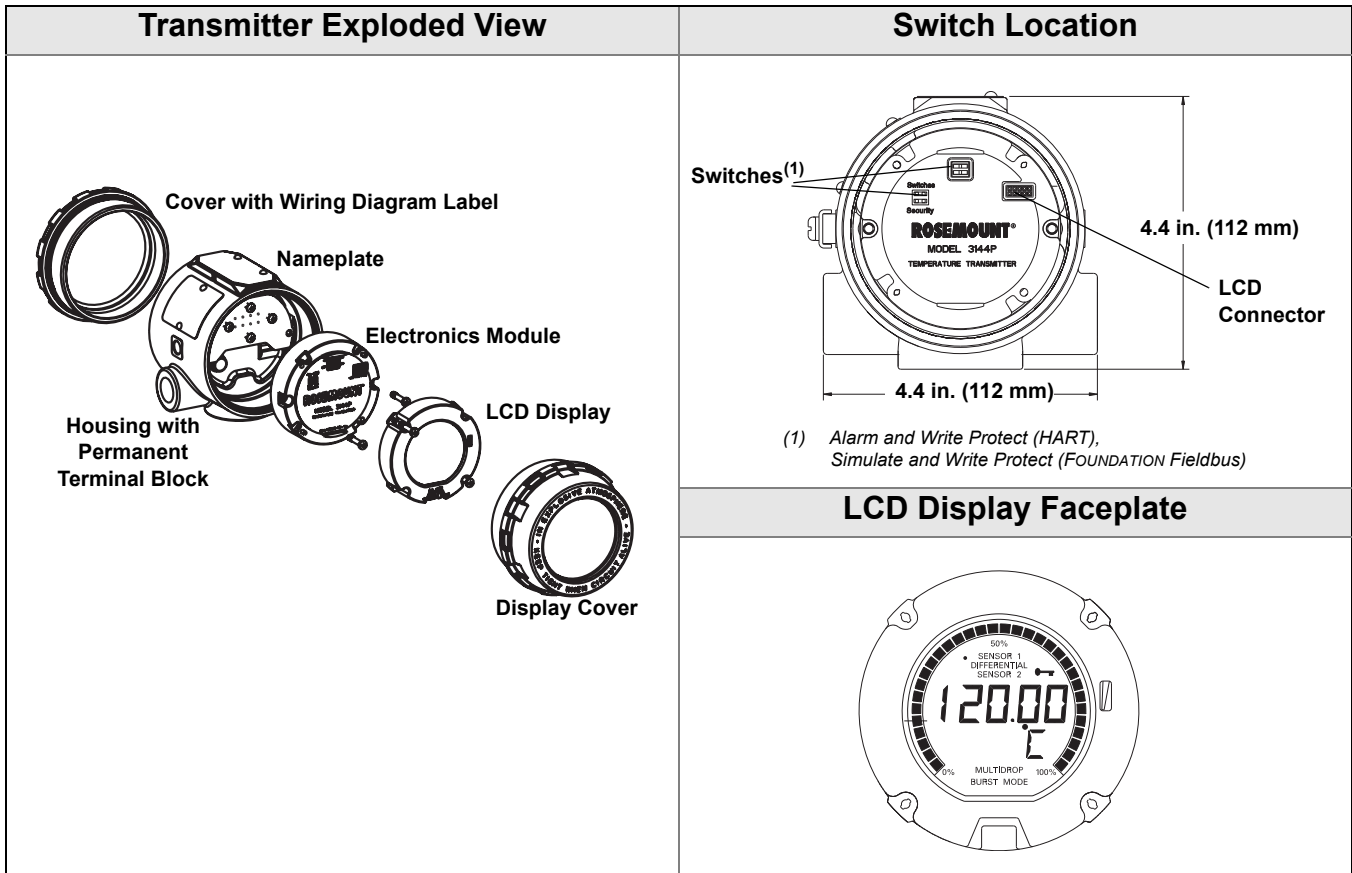
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## Combination Certifications

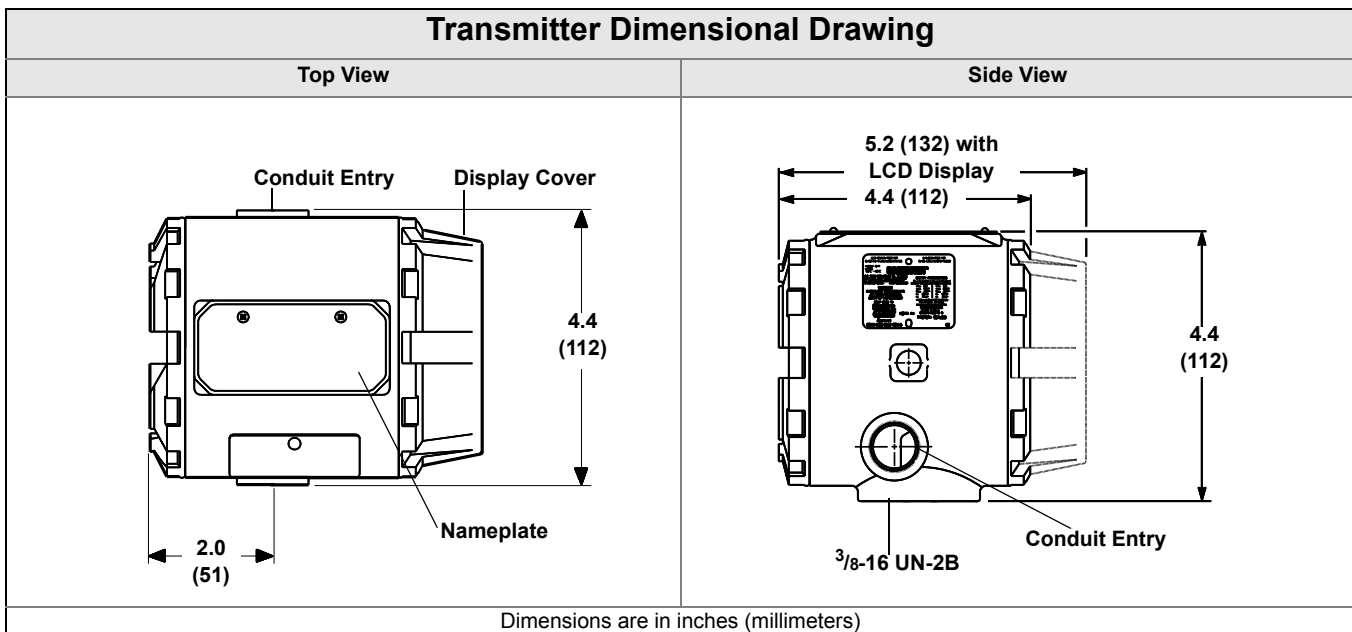
Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

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

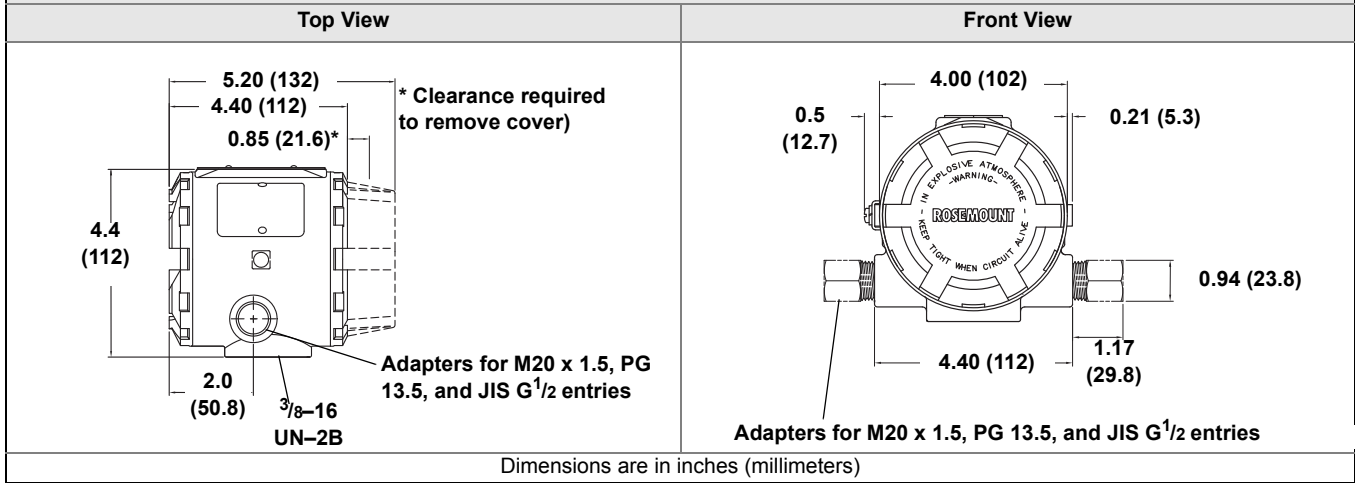
## Dimensional Drawings



FOUNDATION Fieldbus

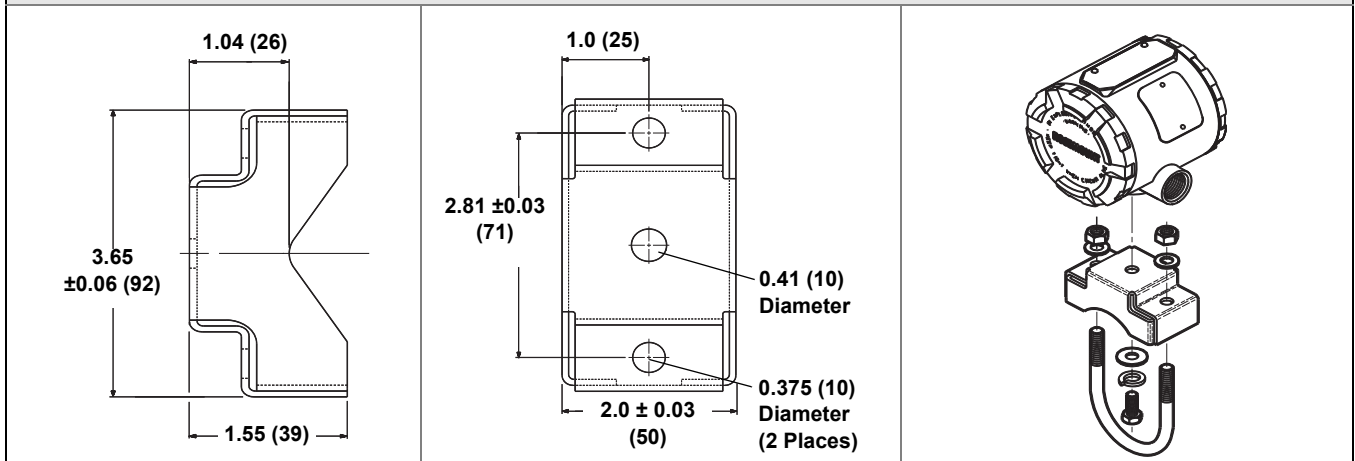


**Transmitter Dimensional Drawing for Conduits with M20 x 1.5, PG 13.5, and JIS G<sup>1</sup>/<sub>2</sub> Entries**

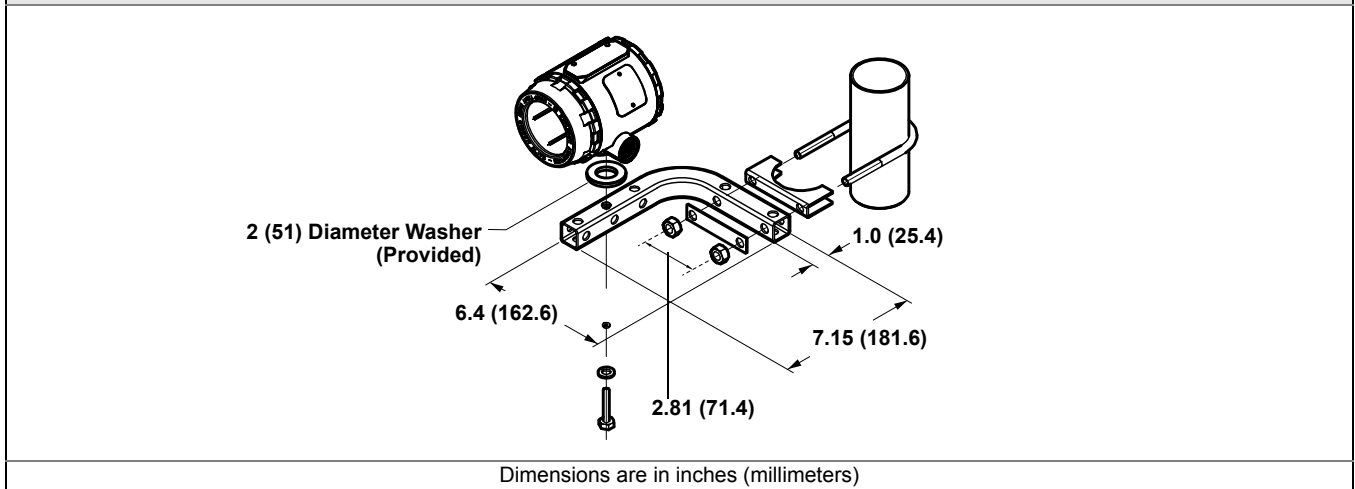


**Optional Transmitter Mounting Brackets**

**Option Code B4 Bracket**



**Option Code B5 Bracket**



FOUNDATION  
Fieldbus

Figure 1. HART / 4–20 mA

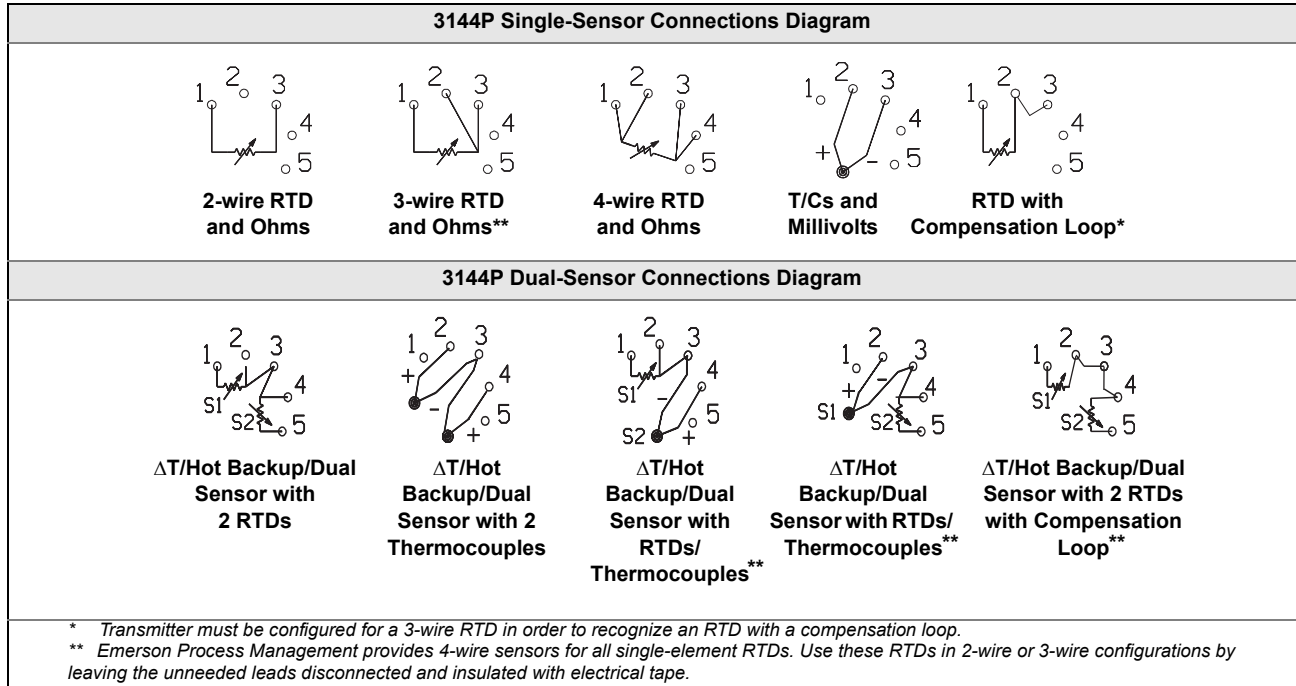
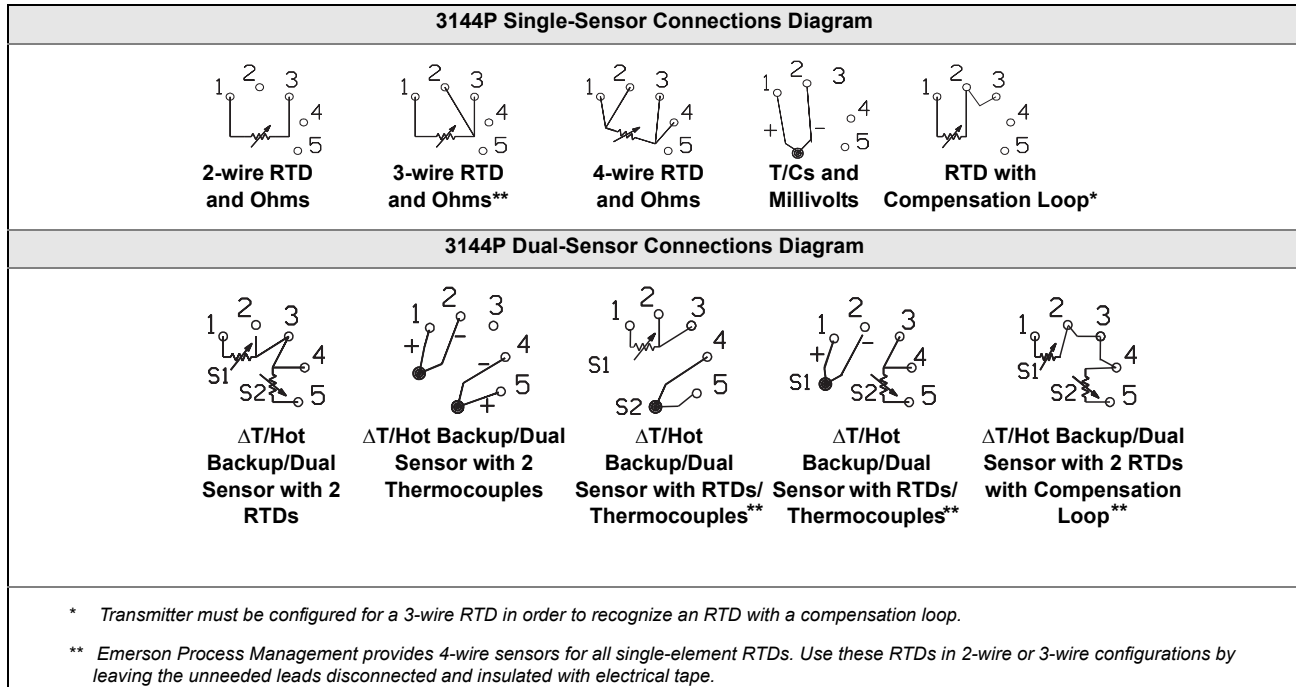


Figure 2. FOUNDATION fieldbus



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## Standard Configuration

Both standard and custom configuration settings may be changed. Unless specified, the transmitter will be shipped as follows:

Standard Configuration	
4 mA value / Lower Range (HART / 4–20 mA) Measurement Point LO (FOUNDATION Fieldbus)	0 °C
20 mA value / Upper Range (HART / 4–20 mA) Measurement Point HI (FOUNDATION Fieldbus)	100 °C
Damping	5 seconds
Output	Linear with temperature
Failure Mode (HART / 4–20 mA)	High
Line Voltage Filter	60 Hz
Software Tag	See "Tagging"
Optional Integral Display	Units and mA / Sensor 1 units
Single-Sensor option	
Sensor Type	4-wire, Pt 100 $\alpha = 0.00385$ RTD
Primary Variable (HART / 4–20 mA) AI 1400 (FOUNDATION Fieldbus)	Sensor 1
Secondary Variable AI 1600 (FOUNDATION Fieldbus)	Terminal Temperature
Tertiary Variable	Not Used
Quaternary Variable	Not Used
Dual-Sensor option	
Sensor Type	Two 3-wire, Pt 100 $\alpha = 0.00385$ RTD
Primary Variable (HART / 4–20 mA) AI 1400 (FOUNDATION Fieldbus)	Sensor 1
Secondary Variable AI 1500 (FOUNDATION Fieldbus)	Sensor 2
Tertiary Variable AI 1600 (FOUNDATION Fieldbus)	Terminal Temperature
Quaternary Variable	Not Used

## Custom Configuration

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

Option Code	Requirements/Specification
C1: Factory Data <sup>(1)</sup>	Date: day/month/year Descriptor: 16 alphanumeric character Message: 32 alphanumeric character Custom Alarm Levels can be specified for configuration at the factory.
C2: Transmitter-Sensor Matching	The 3144P transmitter is 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 3144P when this option is selected.
C4: Five Point Calibration	Will include five-point calibration at 0, 25, 50, 75, and 100% analog and digital output points. Use with option code Q4 to obtain a Calibration Certificate.
C7: Special Sensor	Used for non-standard sensor, adding a special sensor or expanding input. Customer must supply the non-standard sensor information. Additional special curve will be added to sensor curve input choices.
A1: NAMUR- Compliant, high alarm	Analog output levels compliant with NAMUR. Alarm is set to fail high.
CN: NAMUR- Compliant, low alarm	Analog output levels compliant with NAMUR. Alarm is set to fail low.
C8: Low Alarm	Analog output levels compliant with Rosemount standard. Alarm is set to fail low.
F5: 50 Hz Line Voltage Filter	Calibrated to 50 Hz line voltage filter.

(1) CDS required.

# Rosemount 3144P

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.

<b>Option Code U1: Hot Backup</b>	
Primary Usage	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. A digital alert will be sent in the event of a failed sensor.
Primary Variable	1st good
Secondary Variable	Sensor 1
Tertiary Variable	Sensor 2
Quaternary Variable	Terminal Temperature

<b>Option Code U2: Average Temperature with Hot Backup and Sensor Drift Alert – Warning Mode</b>	
Primary Usage	Critical applications, such as safety interlocks and control loops. Outputs the average of two measurements and sends a digital alert if temperature difference exceeds the set maximum differential (Sensor Drift Alert – warning mode). If a sensor fails, an alert will be sent digitally and the primary variable will be reported as the remaining good sensor value.
Primary Variable	Sensor Average
Secondary Variable	Sensor 1
Tertiary Variable	Sensor 2
Quaternary Variable	Terminal Temperature

<b>Option Code U3: Average temperature with Hot Backup and Sensor Drift Alert – Alarm Mode</b>	
Primary Usage	Critical applications, such as safety interlocks and control loops. Outputs the average of two measurements and sets the analog output into alarm if temperature difference exceeds the set maximum differential (Sensor Drift Alert – alarm mode). If a sensor fails, an alert will be sent digitally and the primary variable will be reported as the remaining good sensor value.
Primary Variable	Sensor Average
Secondary Variable	Sensor 1
Tertiary Variable	Sensor 2
Quaternary Variable	Terminal Temperature

<b>Option Code U4: Two Independent Sensors</b>	
Primary Usage	Used in non-critical applications where the digital output is used to measure two separate process temperatures.
Primary Variable	Sensor 1
Secondary Variable	Sensor 2
Tertiary Variable	Terminal Temperature
Quaternary Variable	Not Used

<b>Option Code U5: Differential Temperature</b>	
Primary Usage	The differential temperature of two process temperatures is configured as the primary variable. If the temperature difference exceeds the maximum differential, the analog output will go into alarm. Primary Variable will be reported as a bad sensor value.
Primary Variable	Differential Temperature
Secondary Variable	Sensor 1
Tertiary Variable	Sensor 2
Quaternary Variable	Terminal Temperature

<b>Option Code U6: Average Temperature</b>	
Primary Usage	When average measurement of two different process temperatures is required. If a sensor fails, the analog output will go into alarm and the primary variable will report the measurement of the remaining good sensor.
Primary Variable	Sensor Average
Secondary Variable	Sensor 1
Tertiary Variable	Sensor 2
Quaternary Variable	Terminal Temperature



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