ABZAR SANJESH ARIA

Product Data Sheet
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Rosemount 644 Temperature Transmitter

The most versatile temperature transmitter

Reduce complexity and simplify the day to day operations of your diverse temperature applications with the versatile Rosemount 644 family of temperature transmitters. Make better decisions for your process with the new and easy to use Rosemount 644 Transmitter capabilities including: diagnostics, safety certification, integral transient protection and display options.

ROSEMOUNT

EMERSON.
Process Management

Rosemount 644 Family of Transmitters

Fit your needs within one model family with a customizable transmitter design

- DIN Head mount, field mount, and rail mount form factors
- 4-20 mA /HART® with Selectable Revisions, FOUNDATION™ fieldbus or PROFIBUS® PA Protocol support
- 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]
- Enhanced display with Local Operator Interface
- LCD display
- Integral Transient Protection
- Enhanced accuracy and stability
- Transmitter-Sensor Matching with Callendar Van Dusen constants
- Variety of enclosures

Rosemount 644 Selection Guide

Rosemount 644 HART Transmitters

HART head mount and field mount

- Single or Dual sensor inputs for RTD, Thermocouple, mV and Ohm
- DIN A Head mount and Field mount transmitters
- 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)
- LCD display
- Enhanced display with Local Operator Interface
- Integral Transient Protection
- Diagnostic Suite
- Enhanced accuracy and stability
- Transmitter-Sensor Matching with Callendar Van Dusen constants

HART rail mount

- Single sensor input for RTD, Thermocouple, mV and Ohm
- Custom alarm and saturation levels
- Transmitter-Sensor Matching with Callendar Van Dusen constants
- Hardware alarm switch

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Rosemount 644 FOUNDATION fieldbus

- Single sensor input for RTD, Thermocouple, mV and Ohm
- DIN A Head mount transmitter
- Standard function blocks: 2 Analog Inputs, 1 PID and 1 Backup Link Active Scheduler (LAS)
- LCD Display
- ITK 5.01 Compliant
- Transmitter Sensor Matching with Callendar Van Dusen constants

Rosemount 644 PROFIBUS PA

- Single sensor input for RTD, Thermocouple, mV and Ohm
- DIN A Head mount transmitter
- Standard function blocks: 1 physical, 1 Transducer, and 1 Analog Out
- LCD Display
- Compliant to PROFIBUS PA Profile 3.02
- Transmitter-Sensor Matching with Callendar Van Dusen constants

Easy to use human-centered designs to make your job simple

- Diagnostic information and process health at your finger tips with intuitive Device Dashboards.
- Communication clips are easily accessible when an LCD display is attached.
- Easy wiring practices with captive sensor screw terminals, an optimized wiring diagram, and field mount enclosure option.

Optimize plant efficiency and increase visibility into the process with an expansive diagnostic offering

- Keep your process up and running with the Hot Backup™ feature where if your primary sensor fails, a second sensor seamlessly takes over and prevents the measurement failure.
- Tighten control with Sensor Drift Alert that detects drifting sensors and pro-actively notifies the user.
- Enable predictive maintenance practices with Thermocouple Degradation Diagnostic that monitors the health of the thermocouple loop.
- Improve quality with Minimum and Maximum Temperature Tracking that records temperature extremes of the process and the ambient environment.

Ordering Information

The Rosemount 644 is a Versatile Temperature Transmitter that delivers field reliability and advanced accuracy and stability to meet demanding process needs.

Transmitter features include:

- HART/4-20 mA with Selectable Revision 5 and 7 selectable (Option Code A), FOUNDATION fieldbus (Option Code F) or PROFIBUS PA (Option Code W)
- DIN A Head Mount, Field Mount, or Rail Mount transmitter styles
- Dual Sensor Input (Option Code S)
- SIS SIL 2 Safety Certification (Option Code QT)
- LCD Display (Option Code M5)
- Local Operator Interface (Option Code M4)
- Advanced Diagnostics (Option Codes DC and DA1)
- Enhanced Transmitter Accuracy and Stability (Option Code P8)
- Transmitter-Sensor Matching (Option Code C2)

Specification and selection of product materials, options, or components must be made by the purchaser of the equipment. See page 14 for more information on Material Selection.

Table 1. Rosemount 644 Smart Temperature Transmitter Ordering Information

★ The Standard offering represents the most common models and options. These options should be selected for best delivery.
The Expanded offering is manufactured after receipt of order and is subject to additional delivery lead time.

● = Available
– = Not Available

Model	Product description					
644	Temperature Transmitter					
Transmitter type						
H	DIN A Head Mount - Single Sensor Input					★
R	Rail Mount - Single Sensor Input					★
S	DIN A Head Mount - Dual Sensor Input (HART only)					★
F[1]	Field Mount - Single Sensor Input (HART only)					★
D[1]	Field Mount - Dual Sensor Input (HART only)					★
Output		**Head**			**Rail**	
A	4–20 mA with digital signal based on HART protocol	●			●	★
F	FOUNDATION fieldbus digital signal (includes 2 AI function blocks and Backup Link Active Scheduler)	●			–	★
W	PROFIBUS PA digital signal	●			–	★
Product certifications		**Head**			**Rail**	
Hazardous locations certificates (consult factory for availability[2])		A	F	W	A	
NA	No approval	●	●	●	●	★
E5	FM Explosion-proof; Dust Ignition-proof	●	●	●	–	★

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		Head			Rail	
		A	F	W	A	
I5	FM Intrinsically Safe; Non-incendive	●	●	●	●	★
K5	FM Explosionproof; Intrinsically Safe; Non-incendive; Dust Ignition-proof	●	●	●	–	★
NK	IECEx Dust	●	–	–	–	★
KC	FM and CSA Intrinsically Safe and Non-incendive	–	–	–	●	★
KB	FM and CSA: Explosionproof; Intrinsically Safe; Non-incendive; Dust Ignition-proof	●	–	–	–	★
KD	FM, CSA and ATEX Explosionproof, Intrinsically Safe	●	●	●		★
I6	CSA Intrinsically Safe	●	●	●	●	★
K6	CSA Explosionproof; Intrinsically Safe; Non-incendive; Dust Ignition-proof	●	●	●	–	★
I3	China Intrinsic Safety	●	–	–	–	★
E3	China Flameproof	●	●	●	–	★
N3	Chine Type n	●	–	–	–	★
E1	ATEX Flameproof	●	●	●	–	★
N1	ATEX Type n	●	●	●	–	★
NC	ATEX Type n Component	●	●	●	●	★
K1	ATEX Flameproof; Intrinsic Safety; Type n; Dust	●	●	●		★
ND	ATEX Dust Ignition–Proof	●	●	●	–	★
KA	CSA and ATEX: Explosionproof; Intrinsically Safe; Non-incendive	●	–	–	–	★
I1	ATEX Intrinsic Safety	●	●	●	●	★
E7	IECEx Flameproof	●	●	●	–	★
I7	IECEx Intrinsic Safety	●	●	●	●	★
N7	IECEx Type n	●	●	●	–	★
NG	IECEx Type n Component	●	●	●	●	★
K7	IECEx Flameproof; Intrinsic Safety; Type n; Dust	●	–	–	–	★
I2	INMETRO Intrinsic Safety	●	–	–	–	★
E4	TIIS Flameproof	●	●	–	–	★
E2	INMETRO Flameproof	●	●	●	–	★
EM	Technical Regulations Customs Union (EAC) Flameproof	●	●	●	–	★
IM	Technical Regulations Customs Union (EAC) Intrinsic Safety	●	●	●	–	★
KM	Technical Regulations Customs Union (EAC) Flameproof, Intrinsic Safety	●	●	●	–	★

Options

		Head			Rail	
		A	F	W	A	
PlantWeb standard diagnostic functionality						
DC	Diagnostics: Hot Backup and Sensor Drift Alert	●	–	–	–	★

Table 1. Rosemount 644 Smart Temperature Transmitter Ordering Information

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PlantWeb advanced diagnostic functionality									
DA1	HART Sensor and Process Diagnostic Suite: Thermocouple Diagnostic and Min/Max Tracking				●	–	–	–	★
Enclosure options					**Head**			**Rail**	
					A	F	W	A	
	Housing style	**Material**	**Entry size**	**Diameter**					
J5(3)(4)	Universal Junction Box, 2 entries	Aluminum	M20 X 1.5	3 in (76 mm)	●	●	●	–	★
J6(4)	Universal Junction Box, 2 entries	Aluminum	1/2–14 NPT	3 in (76 mm)	●	●	●	–	★
R1	Rosemount Connection Head, 2 entries	Aluminum	M20 X 1.5	3 in (76 mm)	●	●	●	–	★
R2	Rosemount Connection Head, 2 entries	Aluminum	1/2–14 NPT	3 in (76 mm)	●	●	●	–	★
J1(3)	Universal Junction Box, 3 entries	Aluminum	M20 X 1.5	3.5 in (89 mm)	●	●	●	–	★
J2	Universal Junction Box, 3 entries	Aluminum	1/2–14 NPT	3.5 in (89 mm)	●	●	●	–	★
D1(1)(3)(5)	Field Mount Housing, Separate Terminal Compartment	Aluminum	M20 X 1.5	3.5 in (89 mm)	–	–	–	–	★
D2(1)(5)	Field Mount Housing, Separate Terminal Compartment	Aluminum	1/2–14 NPT	3.5 in (89 mm)	–	–	–	–	★
J3(3)	Universal Junction Box, 3 entries	Cast SST	M20 X 1.5	3.5 in (89 mm)	●	●	●	–	
J4	Universal Junction Box, 3 entries	Cast SST	1/2–14 NPT	3.5 in (89 mm)	●	●	●	–	
J7(3)(4)	Universal Junction Box, 2 entries	Cast SST	M20 X 1.5	3 in (76 mm)	●	●	●	–	
J8(4)	Universal Junction Box, 2 entries	Cast SST	1/2–14 NPT	3 in (76 mm)	●	●	●	–	
R3	Rosemount Connection Head, 2 entries	Cast SST	M20 X 1.5	3 in (76 mm)	●	●	●	–	
R4	Rosemount Connection Head, 2 entries	Cast SST	1/2–14 NPT	3 in (76 mm)	●	●	●	–	
S1	Connection Head, 2 entries	Polished SST	1/2–14 NPT	3 in (76 mm)	●	●	●	–	
S2	Connection Head, 2 entries	Polished SST	1/2–14 NPSM	3 in (76 mm)	●	●	●	–	
S3	Connection Head, 2 entries	Polished SST	M20 X 1.5	3 in (76 mm)	●	●	●	–	
S4	Connection Head, 2 entries	Polished SST	M20 X 1.5, M24 X 1.4	3 in (76 mm)	●	●	●	–	
Mounting bracket									
B4(6)	316 SST U-bolt Mounting Bracket, 2-in pipe mount				●	●	●	–	★
B5(6)	“L” Mounting Bracket for 2-inch pipe or panel mounting				●	●	●	–	★
Display and interface options									
M4	LCD Display with Local Operator Interface				●	–	–	–	★
M5	LCD Display				●	●	●	–	★
Software configuration									
C1	Custom Configuration of Date, Descriptor and Message (requires CDS with order)				●	●	●	●	★
Enhanced performance									
P8(7)	Enhanced Transmitter Accuracy and Stability				●	–	–	–	★

Table 1. Rosemount 644 Smart Temperature Transmitter Ordering Information

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● = Available
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Alarm level configuration						
A1	NAMUR alarm and saturation levels, high alarm	●	–	–	●	★
CN	NAMUR alarm and saturation levels, low alarm	●	–	–	●	★
C8	Low Alarm (Standard Rosemount Alarm and Saturation Values)	●	–	–	●	★
Line filter		**Head**			**Rail**	
F5	50 Hz Line Voltage Filter	●	●	●	●	★
F6	60 Hz Line Voltage Filter	●	●	●	●	★
Sensor trim						
		A	F	W	A	
C2	Transmitter-Sensor Matching - Trim to Specific Rosemount RTD Calibration Schedule (CVD constants)	●	●	●	●	★
5-point calibration option						
C4	5-point calibration (use option code Q4 to generate a calibration certificate)	●	●	●	●	★
Calibration certificate						
Q4	Calibration certificate (3-Point calibration with certificate)	●	●	●	●	★
QP	Calibration Certification & Tamper Evident Seal	●	●	●	–	★
Quality certification for safety						
QT	Safety Certified to IEC 61508 with certificate of FMEDA data	●	–	–	–	★
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	●	●	●	–	★
External ground						
G1	External ground lug assembly (see "External ground screw assembly" on page 11)	●	●	●	–	★
Transient protection						
T1[8]	Integral Transient Protector	●	–	–	–	★
Cable gland option						
G2	Cable gland (7.5 mm - 11.99 mm)	●	●	●	–	★
G7	Cable gland, M20x1.5, Ex e, Blue Polyamide (5 mm - 9 mm)	●	●	●	–	★
Cover chain option						
G3	Cover chain	●	●	●	–	★
Conduit electrical connector						
GE[9]	M12, 4-pin, Male Connector (eurofast®)	●	●	●	–	★
GM[9]	A size Mini, 4-pin, Male Connector (minifast®)	●	●	●	–	★

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– = Not Available

External label						
EL	External label for ATEX Intrinsic Safety	●	●	●	–	★
HART revision configuration		**Head**			**Rail**	
		A	F	W	A	
HR5	Configured for HART Revision 5	●	–	–	–	★
HR7(10)	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 rail mount model number: 644 R A I5
Typical head mount model number: 644 S A I5 DC DA1 J5 M5
Typical field mount model number: 644 F A I5 DC DA1 D1 M4 T1

(1) Consult factory on availability.
(2) See Table 2 for the validity of enclosures with individual approval options.
(3) When ordered with XA, 1/2-in. NPT enclosure will come equipped with an M20 adapter with the sensor installed as a process ready.
(4) Enclosure ships equipped with 50.8 mm (2-in) SST pipe "U" bolt mounting kit.
(5) Available with Transmitter Type 644F or 644D only.
(6) Bracket assembly only available with J1, J2, J3, J4, D1, and D2.
(7) See Table 10 for Enhanced Accuracy specifications.
(8) Transient Protection option requires the use of J1, J2, J3, J4, D1, or D2.
(9) 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.
(10) Configures the HART output to HART Revision 7. The device can be field configured to HART Revision 5 if needed.

Note
For additional options (e.g. "K" codes), contact your local Emerson Process Management representative.

Table 2. 644 Enclosure Options Valid with Individual Approval Codes

Code	Hazardous location approval description	Enclosure options valid with approval
NA	No approval	J1, J2, J3, J4, R1, R2, R3, R4, J5, J6, J7, J8, S1, S2, S3, S4, D1, D2
E5	FM Explosionproof; Dust Ignition-proof	J1, J2, J3, J4, R1, R2, R3, R4, J5, J6, J7, J8, D1, D2
I5	FM Intrinsically Safe; Non-incendive	J1, J2, J3, J4, R1, R2, R3, R4, J5, J6, J7, J8, D1, D2
K5	FM Explosionproof; Intrinsically Safe; Non-incendive; Dust Ignition-proof	J1, J2, J3, J4, R1, R2, R3, R4, J5, J6, J7, J8, D1, D2
NK	IECEx Dust	J1, J2, J3, J4, R1, R2, R3, R4, J5, J6, J7, J8, D1, D2
KC	FM and CSA Intrinsically Safe and Non-incendive	Only available with Rail mount device
KB	FM and CSA: Explosionproof; Intrinsically Safe; Non-incendive; Dust Ignition-proof	J2, J4, R2, R4, J6, J8, D2
KD	FM, CSA and ATEX Explosionproof, Intrinsically Safe	J2, J4, R2, R4, J6, J8, D2
I6	CSA Intrinsically Safe	J1, J2, J3, J4, R1, R2, R3, R4, J5, J6, J7, J8, D1, D2
K6	CSA Explosionproof; Intrinsically Safe; Non-incendive; Dust Ignition-proof	J2, J4, R2, R4, J6, J8, D2
I3	China Intrinsic Safety	J1, J2, J3, J4, R1, R2, R3, R4, J5, J6, J7, J8
E3	China Flameproof	R1, R2, R3, R4, J5, J6, J7, J8
N3	China Type n	R1, R2, R3, R4, J5, J6, J7, J8
E1	ATEX Flameproof	J1, J2, J3, J4, R1, R2, R3, R4, J5, J6, J7, J8, D1, D2
N1	ATEX Type n	J1, J2, J3, J4, R1, R2, R3, R4, J5, J6, J7, J8, D1, D2
NC	ATEX Type n Component	None
K1	ATEX Flameproof; Intrinsic Safety; Type n; Dust	J1, J2, J3, J4, R1, R2, R3, R4, J5, J6, J7, J8, D1, D2
ND	ATEX Dust Ignition-Proof	J1, J2, J3, J4, R1, R2, R3, R4, J5, J6, J7, J8, D1, D2
KA	CSA and ATEX: Explosionproof; Intrinsically Safe; Non-incendive	J2, J4, R2, R4, J6, J8, D2
I1	ATEX Intrinsic Safety	J1, J2, J3, J4, R1, R2, R3, R4, J5, J6, J7, J8, S1, S2, S3, S4, D1, D2
E7	IECEx Flameproof	J1, J2, J3, J4, R1, R2, R3, R4, J5, J6, J7, J8, D1, D2
I7	IECEx Intrinsic Safety	J1, J2, J3, J4, R1, R2, R3, R4, J5, J6, J7, J8, S1, S2, S3, S4, D1, D2
N7	IECEx Type n	J1, J2, J3, J4, R1, R2, R3, R4, J5, J6, J7, J8, D1, D2
NG	IECEx Type n Component	None
K7	IECEx Flameproof; Intrinsic Safety; Type n; Dust	J1, J2, J3, J4, R1, R2, R3, R4, J5, J6, J7, J8, D1, D2
I2	INMETRO Intrinsic Safety	J1, J2, J3, J4, R1, R2, R3, R4, J5, J6, J7, J8
E4	TIIS Flameproof	J2, J6
E2	INMETRO Flameproof	R1, R2, R3, R4, J5, J6, J7, J8
KM	Technical Regulations Customs Union (EAC) Flameproof, Intrinsic Safety	J1, J2, J3, J4,J5,J6, J7, J8, R1, R2, R3, R4, S1, S2, S3, S4
IM	Technical Regulations Customs Union (EAC) Intrinsic Safety	J1, J2, J3, J4,J5,J6, J7, J8, R1, R2, R3, R4, S1, S2, S3, S4
EM	Technical Regulations Customs Union (EAC) Flameproof	J1, J2, J3, J4,J5,J6, J7, J8, R1, R2, R3, R4, S1, S2, S3, S4
K2	INMETRO Flameproof, Intrinsic Safety	R1, R2, R3, R4, J5, J6, J7, J8

Tagging

Hardware

- 13 characters total
- Tags are adhesive or metal labels
- Tag is permanently attached to transmitter

Software

- The transmitter can store up to 13 characters for FOUNDATION fieldbus and PROFIBUS PA or 8 for HART protocol. If no characters are specified, the first 8 characters of the hardware tag are the default. An optional 32 character Long Software Tag is available when option code HR7 is ordered.

Considerations

External ground screw assembly

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

Option code	External ground screw assembly included?
E5, I1, I2, I5, I6, I7, K5, K6, NA, I3, KB	No–Order option code G1
E1, E2, E3, E4, E7, K7, N1, N7, ND, K1, K2, KA, NK, N3, KD, T1	Yes

Table 3. Enclosure Spares

Description	Part number
Universal Head, Aluminum, Standard cover, 2-conduit - M20 entries	00644-4420-0002
Universal Head, Aluminum, Display cover, 2-conduit - M20 entries	00644-4420-0102
Universal Head, Aluminum, Standard cover, 2-conduit - 1/2 - 14 NPT entries	00644-4420-0001
Universal Head, Aluminum, Display cover, 2-conduit - 1/2 - 14 NPT entries	00644-4420-0101
Universal Head, SST, Standard cover, 2-conduit - M20 entries	00644-4433-0002
Universal Head, SST, Display cover, 2-conduit - M20 entries	00644-4433-0102
Universal Head, SST, Standard cover, 2-conduit - 1/2 - 14 NPT entries	00644-4433-0001
Universal Head, SST, Display cover, 2-conduit - 1/2 - 14 NPT entries	00644-4433-0101
Connection Head, Aluminum, Standard cover, 2-conduit - M20 x 1/2 ANPT entries	00644-4410-0021
Connection Head, Aluminum, Display cover, 2-conduit - M20 x 1/2 ANPT entries	00644-4410-0121
Connection Head, Aluminum, Standard cover, 2-conduit - 1/2 - 14 NPT x 1/2 ANPT entries	00644-4410-0011
Connection Head, Aluminum, Display cover, 2-conduit - 1/2 - 14 NPT x 1/2 ANPT entries	00644-4410-0111
Connection Head, SST, Standard cover, 2-conduit - M20 X 1/2 ANPT entries	00644-4411-0021
Connection Head, SST, Display cover, 2-conduit - M20 X 1/2 ANPT entries	00644-4411-0121
Connection Head, SST, Standard cover, 2-conduit - 1/2 - 14 NPT x 1/2 ANPT entries	00644-4411-0011
Connection Head, SST, Display cover, 2-conduit - 1/2 - 14 NPT x 1/2 ANPT entries	00644-4411-0111
Connection Head, Polished SST, Standard cover, 2-conduit - M20 x 1.5 entries	00079-0312-0033
Connection Head, Polished SST, Display cover, 2-conduit - M20 x 1.5 entries	00079-0312-0133
Connection Head, Polished SST, Standard cover, 2-conduit - M20 x 1.5 / M24 x 1.5 entries	00079-0312-0034
Connection Head, Polished SST, Display cover, 2-conduit - M20 x 1.5 / M24 x 1.5 entries	00079-0312-0134
Connection Head, Polished SST, Standard cover, 2-conduit - 1/2 -14 NPT entries	00079-0312-0011
Connection Head, Polished SST, Display cover, 2-conduit - 1/2 -14 NPT entries	00079-0312-0111
Connection Head, Polished SST, Standard cover, 2-conduit - 1/2 -14 NPSM entries	00079-0312-0022
Connection Head, Polished SST, Display cover, 2-conduit - 1/2 -14 NPSM entries	00079-0312-0122

Table 3. Enclosure Spares

Description	Part number
Universal Head, Aluminum, Standard cover, 3-conduit - M20 entries	00644-4439-0001
Universal Head, Aluminum, Display cover, 3-conduit - M20 entries	00644-4439-0101
Universal Head, Aluminum, Standard cover, 3-conduit - 1/2 - 14 NPT entries	00644-4439-0002
Universal Head, Aluminum, Display cover, 3-conduit - 1/2 - 14 NPT entries	00644-4439-0102
Universal Head, SST, Standard cover, 3-conduit - M20 entries	00644-4439-0003
Universal Head, SST, Display cover, 3-conduit - M20 entries	00644-4439-0103
Universal Head, SST, Standard cover, 3-conduit - 1/2 - 14 NPT entries	00644-4439-0004
Universal Head, SST, Display cover, 3-conduit - 1/2 - 14 NPT entries	00644-4439-0104

Table 4. Display Kit Spares

Description	Part number
Display only	
644 HART LCD Display (option M5)	00644-7630-0001
644 HART Local Operator Interface (option M4)	00644-7630-1001
644 FOUNDATION fieldbus LCD Display (option M5)	00644-4430-0002
644 PROFIBUS PA LCD Display (option M5)	00644-4430-0002
644 HART Legacy display Kit (option M5 - Device Rev 7)	00644-4430-0002
Display with aluminum meter cover	
Rosemount 644 HART LCD Display (option M5)(1)	00644-7630-0011
Rosemount 644 HART LCD Display (option M5)(2)	00644-7630-0111
Display with aluminum cover	
Rosemount 644 HART Local Operator Interface (option M4)(1)	00644-7630-1011
Rosemount 644 HART Local Operator Interface (option M4)(2)	00644-7630-1111
Rosemount 644 FOUNDATION fieldbus LCD Display (option M5)(1)	00644-4430-0001
Rosemount 644 PROFIBUS PA LCD Display (option M5)(1)	00644-4430-0001
Rosemount 644 HART Legacy display Kit (option M5)(1)	00644-4430-0001
Display with SST meter cover	
Rosemount 644 HART LCD Display (option M5)(1)	00644-7630-0021
Rosemount 644 HART LCD Display (option M5)(2)	00644-7630-0121
Rosemount 644 HART Local Operator Interface (option M4)(1)	00644-7630-1021
Rosemount 644 HART Local Operator Interface (option M4)(2)	00644-7630-1121
Rosemount 644 FOUNDATION fieldbus LCD Display (option M5)(1)	00644-4430-0011
Rosemount 644 PROFIBUS PA LCD Display (option M5)(1)	00644-4430-0011
Rosemount 644 HART Legacy display Kit (option M5)(1)	00644-4430-0011

(1) Covers provided are compatible with the 3-in (76 mm) Universal Junction Box and Rosemount Connection Head enclosure styles.
(2) Cover provided is compatible with the 3.5-in (89 mm) Universal Junction Box and Field Mount enclosure styles.

Table 5. Transient Protection Spares

Description	Part number
Transient Protector without Enclosure	00644-4437-0001
Transient Protector with Universal Head, Aluminum, Standard cover, 3-conduit - M20	00644-4438-0001
Transient Protector with Universal Head, Aluminum, Display cover, 3-conduit - M20	00644-4438-0101
Transient Protector with Universal Head, Aluminum, Standard cover, 3-conduit - 1/2 NPT	00644-4438-0002
Transient Protector with Universal Head, Aluminum, Display cover, 3-conduit - 1/2 NPT	00644-4438-0102
Transient Protector with Universal Head, SST, Standard cover, 3-conduit - M20	00644-4438-0003
Transient Protector with Universal Head, SST, Display cover, 3-conduit - M20	00644-4438-0103
Transient Protector with Universal Head, SST, Standard cover, 3-conduit - 1/2 NPT	00644-4438-0004
Transient Protector with Universal Head, SST, Display cover, 3-conduit - 1/2 NPT	00644-4438-0104

Table 6. Miscellaneous Accessories

Description	Part number
Ground Screw Assembly Kit(1)	00644-4431-0001
Ground Screw Assembly Kit(2)	00644-4431-0002
Mounting Screws and Springs	00644-4424-0001
Hardware Kit for mounting a Rosemount 644 Head mount to a DIN rail (includes clips for symmetrical and asymmetrical rails)	00644-5301-0010
U-Bolt mounting Kit for Universal Housing	00644-4423-0001
Universal Clip for Rail or Wall Mount	03044-4103-0001
24 Inches of Symmetric (Top Hat) Rail	03044-4200-0001
24 Inches of Asymmetric (G) Rail	03044-4201-0001
Ground Clamp for symmetric or asymmetric rail	03044-4202-0001
Snap Rings Kit (used for assembly to a DIN sensor)	00644-4432-0001
Cover Clamp Assembly	00644-4434-0001
Terminal Block, 13mm M4 Mounting Screws	00065-0305-0001
U-bolt Mounting Bracket, 2-in pipe mount (option B4)	00644-7610-0001
L - Mounting Bracket for 2-inch pipe or panel mounting (option B5)	00644-7611-0001

(1) Compatible with the 3-in (76 mm) Universal Junction Box and Rosemount Connection Head enclosure styles.
(2) Compatible with the 3.5-in (89 mm) Universal Junction Box and Field Mount enclosure styles.

Specifications

HART, FOUNDATION fieldbus, and PROFIBUS PA

Functional specifications

Inputs

User-selectable; sensor terminals rated to 42.4 Vdc. See "Accuracy" on page 20 for sensor options.

Output

Single 2-wire device with either 4–20 mA/HART, linear with temperature or input; or completely digital outputs with FOUNDATION fieldbus communication (ITK 5.01 compliant), or PROFIBUS PA (compliant with profile 3.02).

Isolation

Input/output isolation tested to 600 Vrms.

Local display options

LCD display

An optional 11 digit, 2 line integral LCD display operates with a floating or fixed decimal point. It displays engineering units (°F, °C, °R, K, Ohms and mV), mA, and percent of range. The display can be configured to alternate between selected display options. Display settings are pre-configured at the factory according to the standard transmitter configuration. They can be re-configured in the field using either HART, FOUNDATION fieldbus, or PROFIBUS PA communications.

LCD display with local operator interface

An optional 14-digit, 2-line integral LCD display operates with a floating or fixed decimal point. The LOI includes all features and functionality available in the regular display with an added 2-button configuration capability directly at the display interface. The LOI also has optional password protection for secure operations. The LOI is only available on the 644 HART Head mount and Field mount transmitters.

For more information on the LOI configuration options or further functionality that the LOI offers, see Appendix D: Local Operator Interface (LOI) in the Rosemount 644 Temperature Transmitter Product Manual (00809-0200-4728), available on rosemount.com.

Humidity limits

0–95% relative humidity

Update time

≤ 0.5 sec. per sensor

Accuracy (default configuration) PT 100

HART Standard: ±0.15 °C
HART Enhanced: ±0.1 °C
FOUNDATION fieldbus: ±0.15 °C
PROFIBUS PA: ±0.15 °C

Physical specifications

Material selection

Emerson provides a variety of Rosemount product 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 Process Management 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 specifications (±3σ [Sigma])

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

Electrical connections

Model	Power and sensor terminals
644 Head (HART)	Captivated screw terminals permanently fixed to terminal block
644 Head (FOUNDATION fieldbus/PROFIBUS)	Compression screw terminals permanently fixed to the terminal block
644 Field Mount (HART)	Captivate screw terminals permanently fixed to the terminal block
644 Rail (HART)	Compression screw permanently fixed to front panel

Field Communicator connections

Communication terminals	
644 Head/Field	Clips permanently fixed to terminal block
644 Rail	Clips permanently fixed to front panel

Materials of construction

Electronics housing and terminal block	
644 Head mount/Field mount	GE polyphenylene oxide glass reinforced
644 Rail mount	Polycarbonate
Enclosure (options J1, J2, J5, J6, R1, R2, D1, and D2)	
Housing	Low-copper aluminum
Paint	Polyurethane
Cover O-ring	Buna-N

Materials of construction (stainless steel housing for biotechnology, pharmaceutical industries, and sanitary applications)

Housing and standard meter cover

- 316 SST

Cover O-ring

- Buna-N

Mounting

The 644R attaches directly to a wall or a DIN rail. The 644H installs in a connection head or universal head mounted directly on a sensor assembly, apart from a sensor assembly using a universal head, or to a DIN rail using an optional mounting clip.

Special mounting considerations

See "Mounting kits for 644H" on page 26 for the special hardware that is available to:

- Mount a 644H to a DIN rail. (see Table 3 on page 11)
- Retrofit a new 644H to replace an existing 644H Transmitter in an existing threaded sensor connection head. (see Table 3 on page 11)

Weight

Code	Options	Weight
644H	HART, Head Mount Transmitter	95 g (3.39 oz)
644H	FOUNDATION fieldbus, Head Mount Transmitter	92 g (3.25 oz)
644H	PROFIBUS PA Head Mount Transmitter	92 g (3.25 oz)
644R	HART, Rail Mount Transmitter	174 g (6.14 oz)
M5	LCD Display	35 g (1.34 oz)
M4	LCD Display with Local Operator Interface	35g (1.34 oz)
J1, J2	Universal Head, 3-conduits, Standard Cover	200 g (7.05 oz)
J1, J2	Universal head, 3-conduits, Meter Cover	307 g (10.83 oz)
J3, J4	Cast SST Universal head, 3-conduits, Standard Cover	2016 g (71.11 oz)
J3, J4	Cast SST Universal head, 3-conduits, Meter Cover	2122 g (74.85 oz)
J5, J6	Aluminum 2-conduits, Universal Head, Standard Cover	577 g (20.35 oz)
J5, J6	Aluminum 2-conduits, Universal Head, Meter Cover	667 g (23.53 oz)
J7, J8	Cast SST Universal Head 2-conduits, Standard, Cover	1620 g (57.14 oz)
J7, J8	Cast SST Universal Head 2-conduits, Meter Cover	1730 g (61.02 oz)
R1, R2	Aluminum Connection Head, Standard Cover	523 g (18.45 oz)
R1, R2	Aluminum Connection Head, Meter Cover	618 g (21.79 oz)
R3, R4	Cast SST Connection Head, Standard Cover	1615 g (56.97 oz)
R3, R4	Cast SST Connection Head, Meter Cover	1747 g (61.62 oz)
D1, D2	HART, Field Mount Transmitter, Aluminum Housing, Meter Cover, Standard Cover	1128 g (39.79 oz)

Weight (stainless steel housing for biotechnology, pharmaceutical industries, and sanitary applications)

Option code	Standard cover	Meter cover
S1	840 g (27 oz)	995 g (32 oz)
S2	840 g (27 oz)	995 g (32 oz)
S3	840 g (27 oz)	995 g (32 oz)
S4	840 g (27 oz)	995 g (32 oz)

Enclosure ratings (644H/F)

All available enclosures are Type 4X, IP66, and IP68.

Sanitary housing surface

Surface finish is polished to 32 RMA. Laser etched product marking on housing and standard covers.

Performance specifications

EMC (ElectroMagnetic Compatibility) NAMUR NE 21 Standard

The 644H HART meets the requirements for NAMUR NE 21 Rating.

Susceptibility	Parameter	Influence
		HART
ESD	■ 6 kV contact discharge ■ 8 kV air discharge	None
Radiated	■ 80 – 1000 MHz at 10 V/m AM	< 1.0%
Burst	■ 1 kV for I.O.	None
Surge	■ 0.5 kV line–line ■ 1 kV line–ground (I.O. tool)	None
Conducted	■ 10 kHz to 80 MHz at 10 V	< 1.0%

CE electromagnetic compatibility compliance testing

The 644 is compliant with Directive 2004/108/EC. Meets the criteria under IEC 61326:2006, IEC 61326-2-3:2006.

Power supply effect

Less than ±0.005% of span per volt

Stability

RTDs and thermocouples have a stability of ±0.15% of output reading or 0.15 °C (whichever is greater) for 24 months.

When ordered with the P8 option code:

- 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

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.

Vibration effect

The 644 HART head mount and field mount are tested to the following specifications with no effect on performance per IEC 60770-1, 2010:

Frequency	Vibration
10 to 60 Hz	0.35 mm displacement
60 to 1000 Hz	5 g (50 m/s^2) peak acceleration

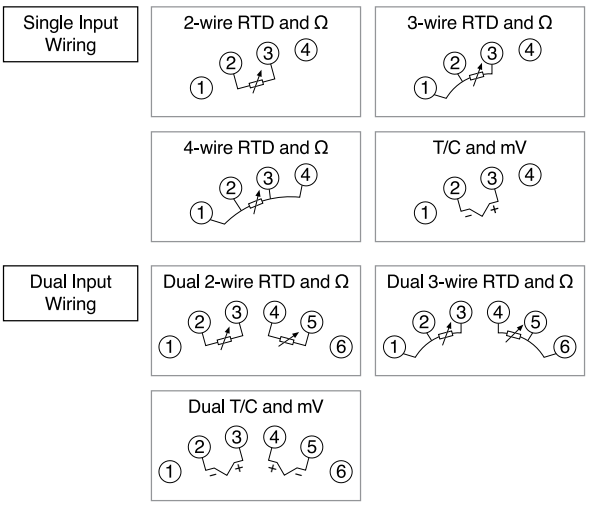
The 644 fieldbus and PROFIBUS are tested to the following specifications with no effect on performance per IEC 60770-1: 1999:

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

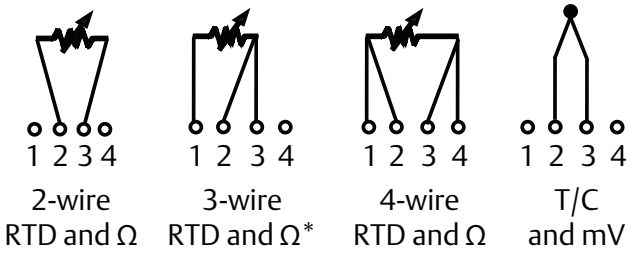
Rosemount 644 Sensor connections diagrams

Rosemount Inc. provides 4-wire sensors for all single element RTDs.
You can use these RTDs in 3-wire configurations by leaving the unneeded leads disconnected and insulated with electrical tape.

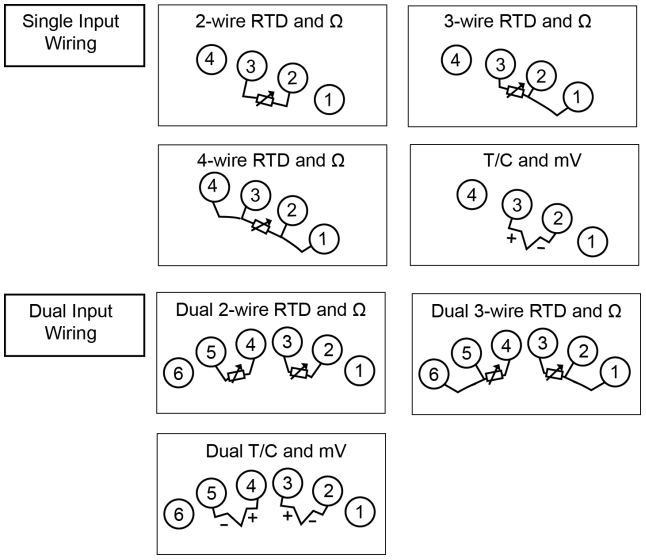
- HART head mount



- HART rail mount
- Fieldbus
- PROFIBUS



- HART field mount



FOUNDATION fieldbus specifications

Function blocks

Resource block

- The resource block contains physical transmitter information including available memory, manufacture identification, device type, software tag, and unique identification.

Transducer block

- The transducer block contains the actual temperature measurement data, including sensor 1 and terminal temperature. It includes information about sensor type and configuration, engineering units, linearization, reranging, damping, temperature correction, and diagnostics.

LCD display block

- The LCD display block is used to configure the local display, if an LCD display is being used.

Analog input (AI)

- Processes the measurement and makes it available on the fieldbus segment.
- Allows filtering, alarming, and engineering unit changes.

PID block

- The transmitter provides control functionality with one PID function block in the transmitter. The PID block can be used to perform single loop, cascade, or feedforward control in the field.

Block	Execution time (milliseconds)
Resource	N/A
Transducer	N/A
LCD display Block	N/A
Analog Input 1	45
Analog Input 2	45
PID 1	60

Turn-on time

Performance within specifications in less than 20 seconds after power is applied, when damping value is set to 0 seconds.

Status

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

Power supply

Powered over FOUNDATION fieldbus with standard fieldbus power supplies. The transmitter operates between 9.0 and 32.0 Vdc, 12 mA maximum.

Alarms

The AI function block allows the user to configure the alarms to HI-HI, HI, LO, or LO-LO with hysteresis settings.

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.

FOUNDATION fieldbus parameters

Schedule Entries	25
Links	16
Virtual Communications Relationships (VCR)	12

PROFIBUS PA specifications

Function blocks

Physical block

- The Physical Block contains physical transmitter information including manufacturer identification, device type, software tag, and unique identification.

Transducer block

- The Transducer Block contains the actual temperature measurement data, including sensor 1 and terminal temperature. It includes information about sensor type and configuration, engineering units, linearization, re-ranging, damping, temperature correction, and diagnostics.

Analog input block (AI)

- The Analog Input Block processes the measurement and makes it available on the PROFIBUS segment. Allows filtering, alarming, and engineering unit changes.

Turn-on time

Performance within specifications in less than 20 seconds after power is applied, when damping value is set to 0 seconds.

Power supply

Powered over PROFIBUS with standard fieldbus power supplies. The transmitter operates between 9.0 and 32.0 Vdc,12 mA maximum.

Alarms

The AI function block allows the user to configure the alarms to HI-HI, HI, LO, or LO-LO with hysteresis settings.

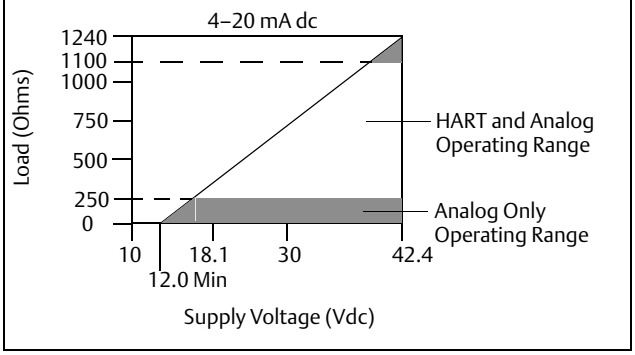
4–20 mA/HART specifications

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.

Load limitations

Maximum load = 40.8 X (supply voltage - 12.0)[1]



(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.

Temperature limits

	Operating limit	Storage limit
With LCD display[1]	–40 to 185 °F –40 to 85 °C	–50 to 185 °F –45 to 85 °C
Without LCD display	–40 to 185 °F –40 to 85 °C	–60 to 248 °F –50 to 120 °C

(1) LCD display may not be readable and display updates will be slower at temperatures below -22 °F (-30 °C).

Hardware and software failure mode

The 644 features software driven alarm diagnostics and an independent circuit which is designed to provide backup alarm output if the microprocessor software fails. The alarm direction (HI/LO) is user-selectable using the failure mode switch. If failure occurs, the position of the switch determines the direction in which the output is driven (HI or LO). 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 software drives its output in failure mode depends on whether it is configured to standard, custom, or NAMUR-compliant (NAMUR recommendation NE 43, June 1997) operation. Table 7 shows the configuration alarm ranges.

Table 7. Available Alarm Range[1]

	Standard	NAMUR- NE 43 compliant
Linear Output:	$3.9 \leq I^{(2)} \leq 20.5$	$3.8 \leq I \leq 20.5$
Fail High:	$21.75 \leq I \leq 23$	$21.5 \leq I \leq 23$
Fail Low:	$3.5 \leq I \leq 3.75$	$3.5 \leq I \leq 3.6$

(1) Measured in mA.
(2) I = Process Variable (current output).

Custom alarm and saturation level

Custom factory configuration of alarm and saturation level is available with option code C1 for valid values. These values can also be configured in the field using a Field Communicator.

Turn-on time

Performance within specifications in less than 5.0 seconds after power is applied, when damping value is set to 0 seconds.

External transient protection

The Rosemount 470 Transient Protector prevents damage from transients induced by lightning, welding, or heavy electrical equipment. For more information, refer to the Rosemount 470 Transient Protector Product Data Sheet (document number 00813-0100-4191).

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 Ωs Wave 8 20 Ωs 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)

Accuracy

Table 8. Rosemount 644 Transmitter Accuracy

Sensor options	Sensor reference	Input ranges		Recommended min. span[1]		Digital accuracy[2]		D/A accuracy[3]
2-, 3-, 4-wire RTDs		°C	°F	°C	°F	°C	°F	
Pt 100 (α = 0.00385)	IEC 751	–200 to 850	–328 to 1562	10	18	± 0.15	± 0.27	±0.03% of span
Pt 200 (α = 0.00385)	IEC 751	–200 to 850	–328 to 1562	10	18	± 0.15	± 0.27	±0.03% of span
Pt 500 (α = 0.00385)	IEC 751	–200 to 850	–328 to 1562	10	18	± 0.19	± 0.34	±0.03% of span
Pt 1000 (α = 0.00385)	IEC 751	–200 to 300	–328 to 572	10	18	± 0.19	± 0.34	±0.03% of span
Pt 100 (α = 0.003916)	JIS 1604	–200 to 645	–328 to 1193	10	18	± 0.15	± 0.27	±0.03% of span
Pt 200 (α = 0.003916)	JIS 1604	–200 to 645	–328 to 1193	10	18	± 0.27	± 0.49	±0.03% of span
Ni 120	Edison Curve No. 7	–70 to 300	–94 to 572	10	18	± 0.15	± 0.27	±0.03% of span
Cu 10	Edison Copper Winding No. 15	–50 to 250	–58 to 482	10	18	±1.40	± 2.52	±0.03% of span
Pt 50 (α = 0.00391)	GOST 6651-94	–200 to 550	–328 to 1022	10	18	± 0.30	± 0.54	±0.03% of span
Pt 100 (α = 0.00391)	GOST 6651-94	–200 to 550	–328 to 1022	10	18	± 0.15	± 0.27	±0.03% of span
Cu 50 (α = 0.00426)	GOST 6651-94	–50 to 200	–58 to 392	10	18	±1.34	± 2.41	±0.03% of span
Cu 50 (α = 0.00428)	GOST 6651-94	–185 to 200	–301 to 392	10	18	±1.34	± 2.41	±0.03% of span
Cu 100 (α = 0.00426)	GOST 6651-94	–50 to 200	–58 to 392	10	18	±0.67	± 1.20	±0.03% of span
Cu 100 (α = 0.00428)	GOST 6651-94	–185 to 200	–301 to 392	10	18	±0.67	± 1.20	±0.03% of span
Thermocouples[4]								
Type B[5]	NIST Monograph 175, IEC 584	100 to 1820	212 to 3308	25	45	± 0.77	± 1.39	±0.03% of span
Type E	NIST Monograph 175, IEC 584	–200 to 1000	–328 to 1832	25	45	± 0.20	± 0.36	±0.03% of span
Type J	NIST Monograph 175, IEC 584	–180 to 760	–292 to 1400	25	45	± 0.35	± 0.63	±0.03% of span
Type K[6]	NIST Monograph 175, IEC 584	–180 to 1372	–292 to 2501	25	45	± 0.50	± 0.90	±0.03% of span
Type N	NIST Monograph 175, IEC 584	–200 to 1300	–328 to 2372	25	45	± 0.50	± 0.90	±0.03% of span
Type R	NIST Monograph 175, IEC 584	0 to 1768	32 to 3214	25	45	± 0.75	± 1.35	±0.03% of span
Type S	NIST Monograph 175, IEC 584	0 to 1768	32 to 3214	25	45	± 0.70	± 1.26	±0.03% of span
Type T	NIST Monograph 175, IEC 584	–200 to 400	–328 to 752	25	45	± 0.35	± 0.63	±0.03% of span
DIN Type L	DIN 43710	–200 to 900	–328 to 1652	25	45	± 0.35	± 0.63	±0.03% of span
DIN Type U	DIN 43710	–200 to –600	–328 to 1112	25	45	± 0.35	± 0.63	±0.03% of span
Type W5Re/W26Re	ASTM E 988-96	0 to 2000	32 to 3632	25	45	± 0.70	± 1.26	±0.03% of span
GOST Type L	GOST R 8.585-2001	–200 to 800	–328 to 1472	25	45	± 1.00	± 1.26	±0.03% of span
Other input types								
Millivolt Input		–10 to 100 mV				±0.015 mV		±0.03% of span
2-, 3-, 4-wire Ohm Input		0 to 2000 ohms				±0.45 ohm		±0.03% 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) The published digital accuracy applies over the entire sensor input range. Digital output can be accessed by HART or FOUNDATION fieldbus Communications or Rosemount control system.
(3) Total Analog accuracy is the sum of digital and D/A accuracies. This is not applicable for FOUNDATION fieldbus.
(4) Total digital accuracy for thermocouple measurement: sum of digital accuracy +0.5 °C. (cold junction accuracy).
(5) Digital accuracy for NIST Type B T/C is ±3.0 °C (±5.4 °F) from 100 to 300 °C (212 to 572 °F).
(6) Digital accuracy for NIST Type K T/C is ±0.70 °C (±1.26 °F) from –180 to –90 °C (–292 to –130 °F).

Accuracy example (HART devices)

When using a Pt 100 (α = 0.00385) sensor input with a 0 to 100 °C span:

- Digital accuracy = ±0.15 °C
- D/A accuracy = ±0.03% of 100 °C or ±0.03 °C
- Total accuracy = ±0.18 °C

Accuracy example (FOUNDATION fieldbus and PROFIBUS PA devices)

When using a Pt 100 (α = 0.00385) sensor input:

- Total accuracy = ±0.15 °C
- No D/A accuracy effects apply.

Table 9. Ambient temperature effect

Sensor options	Sensor reference	Input range (°C)	Temperature effects per 1.0 °C (1.8 °F) change in ambient temperature[1][2]	Range	D/A effect[3]
2-, 3-, 4-wire RTDs					
Pt 100 (α = 0.00385)	IEC 751	-200 to 850	0.003 °C (0.0054 °F)	Entire Sensor Input Range	0.001% of span
Pt 200 (α = 0.00385)	IEC 751	-200 to 850	0.004 °C (0.0072 °F)	Entire Sensor Input Range	0.001% of span
Pt 500 (α = 0.00385)	IEC 751	-200 to 850	0.003 °C (0.0054 °F)	Entire Sensor Input Range	0.001% of span
Pt 1000 (α = 0.00385)	IEC 751	-200 to 300	0.003 °C (0.0054 °F)	Entire Sensor Input Range	0.001% of span
Pt 100 (α = 0.003916)	JIS 1604	-200 to 645	0.003 °C (0.0054 °F)	Entire Sensor Input Range	0.001% of span
Pt 200 (α = 0.003916)	JIS 1604	-200 to 645	0.004 °C (0.0072 °F)	Entire Sensor Input Range	0.001% of span
Ni 120	Edison Curve No. 7	-70 to 300	0.003 °C (0.0054 °F)	Entire Sensor Input Range	0.001% of span
Cu 10	Edison Copper Winding No. 15	-50 to 250	0.03 °C (0.054 °F)	Entire Sensor Input Range	0.001% of span
Pt 50 (α = 0.00391)	GOST 6651-94	-200 to 550	0.004 °C (0.0072 °F)	Entire Sensor Input Range	0.001% of span
Pt 100 (α = 0.00391)	GOST 6651-94	-200 to 550	0.003 °C (0.0054 °F)	Entire Sensor Input Range	0.001% of span
Cu 50 (α = 0.00426)	GOST 6651-94	-50 to 200	0.008 °C (0.0144 °F)	Entire Sensor Input Range	0.001% of span
Cu 50 (α = 0.00428)	GOST 6651-94	-185 to 200	0.008 °C (0.0144 °F)	Entire Sensor Input Range	0.001% of span
Cu 100 (α = 0.00426)	GOST 6651-94	-50 to 200	0.004 °C (0.0072 °F)	Entire Sensor Input Range	0.001% of span
Cu 100 (α = 0.00428)	GOST 6651-94	-185 to 200	0.004 °C (0.0072 °F)	Entire Sensor Input Range	0.001% of span
Thermocouples					
Type B	NIST Monograph 175, IEC 584	100 to 1820	0.014 °C	T ≥ 1000 °C	0.001% of span
			0.032 °C – (0.0025% of (T – 300))	300 °C ≤ T < 1000 °C	0.001% of span
			0.054 °C – (0.011% of (T – 100))	100 °C ≤ T < 300 °C	0.001% of span
Type E	NIST Monograph 175, IEC 584	-200 to 1000	0.005 °C + (0.0043% of T)	All	0.001% of span
Type J	NIST Monograph 175, IEC 584	-180 to 760	0.0054 °C + (0.00029%of T)	T ≥ 0 °C	0.001% of span
			0.0054 °C + (0.0025% of absolute value T)	T < 0 °C	0.001% of span
Type K	NIST Monograph 175, IEC 584	-180 to 1372	0.0061 °C + (0.0054% of T)	T ≥ 0 °C	0.001% of span
			0.0061 °C + (0.0025% of absolute value T)	T < 0 °C	0.001% of span
Type N	NIST Monograph 175, IEC 584	-200 to 1300	0.0068 °C + (0.00036% of T)	All	0.001% of span
Type R	NIST Monograph 175, IEC 584	0 to 1768	0.016 °C	T ≥ 200 °C	0.001% of span
			0.023 °C – (0.0036% of T)	T < 200 °C	0.001% of span
Type S	NIST Monograph 175, IEC 584	0 to 1768	0.016 °C	T ≥ 200 °C	0.001% of span
			0.023 °C – (0.0036% of T)	T < 200 °C	0.001% of span
Type T	NIST Monograph 175, IEC 584	-200 to 400	0.0064 °C	T ≥ 0 °C	0.001% of span
			0.0064 °C +(0.0043% of absolute value T)	T < 0 °C	0.001% of span
DIN Type L	DIN 43710	-200 to 900	0.0054 °C + (0.00029% of T)	T ≥ 0 °C	0.001% of span
			0.0054 °C + (0.0025% of absolute value T)	T < 0 °C	0.001% of span
DIN Type U	DIN 43710	-200 to 600	0.0064 °C	T ≥ 0 °C	0.001% of span
			0.0064 °C + (0.0043% of absolute value T)	T < 0 °C	0.001% of span

Table 9. Ambient temperature effect

Sensor options	Sensor reference	Input range (°C)	Temperature effects per 1.0 °C (1.8 °F) change in ambient temperature[1][2]	Range	D/A effect[3]
Type W5Re/W26Re	ASTM E 988-96	0 to 2000	0.016 °C	T ≥ 200 °C	0.001% of span
			0.023 °C – (0.0036% of T)	T < 200 °C	0.001% of span
GOST Type L	GOST R 8.585-2001	-200 to 800	0.007 °C	T ≥ 0 °C	0.001% of span
			0.007 °C – (0.003% of absolute value T)	T < 0 °C	0.001% of span
Other input types					
Millivolt Input		-10 to 100 mV	0.0005 mV	Entire Sensor Input Range	0.001% of span
2-, 3-, 4-wire Ohm		0 to 2000 Ω	0.0084 Ω	Entire Sensor Input Range	0.001% of span

(1) Change in ambient is with reference to the calibration temperature of the transmitter 68 °F (20 °C) from factory.
(2) Ambient temperature effect specification valid over minimum temperature span of 28°C (50°F).
(3) Does not apply to FOUNDATION fieldbus.

Temperature effects example (HART devices)

When using a Pt 100 (α = 0.00385) sensor input with a 0–100 °C span at 30 °C ambient temperature:

- Digital Temperature Effects: 0.003 °C x (30 - 20) = 0.03 °C
- D/A Effects: [0.001% of 100] x (30 - 20) = 0.01 °C
- Worst Case Error: Digital + D/A + Digital Temperature Effects + D/A Effects = 0.15 °C + 0.03 °C + 0.03 °C + 0.01 °C = 0.22 °C
- Total Probable Error: $\sqrt{0.15^2 + 0.03^2 + 0.03^2 + 0.01^2} = 0.16°C$

Temperature effects examples (FOUNDATION fieldbus devices and PROFIBUS PA)

When using a Pt 100 (α = 0.00385) sensor input at 30 °C span at 30 °C ambient temperature:

- Digital Temperature Effects: 0.003 °C x (30 - 20) = 0.03 °C
- D/A Effects: No D/A effects apply.
- Worst Case Error: Digital + Digital Temperature Effects = 0.15 °C + 0.03 °C = 0.18 °C
- Total Probable Error: $\sqrt{0.15^2 + 0.03^2} = 0.153°C$

Table 10. Transmitter Accuracy when Ordered with Option Code P8

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

Table 10. Transmitter Accuracy when Ordered with Option Code P8

Sensor options	Sensor reference	Input ranges		Minimum span[5]		Digital accuracy[6]		D/A accuracy[7][8]
2-, 3-, 4-wire RTDs		°C	°F	°C	°F	°C	°F	
Cu 50 (α=0.00428)	GOST 6651-94	–185 to 200	–301 to 392	10	18	±0.34	±0.61	±0.02% of span
Cu 100 (α=0.00426)	GOST 6651-94	–50 to 200	–58 to 392	10	18	±0.17	±0.31	±0.02% of span
Cu 100 (α=0.00428)	GOST 6651-94	–185 to 200	–301 to 392	10	18	±0.17	±0.31	±0.02% of span
Thermocouples[9]								
Type B[10]	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	–200 to 1000	–328 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[11]	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) Total Analog accuracy is the sum of digital and D/A accuracies.
(4) Applies to HART/4-20 mA devices.
(5) No minimum or maximum span restrictions within the input ranges. Recommended minimum span will hold noise within accuracy specification with damping at zero seconds.
(6) Digital accuracy: Digital output can be accessed by the Field Communicator.
(7) Total Analog accuracy is the sum of digital and D/A accuracies.
(8) Applies to HART/4-20 mA devices.
(9) Total digital accuracy for thermocouple measurement: sum of digital accuracy +0.25 °C (0.45 °F) (cold junction accuracy).
(10) Digital accuracy for NIST Type B is ±3.0 °C (±5.4 °F) from 100 to 300 °C (212 to 572 °F).
(11) 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 (α = 0.00385) sensor input with a 0 to 100 °C span: Digital Accuracy would be ±0.10 °C, D/A accuracy would be ±0.02% of 100 °C or ±0.02 °C, Total = ±0.12 °C.

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

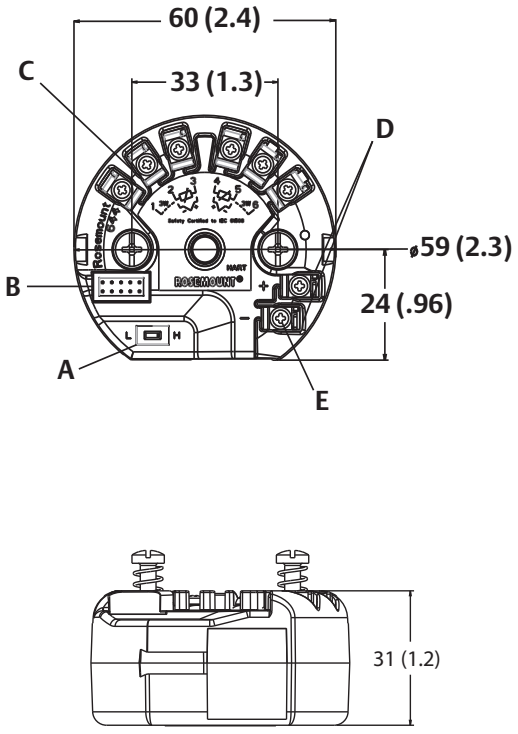
For all differential configurations, the input range is X to Y where:

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

Rosemount 644 Dimensional Drawings

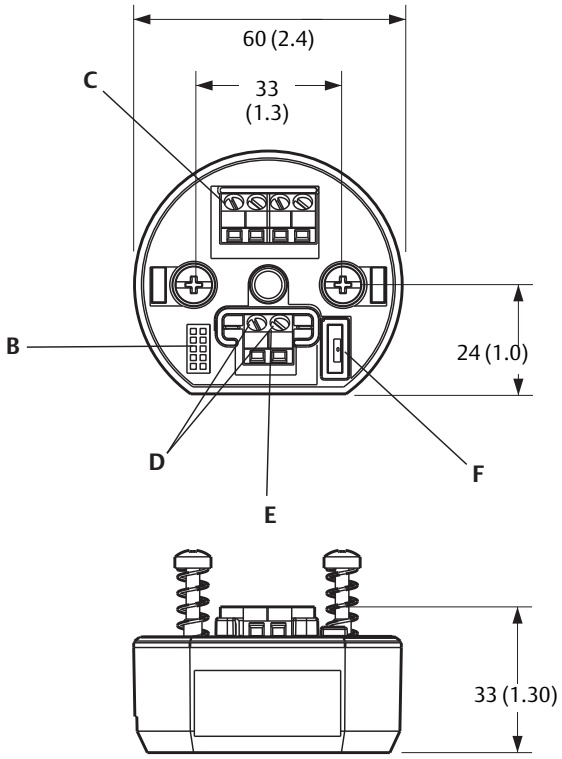
644H (DIN A Head Mount)

HART device shown with captivated screw terminals



A.Failure Mode Switch
B. Display Connection
C. Sensor Terminals

FOUNDATION fieldbus and PROFIBUS device shown with standard compression screw terminals

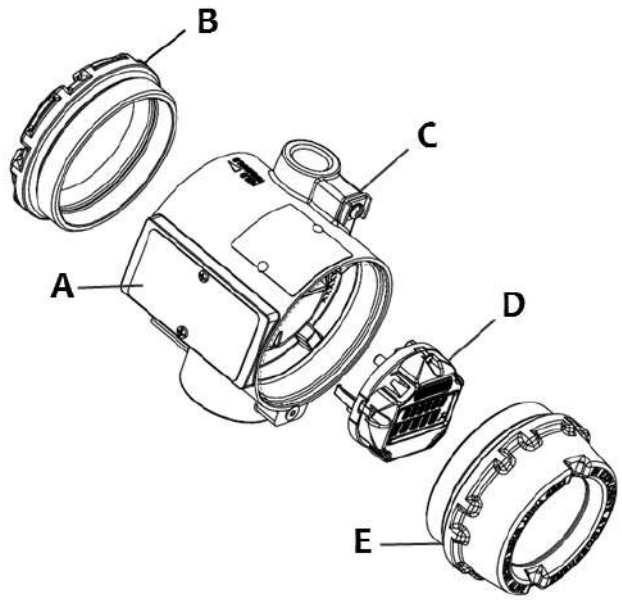


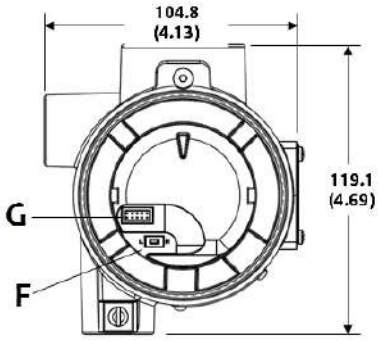
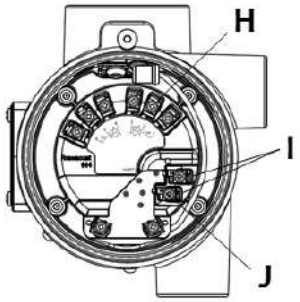
D. Communication Terminals
E. Power Terminals
F. Simulation Switch

Dimensions are in millimeters (inches).

644 Field Mount

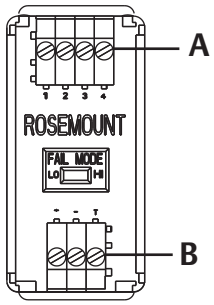
Transmitter exploded view

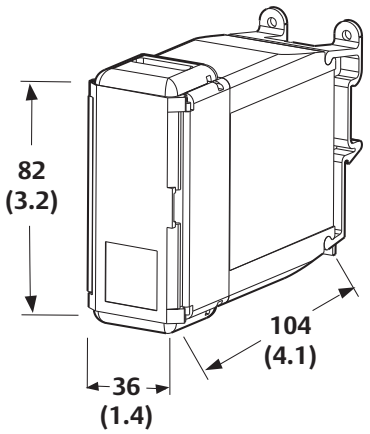


Display compartment	Terminal compartment with optional transient protector
	
A. Nameplate B. Cover C. Housing with Electronics Module D. LCD Display E. Display Cover	F. Failure Mode Switch G. Display Connection H. Sensor Terminals I. Communication Terminals J. Power Terminals

Dimensions are in millimeters (inches).

644 Rail Mount



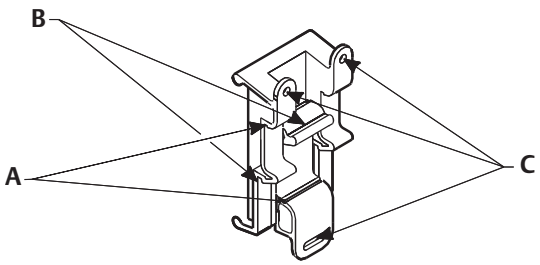


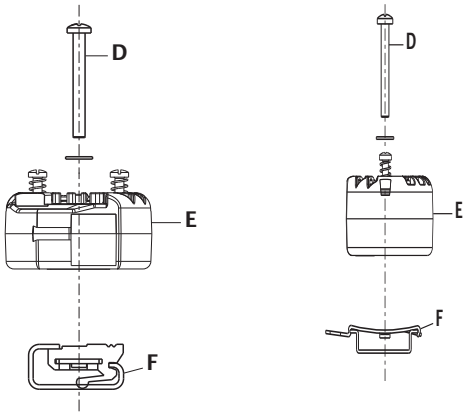
A. Sensor Terminals
B. Power Terminals

Dimensions are in millimeters (inches).

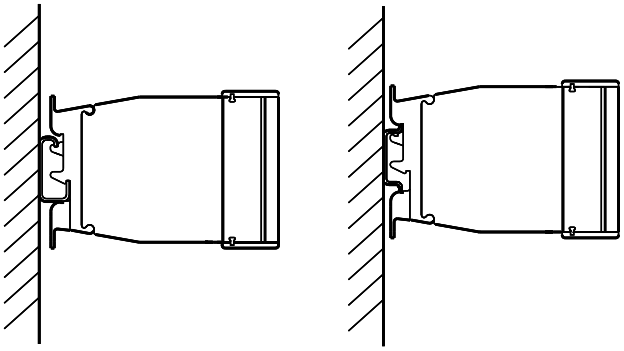
Mounting kits for 644H

644R rail & walls clips	644H rail clips	
	G-rail (asymmetric)	Top hat rail (symmetric)



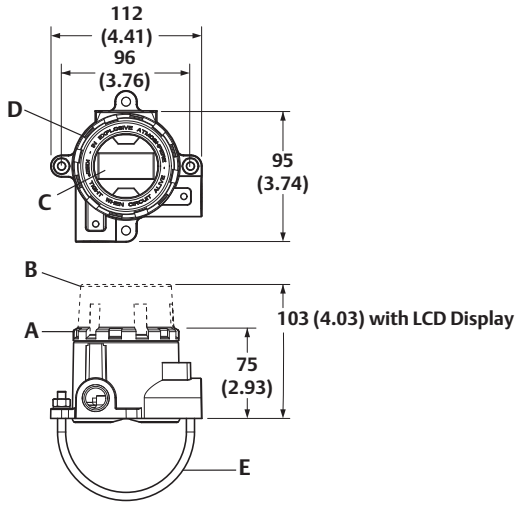
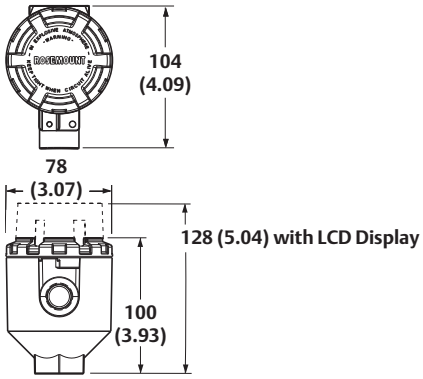


Note: Kit (part number 00644-5301-0010) includes mounting hardware and both types of rail kits.

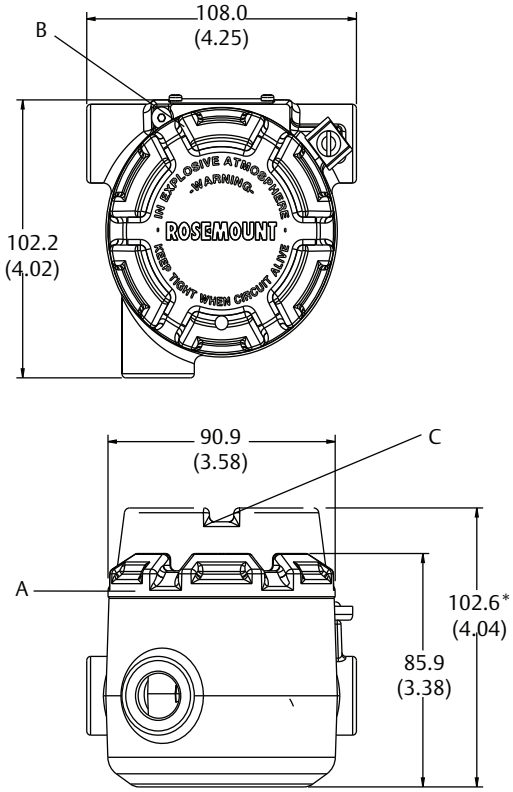
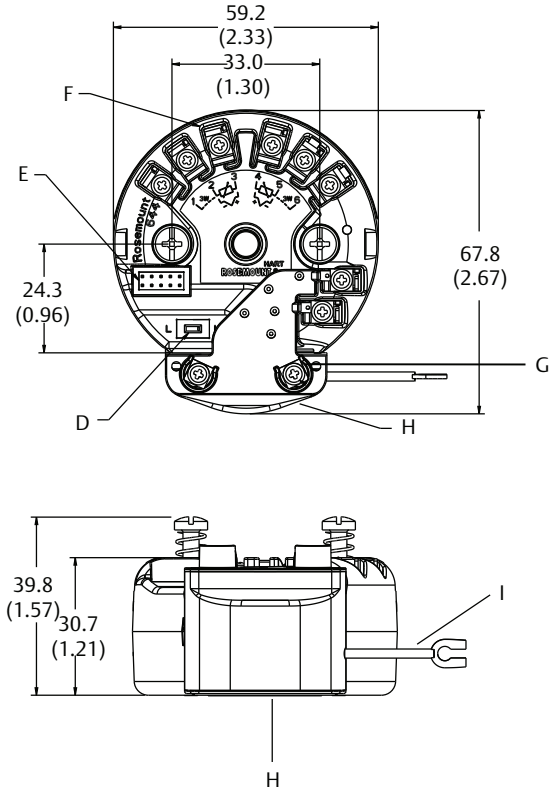


(part number 03044-4103-0001)

A. Top Hat Rail Grooves
B. G-Rail Grooves
C. Screw Holes for Mounting to a Wall
D. Mounting Hardware
E. Transmitter
F. Rail Clip

Threaded-sensor universal head (option code J5, J6, J7 or J8)	DIN style sensor connection head (option code R1, R2, R3 or R4)
	
A. Standard Cover B. Display Cover C. LCD Display	D. Label E. 316 SST “U” Bolt Mounting, 2-inch Pipe (shipped with each head unless assembly option XA is ordered)

Dimensions are in millimeters (inches).

Threaded sensor universal head, 3-conduit (option code J1 or J2)	Rosemount 644 with transient protector (option code T1)
	
A. Standard Cover B. Label C. Display Cover D. Failure Mode Switch E. Display Connection	F. Sensor Terminals G. Power Terminals H. Transient Protector I. Ground Wire

* **with LCD cover**

Note: Option code T1 requires the use of J1, J2, J3 or J4 enclosure option.

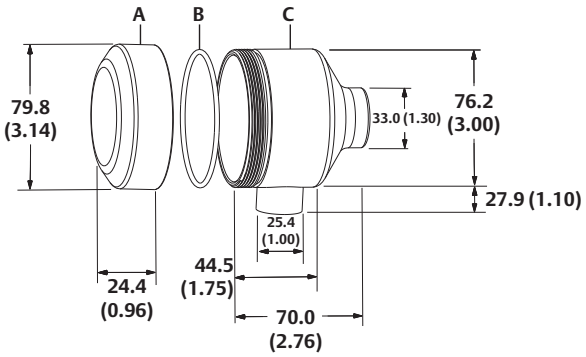
Dimensions are in millimeters (inches).

Accessory dimensional drawings

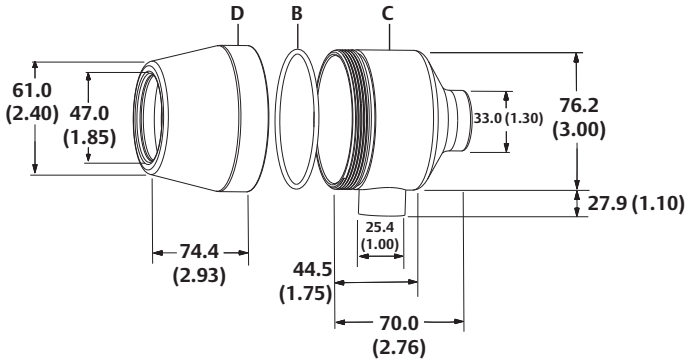
Stainless steel housing for biotechnology, pharmaceutical industries, and sanitary applications

Sanitary housing (Option Code S1, S2, S3, S4)

Standard cover



LCD display cover

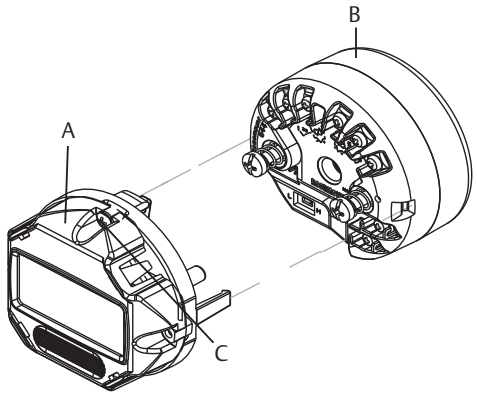


A. Standard Cover
B. O-Ring
C. Housing
D. LCD Display Cover

Dimensions are in millimeters (inches).

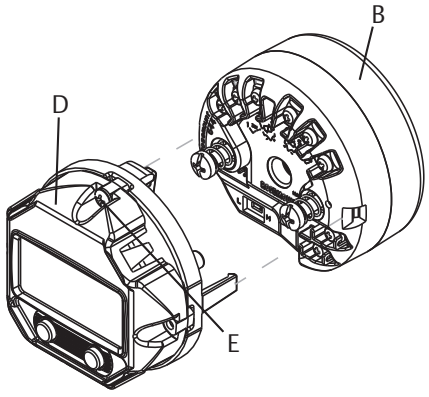
Display drawings

LCD display



A. LCD Display
B. 644 Transmitter
C. Display Rotation

Enhanced display with local operator interface

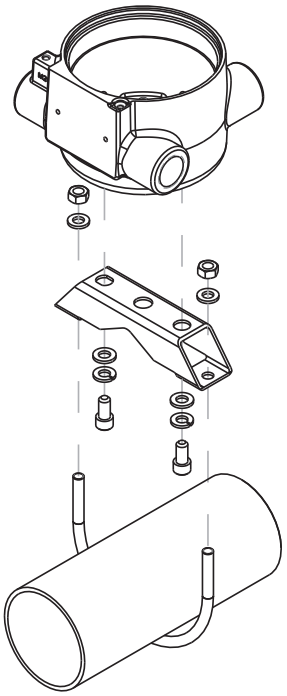


D. LCD Display with LOI
E. Display Rotation Screws

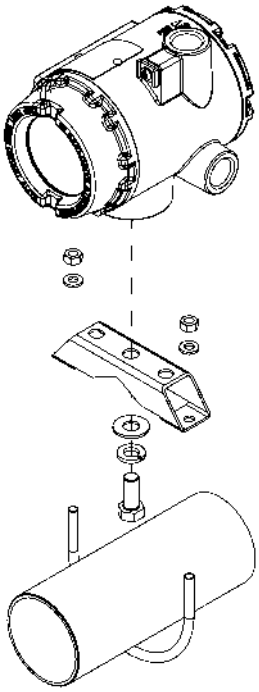
Optional mounting

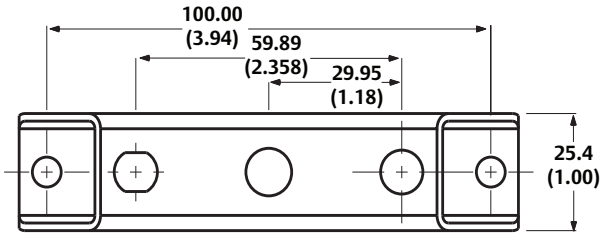
Optional transmitter mounting brackets

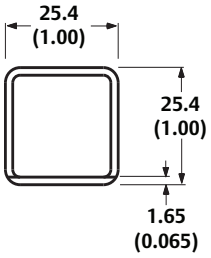
Option code B4 bracket for enclosures J1, J2, J3, and J4

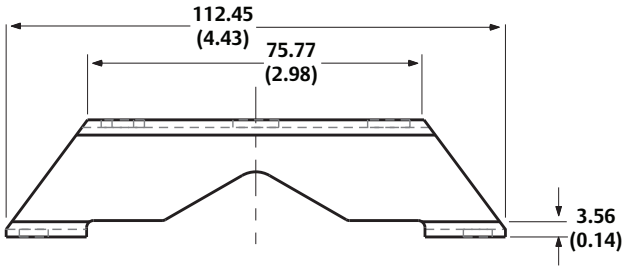


Option code B4 bracket for enclosures D1 and D2



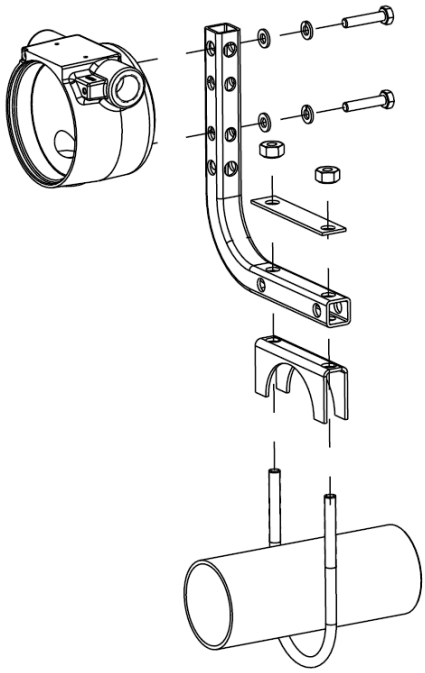


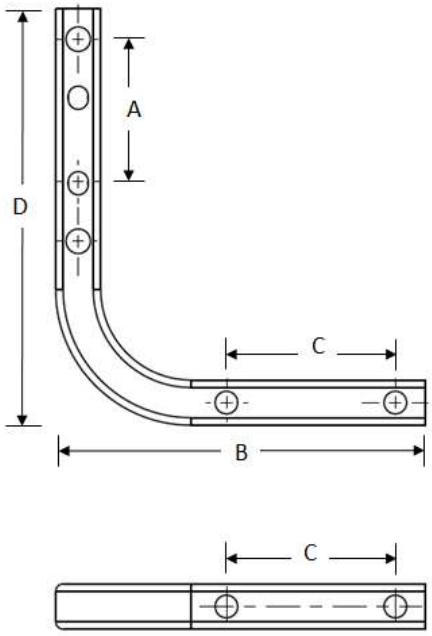




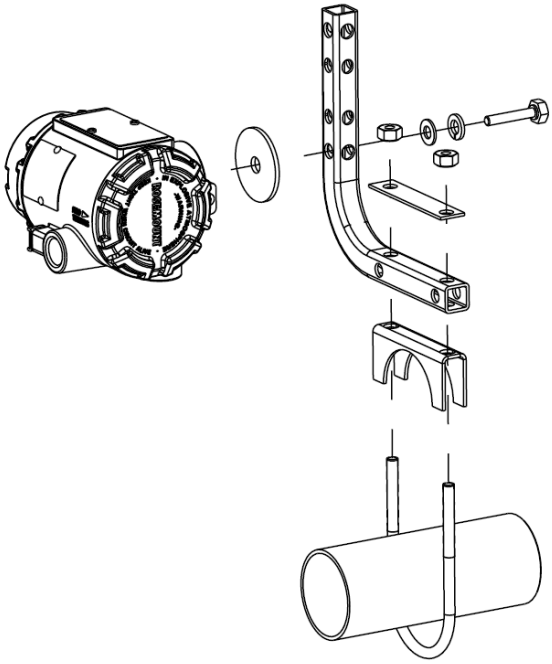
Dimensions are in millimeters (inches).

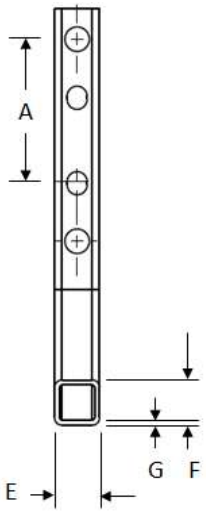
Option code B5 bracket for enclosures J1, J2, J3, and J4





Option code B5 bracket for enclosures D1 and D2





A. 59.89(2.358)
B. 156.2 (6.15)
C. 71.4 (2.81)
D. 175.3 (6.9)
E. 19.05 (0.75)
F. 19.05 (0.75)
G. 2.11 (0.083)

Dimensions are in millimeters (inches).

Configuration

Transmitter configuration

The transmitter is available with standard configuration setting for either HART (see Standard HART configuration), FOUNDATION fieldbus (see Standard Foundation fieldbus configuration) or PROFIBUS PA (see Standard PROFIBUS PA configuration). The configuration settings and block configuration may be changed in the field with Emerson's DeltaV™, AMS® Suite, handheld Field Communicator or other host or configuration tool.

Standard HART configuration

Unless specified, the transmitter will be shipped as follows:

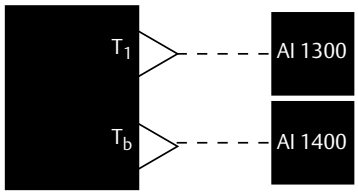
Sensor Type	RTD, Pt 100 (α=0.00385, 4-wire)
4 mA Value	0 °C
20 mA Value	100 °C
Output	Linear with temperature
Saturation Levels	3.9 / 20.5 mA
Damping	5 sec.
Line Voltage Filter	50 Hz
Alarm	High (21.75 mA)
LCD display (when installed)	Engineering Units and mA
Tag	See "Tagging" on page 11.

Standard FOUNDATION fieldbus configuration

Unless otherwise specified, the transmitter will be shipped as follows:

Sensor Type: RTD, Pt 100 (α=0.00385, 4-wire)
Damping: 5 sec.
Units of Measurement: °C
Line Voltage Filter: 50 Hz
Software Tag: See "Tagging" on page 11
Function Block Tags: • Resource Block: Resource • Transducer Block: Transducer • LCD display Block: LCD display • Analog Input Blocks: AI 1300, AI 1400 • PID Block: PID 1500
Alarm Limits of AI 1300, AI 1400 • HI-HI: Infinity • HI: Infinity • LO: Infinity • LO-LO: Infinity
Local Display (when installed): Engineering Units of Temperature

Standard block configuration



Note:
T_1 = Sensor Temperature
T_b = Terminal Temperature

Final station

AI Blocks are scheduled for 1 second. AI Blocks are linked as shown above.

Standard PROFIBUS PA configuration

Unless specified, the transmitter will be shipped as follows:

Device Address: 126
Sensor Type: RTD, Pt 100 (α=0.00385, 4-wire)
Damping: 5 sec.
Units of Measurement: °C
Line Voltage Filter: 50 Hz
Software Tag: See "Tagging" on page 11.
Alarm Limits: • HI-HI: Infinity • HI: Infinity • LO: - Infinity • LO-LO: Infinity
Local Display (when installed): Engineering Units of Temperature

Custom configuration

Custom configurations are to be specified when ordering. This configuration must be the same for all sensors. The following table lists the necessary requirements to specify a custom configuration.

	Option code	Customization available
HART	**C1**: Factory Configuration Data (CDS required) Also needs option code: **...DC** **...DC** **...M4 or M5**	■ **Date**: day/month/year ■ **Descriptor**: 8 alphanumeric characters ■ **Message**: 32 alphanumeric characters ■ **Hardware Tag**: 13 Characters ■ **Software Tag**: 8 Characters ■ Sensor Type and Connection ■ Measurement Range and Units ■ Damping Value ■ **Failure Mode:** High or Low ■ **Hot Backup:** Mode and PV ■ **Sensor Drift Alert:** Mode, Limit and Units ■ **Display Configuration**: Choose what will be shown on the LCD display ■ **Custom Alarm and saturation levels**: Choose custom High and Low Alarm and Saturation levels ■ **Security information:** Write Protection, HART Lock and Local Operator Interface Password
	C2:Transmitter – Sensor Matching	■ The transmitters are designed to accept Callendar-Van Dusen constants from a calibrated RTD. Using these constants, the transmitter generates a custom curve to match the sensor-specific curve. Specify a Series 65, 65, or 78 RTD sensor on the order with a special characterization curve (V or X8Q4 option). These constants will be programmed into the transmitter with this option.
	A1, CN, or C8: Alarm Level Configuration	■ **A1:** NAMUR Alarm and Saturation Levels, with High Alarm configured ■ **CN:** NAMUR Alarm and Saturation Levels, with Low Alarm configured ■ **C8:** Low Alarm (Standard Rosemount Alarm and Saturation Values)
	Q4: Three-Point Calibration with Certificate	■ Calibration certificate. Three-Point calibration at 0, 50 and 100% with certificate.
	C4: Five-Point Calibration	■ Will include five-point calibration at 0, 25, 50, 75, and 100% analog and digital output points. Use with Calibration Certificate Q4
	HR7: HART Revision configuration	■ Your 644 Head mount and Field mount are HART revision selectable. Order the HR7 code to configure your device to operate in HART Revision 7 mode. Your device is also configurable in the field. Refer to the 644 Quick Start Guide or Reference Manual for more instructions. ■ **Long Software Tag:** 32 Characters

	Option code	Requirements/specification
FOUNDATION fieldbus	C1: Factory Configuration Data (CDS required)	Date: day/month/year Descriptor: 16 alphanumeric characters Message: 32 alphanumeric characters
	C2:Transmitter – Sensor Matching	The transmitters are designed to accept Callendar-Van Dusen constants from a calibrated RTD. Using these constants, the transmitter generates a custom curve to match the sensor-specific curve. Specify a Series 65, 65, or 78 RTD sensor on the order with a special characterization curve (V or X8Q4 option). These constants will be programmed into the transmitter with this option.
	C4: Five-Point Calibration	Will include five-point calibration at 0, 25, 50, 75, and 100% analog and digital output points. Use with Calibration Certificate Q4.
	Q4: Three-Point Calibration with Certificate	Calibration certificate. Three-Point calibration with certificate.

	Option code	Requirements/specification
PROFIBUS PA	C1: Factory Configuration Data (CDS required)	Date: day/month/year Descriptor: 16 alphanumeric characters Message: 32 alphanumeric characters
	C2:Transmitter – Sensor Matching	The transmitters are designed to accept Callendar-Van Dusen constants from a calibrated RTD. Using these constants, the transmitter generates a custom curve to match the sensor-specific curve. Specify a Series 65, or 78 RTD sensor on the order with a special characterization curve (V or X8Q4 option). These constants will be programmed into the transmitter with this option.
	C4: Five-Point Calibration	Will include five-point calibration at 0, 25, 50, 75, and 100% analog and digital output points. Use with Calibration Certificate Q4.
	Q4: Three-Point Calibration with Certificate	Calibration certificate. Three-Point calibration with certificate.

Specifications and Reference Data for 644 HART (Device Revision 7 or Previous)

Functional specifications

Inputs
User-selectable; sensor terminals rated to 42.4 Vdc. See "Accuracy" on page 20 for sensor options.

Output
Single 2-wire device with either 4-20 mA/HART, linear with temperature or input. Device supports protocol revision HART 5.

Isolation
Input/output isolation tested to 600 Vrms.

Local display
The optional five-digit integral LCD display includes a floating or fixed decimal point. It can also display engineering units (°F, °C, °R, K, Ω, and mV), mA, and percent of span. The display can be configured to alternate between selected display options. Display settings are preconfigured at the factory according to the standard transmitter configuration. They can be reconfigured in the field using a compliant field communicator.

Humidity limits
0–95% relative humidity

Update time
≤ 0.5 sec.

Accuracy (default configuration) PT 100
HART (0-100 °C): ±0.18 °C

Table 11. 644 HART legacy display kits

	Kit part number
Display Only	00644-4430-0002
Display and Aluminum, Housing Cover(1)	00644-4430-0001
Display and SST Housing Cover(1)	00644-4430-0011

(1) Covers provided are compatible with the 3 in (76mm) Universal Junction Box and Rosemount Connection Head enclosure styles.

Physical specifications

Electrical connections

Model	Power and sensor terminals
644H	Compression screws permanently fixed to terminal block

Field communicator connections

Communication terminals	
644H	Clips permanently fixed to terminal block

Materials of construction

Electronics housing and terminal block	
644H	GE polyphenylene oxide glass reinforced
Enclosure (options J5, J6)	
Housing	Low-copper aluminum
Paint	Polyurethane
Cover O-ring	Buna-N

Materials of constructions (stainless steel housing for biotechnology, pharmaceutical industries, and sanitary applications)
Housing and Standard Meter Cover
- 316 SST

Cover O-Ring
- Buna-N

Mounting
The 644H installs in a connection head or universal head mounted directly on a sensor assembly, apart from a sensor assembly using a universal head, or to a DIN rail using an optional mounting clip.

Special mounting considerations
See "Mounting kits for 644H" on page 26 for the special hardware that is available to:

- Mount a 644H to a DIN rail. (see page 24)
- Retrofit a new 644H to replace an existing 644H Transmitter in an existing threaded sensor connection head.(see Table 3 on page 11)

Weight

Code	Options	Weight
644H	HART, Head Mount Transmitter	95 g (3.39 oz)
644H	FOUNDATION fieldbus, Head Mount Transmitter	92 g (3.25 oz)
644H	PROFIBUS PA Head Mount Transmitter	92 g (3.25 oz)
644R	HART, Rail Mount Transmitter	174 g (6.14 oz)
M5	LCD Display	35 g (1.34 oz)
J5, J6	Universal Head, Standard Cover	577 g (20.35 oz)
J5, J6	Universal Head, Meter Cover	667 g (23.53 oz)
J7, J8	SST Universal Head, Std. Cover	1620 g (57.14 oz)
J7, J8	SST Universal Head, Meter Cover	1730 g (61.02 oz)

Weight (stainless steel housing for biotechnology, pharmaceutical industries, and sanitary applications)

Option code	Standard cover	Meter cover
S1	840 g (27 oz)	995 g (32 oz)
S2	840 g (27 oz)	995 g (32 oz)
S3	840 g (27 oz)	995 g (32 oz)
S4	840 g (27 oz)	995 g (32 oz)

Enclosure ratings (644H)

All available enclosures are Type 4X, IP66, and IP68.

Sanitary housing surface

Surface finish is polished to 32 RMA. Laser etched product marking on housing and standard covers.

Performance specifications

EMC (electromagnetic compatibility) NAMUR NE 21 Standard

The 644H HART meets the requirements for NAMUR NE 21 Rating.

Susceptibility	Parameter	Influence
		HART
ESD	• 6 kV contact discharge • 8 kV air discharge	None
Radiated	• 80 – 1000 MHz at 10 V/m AM	< 1.0%
Burst	• 1 kV for I.O.	None
Surge	• 0.5 kV line–line • 1 kV line–ground (I.O. tool)	None
Conducted	• 10 kHz to 80 MHz at 10 V	< 1.0%

CE electromagnetic compatibility compliance testing

The 644 is compliant with Directive 2004/108/EC. Meets the criteria under IEC 61326:2006

Power supply effect

Less than ±0.005% of span per volt

Stability

RTDs and thermocouples have a stability of ±0.15% of output reading or 0.15 °C (whichever is greater) for 24 months.

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.

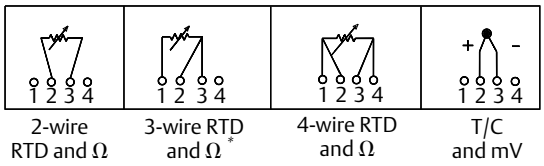
Vibration effect

The 644 is tested to the following specifications 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

Sensor connections

644 Sensor connections diagram



***Rosemount Inc. provides 4-wire sensors for all single element RTDs. You can use these RTDs in 3-wire configurations by leaving the unneeded leads disconnected and insulated with electrical tape.**

Tagging

Hardware

- 13 characters total
- Tags are adhesive labels affixed to the side of the transmitter.
- Permanently attached to transmitter
- Character height is 1/16-in (1.6 mm).

Software

- The transmitter can store up to 8 characters for the HART protocol.
- Order Software Tag with C1 option code.

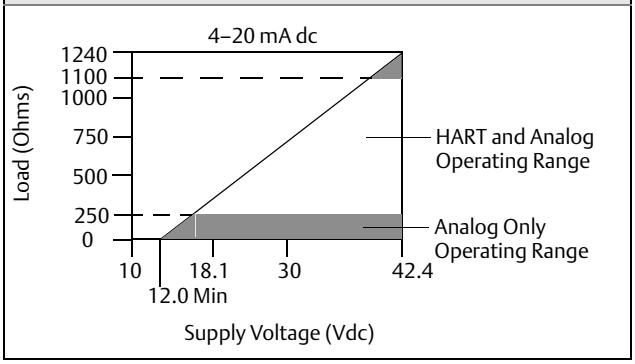
4–20 mA/HART specifications

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.

Load limitations

Maximum load = 40.8 X (supply voltage - 12.0)[1]



(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.

Temperature limits

	Operating limit	Storage limit
With LCD display[1]	–40 to 185 °F –40 to 85 °C	–50 to 185 °F –45 to 85 °C
Without LCD display	–40 to 185 °F –40 to 85 °C	–60 to 248 °F –50 to 120 °C

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

Hardware and software failure mode

The 644 features software driven alarm diagnostics and an independent circuit which is designed to provide backup alarm output if the microprocessor software fails. The alarm direction (HI/LO) is user-selectable using the failure mode switch. If failure occurs, the position of the switch determines the direction in which the output is driven (HI or LO). 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 software drives its output in failure mode depends on whether it is configured to standard, custom, or NAMUR-compliant (NAMUR recommendation NE 43, June 1997) operation. Table 7 shows the configuration alarm ranges.

Table 12. Available Alarm Range[1]

	Standard	NAMUR- NE 43 compliant
Linear Output:	3.9 ≤ I[2] ≤ 20.5	3.8 ≤ I ≤20.5
Fail High:	21.75 ≤ I ≤ 23	21.5 ≤ I ≤ 23
Fail Low:	3.5 ≤ I≤ 3.75	3.5 ≤ I≤ 3.6

(1) Measured in mA.
(2) I = Process Variable (current output).

Custom alarm and saturation level

Custom factory configuration of alarm and saturation level is available with option code C1 for valid values. These values can also be configured in the field using a Field Communicator.

Turn-on time

Performance within specifications in less than 5.0 seconds after power is applied, when damping value is set to 0 seconds.

Transient protection

The Rosemount 470 Transient Protector prevents damage from transients induced by lightning, welding, or heavy electrical equipment. For more information, refer to the Rosemount 470 Transient Protector Product Data Sheet (document number 00813-0100-4191).

Accuracy

For complete accuracy tables by sensor type, see Table 8 on page 20. For ambient temperature effects by sensor type, see “Ambient temperature effect” on page 21. For Enhanced Accuracy specifications, see “Ambient temperature effect” on page 21.

Configuration

For standard and custom configuration information, see “Configuration” on page 37.

Product Certifications

European Directive Information

A copy of the EC Declaration of Conformity can be found at the end of the Quick Start Guide. The most recent revision of the EC Declaration of Conformity can be found at www.rosemount.com.

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).

Installing Equipment in North America

The US National Electrical Code (NEC) and the Canadian Electrical Code (CEC) permit the use of Division marked equipment in Zones and Zone marked equipment in Divisions. The markings must be suitable for the area classification, gas, and temperature class. This information is clearly defined in the respective codes.

USA

E5 FM Explosionproof, Non-Incendive, Dust-Ignitionproof
Certificate: [XP & DIP]: 3006278; [NI]: 3008880 & 3044581
Standards: FM Class 3600: 2011, FM Class 3615: 2006, FM Class 3616: 2011, FM Class 3810: 2005, NEMA-250: 250: 2003, ANSI/IEC 60529: 2004
Markings: XP CL I, DIV 1, GP B, C, D; DIP CL II / III, GP E, F, G; (-50 °C ≤ Ta ≤ +85 °C); Type 4X; See I5 description for Non-Incendive markings

I5 FM Intrinsic Safety and Non-Incendive
Certificate: 3008880 [Headmount Fieldbus/Profibus, Rail-mount HART]
Certificate: 3044581 [Headmount HART]
Standards: FM Class 3600: 1998, FM Class 3610: 2010, FM Class 3611: 2004, FM Class 3810: 2005, NEMA - 250: 1991
Markings: IS CL I / II / III, DIV I, GP A, B, C, D, E, F, G; NI CL I, DIV 2, GP A, B, C, D

Special Conditions for Safe Use (X):

1. When no enclosure option is selected, the Model 644 Temperature Transmitter shall be installed in an enclosure meeting the requirements of ANSI/ISA S82.01 and S82.03 or other applicable ordinary location standards.
2. Option code K5 is only applicable with Rosemount J5 Universal Head (M20 x 1.5) or Rosemount J6 Universal Head (1/2-14 NPT) enclosure.
3. An enclosure options must be selected to maintain a Type 4X rating.

Certificate: 3044581 [Headmount HART]
Standards: FM Class 3600: 2011, FM Class 3610: 2010, FM Class 3611: 2004, FM Class 3810: 2005, ANSI/NEMA - 250: 1991, ANSI/IEC 60529: 2004; ANSI/ISA 60079-0: 2009; ANSI/ISA 60079-11: 2009
Markings: [No Enclosure]: IS CL I, DIV I, GP A, B, C, D T4; CL I ZONE 0 AEx ia IIC T4 Ga; NI CL I, DIV 2, GP A, B, C, D T5
[With Enclosure]: IS CL I / II / III, DIV 1, GP A, B, C, D, E, F, G; NI CL I, DIV 2, GP A, B, C, D

Special Conditions for Safe Use (X):

1. When no enclosure option is selected, the Model 644 Temperature Transmitter shall be installed in a final enclosure meeting type of protection IP20 and meeting the requirements of ANSI/ISA 61010-1 and ANSI/ISA 60079-0.
2. The Model 644 optional housings may contain aluminum and is considered a potential risk of ignition by impact or friction. Care must be taken during installation and use to prevent impact and friction.

Canada

I6 CSA Intrinsic Safety and Division 2
Certificate: 1091070
Standards: CAN/CSA C22.2 No. 0-10, CSA Std C22.2 No. 25-1966, 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, C22.2 No 60529-05
Markings: [HART] IS CL I GP A, B, C, D T4/T6; CL I, ZONE 0 IIC; CL I, DIV 2, GP A, B, C, D [Fieldbus/Profibus] IS CL I GP A, B, C, D T4; CL I, ZONE 0 IIC; CL I, DIV 2, GP A, B, C, D

K6 CSA Explosionproof, Dust-Ignitionproof, Intrinsic Safety and Division 2
Certificate: 1091070
Standards: CAN/CSA C22.2 No. 0-10, 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, C22.2 No 60529-05
Markings: CL I / II / III, DIV 1, GP B, C, D, E, F, G
See I6 description for Intrinsic Safety and Division 2 markings

Europe

E1 ATEX Flameproof
Certificate: FM12ATEX0065X
Standards: EN 60079-0: 2012, EN 60079-1: 2007, EN 60529:1991 +A1:2000
Markings: ⟨Ex⟩ II 2 G Ex d IIC T6...T1 Gb, T6(-50 °C ≤ Ta ≤ +40 °C), T5...T1(-50 °C ≤ Ta ≤ +60 °C)
See Table 13 at the end of the Product Certifications section for Process Temperatures.

Special Conditions for Safe 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 cover against impact energies greater than 4 joules.
4. Consult the manufacturer if dimensional information on the flameproof joints is necessary.

I1 ATEX Intrinsic Safety
Certificate: [Headmount HART]: Baseefa12ATEX0101X
[Headmount Fieldbus/Profibus]: Baseefa03ATEX0499X
[Railmount HART]: BAS00ATEX1033X
Standards: EN 60079-0: 2012, EN 60079-11: 2012
Markings: [HART]: ⟨Ex⟩ II 1 G Ex ia IIC T6...T4 Ga;
[Fieldbus/PROFIBUS]; ⟨Ex⟩ II 1 G Ex ia IIC T4
See Table 14 at the end of the Product Certifications section for Entity Parameters and Temperature Classifications.

Special Condition for Safe Use (X):

1. The equipment must be installed in an enclosure which affords it a degree of protection of at least IP20 in accordance with the requirements of IEC 60529. Non-metallic enclosures must have a surface resistance of less than 1GΩ; light alloy or zirconium enclosures must be protected from impact and friction when installed in a Zone 0 environment.
2. When fitted with the Transient Protector Assembly, the equipment is not capable of withstanding the 500V test as defined in Clause 6.3.13 of EN 60079-11:2012. This must be taken into account during installation.

N1 ATEX Type n - with enclosure
Certificate: BAS00ATEX3145
Standards: EN 60079-0: 2012, EN 60079-15: 2010
Markings: ⟨Ex⟩ II 3 G Ex nA IIC T5 Gc (-40 °C ≤ Ta ≤ +70 °C);

NC ATEX Type n - without enclosure
Certificate: [Headmount Fieldbus/Profibus, Railmount HART]: Baseefa13ATEX0093X
[Headmount HART]: Baseefa12ATEX0102U
Standards: EN 60079-0: 2012, EN 60079-15: 2010
Markings: [Headmount Fieldbus/Profibus, Railmount HART]: ⟨Ex⟩ II 3 G Ex nA IIC T5 Gc (-40 °C ≤ Ta ≤ +70 °C)
[Headmount HART]: ⟨Ex⟩ II 3 G Ex nA IIC T6...T5 Gc; T6(-60 °C ≤ Ta ≤ +40 °C); T5(-60 °C ≤ Ta ≤ +85 °C)

Special Condition for Safe Use (X):

1. The Model 644 Temperature Transmitter must be installed in a suitably certified enclosure such that it is afforded a degree of protection of at least IP54 in accordance with IEC 60529 and EN 60079-15.
2. When fitted with the Transient Protector Assembly, the equipment is not capable of withstanding the 500V test. This must be taken into account during installation.

ND ATEX Dust
Certificate: FM12ATEX0065X
Standards: EN 60079-0: 2012, EN 60079-31: 2009, EN 60529:1991 +A1:2000
Markings: ⟨Ex⟩ II 2 D Ex tb IIIC T130°C Db, (-40 °C ≤ Ta ≤ +70 °C); IP66
See Table 13 at the end of the Product Certifications section for Process Temperatures.

Special Conditions for Safe 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 cover against impact energies greater than 4 joules.
4. Consult the manufacturer if dimensional information on the flameproof joints is necessary.

International

E7 IECEx Intrinsic Safety
Certificate: IECEx FMG 12.0022X
Standards: IEC 60079-0: 2011, IEC 60079-1: 2007
Markings: Ex d IIC T6...T1 Gb, T6(-50 °C ≤ Ta ≤ +40 °C), T5...T1(-50 °C ≤ Ta ≤ +60 °C)
See Table 13 at the end of the Product Certifications section for Process Temperatures.

Conditions of Certification (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 cover against impact energies greater than 4 joules.
4. Consult the manufacturer if dimensional information on the flameproof joints is necessary.

I7 IECEx Intrinsic Safety
Certificate: [Headmount HART]: IECEx BAS 12.0069X
[Headmount Fieldbus/Profibus, Railmount HART]: IECEx BAS 07.0053X
Standards: IEC 60079-0: 2011, IEC 60079-11: 2011
Markings: Ex ia IIC T6...T4 Ga
See Table 14 at the end of the Product Certifications section for Entity Parameters and Temperature Classifications.

Conditions of Certification (X):

1. The equipment must be installed in an enclosure which affords it a degree of protection of at least IP20 in accordance with the requirements of IEC 60529. Non-metallic enclosures must have a surface resistance of less than 1GΩ; light alloy or zirconium enclosures must be protected from impact and friction when installed in a Zone 0 environment.
2. When fitted with the Transient Protector Assembly, the equipment is not capable of withstanding the 500V test as defined in Clause 6.3.13 of IEC 60079-11:2011. This must be taken into account during installation.

N7 IECEx Type n - with enclosure
Certificate: IECEx BAS 07.0055
Standards: IEC 60079-0: 2011, IEC 60079-15: 2010
Markings: Ex nA IIC T5 Gc (-40 °C ≤ Ta ≤ +70 °C)

NG IECEx Type n - without enclosure
Certificate: [Headmount Fieldbus/Profibus, Railmount HART]: IECEx BAS 12.0053X
[Headmount HART]: IECEx BAS 12.0070U
Standards: IEC 60079-0: 2011, IEC 60079-15: 2010
Markings: [Headmount Fieldbus/Profibus, Railmount HART]: Ex nA IIC T5 Gc (-40 °C ≤ Ta ≤ +70 °C)

Conditions of Certification (X):

1. The Model 644 Temperature Transmitter must be installed in a suitably certified enclosure such that it is afforded a degree of protection of at least IP54 in accordance with IEC 60529 and IEC 60079-15.
2. When fitted with the Transient Protector Assembly, the equipment is not capable of withstanding the 500V test. This must be taken into account during installation.

NK IECEx Dust
Certificate: IECEx FMG 12.0022X
Standards: IEC 60079-0: 2011, IEC 60079-31: 2008
Markings: Ex tb IIIC T130°C Db, (-40 °C ≤ Ta ≤ +70 °C); IP66
See Table 13 at the end of the Product Certifications section for Process Temperatures

Conditions of Certification (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 cover against impact energies greater than 4 joules.
4. Consult the manufacturer if dimensional information on the flameproof joints is necessary.

Brazil

E2 INMETRO Flameproof
Certificate: NCC 12.1147X
Standards: ABNT NBR IEC 60079-0:2008, ABNT NBR IEC 60079-1:2009, NBR 8094:1983
Markings: Ex d IIC T6...T1 (-40 °C ≤ Ta ≤ +65 °C) Gb; IP66W

Special Conditions for Safe Use (X):

1. Care must be taken to ensure that the surface temperature does not exceed 85 °C when RTDs or thermocouples are fitted to the transmitter.
2. The mechanical and chemical characteristics of the process fluid must be evaluated in order not to cause deterioration or corrosion to the temperature probes.
3. For information on the dimensions of explosion-proof joints, the manufacturer should be contacted.

I2 INMETRO Intrinsic Safety
Certificate: CEPEL 02.0096X
Standards: ABNT NBR IEC 60079-0:2008, ABNT NBR IEC 60079-11:2009, ABNT NBR IEC 60079-26:2008, ABNT NBR IEC 60529:2009
Markings: Ex ia IIC T* Ga; IP66W
See Table 14 at the end of the Product Certifications section for Entity Parameters and Temperature Classifications.

Special Conditions for Safe Use (X):

1. The apparatus must be installed in an enclosure which affords it a degree of protection of at least IP20.
2. Light alloy or zirconium enclosures must be protected from impact and friction when installed.
3. When the maximum ambient temperature at the place of installation is greater than 50 °C, the equipment shall be installed with adequate insulation cables with a minimum rated temperature of 90 °C.

China

E3 China Flameproof
Certificate: GYJ111385
Standards: GB3836.1-2000, GB3836.2-2000, GB12476.1-2000
Markings: Ex d IIC T6; DIP A20 Ta 95 °C; IP66

Special Conditions for Safe Use (X):

1. Temperature Assembly using temperature sensor type 65, 68, 75, 183, 185 are certified.
2. The ambient temperature range is:

Gas/dust	Ambient temperature
Gas	-40 °C ≤ Ta ≤ +65 °C
Dust	-40 °C ≤ Ta ≤ +85 °C

3. The earth connection facility in the enclosure should be connected reliably.

4. During installation, use and maintenance in explosive gas atmospheres, observe the warning “Do not open when energized”. During installation, use and maintenance in explosive dust atmosphere, observe the warning “Do not open when an explosive dust atmosphere is present”.
5. During installation, there should be no mixture harmful to flameproof housing.
6. During installation in hazardous location, cable glands, conduits and blanking plugs, certified by state-appointed inspection bodies with Ex d IIC, DIP A20 IP66 degree, should be used.
7. Maintenance should be done in a non-hazardous location.
8. During installation, use and maintenance in explosive dust atmosphere, product enclosure should be cleaned to avoid dust accumulation, but compressed air should not be used.
9. End users are not permitted to change any components inside, but to settle the problem in conjunction with manufacturer to avoid damage to the product.
10. During installation, use and maintenance of this product, observe the following standards:
GB3836.13-1997 “Electrical apparatus for explosive gas atmospheres Part 13: Repair and overhaul for apparatus used in explosive gas atmospheres”
GB3836.15-2000 “Electrical apparatus for explosive gas atmospheres Part 15: Electrical installations in hazardous area (other than mines)”
GB3836.16-2006 “Electrical apparatus for explosive gas atmospheres Part 16: Inspection and maintenance of electrical installation (other than mines)”
GB50257-1996 “Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering”.
GB15577-1995 “Safe regulation for explosive dust atmospheres”
GB12476.2-2006 “Electrical apparatus for use in the presence of combustible dust Part 1-2: Electrical apparatus protected by enclosures and surface temperature limitation-Selection, installation and maintenance”

I3 China Intrinsic Safety
Certificate: GYJ111384X
Standards: GB3836.1-2000, GB3836.4-2000
Markings: Ex ia IIC T4/T5/T6

Special Conditions for Safe Use (X):

1. The ambient temperature range is:

When options do not select Enhanced Performance:

Transmitter output	Maximum input power: (W)	T code	Ambient temperature
A	0.67	T6	-60 °C ≤ Ta ≤ +40 °C
	0.67	T5	-60 °C ≤ Ta ≤ +50 °C
	1	T5	-60 °C ≤ Ta ≤ +40 °C
	1	T4	-60 °C ≤ Ta ≤ +80 °C
F or W	1.3	T4	-50 °C ≤ Ta ≤ +60 °C
	5.32	T4	-50 °C ≤ Ta ≤ +60 °C

When options select Enhanced Performance:

Maximum Input Power: (W)	T code	Ambient temperature
0.67	T6	-60 °C ≤ Ta ≤ +40 °C
0.67	T5	-60 °C ≤ Ta ≤ +50 °C
0.80	T5	-60 °C ≤ Ta ≤ +40 °C
0.80	T4	-60 °C ≤ Ta ≤ +80 °C

2. Parameters:

When options do not select Enhanced Performance:

■ Terminals of power supply (+, -)

Transmitter output	Maximum input voltage: U_i (V)	Maximum input current: I_i (mA)	Maximum input power: P_i (W)	Maximum internal parameters	
				C_i (nF)	L_i (mH)
A	30	200	0.67/1	10	0
F, W	30	300	1.3	2.1	0
F, W (FISCO)	17.5	380	5.32	2.1	0

■ Terminals of sensor (1,2,3,4)

Transmitter output	Maximum output voltage: U_o (V)	Maximum output current: I_o (mA)	Maximum output power: P_o (W)	Maximum internal parameters	
				C_o (nF)	L_o (mH)
A	13.6	80	0.08	75	0
F, W	13.9	23	0.079	7.7	0

When options select Enhanced Performance:

■ Terminals of power supply (+, -)

Maximum input voltage: U_i (V)	Maximum input current: I_i (mA)	Maximum input power: P_i (W)	Maximum internal parameters	
			C_i (nF)	L_i (mH)
30	150 (Ta ≤ +80 °C)	0.67/0.8	3.3	0
	170 (Ta ≤ +70 °C)			
	190 (Ta ≤ +60 °C)			

■ Terminals of sensor (1,2,3,4)

Maximum output voltage: U_o (V)	Maximum output current: I_o (mA)	Maximum output power: P_o (W)	Gas group	Maximum internal parameters	
				C_o (nF)	L_o (mH)
13.6	80	0.08	IIC	0.816	5.79
			IIB	5.196	23.4
			IIA	18.596	48.06

3. This product complies to the requirements for FISCO field devices specified in IEC60079-27: 2008. For the connection of an intrinsically safe circuit in accordance FISCO model, FISCO parameters of this product are as above.
4. The product should be used with Ex-certified associated apparatus to establish explosion protection system that can be used in explosive gas atmospheres. Wiring and terminals should comply with the instruction manual of the product and associated apparatus.

5. The cables between this product and associated apparatus should be shielded cables (the cables must have insulated shield). The shielded has to be grounded reliably in non-hazardous area.
6. End users are not permitted to change any components insides, but to settle the problem in conjunction with manufacturer to avoid damage to the product
7. During installation, use and maintenance of this product, observe the following standards:
   GB3836.13-1997 "Electrical apparatus for explosive gas atmospheres Part 13: Repair and overhaul for apparatus used in explosive gas atmospheres"
   GB3836.15-2000 "Electrical apparatus for explosive gas atmospheres Part 15: Electrical installations in hazardous area (other than mines)"
   GB3836.16-2006 "Electrical apparatus for explosive gas atmospheres Part 16: Inspection and maintenance of electrical installation (other than mines)"
   GB50257-1996 "Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering".

N3 China Type n
Certificate: GYJ101421
Standards Used: GB3836.1-2000, GB3836.8-2003
Markings: Ex nA nL IIC T5/T6

Special Conditions for Safe Use (X):

1. The relation among T code, ambient temperature range is as following:

When options do not select Enhanced Performance:

T code	Ambient temperature
T5	-40 °C ≤ Ta ≤ +70 °C

When options select Enhanced Performance:

T code	Ambient temperature
T6	-60 °C ≤ Ta ≤ +40 °C
T5	-60 °C ≤ Ta ≤ +85 °C

2. Maximum input voltage: 42.4V.
3. Cable glands, conduit or blanking plugs, certified by NEPSI with Ex e or Ex n protection type and appropriate thread type and IP54 degree, should be used on external connections and redundant cable entries.
4. Maintenance should be done in non-hazardous location.
5. End users are not permitted to change any components inside, but to settle the problem in conjunction with manufacturer to avoid damage to the product.
6. During installation, use and maintenance of this product, observe the following standards:
   GB3836.13-1997 "Electrical apparatus for explosive gas atmospheres Part 13: Repair and overhaul for apparatus used in explosive gas atmospheres"
   GB3836.15-2000 "Electrical apparatus for explosive gas atmospheres Part 15: Electrical installations in hazardous area (other than mines)"
   GB3836.16-2006 "Electrical apparatus for explosive gas atmospheres Part 16: Inspection and maintenance of electrical installation (other than mines)"
   GB50257-1996 "Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering"

EAC - Belarus, Kazakhstan, Russia

EM Technical Regulation Customs Union (EAC) Flameproof
Certificate: RU C-US.GB05.B.00289
Standards: GOST R IEC 60079-0-2011, GOST IEC 60079-1-2011
Markings: 1Ex d IIC T6...T1 Gb X, T6(-50 °C ≤Ta ≤+40 °C), T5...T1(-50 °C ≤Ta ≤+60 °C); IP65/IP66/IP68

Special Conditions for Safe Use (X):

1. See certificate for special conditions.

IM Technical Regulation Customs Union (EAC) Intrinsic Safety
Certificate: RU C-US.GB05.B.00289
Standards: GOST R IEC 60079-0-2011, GOST R IEC 60079-11-2010
Markings: [HART]: 0Ex ia IIC T4...T6 Ga X;
[Fieldbus/Profibus]: 0Ex ia IIC T4 Ga X

Special Conditions for Safe Use (X):

1. See certificate for special conditions.

Japan

E4 Japan Flameproof
Certificate: TC20671 [J2 with LCD], TC20672 [J2], TC20673 [J6 with LCD], TC20674 [J6]
Markings: Ex d IIC T5

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 K6, E1, and I1
KB Combination of K5 and K6
KC Combination of I5 and I6
KD Combination of E5, I5, K6, E1, and I1
KM Combination of EM, and IM

Additional Certifications

SBS American Bureau of Shipping (ABS) Type Approval
Certificate: 11-HS771994A-1-PDA
ABS Rules: 2013 Steel Vessels Rules 1-1-4/7.7, 1-1-Appendix 3, 4-8-3/1.7, 4-8-3/13.1

SBV Bureau Veritas (BV) Type Approval
Certificate: 26325/A2 BV
Requirements: Bureau Veritas Rules for the Classification of Steel Ships
Application: Class notations: AUT-UMS, AUT-CCS, AUT-PORT and AUT-IMS

SDN Det Norske Veritas (DNV) Type Approval
Certificate: A-13246
Intended Use: Det Norske Veritas' Rules for Classification of Ships, High Speed & Light Craft and Det Norske Veritas' Offshore Standards
Application: Location Classes: Temperature: D; Humidity: B; Vibration: A; EMC: B; Enclosure: B/IP66: A, C/IP66: SST

SLL Lloyds Register (LR) Type Approval
Certificate: 11/60002
Application: For use in environmental categories ENV1, ENV2, ENV3 and ENV5.

Tables

Table 13. Process Temperatures

		T6	T5	T4	T3	T2	T1	T130
Max Ambient		+40 °C	+60 °C	+60 °C	+60 °C	+60 °C	+60 °C	+70 °C
		Transmitter with LCD display						
Sensor Extension	0”	55 °C	70 °C	95 °C	95 °C	95 °C	95 °C	95 °C
	3”	55 °C	70 °C	100 °C	100 °C	100 °C	100 °C	100 °C
	6”	60 °C	70 °C	100 °C	100 °C	100 °C	100 °C	100 °C
	9”	65 °C	75 °C	110 °C	110 °C	110 °C	110 °C	110 °C
		Transmitter without LCD display						
	0”	55 °C	70 °C	100 °C	170 °C	280 °C	440 °C	100 °C
	3”	55 °C	70 °C	110 °C	190 °C	300 °C	450 °C	110 °C
	6”	60 °C	70 °C	120 °C	200 °C	300 °C	450 °C	110 °C
	9”	65 °C	75 °C	130 °C	200 °C	300 °C	450 °C	120 °C

Table 14. Entity Parameters

	Fieldbus/PROFIBUS	HART Legacy	HART Enhanced
Voltage U_i (V)	30	30	30
Current I_i (mA)	300	200	150 for Ta ≤ 80 °C 170 for Ta ≤ 70 °C 190 for Ta ≤ 60 °C
Power P_i (W)	1.3 @ T4(-50 °C ≤ Ta ≤ +60 °C)	.67 @ T6(-60 °C ≤ Ta ≤ +40 °C) .67 @ T5(-60 °C ≤ Ta ≤ +50 °C) 1.0 @ T5(-60 °C ≤ Ta ≤ +40 °C) 1.0 @ T4(-60 °C ≤ Ta ≤ +80 °C)	.67 @ T6(-60 °C ≤ Ta ≤ +40 °C) .67 @ T5(-60 °C ≤ Ta ≤ +50 °C) .80 @ T5(-60 °C ≤ Ta ≤ +40 °C) .80 @ T4(-60 °C ≤ Ta ≤ +80 °C)
Capacitance C_i (nF)	2.1	10	3.3
Inductance L_i (mH)	0	0	0

Rosemount World Headquarters
Emerson Process Management
6021 Innovation Blvd
Shakopee, MN 55379, USA
+1 800 999 9307 or +1 952 906 8888
+1 952 949 7001
RFQ.RMD-RCC@EmersonProcess.com

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

Latin America Regional Office
Emerson Process Management
1300 Concord Terrace, Suite 400
Sunrise, Florida, 33323, USA
+1 954 846 5030
+1 954 846 5121
RFQ.RMD-RCC@EmersonProcess.com

Europe Regional Office
Emerson Process Management 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@EmersonProcess.com

Asia Pacific Regional Office
Emerson Process Management Asia Pacific Pte Ltd
1 Pandan Crescent
Singapore 128461
+65 6777 8211
+65 6777 0947
Enquiries@AP.EmersonProcess.com

Middle East and Africa Regional Office
Emerson Process Management
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

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