

Rosemount 3144P Temperature Transmitter



- Industry-leading temperature transmitter delivers unmatched field reliability and innovative process measurement solutions
- Improve efficiency with Best-in-Class product specifications and capabilities
- Optimize measurement reliability with diagnostics designed for any protocol on any host system
- Explore the benefits of a Complete Point Solution from Rosemount Temperature

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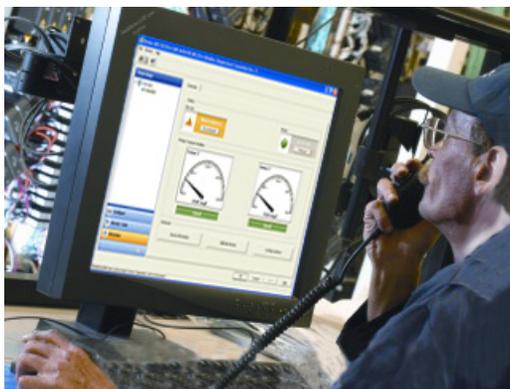
Industry-leading temperature transmitter delivers unmatched field reliability and innovative process measurement solutions

- 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
- 4-20 mA /HART® with Selectable Revisions (5 and 7)
- FOUNDATION Fieldbus, compliant to ITK 6.0 and NE107 standards



Improve efficiency with best-in-class product specifications and capabilities

- Reduce maintenance and improve performance with industry leading accuracy and stability
- Improve measurement accuracy by 75% with Transmitter-Sensor Matching
- Ensure process health with system alerts and easy to use Device Dashboards
- Easily check device status and values on local LCD display with large percent range graph
- Achieve high reliability and installation ease with the industry's most rugged dual compartment design



Optimize measurement reliability with diagnostics designed for any protocol on any host system

- 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® provides temperature measurement redundancy

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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 Rosemount 3144P Thermocouple Diagnostic with the **Rosemount 1075 High Temperature Thermocouple**.
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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 Codes D01 and DA1)
- 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			
Housing style		Material	Conduit entry size	
Standard				Standard
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	★
Transmitter output				
Standard				Standard
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)			★
Measurement configuration				
Standard				Standard
1	Single-Sensor Input			★
2	Dual-Sensor Input			★
Product certifications				
Standard				Standard
NA	No Approval			★
E5	FM Explosion-proof, Dust Ignition-Proof, and Non-incendive approval			★
I5 ⁽¹⁾	FM Intrinsically Safe and Non-incendive (includes standard IS and FISCO for fieldbus units)			★
K5 ⁽¹⁾	FM IS, Non-incendive & Explosion-proof combo (includes standard IS and FISCO for fieldbus units)			★
KB ⁽¹⁾	FM and CSA IS, Explosion-proof, and Non-incendive combo (includes standard IS and FISCO for FF units)			★
I6 ⁽¹⁾	CSA Intrinsically Safe/FISCO and Division 2 (includes standard IS and FISCO for fieldbus units)			★

Table 1. Rosemount 3144P Temperature Transmitter ordering information

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Standard		Standard
K6 ⁽¹⁾	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 ⁽¹⁾	ATEX intrinsic safety approval (includes standard IS and FISCO for fieldbus units)	★
K1 ⁽¹⁾	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 ⁽¹⁾	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 ⁽¹⁾⁽²⁾	IECEx Intrinsic Safety	★
K7 ⁽¹⁾⁽²⁾	IECEx Intrinsic Safety, Flameproof, Dust Ignition-Proof and Type n combination	★
E2 ⁽²⁾	INMETRO Flameproof	★
I2 ⁽²⁾⁽⁶⁾	INMETRO Intrinsic safety	★
E4 ⁽²⁾	TIIS Flameproof approval	★
E3 ⁽²⁾	NEPSI Flameproof approval	★
I3 ⁽¹⁾⁽²⁾	NEPSI Intrinsic safety	★

Options (include with selected model number)

PlantWeb control functionality		
Standard		Standard
A01	FOUNDATION Fieldbus Advanced Control Function Block Suite	★
PlantWeb advanced diagnostic functionality		
Standard		Standard
D01	FOUNDATION Fieldbus Sensor and Process Diagnostic Suite: Thermocouple Diagnostic, Min/Max Tracking	★
DA1	HART Sensor and Process Diagnostic Suite: Thermocouple Diagnostic, Min/Max Tracking	★
Enhanced performance		
Standard		Standard
P8 ⁽³⁾	Enhanced Transmitter Accuracy	★
Mounting bracket		
Standard		Standard
B4	“U” Mounting Bracket for 2-inch pipe mounting - All SST	★
B5	“L” Mounting Bracket for 2-inch pipe or panel mounting - All SST	★
Display		
Standard		Standard
M5	LCD Display	★
External ground		
Standard		Standard
G1	External Ground Lug Assembly	★
Transient protector		
Standard		Standard
T1	Integral Transient Protector	★
Software configuration		
Standard		Standard
C1 ⁽⁴⁾	Custom Configuration of Date, Descriptor and Message (Requires CDS with order)	★

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.

Line filter		
Standard		Standard
F5	50 Hz Line Voltage Filter	★
Alarm level configuration		
Standard		Standard
A1	NAMUR Alarm and Saturation Levels, High Alarm	★
CN	NAMUR Alarm and Saturation Levels, Low Alarm	★
Low alarm		
Standard		Standard
C8	Low Alarm (Standard Rosemount Alarm and Saturation Values)	★
Sensor trim		
Standard		Standard
C2	Transmitter-Sensor Matching – Trim to PT100 RTD Calibration Schedule (CVD constants)	★
Expanded		
C7	Trim to Non-Standard Sensor (Special Sensor–Customer must provide sensor information)	
5-point calibration		
Standard		Standard
C4	5-Point Calibration (Requires the Q4 option code to generate a Calibration Certificate)	★
Calibration certification		
Standard		Standard
Q4	Calibration Certificate (3-Point Calibration)	★
QG	Calibration Certificate and GOST Verification Certificate	★
QP	Calibration Certificate and Tamper Evident Seal	★
Dual-input custom configuration (only with measurement type option code 2)		
Standard		Standard
U1 ⁽⁵⁾	Hot Backup	★
U2 ⁽⁵⁾	Average temperature with Hot Backup and Sensor Drift Alert – warning mode	★
U3 ⁽⁶⁾	Average temperature with Hot Backup and Sensor Drift Alert – alarm mode	★
U5	Differential temperature	★
U6 ⁽⁵⁾	Average temperature	★
U7 ⁽⁵⁾	First good temperature	★
Expanded		
U4	Two independent sensors	
Customer transfer		
Expanded		
D3 ⁽⁶⁾⁽⁵⁾	Custody Transfer Approval (Canada)	
D4 ⁽⁶⁾	MID Custody Transfer (Europe)	
Quality certification for safety		
Standard		Standard
QS	Prior-use certificate of FMEDA data (HART Only)	★
QT	Safety-certified to IEC 61508 with certificate of FMEDA data (HART only)	★

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.

Shipboard certification		
Standard		Standard
SBS	American Bureau of Shipping (ABS) Type Approval	★
SBV	Bureau Veritas (BV) Type Approval	★
SDN	Det Norske Veritas (DNV) Type Approval	★
SLL	Lloyd's Register (LR) Type Approval	★
Conduit electrical connector		
Standard		Standard
GE ⁽⁷⁾	M12, 4-pin, Male Connector (<i>eurofast</i> [®])	★
GM ⁽⁷⁾	A size Mini, 4-pin, Male Connector (<i>minifast</i> [®])	★
HART revision configuration		
Standard		Standard
HR7	Configured for HART Revision 7	★
Assemble to options		
Standard		Standard
XA	Sensor Specified Separately and Assembled to Transmitter	★
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) Enhanced accuracy only applies to RTDs, however the option can be ordered with any sensor type.

(4) Consult factory for availability when ordering with FOUNDATION Fieldbus models.

(5) Option code D3 is only available to be ordered in Canada.

(6) Option code D4 is only available to be ordered in Europe.

(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 4X rating.

Transmitter specifications

HART[®] and FOUNDATION[™] Fieldbus

Functional specifications

Inputs

User-selectable. See [Table 2 on page Wireless-9](#) 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 6.0.1 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 21](#) 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 22](#).

Weight

Aluminum ⁽¹⁾	Stainless steel ⁽¹⁾
3.1 lb (1.4 kg)	7.8 lb (3.5 kg)

(1) 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 2 on page 9](#), 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 Rosemount 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? ⁽¹⁾
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

(1) 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.

Hardware tag

- No charge
- 2 lines of 28 characters (56 characters total)
- Tags are stainless steel
- Permanently attached to transmitter
- Character height is $1/16$ -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 in HART 5 mode and 32 characters in HART 7 mode. 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.

Table 2. Transmitter accuracy

Sensor options	Sensor reference	Input ranges		Minimum span ⁽¹⁾		Digital accuracy ⁽²⁾		Enhanced accuracy ⁽³⁾	D/A accuracy ⁽⁴⁾⁽⁵⁾
		°C	°F	°C	°F	°C	°F	°C	
2-, 3-, 4-wire RTDs									
Pt 100 ($\alpha = 0.00385$)	IEC 751	-200 to 850	-328 to 1562	10	18	± 0.10	± 0.18	± 0.08	±0.02% of span
Pt 200 ($\alpha = 0.00385$)	IEC 751	-200 to 850	-328 to 1562	10	18	± 0.22	± 0.40	± 0.176	±0.02% of span
Pt 500 ($\alpha = 0.00385$)	IEC 751	-200 to 850	-328 to 1562	10	18	± 0.14	± 0.25	± 0.112	±0.02% of span
Pt 1000 ($\alpha = 0.00385$)	IEC 751	-200 to 300	-328 to 572	10	18	± 0.10	± 0.18	± 0.08	±0.02% of span
Pt 100 ($\alpha = 0.003916$)	JIS 1604	-200 to 645	-328 to 1193	10	18	± 0.10	± 0.18	± 0.08	±0.02% of span
Pt 200 ($\alpha = 0.003916$)	JIS 1604	-200 to 645	-328 to 1193	10	18	± 0.22	± 0.40	± 0.176	±0.02% of span
Ni 120	Edison Curve No. 7	-70 to 300	-94 to 572	10	18	± 0.08	± 0.14	± 0.064	±0.02% of span
Cu 10	Edison Copper Winding No. 15	-50 to 250	-58 to 482	10	18	±1.00	± 1.80	± 0.08	±0.02% of span
Pt 50 ($\alpha=0.00391$)	GOST 6651-94	-200 to 550	-328 to 1022	10	18	±0.20	±0.36	± 0.16	±0.02% of span
Pt 100 ($\alpha=0.00391$)	GOST 6651-94	-200 to 550	-328 to 1022	10	18	±0.10	±0.18	± 0.08	±0.02% of span
Cu 50 ($\alpha=0.00426$)	GOST 6651-94	-50 to 200	-58 to 392	10	18	±0.34	±0.61	± 0.272	±0.02% of span
Cu 50 ($\alpha=0.00428$)	GOST 6651-94	-185 to 200	-301 to 392	10	18	±0.34	±0.61	± 0.272	±0.02% of span
Cu 100 ($\alpha=0.00426$)	GOST 6651-94	-50 to 200	-58 to 392	10	18	±0.17	±0.31	± 0.136	±0.02% of span
Cu 100 ($\alpha=0.00428$)	GOST 6651-94	-185 to 200	-301 to 392	10	18	±0.17	±0.31	± 0.136	±0.02% of span

Thermocouples⁽⁶⁾									
Type B ⁽⁷⁾	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 ⁽⁸⁾	NIST Monograph 175, IEC 584	-180 to 1372	-292 to 2501	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
Other input types									
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) Enhanced accuracy can be ordered using the P8 Model Code.
- (4) Total Analog accuracy is the sum of digital and D/A accuracies.
- (5) Applies to HART / 4-20 mA devices.
- (6) Total digital accuracy for thermocouple measurement: sum of digital accuracy +0.25 °C (0.45 °F) (cold junction accuracy).
- (7) Digital accuracy for NIST Type B is ±3.0 °C (±5.4 °F) from 100 to 300 °C (212 to 572 °F).
- (8) Digital accuracy for NIST Type K is ±0.50 °C (±0.9 °F) from -180 to -90 °C (-292 to -130 °F).

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 $\pm 0.02\%$ 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.

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.

Table 3. Ambient temperature effect on digital accuracy

Sensor options	Sensor reference	Effect per 1.0 °C (1.8 °F) change in ambient ⁽¹⁾	Input temperature (T)	D/A effect ⁽²⁾
2-, 3-, or 4- Wire RTDs				
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 (0.0027 °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
Thermocouples				
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 ≥ 1000 °C 300 °C ≤ T < 1000 °C 100 °C ≤ 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 ≥ 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 ≥ 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 ≥ 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 ≥ 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 ≥ 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 ≥ 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 ≥ 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 ≥ 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

Sensor options	Sensor reference	Effect per 1.0 °C (1.8 °F) change in ambient ⁽¹⁾	Input temperature (T)	D/A effect ⁽²⁾
Other input types				
Millivolt Input		0.00025 mV	Entire Sensor Input Range	0.001% of span
2-, 3-, 4-wire Ohm Input		0.007 Ω	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.

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

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

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 = $0.10\text{ }^{\circ}\text{C} + 0.02\text{ }^{\circ}\text{C} + 0.015\text{ }^{\circ}\text{C} + 0.01\text{ }^{\circ}\text{C} = 0.145\text{ }^{\circ}\text{C}$

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 23.

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 × 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/Sensor 2/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 ±0.005% of span per volt.

SIS safety transmitter failure values

IEC 61508 Safety Certified SIL 2 and SIL 3 Claim Limit

- Safety accuracy: Span ≥ 100 °C: $\pm 2\%$ of process variable span

- Span < 100 °C: ± 2 °C
- Safety response time: 5 seconds
- Safety specifications and FMEDA Report available at www.rosemount.com/safety
- Software suitable for SIL3 Applications

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 ⁽¹⁾	-40 to 185 °F -40 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 Rosemount 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.

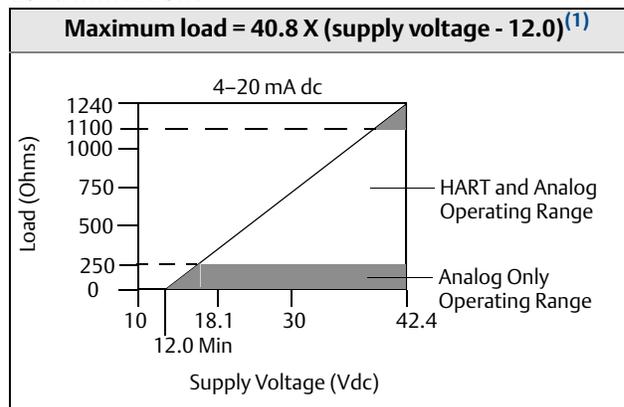
The alarm level is user-selectable using the failure mode switch. If failure occurs, the position of the hardware switch determines the direction in which the output is driven (HIGH or LOW). The switch feeds into the digital-to-analog (D/A) converter, which drives the proper alarm output even if the 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:

Table 4. Operation parameters

	Standard ⁽¹⁾	NAMUR-compliant ⁽¹⁾
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

Fieldbus Foundation Device Registration

Device Tested and Registered to ITK 6.0.1

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 23.

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*50nS
- 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 (°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 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

The device is compliant to NAMUR NE 107, ensuring consistent, reliable and standardized device diagnostic information.

The new standard is designed to improve the way device status and diagnostic information is communicated to operators and maintenance personnel in order to increase productivity and reduce costs.

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.)

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

- All blocks will ship with unique block names, e.g. AI_1400_XXXX
- All blocks shall be instantiated to avoid invalid defaults
- All Rosemount 3144P FF have parameter COMPATIBILITY_REV for backward compatibility
- Parameters will be initialized to common values for easier bench configuration
- All default block tags are less than or equal to 16 characters in length to avoid inconvenience of apparently identical tags
- Default block tags include underscores, “_”, instead of whitespaces for easier configuration

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.
- Device Revision 3 and above includes Hot Backup functionality in the transducer block

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.
- All devices ship with the AI blocks scheduled, meaning no configuration is needed if the factory default channels are used

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, 4	60 milliseconds
PID 1 and 2 with Autotune	90 milliseconds
Input Selector	65 milliseconds
Signal Characterizer	60 milliseconds
Arithmetic	60 milliseconds
Output Splitter	60 milliseconds