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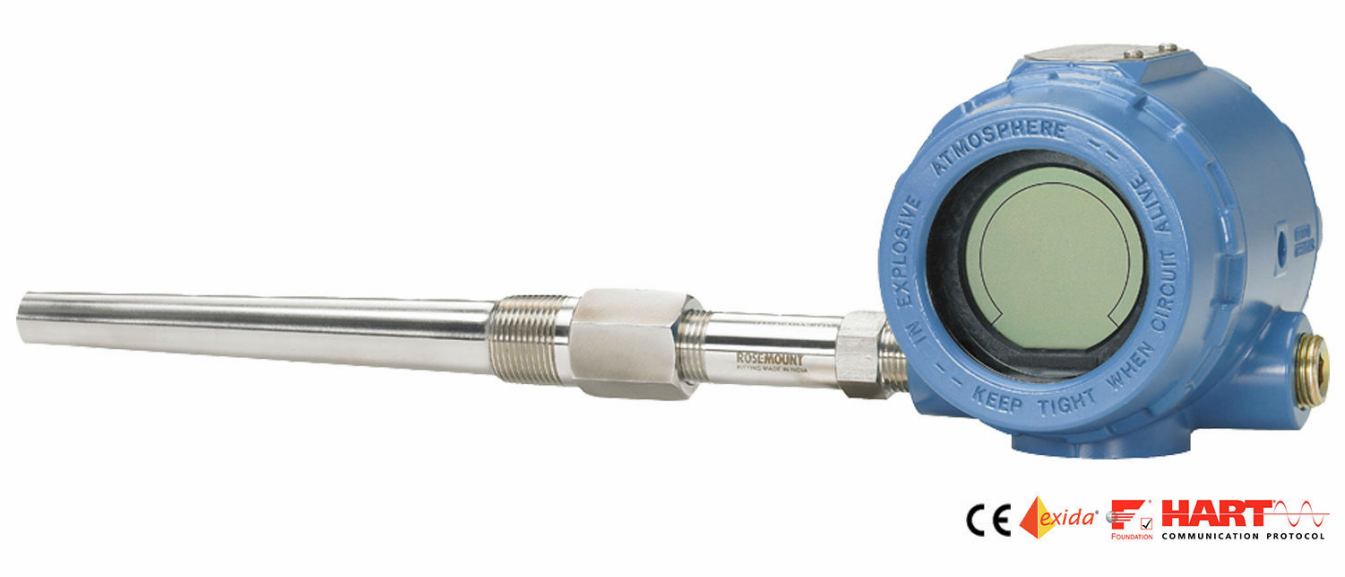
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Find the *Emerson / Rosemount Analytical 3144PD1A1E5B4T1* at our website: *Click HERE*

Product Data Sheet
00813-0100-4021, Rev SB
April 2019

Rosemount™ 3144P Temperature Transmitter

with Rosemount X-well™ Technology



For every responsibility you have, you are confronted with a number of challenges. You have aggressive production and quality targets, but inaccurate or unavailable temperature measurements create unscheduled downtime and off-spec products. Loops may be running in manual because you don't trust your temperature measurement, requiring the attention of your maintenance staff and costing money in lost production. Additionally, improving safety and complying with government and company regulations is made more difficult when you don't have the information or tools needed to prove your compliance.

That is why companies are coming to Emerson™ – because they know they need reliable measurements and visibility into their temperature measurements in order to address these challenges and achieve their business objectives. With the Rosemount 3144P Transmitter, you gain greater visibility into your temperature processes so you can improve safety, comply with regulations, make the most of your limited resources, and reach your production and quality targets. By leveraging Rosemount X-well Technology, advanced diagnostic capabilities and the unparalleled reliability and accuracy of the transmitter, you can minimize off-spec product, reduce maintenance and downtime, improve the usage of your limited resources, and meet regulatory demands.

Features and benefits

Rosemount X-well™ Technology provides a Complete Point Solution™ for accurately measuring process temperature in monitoring applications without the requirement of a thermowell or process penetration.



- Simplify temperature measurement point specification, installation and maintenance, and eliminate possible leak points.
- Calculates a repeatable and accurate process temperature measurement via an in-transmitter thermal conductivity algorithm.
- Measures pipe surface and ambient temperature, and utilizes the thermal conductivity properties of the installation and process piping in order to provide an accurate process measurement.

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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
- SIL3 Capable: IEC 61508 certified by an accredited 3rd party agency for use in safety instrumented systems up to SIL 3 (minimum requirement of single use [1oo1] for SIL 2 and redundant use [1oo2] for SIL 3)
- 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 percent 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.

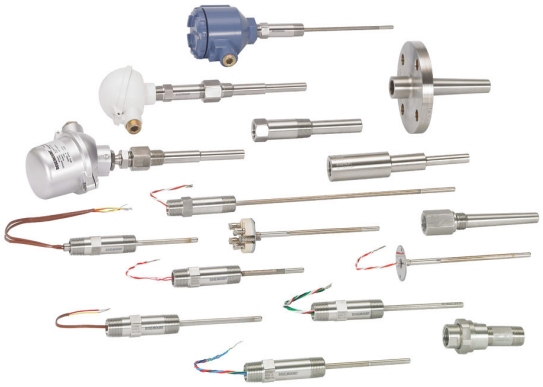
Optimize measurement reliability with diagnostics designed for any protocol on any host system



- 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.
- The Hot Backup™ feature provides temperature measurement redundancy.

Explore the benefits of a Complete Point Solution from Emerson

- 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 Emerson 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.
- Make wireless installation and configuration easy with the Emerson Wireless Gateway.

Looking for a wireless temperature solution? For wireless applications that require superior performance and unmatched reliability, consider the **Rosemount 648 Wireless Temperature Transmitter**.

Ordering information

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:

- Temperature measurement assembly with Rosemount X-well Technology (option code PT)
- 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)

Specification and selection of product materials, options, or components must be made by the purchaser of the equipment. See for more information on material selection. When ordering Rosemount X-well™ Technology, specific option codes are required. See for more information.

Table 1: Rosemount 3144P Temperature Transmitter Ordering Information

The starred offerings (H) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Model	Product description			
3144P	Temperature transmitter			
Housing style		**Material**	**Conduit entry size**	
D1	Field mount housing, dual-compartment housing	Aluminum	½–14-in. 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 ½	★
D5	Field mount housing, dual-compartment housing	Stainless steel	½–14-in. 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 ½	★
Transmitter output				
A	4—20 mA with digital signal based on HART Protocol			★
F	FOUNDATION Fieldbus digital signal (includes three AI function block and backup link active scheduler)			★
Measurement Configuration				
1	Single-sensor input			★

Table 1: Rosemount 3144P Temperature Transmitter Ordering Information *(continued)*

Model	Product description	
2	Dual-sensor input	★
Product Certificates		
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 and 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)	★
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)	INMETRO Intrinsic safety	★
E4(2)	TIIS Flameproof approval	★
E3(2)	NEPSI Flameproof approval	★
I3(1)(2)	NEPSI Intrinsic safety	★
N3	NEPSI Type n	★
KM	Technical Regulations Customs Union (EAC) Flameproof, Intrinsic Safety	★
IM	Technical Regulations Customs Union (EAC) Intrinsic Safety	★
EM	Technical Regulations Customs Union (EAC) Flameproof	★

(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.

Table 2: Options (include with selected model number)

Plantweb™ Control FunctionalityPlatAO1		
AO1	FOUNDATION Fieldbus advanced control function block suite	★
Plantweb Advanced Diagnostic Functionality		
D01	FOUNDATION Fieldbus sensor and process diagnostic suite: thermocouple diagnostic, min/max tracking	★

Table 2: Options (include with selected model number) *(continued)*

DA1	HART sensor and process diagnostic suite: thermocouple diagnostic, min/max tracking	★
Enhanced Performance		
PT(1)	Temperature measurement assembly with Rosemount X-well Technology	★
P8(2)	Enhanced transmitter accuracy	★
Mounting bracket		
B4	“U” mounting bracket for 2-in. pipe mounting - All SST	★
B5	“L” mounting bracket for 2-in. pipe or panel mounting - All SST	★
Display		
M5	LCD display	★
External ground		
G1	External ground lug assembly	★
Transient protector		
T1	Integral transient protector	★
Software configuration		
C1	Custom configuration of date, descriptor and message (requires Configuration Data Sheet with order)	★
Line filter(1)		
F5	50 Hz Line voltage filter	★
Alarm level configuration(1)		★
A1	NAMUR alarm and saturation levels, high alarm	★
CN	NAMUR alarm and saturation levels, low alarm	★
Low alarm		
C8	Low alarm (standard Rosemount alarm and saturation values)	★
Sensor trim		
C2	Transmitter-sensor matching – trim to PT100 RTD calibration schedule (Callendar-Van Dusen constants)	★
C7	Trim to non-standard sensor (special sensor–customer must provide sensor information)	
5-point calibration		
C4	5-point calibration (requires the Q4 option code to generate a calibration certificate)	★
Calibration certification		
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)		
U1	Hot Backup	★
U2(1)	Average temperature with Hot Backup and sensor drift alert – warning mode	★
U3(1)	Average temperature with Hot Backup and sensor drift alert – alarm mode	★
U5	Differential temperature	★

Table 2: Options (include with selected model number) *(continued)*

U6	Average temperature	★
Dual-Input Custom Configuration (only with measurement type option code 2)		
U7	First good temperature	★
U4	Two independent sensors	
Custody transfer(1)		
D3	Custody transfer approval (Canada)	
D4	MID custody transfer (Europe)	
Quality certification for safety		
QS	Prior-use certificate of FMEDA data (HART only)	★
QT	Safety-certified to IEC 61508 with certificate of FMEDA data (HART only)	★
Shipboard certification		
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(3)		
GE	M12, 4-pin, male connector (eurofast®)	★
GM	A size mini, 4-pin, male connector (minifast®)	★
HART revision configuration		
HR7	Configured for HART Revision 7	★
Assemble to options		
XA	Sensor specified separately and assembled to transmitter	★
Extended product warranty		
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★
Typical model number: 3144P D1 A 1 E5 B4 M5		

(1) Not available with FOUNDATION Fieldbus models.
(2) Enhanced accuracy only applies to RTDs, however the option can be ordered with any sensor type.
(3) 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.

How to order Rosemount X-well™ Technology

Rosemount X-well Technology is for temperature monitoring applications and is not intended for control or safety applications. It is available in the Rosemount™ 3144P Transmitter in a factory assembled direct mount configuration with a Rosemount 0085 Pipe Clamp Sensor. It cannot be used in a remote mount configuration. Rosemount X-well Technology will only work as specified with factory supplied and assembled Rosemount 0085 Sensor silver tipped single element sensor with an 80 mm extension length. It will not work as specified if used with other sensors.

Table 3: Rosemount 3144P X-well Technology Option Code Requirements

Code	Description
D1-D4	Aluminum field mount housing
PT	Temperature measurement assembled with Rosemount X-well Technology
A	4–20 mA with digital signal based on HART Protocol
XA	Sensor specified separately and assembled to transmitter
C1	Custom configuration of date, descriptor, message, and wireless parameters (requires Configuration Data Sheet with order)
HR7	Configured for HART Revision 7

Table 4: Rosemount 0085 Pipe Clamp Sensor Option Code Requirements for Use with X-well Technology

Code	Description
N	No connection head
3	Sensor connection
P1	Sensor type
J	Extension type
0080	Extension length
XA	Assemble sensor to specific temperature transmitter

Rosemount X-well assemblies are available in most Rosemount 0085 Pipe Clamp Sensor diameter sizes.

Typical model number of the assembly:
3144P D 1A 1 NA M5 PT C1 XA
0085 N 3 P1 J 0080 C 0169 N XA

Specifications

HART® and FOUNDATION™ Fieldbus

Functional specifications

Inputs

User-selectable. See for sensor options.

Output

Two-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 percent relative humidity, non-condensing

Update time

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

Physical specifications

Material selection

Emerson provides a variety of Rosemount™ products with various product options and configurations including materials of construction that can be expected to perform well in a wide range of applications. The Rosemount product information presented is intended as a guide for the purchaser to make an appropriate selection for the application. It is the purchaser's sole responsibility to make a careful analysis of all process parameters (such as all chemical components, temperature, pressure, flow rate, abrasives, contaminants, etc.), when specifying product, materials, options and components for the particular application. Emerson is not in a position to evaluate or guarantee the compatibility of the process fluid or other process parameters with the product, options, configuration or materials of construction selected.

Conformance to specification (±3σ [Sigma])

Technology leadership, advanced manufacturing techniques, and statistical process control ensure specification conformance to at least ±3σ.

Conduit connections

The standard field mount housing has ½–14-in. NPT conduit entries. Additional conduit entry types are available, including PG13.5 (PG11), M20 3 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 for dimensions.

Materials of construction

Enclosure	Low-copper aluminum CF-8M (cast version of 316 stainless steel)
Paint	Polyurethane
O-rings	Buna N

Mounting specification

Transmitters may be attached directly to the sensor. Optional mounting brackets (codes B4 and B5) allow for remote mounting. See

Transmitter weight

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

Enclosure ratings

Type 4X

IP66 and IP68

Stability

RTDs: ±0.1 percent of reading or 0.1 °C (0.18 °F), whichever is greater, for two years for RTDs.

Thermocouples: ±0.1 percent of reading or 0.1 °C (0.18 °F), whichever is greater, for one year for thermocouples.

Five-year stability

RTDs: ±0.25% of reading or 0.25 °C, whichever is greater, for five years.

Thermocouples: ±0.5% of reading or 0.5 °C, whichever is greater, for five years.

Vibration effect

Tested to the following with no effect on performance per IEC 60770-1, 1999:

Frequency	Vibration
10 to 60 Hz	0.21 mm displacement
60 to 2000 Hz	3 g peak acceleration

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 , 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
- Two lines of 28 characters (56 characters total)
- Tags are stainless steel
- Permanently attached to transmitter
- Character height is 1/16-in. (1.6 mm)
- A wire-on tag is available upon request. Five lines of 12 characters (60 characters total)

Software tag

- HART® transmitter can store up to eight 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 eight characters of the hardware tag are the default.

Transmitter accuracy

Table 5: Transmitter Accuracy

Sensor options	Sensor reference	Input ranges		Minimum span(1)		Digital accuracy(2)		Enhanced accuracy(3)	D/A accuracy(4)(5)
2-, 3-, 4-wire RTDs		°C	°F	°C	°F	°C	°F	°C	
Pt 100 (α = 0.00385)	IEC 751	–200 to 850	–328 to 1562	10	18	± 0.10	± 0.18	± 0.08	±0.02% of span
Rosemount X-well Pt 100	(α = 0.00385)	IEC 751	–58 to 572	10	18	± 0.29	± 0.52	N/A	±0.02% of span
Pt 200 (α = 0.00385)	IEC 751	–200 to 850	–328 to 1562	10	18	± 0.22	± 0.40	± 0.176	±0.02% of span
Pt 500 (α = 0.00385)	IEC 751	–200 to 850	–328 to 1562	10	18	± 0.14	± 0.25	± 0.112	±0.02% of span
Pt 1000 (α = 0.00385)	IEC 751	–200 to 300	–328 to 1193	10	18	± 0.10	± 0.18	± 0.08	±0.02% of span
Pt 100 (α = 0.003916)	JIS 1604	–200 to 645	–328 to 1193	10	18	± 0.10	± 0.18	± 0.08	±0.02% of span
Pt 200 (α = 0.003916)	JIS 1604	–200 to 645	–94 to 572	10	± 0.22	± 0.40	± 0.40	± 0.176	±0.02% of span
Ni 120	Edison Curve No. 7	–70 to 300	–58 to 482	10	18	± 0.08	± 0.14	± 0.064	±0.02% of span
Cu 10	Edison Copper Winding No. 15	–50 to 250	–328 to 1022	10	18	±1.00	± 1.80	± 0.8	±0.02% of span
Pt 50 (α=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 (α=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 (α=0.00426)	GOST 6651-94	–50 to 200	–58 to 392	10	18	±0.34	±0.61	± 0.272	±0.02% of span

Table 5: Transmitter Accuracy *(continued)*

Sensor options	Sensor reference	Input ranges		Minimum span[1]		Digital accuracy[2]		Enhanced accuracy[3]	D/A accuracy[4][5]
Cu 50 (α=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 (α=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 (α=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	N/A	±0.02% of span
Type E	NIST monograph 175, IEC 584	–200 to 1000	–328 to 1832	25	45	± 0.20	± 0.36	N/A	±0.02% of span
Type J	NIST monograph 175, IEC 584	–180 to 760	–292 to 1400	25	45	± 0.25	± 0.45	N/A	±0.02% of span
Type K[8]	NIST monograph 175, IEC 584	–180 to 1372	–292 to 2501	25	45	± 0.25	± 0.45	N/A	±0.02% of span
Type N	NIST monograph 175, IEC 584	–200 to 1300	–328 to 2372	25	45	± 0.40	± 0.72	N/A	±0.02% of span
Type R	NIST monograph 175, IEC 584	0 to 1768	32 to 3214	25	45	± 0.60	± 1.08	N/A	±0.02% of span
Type S	NIST monograph 175, IEC 584	0 to 1768	32 to 3214	25	45	± 0.50	± 0.90	N/A	±0.02% of span
Type T	NIST monograph 175, IEC 584	–200 to 400	–328 to 752	25	45	± 0.25	± 0.45	N/A	±0.02% of span
DIN Type L	DIN 43710	–200 to 900	–328 to 1652	25	45	± 0.35	± 0.63	N/A	±0.02% of span
DIN Type U	DIN 43710	–200 to 600	–328 to 1112	25	45	± 0.35	± 0.63	N/A	±0.02% of span
Type W5Re/ W26Re	ASTM E 988-96	0 to 2000	32 to 3632	25	45	± 0.70	± 1.26	N/A	±0.02% of span
GOST Type L	GOST R 8.585–2001	–200 to 800	–392 to 1472	25	45	± 0.25	± 0.45	N/A	±0.02% of span
Other input types									
Millivolt input		–10 to 100 mV		3 mV		±0.015 mV		N/A	±0.02% of span

Table 5: Transmitter Accuracy *(continued)*

Sensor options	Sensor reference	Input ranges	Minimum span[1]	Digital accuracy[2]	Enhanced accuracy[3]	D/A accuracy[4][5]
2-, 3-, 4-wire Ohm Input		0 to 2000 ohms	20 ohm	±0.35 ohm	N/A	±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 Protocol only)

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

Differential capability exists between any two sensor types (dual-sensor option)

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

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

Digital accuracy for differential configurations (dual-sensor option, HART Protocol 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

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 6: Ambient Temperature Effect on Digital Accuracy

Sensor options	Sensor reference	Effect per 1.0 °C (1.8 °F) change in ambient[1][2]	Input temperature (T)	D/A effect[3]
2-, 3-, or 4-wire RTDs				
Pt 100 (α = 0.00385)	IEC 751	0.0015 °C (0.0027 °F)	Entire sensor input range	0.001% of span
Rosemount X-well Pt 100 (α = 0.00385)	IEC 751	0.0058 °C (0.0104 °F)	Entire sensor input range	0.001% of span
Pt 200 (α = 0.00385)	IEC 751	0.0023 °C (0.00414 °F)	Entire sensor input range	0.001% of span
Pt 500 (α = 0.00385)	IEC 751	0.0015 °C (0.0027 °F)	Entire sensor input range	0.001% of span
Pt 1000 (α = 0.00385)	IEC 751	0.0015 °C (0.0027 °F)	Entire sensor input range	0.001% of span
Pt 100 (α = 0.003916)	JIS 1604	0.0015 °C (0.0027 °F)	Entire sensor input range	0.001% of span

Table 6: Ambient Temperature Effect on Digital Accuracy *(continued)*

Sensor options	Sensor reference	Effect per 1.0 °C (1.8 °F) change in ambient[1][2]	Input temperature (T)	D/A effect[3]
Pt 200 (α = 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 (α = 0.00391)	GOST 6651-94	0.003 °C (0.0054 °F)	Entire sensor input range	0.001% of span
Pt 100 (α = 0.00391)	GOST 6651-94	0.0015 °C (0.0027 °F)	Entire sensor input range	0.001% of span
Cu 50 (α = 0.00426)	GOST 6651-94	0.003 °C (0.0054 °F)	Entire sensor input range	0.001% of span
Cu 50 (α = 0.00428)	GOST 6651-94	0.003 °C (0.0054 °F)	Entire sensor input range	0.001% of span
Cu 100 (α = 0.00426)	GOST 6651-94	0.0015 °C (0.0027 °F)	Entire sensor input range	0.001% of span
Cu 100 (α = 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	N/A	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
Type 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
Type 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

Table 6: Ambient Temperature Effect on Digital Accuracy *(continued)*

Sensor options	Sensor reference	Effect per 1.0 °C (1.8 °F) change in ambient[1][2]	Input temperature (T)	D/A effect[3]
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	N/A	0.001% of span
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) Ambient temperature effect specification valid over minimum temperature span of 28 °C (50 °F).
(3) Applies to HART/4–20 mA devices.

Process temperature effects

Table 7: Ambient and Process Temperature Difference Effect on Digital Accuracy

Sensor option	Sensor reference	Effects per 1.0 °C(1.8 °F) difference in ambient and process temperature[1]	Input temperature (T)
Rosemount X-well Pt 100 (α = 0.00385)	IEC 751	± 0.01 °C (0.018 °F)	Entire sensor input range

(1) Valid under steady state process and ambient conditions.

Temperature effects example

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

Digital temp effects

- 0.0015 °C/°C x (30 - 20 °C) = 0.015 °C

D/A effects (HART/4–20 mA only)

- [0.001%/°C of span] x 100 °C x |(30 - 20 °C)| = °C DA effect
- [0.001%/°C x 100] x |(30 - 20)| = 0.001 °C

Worst case error

- Digital + D/A + Digital temp effects + D/A effects
  = 0.10 °C + 0.02 °C + 0.015 °C + 0.01 °C = 0.145 °C

Total probable error

- $\sqrt{0.10^2 + 0.02^2 + 0.015^2 + 0.01^2} = 0.10\ °C$

Rosemount X-well temperature effects example

When using Rosemount X-well Technology at 30 °C ambient temperature and 100 °C process temperature:

Digital ambient temperature effects:

- 0.0058 °C x (30 - 20) = 0.058 °C

Process temperature effects:

- 0.01 °C x (100 - 30) = 0.70 °C

Worst case error:

- Digital accuracy + Digital ambient temperature effects + Process temperature effects = 0.29 °C + 0.058 °C + 0.70 °C = 1.05 °C

Total probable error:

- $\sqrt{0.29^2 + 0.058^2 + 0.70^2} = 0.76\ °C$

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 7.

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. 6 kV/3 kA peak (1.2 x 50 μS Wave 8 x 20 μS combination wave) 6 kV/0.5 kA peak (100 kHz ring wave) EFT, 4 kV peak, 2.5 kHz, 5 x 50 nS
- Loop resistance added by protector: 22 ohmsmax.
- 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 (8mm) 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 Device Manager.

Turn-on time

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

Power supply effect

Less than ±0.005 percent 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: ±2% of process variable span
- Span < 100 °C: ±2 °C
- Safety response time: five seconds
- Safety specifications and FMEDA report available at Emerson.com/Rosemount/Safety
- Software suitable for SIL3 applications

Temperature limits

Table 8: Temperature Limits

Description	Operating limit	Storage limit
Without LCD display	–40 to 185 °F –40 to 85 °C	–76 to 250 °F –60 to 120 °C
With LCD display(1)	–40 to 185 °F –40 to 85 °C	–76 to 185 °F –60 to 85 °C

(1) LCD display may not be readable and LCD display 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:

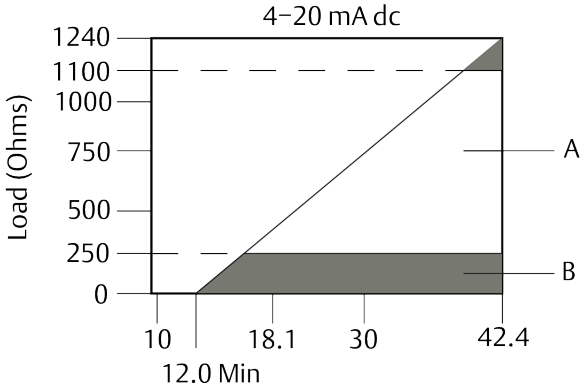
Table 9: Operation Parameters

	Standard(1)	NAMUR-compliant(1)
Linear output	3.9 ≤ I ≤ 20.5	3.8 ≤ I ≤ 20.5
Fail high	21.75 ≤ I ≤ 23 (default)	21.5 ≤ I ≤ 23 (default)
Fail low	I ≤ 3.75	I ≤ 3.6

(1) Measured in milliamperes.

Load limitations

Maximum load = 40.8 x (Supply voltage - 12.0) without transient protection (optional).



1. HART® and analog operating range
2. Analog only operating range

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

FOUNDATION Fieldbus 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 8

Alarm

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. 6 kV/3 kA peak (1.2 x 50 μS Wave 8 x 20 μS Combination Wave) 6 kV/0.5 kA peak (100 kHz Ring Wave) EFT, 4 kV peak, 2.5 kHz, 5*50 nS
- Loop resistance added by protector: 22 ohmsmaximum
- Nominal clamping voltages: 90 V (common mode), 77 V (normal mode)

Diagnostics suite for FOUNDATION Fieldbus (option code D01)

The Rosemount 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 transmitter 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 display 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 display 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 zero 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)

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 display 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	N/A
Transducer	N/A
LCD display block	N/A
Advanced diagnostics	N/A
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

Product Certifications

Rev 1.30

European Directive Information

A copy of the EU Declaration of Conformity can be found at the end of the Quick Start Guide. The most recent revision of the EU Declaration of Conformity can be found at Emerson.com/Rosemount.

Ordinary Location Certification

As standard, the transmitter has been examined and tested to determine that the design meets the basic electrical, mechanical, and fire protection requirements by a nationally recognized test laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

North America

E5 FM Explosionproof, Dust-Ignitionproof, and Nonincendive

Certificate FM16US0202X

Standards FM Class 3600: 2011, FM Class 3611: 2004, FM Class 3615: 2006, FM Class 3810: 2005, ANSI/NEMA 250: 1991, ANSI/ISA 60079-0: 2009, ANSI/ISA 60079-11: 2009

Markings **XP** CL I, DIV 1, GP A, B, C, D; T5(-50 °C ≤ T_a ≤ +85 °C); **DIP** CL II/III, DIV 1, GP E, F, G; T5(-50 °C ≤ T_a ≤ +75 °C); T6(-50 °C ≤ T_a ≤ +60 °C); when installed per Rosemount™ drawing 03144-0320; **NI** CL I, DIV 2, GP A, B, C, D; T5(-60 °C ≤ T_a ≤ +75 °C); T6(-60 °C ≤ T_a ≤+60 °C); when installed per Rosemount™ drawing 03144-0321, 03144-5075

I5 FM Intrinsic Safety and Nonincendive

Certificate FM16US0202X

Standards FM Class 3600: 2011, FM Class 3610: 2010, FM Class 3611: 2004, FM Class 3810: 2005, ANSI/NEMA 250: 1991, ANSI/ISA 60079-0: 2009, ANSI/ISA 60079-11: 2009

Markings **IS** CL I/II/III, DIV 1, GP A, B, C, D, E, F, G; T4(-60 °C ≤ T_a ≤ +60 °C); **IS** [Entity] CL I, Zone 0, AEx ia IIC T4(-60 °C ≤ T_a ≤ +60 °C); **NI** CL I, DIV 2, GP A, B, C, D; T5(-60 °C ≤ T_a ≤ +75 °C); T6(-60 °C ≤ T_a ≤ +60 °C); when installed per Rosemount™ drawing 03144-0321, 03144-5075

I6 CSA Intrinisic Safety and Division 2

Certificate 1242650

Standards CAN/CSA C22.2 No. 0-M91 (R2001), CAN/CSA-C22.2 No. 94-M91, CSA Std C22.2 No. 142-M1987, CAN/CSA-C22.2 No. 157-92, CSA Std C22.2 No. 213-M1987

Markings Intrinsically Safe for Class I Groups A, B, C, D; Class II, Groups E, F, G; Class III;
[HART® only zone markings]: Intrinsically Safe for Class I Zone 0 Group IIC; T4(-50 °C ≤ Ta ≤ +60 °C); Type 4X;
Suitable for Class I, Div. 2, Groups A, B, C, D;
[HART only zone markings]: Suitable for Class I Zone 2 Group IIC; T6(-60 °C ≤ T_a ≤ +60 °C); T5(-60 °C ≤ T_a ≤ +85 °C); when installed per Rosemount™ drawing 03144-5076

K6 CSA Explosionproof, Intrinsic Safety and Division 2

Certificate 1242650

Standards CAN/CSA C22.2 No. 0-M91 (R2001), CSA Std C22.2 No. 25-1966, CSA Std C22.2 No. 30-M1986; CAN/CSA-C22.2 No. 94-M91, CSA Std C22.2 No. 142-M1987, CAN/CSA-C22.2 No. 157-92, CSA Std C22.2 No. 213-M1987

Markings Explosionproof for Class I, Groups A, B, C, D; Class II, Groups E, F, G; Class III; [HART® only zone markings]: Suitable for Class I Zone 1 Group IIC; Intrinsically Safe for Class I Groups A, B, C, D; Class II, Groups E, F, G; Class III; [HART only zone markings]: Suitable for Class I Zone 0 Group IIC; T4(-50 °C ≤ T_a ≤ +60 °C); Type 4X; Suitable for Class I, Div. 2, Groups A, B, C, D; [HART only zone markings]: Suitable for Class I Zone 2 Group IIC; T6(-60 °C ≤T_a ≤ +60 °C); T5(-60 °C ≤ T_a ≤ +85 °C); when installed per Rosemount™ drawing 03144-5076

Europe

E1 ATEX Flameproof

Certificate FM12ATEX0065X

Standards EN 60079-0: 2012+A11:2013, EN 60079-1: 2014, EN 60529:1991 +A1:2000+A2:2013

Markings Ⓔx II 2 G Ex db IIC T6...T1 Gb, T6(-50 °C ≤ T_a ≤ +40 °C), T5...T1(-50 °C ≤ T_a ≤ +60 °C);
See Process temperature limits for process temperatures.

Specific conditions of use (X):

1. See certificate for ambient temperature range.
2. The non-metallic label may store an electrostatic charge and become a source of ignition in Group III environments.
3. Guard the LCD display cover against impact energies greater than four joules.
4. Flameproof joints are not intended for repair.
5. A suitable certified Ex d or Ex tb enclosure is required to be connected to temperature probes with Enclosure option "N".
6. Care shall be taken by the end user to ensure that the external surface temperature on the equipment and the neck of DIN Style Sensor probe does not exceed 266 °F (130 °C).
7. Non-standard paint options may cause risk of electrostatic discharge. Avoid installations that cause electrostatic build-up on painted surfaces and only clean the painted surfaces with a damp cloth. If paint is ordered through a special option code, contact the manufacturer for more information.

I1 ATEX Intrinsic Safety

Certificate BAS01ATEX1431X [HART®]; Baseefa03ATEX0708X [Fieldbus];

Standards EN 60079-0: 2012; EN 60079-11:2012;

Markings HART: Ⓔx II 1 G Ex ia IIC T5/T6 Ga; T6(-60 °C ≤ T_a ≤ +50 °C), T5(-60 °C ≤ T_a ≤ +75 °C)

Fieldbus: Ⓔx II 1 G Ex ia IIC T4 Ga; T4(-60 °C ≤ T_a ≤ +60 °C)

See Table 17 for entity parameters.

Special conditions for safe use (X):

1. When fitted with the transient terminal options, the equipment is not capable of passing the 500 V insulation test. This must be taken into account during installation.
2. The enclosure may be made from aluminum alloy with a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion when located in Zone 0.

N1 ATEX Type n

Certificate	BAS01ATEX3432X [HART®]; Baseefa03ATEX0709X [Fieldbus]
Standards	EN 60079-0:2012, EN 60079-15:2010
Markings	HART: ⟨Ex⟩ II 3 G Ex nA IIC T5/T6 Gc; T6(-40 °C ≤ T_a ≤ +50 °C), T5(-40 °C ≤ T_a ≤ +75 °C); Fieldbus: ⟨Ex⟩ II 3 G Ex nA IIC T5 Gc; T5(-40 °C ≤ T_a ≤ +75 °C);

Special condition for safe use (X):

1. When fitted with the transient terminal options, the equipment is not capable of passing the 500 V electrical strength test as defined in clause 6.5.1 of EN 60079-15: 2010. This must be taken into account during installation.

ND ATEX Dust

Certificate	FM12ATEX0065X
Standards used	EN 60079-0: 2012+A11:2013, EN 60079-31:2014, EN 60529:1991 +A1:2000+A2:2013
Markings	⟨Ex⟩ II 2 D Ex tb IIIC T130°C Db, (-40 °C ≤ T_a ≤ +70 °C); IP66 See Process temperature limits for process temperature.

Specific conditions of use (X):

1. See certificate for ambient temperature range.
2. The non-metallic label may store an electrostatic charge and become a source of ignition in Group III environments.
3. Guard the LCD display cover against impact energies greater than four joules.
4. Flameproof joints are not intended for repair.
5. A suitable certified Ex d or Ex tb enclosure is required to be connected to temperature probes with Enclosure option "N".
6. Care shall be taken by the end user to ensure that the external surface temperature on the equipment and the neck of DIN Style Sensor probe does not exceed 266 °F (130 °C).
7. Non-standard paint options may cause risk of electrostatic discharge. Avoid installations that cause electrostatic build-up on painted surfaces and only clean the painted surfaces with a damp cloth. If paint is ordered through a special option code, contact the manufacturer for more information.

International

E7 IECEx Flameproof

Certificate	IECEx FMG 12.0022X
Standards	IEC 60079-0:2011, IEC 60079-1:2014-06
Markings	Ex db IIC T6...T1 Gb, T6(-50 °C ≤ T_a ≤ +40 °C), T5...T1(-50 °C ≤ T_a ≤ +60 °C) See Process temperature limits for process temperatures.

Specific conditions of use (X):

1. See certificate for ambient temperature range.
2. The non-metallic label may store an electrostatic charge and become a source of ignition in Group III environments.
3. Guard the LCD display cover against impact energies greater than four joules.

4. Flameproof joints are not intended for repair.
5. A suitable certified Ex d or Ex tb enclosure is required to be connected to temperature probes with Enclosure option "N".
6. Care shall be taken by the end user to ensure that the external surface temperature on the equipment and the neck of DIN Style Sensor probe does not exceed 266 °F (130 °C).
7. Non-standard paint options may cause risk of electrostatic discharge. Avoid installations that cause electrostatic build-up on painted surfaces and only clean the painted surfaces with a damp cloth. If paint is ordered through a special option code, contact the manufacturer for more information.

Additionally available with option K7

IECEx Dust

Certificate:	IECEx FMG 12.0022X
Standards:	IEC 60079-0:2011 and IEC 60079-31:2013
Markings:	Ex tb IIIC T130 °C Db, (-40 °C ≤ T_a ≤ +70 °C); IP66 See Process temperature limits for process temperatures.

Specific conditions of use (X):

1. See certificate for ambient temperature range.
2. The non-metallic label may store an electrostatic charge and become a source of ignition in Group III environments.
3. Guard the LCD display cover against impact energies greater than four joules.
4. Flameproof joints are not intended for repair.
5. A suitable certified Ex d or Ex tb enclosure is required to be connected to temperature probes with Enclosure option "N".
6. Care shall be taken by the end user to ensure that the external surface temperature on the equipment and the neck of DIN Style Sensor probe does not exceed 266 °F (130 °C).
7. Non-standard paint options may cause risk of electrostatic discharge. Avoid installations that cause electrostatic build-up on painted surfaces and only clean the painted surfaces with a damp cloth. If paint is ordered through a special option code, contact the manufacturer for more information.

I7 IECEx Intrinsic Safety

Certificate	IECEx BAS 07.0002X [HART®]; IECEx BAS 07.0004X [Fieldbus]
Standards	IEC 60079-0: 2011; IEC 60079-11: 2011;
Markings	HART: Ex ia IIC T5/T6 Ga; T6(-60 °C ≤ T_a ≤ +50 °C), T5(-60 °C ≤ T_a ≤ +75 °C); Fieldbus: Ex ia IIC T4 Ga; T4(-60 °C ≤ T_a ≤ +60 °C) See Table 17 for entity parameters.

Special conditions for safe use (X):

1. When fitted with the transient terminal options, the equipment is not capable of passing the 500 V electrical strength test as defined in Clause 6.3.13 of IEC 60079-11: 2011. This must be taken into account during installation.
2. The enclosure may be made from aluminum alloy with a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion when located in Zone 0.

N7 IECEx Type n

Certificate	IECEx BAS 07.0003X [HART®]; IECEx BAS 07.0005X [Fieldbus]
Standards	IEC 60079-0:2011, IEC 60079-15:2010

Markings	HART: Ex nA IIC T5/T6 Gc; T6(-40 °C ≤ T_a ≤ +50 °C), T5(-40 °C ≤ T_a ≤ +75 °C); Fieldbus: Ex nA IIC T5 Gc; T5(-40 °C ≤ T_a ≤ +75 °C);

Special condition for safe use (X):

1. When fitted with the transient terminal options, the equipment is not capable of passing the 500 V electrical strength test as defined in clause 6.5.1 of EN 60079-15: 2010. This must be taken into account during installation.

Brazil

E2 INMETRO Flameproof and Dust

Certificate	UL-BR 13.0535X
Standards	ABNT NBR IEC 60079-0:2013; ABNT NBR IEC 60079-1:2016; ABNT NBR IEC 60079-31:2014
Markings	Ex db IIC T6...T1 Gb; T6(-50 °C ≤ T_a ≤ +40 °C); T5...T1(-50 °C ≤ T_a ≤ +60 °C) Ex tb IIIC T130 °C Db; IP66; (-40 °C ≤ T_a ≤ +70 °C)

Special conditions for safe use (X):

1. See product description for ambient temperature limits and process temperature limits.
2. The non-metallic label may store an electrostatic charge and become a source of ignition in Group III environments.
3. Guard the LCD display cover against impact energies greater than four joules.
4. Consult the manufacturer if dimensional information on the flameproof joints is necessary.

I2 INMETRO Intrinsic Safety [HART®]

Certificate	UL-BR 15.0088X
Standards	ABNT NBR IEC 60079-0:2008 + Errata 1:2011, ABNT NBR IEC 60079-11:2009
Markings	Ex ia IIC T6 Ga (-60 °C < T_a < 50 °C), Ex ia IIC T5 Ga (-60 °C < T_a < 75 °C) See Table 17 for entity parameters.

Special conditions for safe use (X)

1. When fitted with the transient terminal options, the equipment is not capable of withstanding the 500 V electrical strength test as defined in ABNT NBR IEC60079-11. This must be taken into account during installation.
2. The enclosure may be made from aluminum alloy with a protective polyurethane paint finish; however, care should be taken to protect it from impact and abrasion when located in areas that require EPL Ga (Zone 0).

INMETRO Intrinsic Safety [Fieldbus/FISCO]

Certificate	UL-BR 15.0030X
Standards	ABNT NBR IEC 60079-0:2008 + Errata 1:2011, ABNT NBR IEC 60079-11:2009
Markings	Ex ia IIC T4 Ga (-60 °C < T_a < +60 °C) See Table 17 for entity parameters.

Special conditions for safe use (X)

1. When fitted with the transient terminal options, the equipment is not capable of withstanding the 500 V electrical strength test as defined in ABNT NBR IEC60079-11. This must be taken into account during installation.
2. The enclosure may be made from aluminum alloy with a protective polyurethane paint finish; however, care should be taken to protect it from impact and abrasion when located in areas that require EPL Ga (Zone 0).

China

E3 China Flameproof

Certificate	GYJ16.1339X
Standards	GB3836.1-2010, GB3836.2-2010
Markings	Ex d IIC T6...T1 Gb

- 产品安全使用特殊条件
  证书编号后缀“X”表明产品具有安全使用特殊条件：涉及隔爆接合面的维修须联系产品制造商。
- 产品使用注意事项
  1. 产品使用环境温度与温度组别的关系为:

温度组别	环境温度
T6~T1	-50 °C ≤ T_a ≤ +40 °C
T5~T1	-50 °C ≤ T_a ≤ +60 °C

  2. 产品外壳设有接地端子，用户在使用时应可靠接地
  3. 安装现场应不存在对产品外壳有腐蚀作用的有害气体
  4. 现场安装时，电缆引入口须选用国家指定的防爆检验机构按检验认可、具有 Ex dIIC 防爆等级的电缆引入装置或堵封件，冗余电缆引入口须用堵封件有效密封
  5. 现场安装、使用和维护必须严格遵守“断电后开盖！”的警告语
  6. 用户不得自行更换该产品的零部件，应会同产品制造商共同解决运行中出现的故障，以杜绝损坏现象的发生
  7. 产品的安装、使用和维护应同时遵守产品使用说明书、GB3836.13-2013“爆炸性环境 第 13 部分：设备的修理、检修、修复和改造”、GB3836.15-2000“爆炸性气体环境用电气设备 第 15 部分：危险场所电气安装（煤矿除外）”、GB3836.16-2006“爆炸性气体环境用电气设备 第 16 部分：电气装置的检查和维护（煤矿除外）”和 GB50257-2014“电气装置安装工程爆炸和火灾危险环境电力装置施工及验收规范”的有关规定

I3 China Intrinsic Safety

Certificate	GYJ16.1338X
Standards	GB3836.1-2010, GB3836.4-2010, GB3836.20-2010
Markings	Ex ia IIC T4/T5/T6 Ga

- 产品安全使用特殊条件
  证书编号后缀“X”表明产品具有安全使用特殊条件:
  1. 产品外壳含有轻金属，用于 0 区时需注意防止由于冲击或摩擦产生的点燃危险
  2. 产品选用瞬态保护端子板（选项代码为 T1）时，此设备不能承受 GB3836.4-2010 标准中第 6.3.12 条规定的 500V 交流有效值试验电压的介电强度试验
- 产品使用注意事项
  1. 产品温度组别与使用环境温度范围的关系:

输出	温度组别	环境温度
HART®	T6	-60 °C ≤ T_a ≤ +50 °C
	T5	-60 °C ≤ T_a ≤ +75 °C

输出	温度组别	环境温度
Fieldbus	T4	-60 °C ≤ T_a ≤ +60 °C

2. 本安电气参数:

Table 10: Power Loop Terminals (+ and -)

输出	最高输入电压 U_i (V)	最大输入电流 I_i (mA)	最大输入功率 P_i (W)	最大内部等效参数	
				C_i (nF)	L_i (μH)
HART	30	300	1	5	0
Fieldbus	30	300	1.3	2.1	0

Table 11: Sensor Terminals (1 to 5)

输出	最高输出电压 U_o (V)	最大输出电流 I_o (mA)	最大输出功率 P_o (W)	最大内部等效参数	
				C_o (nF)	L_o (μH)
HART	13.6	56	0.19	78	0
Fieldbus	13.9	23	0.079	7.7	0

Table 12: Load Connected to Sensor Terminals (1 to 5)

输出	组别	最大外部等效电路	
		C_o (μF)	L_o (mH)
HART	IIC	0.74	11.7
	IIB	5.12	44
	IIA	18.52	94
Fieldbus	IIC	0.73	30.2
	IIB	4.8	110.9
	IIA	17.69	231.2

温度变送器符合 GB3836.19-2010 标准对 FISCO 系统中现场仪表的有关要求
其本安参数及内部最大等效参数如下:

最高输入电压 U_i (V)	最大输入电流 I_i (mA)	最大输入功率 P_i (W)	最大内部等效参数	
			C_i (nF)	L_i (mH)
17.5	380	5.32	2.1	0

3. 该产品必须与已通过防爆认证的关联设备配套共同组成本安防爆系统方可使用于爆炸性气体环境。其系统接线必须同时遵守本产品和所配关联设备的使用说明书要求，接线端子不得接错
4. 该产品与关联设备的连接电缆应为带绝缘护套的屏蔽电缆，其屏蔽层应在安全场所接地
5. 用户不得自行更换该产品的零部件，应会同产品制造商共同解决运行中出现的故障，以杜绝损坏现象的发生
6. 产品的安装、使用和维护应同时遵守产品使用说明书、GB3836.13-2013“爆炸性环境 第 13 部分：设备的修理、检修、修复和改造”、GB3836.15-2000“爆炸性气体环境用电气设备 第 15 部分：危险场所电气安装（煤矿除外）”、

GB3836.16-2006“爆炸性气体环境用电气设备 第 16 部分：电气装置的检查和维护（煤矿除外）”、GB3836.18-2010“爆炸性环境 第 18 部分：本质安全系统”和 GB50257-2014“电气装置安装工程爆炸和火灾危险环境电力装置施工及验收规范”的有关规定

N3 China Type n

Certificate GYJ15.1087X [Fieldbus]; GYJ15.1088X [HART®]

Standards GB3836.1-2010, GB3836.8-2003

Markings Ex nA nL IIC T5 Gc [Fieldbus]; Ex nA nL IIC T5/T6 Gc [HART]

Output	T code	Ambient temperature
Fieldbus	T5	-40 °C ≤ T_a ≤ +75 °C
HART	T6	-40 °C ≤ T_a ≤ +50 °C
	T5	-40 °C ≤ T_a ≤ +75 °C

- 产品安全使用特殊条件
  产品防爆合格证后缀“X”代表产品安全使用有特殊条件，即：当使用瞬态保护选项，此设备不能承受 GB3836.8-2003 标准中第 8.1 条规定的 500V 耐压试验，安装时必须考虑在内
- 产品使用注意事项

EAC - Belarus, Kazakhstan, Russia

EM Technical Regulation Customs Union (EAC) Flameproof

Standards GOST 31610.0-2014, GOST IEC 60079-1-2013

Markings 1Ex db IIC T6...T1 Gb X, T6(-50 °C ≤ T_a ≤ +40 °C), T5...T1(-50 °C ≤ T_a ≤ +60 °C);
See Process temperature limits for process temperatures.

Special conditions for safe use (X):

1. Non-standard paint options may cause risk of electrostatic discharge. Avoid installations that cause electrostatic build-up on painted surfaces and only clean the painted surfaces with a damp cloth. If paint is ordered through a special option code, contact the manufacturer for more information.

IM Technical Regulation Customs Union (EAC) Intrinsic Safety

Standards GOST 31610.0-2014, GOST IEC 60079-11-2014

Markings [HART®]: 0Ex ia IIC T5, T6 Ga X, T6(-60 °C ≤ T_a ≤ +50 °C), T5(-60 °C ≤ T_a ≤ +75 °C);
[Fieldbus/Profibus]: 0Ex ia IIC T4 Ga X, T4(-60 °C ≤ T_a ≤ +60 °C;
See Table 17 for entity parameters.

Special conditions for safe use (X):

1. When fitted with the transient terminal options, the apparatus is not capable of withstanding the 500 V electrical strength test as defined in Clause 6.3.13 of GOST 31610.11-2014. This must be taken into account during installation.
2. The enclosure may be made from aluminum alloy with a protective polyurethane paint finish; however, care should be taken to protect it from impact or abrasion when located in Zone 0.

KM Technical Regulation Customs Union (EAC) Flameproof, Intrinsic Safety, and Dust

Standards	GOST 31610.0-2014, GOST IEC 60079-1-2013, GOST IEC 60079-11-2014, GOST IEC 60079-31-2013
Markings	Ex tb IIIC T130 °C Db X (-40 °C ≤ T_a ≤ +70 °C), IP 66 in addition to markings listed for EM and IM above

Special condition for safe use (X):

See certificate for special conditions.

Japan

E4 TIIS Flameproof

Certificate	TC21038, TC21039
Markings	Ex d IIC T5 (-20 °C ≤ T_a ≤ +60 °C)
Certificate	TC16127, TC16128, TC16129, TC16130
Markings	Ex d IIB T4 (-20 °C ≤ T_a ≤ +55 °C)

Korea

EP Korea Flameproof

Certificate	10-KB4BO-0011X
Markings	Ex d IIC T6/T5; T6(-40 °C ≤ T_{amb} ≤ +70 °C), T5(-40 °C ≤ T_{amb} ≤ +80 °C)

Special conditions for safe use (X):

See certificate for special conditions.

IP Korea Intrinsic Safety

Certificate	09-KB4BO-0028X
Markings	Ex ia IIC T6/T5; T6(-60 °C ≤ T_{amb} ≤ +50 °C), T5(-60 °C ≤ T_{amb} ≤ +75 °C)

Special conditions for safe use (X):

See certificate for special conditions.

Combinations

K1	Combination of E1, I1, N1, and ND
K2	Combination of E2 and I2
K5	Combination of E5 and I5
K7	Combination of E7, I7, and N7
KA	Combination of K1 and K6
KB	Combination of K5, I6, and K6

Tables

Process temperature limits

Table 13: Sensor Only (No Transmitter Installed)

Sensor only	Process Temperature [˚C]						
	Gas						Dust
	T6	T5	T4	T3	T2	T1	T130 °C
Any extension length	85	100	135	200	300	450	130

Table 14: Transmitter

Transmitter	Process Temperature [˚C]						
	Gas						Dust
	T6	T5	T4	T3	T2	T1	T130 °C
No extension	55	70	100	170	280	440	100
3-in. extension	55	70	110	190	300	450	110
6-in. extension	60	70	120	200	300	450	110
9-in. extension	65	75	130	200	300	450	120

Adhering to the process temperature limitations of Table 15 will ensure that the service temperature limitations of the LCD display cover are not exceeded. Process temperatures may exceed the limits defined in Table 15 if the temperature of the LCD display cover is verified to not exceed the service temperatures in Table 16 and the process temperatures do not exceed the values specified in Table 14.

Table 15: Transmitter with LCD Display Cover

Transmitter with LCD display cover	Process Temperature [˚C]			
	Gas			Dust
	T6	T5	T4...T1	T130 °C
No extension	55	70	95	95
3-in. extension	55	70	100	100
6-in. extension	60	70	100	100
9-in. extension	65	75	110	110

Table 16: Transmitter with LCD Display Cover

Transmitter with LCD display cover	Service Temperature [˚C]			
	Gas			Dust
	T6	T5	T4...T1	T130 °C
Any extension length	65	75	95	95

Entity parameters

Table 17: Entity Parameters

Parameters	HART®	Fieldbus/PROFIBUS	FISCO
Voltage Ui (V)	30	30	17.5
Current Ii (mA)	300	300	380
Power Pi (W)	1	1.3	5.32
Capacitance Ci (nF)	5	2.1	2.1
Inductance Li (mH)	0	0	0

Additional certifications

SBS American Bureau of Shipping (ABS) Type Approval

Certificate 16-HS1488352-PDA

Intended use Measurement of temperature for marine and offshore applications

SBV Bureau Veritas (BV) Type Approval

Certificate 23154

Requirements Bureau Veritas Rules for the Classification of Steel Ships

Application Class notations: AUT-UMS, AUT-CCS, AUT-PORT and AUT-IMS; Temperature transmitter type 3144P cannot be installed on diesel engines.

SDN Det Norske Veritas (DNV) Type Approval

Certificate TAA00001JK

Intended use Det Norske Veritas' Rules for Classification of Ships, High Speed & Light Craft and Det Norske Veritas' Offshore Standards

Application

Table 18: Location Classes

Temperature	D
Humidity	B
Vibration	A
EMC	A
Enclosure	D

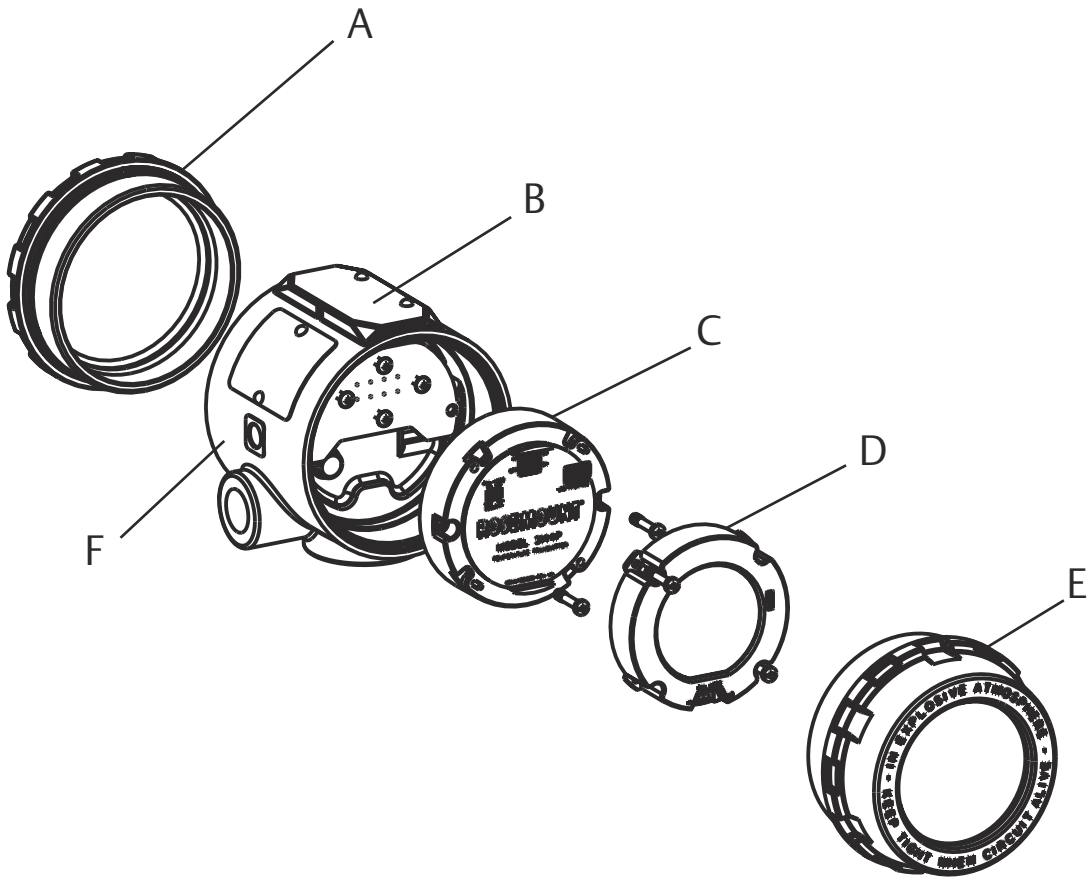
SLL Lloyds Register (LR) type approval

Certificate 11/60002

Application Environmental categories ENV1, ENV2, ENV3, and ENV5

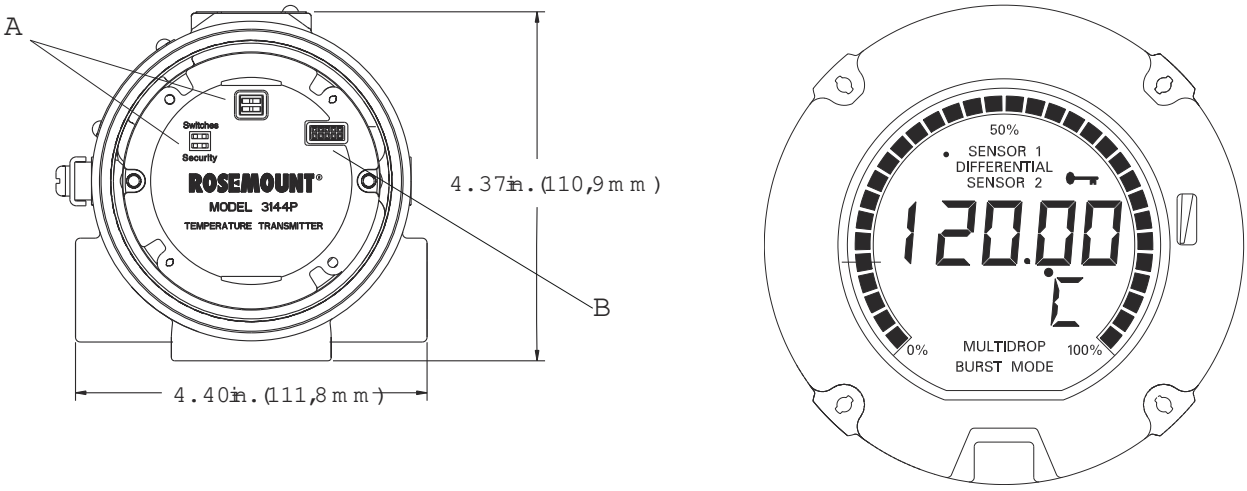
Dimensional drawings

Figure 1: Transmitter Exploded View



A. Cover with wiring diagram
B. Nameplate
C. Electronic module
D. LCD display
E. Display cover
F. Housing with permanent terminal block

Figure 2: Switch Location and LCD Display Faceplate

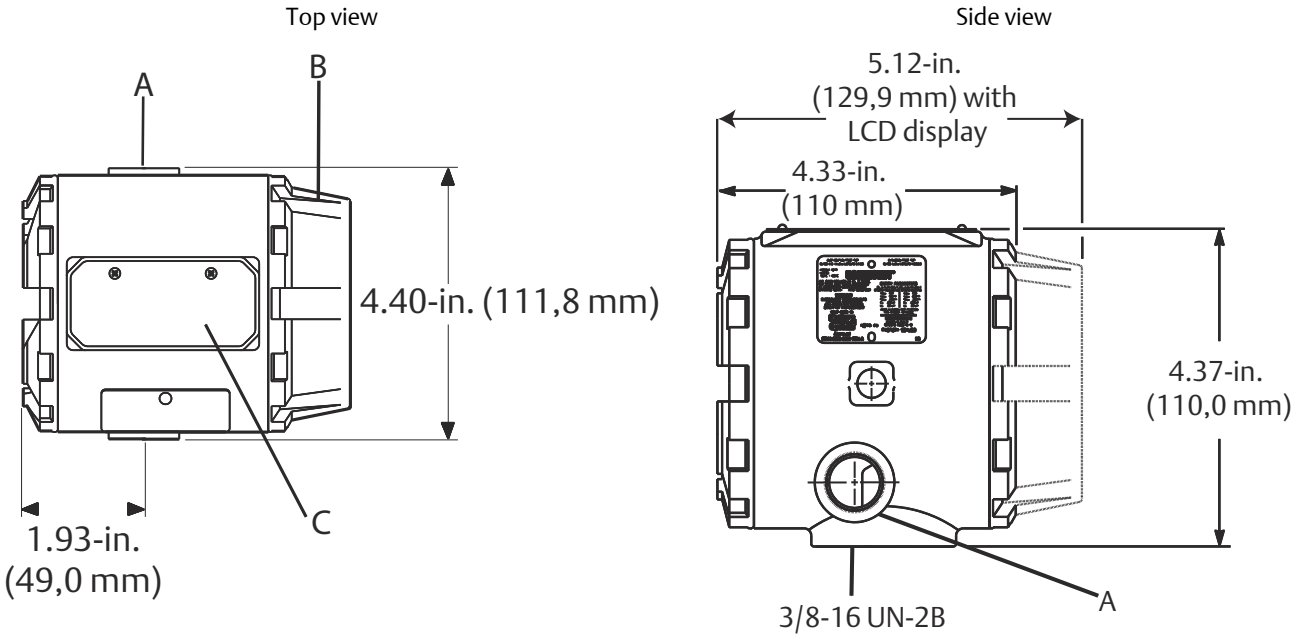


A. Switches(1)

B. LCD display connector

Dimensions are in inches (millimeters).

Figure 3: Transmitter view



A. Conduit entry

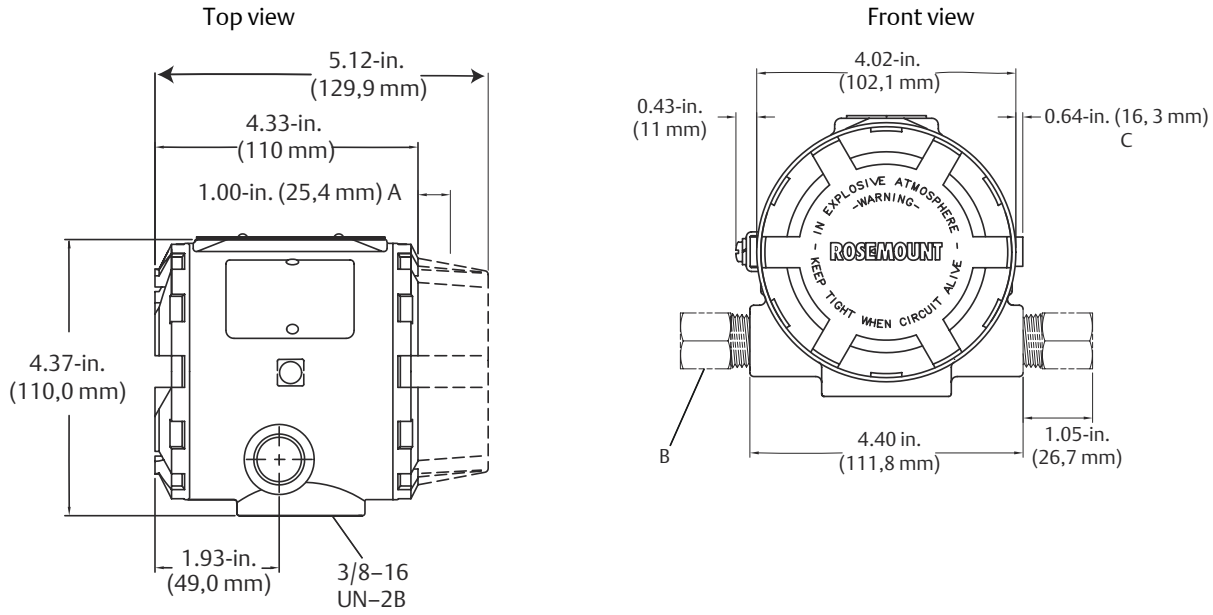
B. Display cover

C. Nameplate

Dimensions are in inches (millimeters).

(1) Alarm and write protect (HART®), simulate and write protect (FOUNDATION™ Fieldbus).

Figure 4: Transmitter for Conduits with M20 3 1.5, PG 13.5 Entries



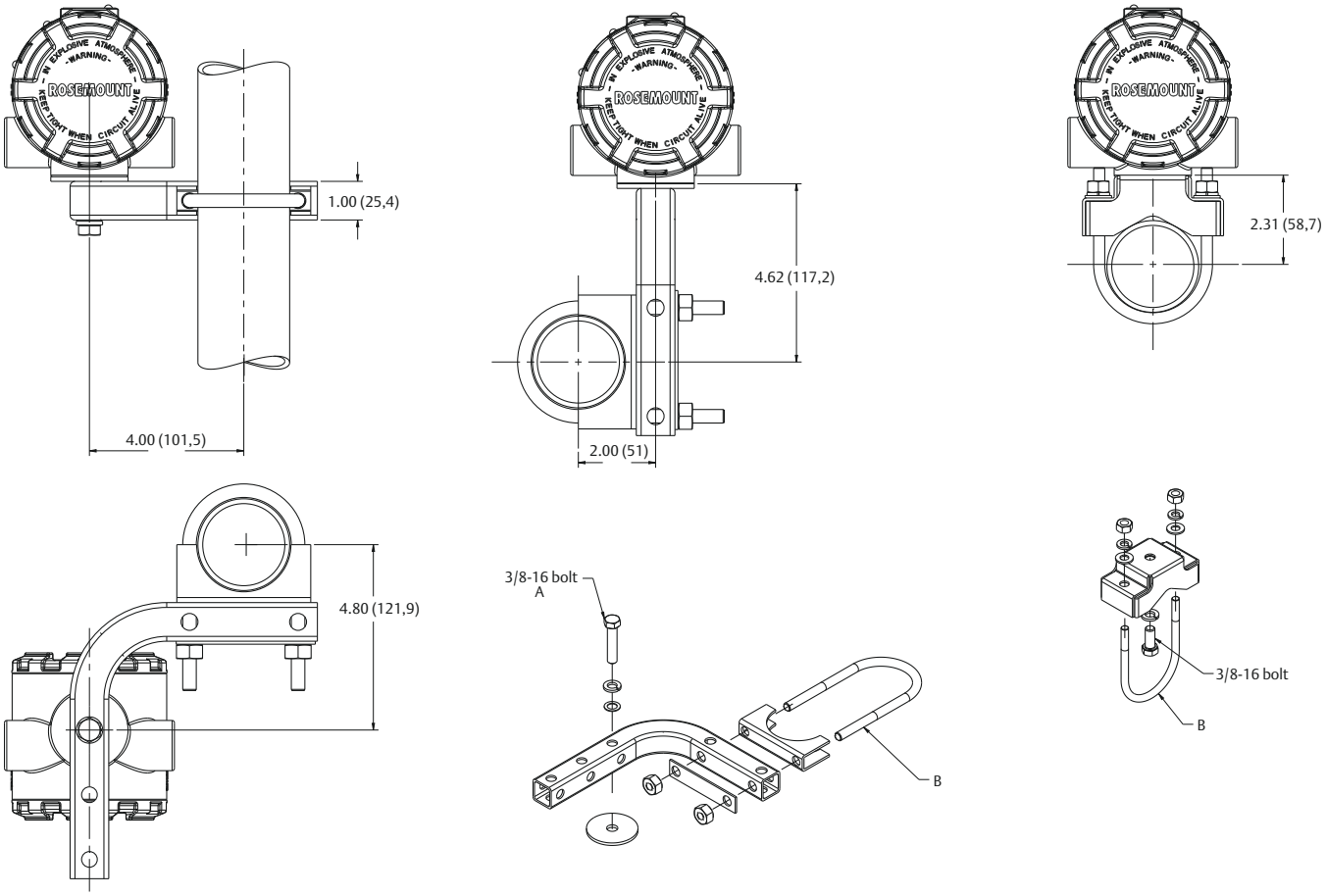
A. Clearance required to remove cover

B. Adapters for M20 x 1.5, PG 13.5

C. Explosion/flameproof clamp (option code dependent)

Dimensions are in inches (millimeters).

Figure 5: Pipe Mounting Configurations with Optional Mounting Bracket



A. For transmitter mounting
B. 2-in. U-bolt for pipe mounting

Dimensions are in inches (millimeters).

Figure 6: Rosemount X-well Assembly

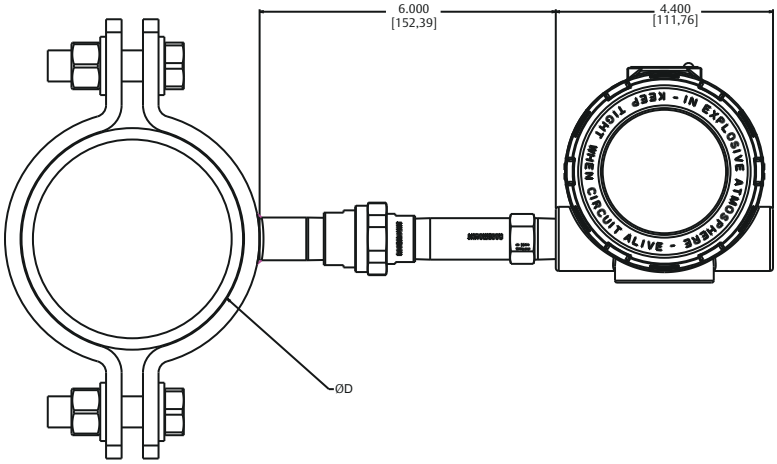
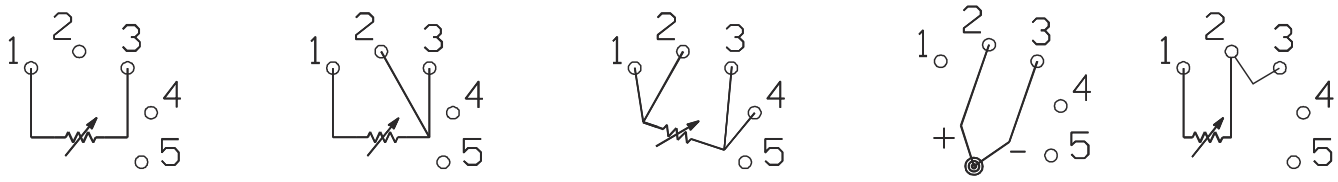


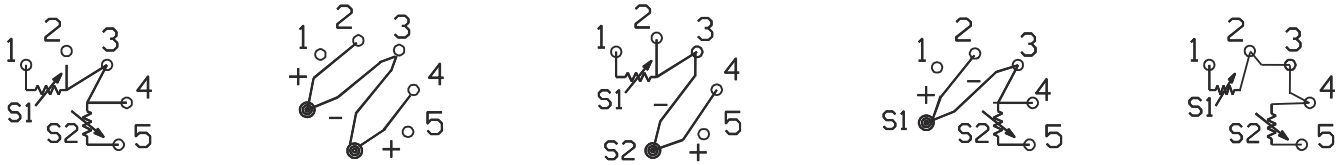
Figure 7: HART/4-20 mA

Rosemount 3144P single-sensor connections



2-wire RTD and Ohms | 3-wire RTD and Ohms(1) | 4-wire RTD and Ohms | T/Cs and Millibvolts | RTD with Compensation Loop(2)

Rosemount 3144P dual-sensor connections

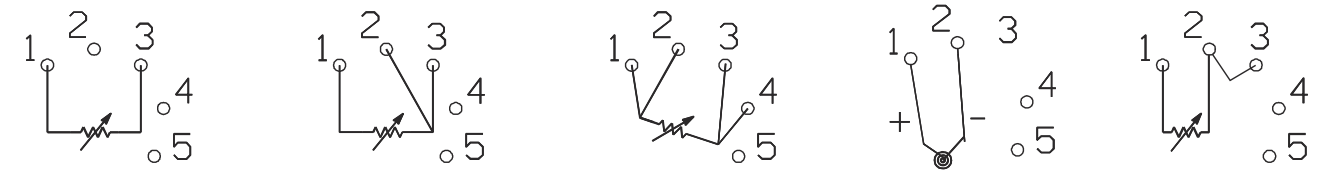


ΔT/Hot Backup/Dual Sensor with two RTDs | ΔT/Hot Backup/Dual Sensor with two RTDs | ΔT/Hot Backup/Dual Sensor with RTDs/ Thermocouples(1) | ΔT/Hot Backup/Dual Sensor with RTDs/ Thermocouples(1) | DT/Hot Backup/Dual Sensor with two RTDs with Compensation Loop(1)

(1) Emerson provides 4-wire sensors for all single-element RTDs. Use these RTDs in 2-wire or 3-wire configurations by leaving the unneeded leads disconnected and insulated with electrical tape.
(2) Transmitter must be configured for a 3-wire RTD in order to recognize an RTD with a compensation loop.

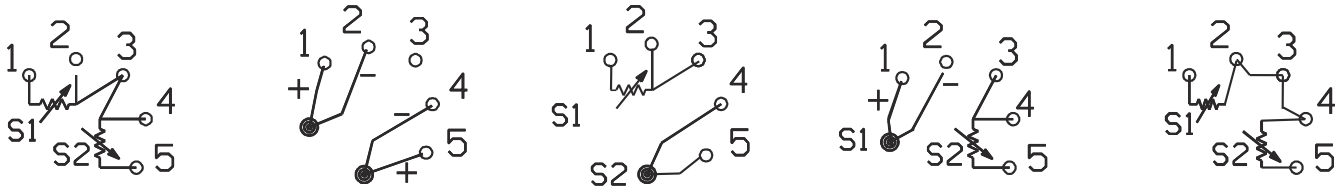
Figure 8: FOUNDATION Fieldbus

Rosemount 3144P single-sensor connections



2-wire RTD and Ohms | 3-wire RTD and Ohms(1) | 4-wire RTD and Ohms | T/Cs and Millibvolts | RTD with Compensation Loop(2)

Rosemount 3144P dual-sensor connections



ΔT/Hot Backup/Dual Sensor with two RTDs | ΔT/Hot Backup/Dual Sensor with two RTDs | ΔT/Hot Backup/Dual Sensor with RTDs/ Thermocouples(1) | ΔT/Hot Backup/Dual Sensor with RTDs/ Thermocouples(1) | DT/Hot Backup/Dual Sensor with two RTDs with Compensation Loop(1)

(1) Emerson provides 4-wire sensors for all single-element RTDs. Use these RTDs in 2-wire or 3-wire configurations by leaving the unneeded leads disconnected and insulated with electrical tape.
(2) Transmitter must be configured for a 3-wire RTD in order to recognize an RTD with a compensation loop.

Transmitter 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	SeeSoftware tag
Optional integral display	Units and mA/ sensor 1 units
Single-Sensor option	
Sensor type	4-wire, Pt 100 a = 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 a = 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

Transmitter custom configuration

The Rosemount™ 3144P Temperature 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(1)	Date: day/month/year Descriptor: 16 alphanumeric character Message: 32 alphanumeric character Custom alarm levels can be specified for configuration at the factory. Rosemount X-well specific information: pipe material, pipe schedule, line size
C2: Transmitter-sensor matching	The Rosemount 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 transmitter 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) Configuration Data Sheet required.

To custom configure the Rosemount 3144P Transmitter 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 (α = 0.00385) RTDs if any of the following option codes are selected.

Table 19:

Option code U1: Hot Backup	
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

Option code U2: average temperature with Hot Backup and sensor drift alert—warning mode	
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

Option code U3: average temperature with Hot Backup and sensor drift alert—alarm mode	
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

Option code U4: two independent sensors	
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

Option code U5: differential temperature	
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

Option code U6: average temperature	
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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Global Headquarters
Emerson Automation Solutions
6021 Innovation Blvd.
Shakopee, MN 55379, USA
+1 800 999 9307 or +1 952 906 8888
+1 952 949 7001
RFQ.RMD-RCC@Emerson.com

North America Regional Office
Emerson Automation Solutions
8200 Market Blvd.
Chanhassen, MN 55317, USA
+1 800 999 9307 or +1 952 906 8888
+1 952 949 7001
RMT-NA.RCCRF@Emerson.com

Latin America Regional Office
Emerson Automation Solutions
1300 Concord Terrace, Suite 400
Sunrise, FL 33323, USA
+1 954 846 5030
+1 954 846 5121
RFQ.RMD-RCC@Emerson.com

Europe Regional Office
Emerson Automation Solutions Europe
GmbH
Neuhofstrasse 19a P.O. Box 1046
CH 6340 Baar
Switzerland
+41 (0) 41 768 6111
+41 (0) 41 768 6300
RFQ.RMD-RCC@Emerson.com

Asia Pacific Regional Office
Emerson Automation Solutions
1 Pandan Crescent
Singapore 128461
+65 6777 8211
+65 6777 0947
Enquiries@AP.Emerson.com

Middle East and Africa Regional Office
Emerson Automation Solutions
Emerson FZE P.O. Box 17033
Jebel Ali Free Zone - South 2
Dubai, United Arab Emirates
+971 4 8118100
+971 4 8865465
RFQ.RMTMEA@Emerson.com

Linkedin.com/company/Emerson-Automation-Solutions
Twitter.com/Rosemount_News
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