

# 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.

## Features and benefits

### Fulfill 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 third 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 (LOI)
- LCD display
- Integral transient protection
- Enhanced accuracy and stability
- Transmitter-sensor matching with Callendar-Van Dusen constants
- Variety of enclosures

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## 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 third 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 LOI
- 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

## Rosemount 644 FOUNDATION Fieldbus



- Single sensor input for RTD, thermocouple, mV, and Ohm
- DIN A head mount transmitter
- Standard function blocks: two analog inputs, one PID, and one backup Link Active Scheduler (LAS)
- LCD display
- ITK 5.01 compliant
- Transmitter–sensor matching with Callendar-Van Dusen constants
- Integral transient protection

## Rosemount 644 PROFIBUS PA



- Single sensor input for RTD, thermocouple, mV, and Ohm
- DIN A head mount transmitter
- Standard function blocks: one physical, one transducer, and one analog output
- 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 fingertips with intuitive Device Dashboards (DD).
- 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 (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
- Head mount - Dual sensor (option code S)
- Field mount - Dual sensor (option code D)
- Safety Certified to IEC 61508 with Certificate of FMEDA Data (option code QT)
- LCD display (option code M5)
- LOI (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 [Specifications and reference data for Rosemount 644 HART \(Device Revision 7 or Previous\)](#) for more information on material selection.

**Table 1: Rosemount 644 Temperature Transmitter Ordering Information**

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are 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 | ★ |

**Table 1: Rosemount 644 Temperature Transmitter Ordering Information (continued)**

| Model   | Product description   |      |   |   |      |   |
|---|---|------|---|---|------|---|
| R   | Rail mount - single sensor input  |      |   |   | ★    |   |
| S   | DIN A head mount - dual sensor input (HART only)  |      |   |   | ★    |   |
| F <sup>(1)</sup>  | Field mount - single sensor input (HART only)   |      |   |   | ★    |   |
| D <sup>(1)</sup>  | Field mount - dual sensor input (HART only)   |      |   |   | ★    |   |
| Output  |   | Head |   |   | Rail |   |
| A   | 4–20 mA with digital signal based on HART protocol                                      | •    |   |   | •    | ★ |
| F <sup>(2)</sup>  | FOUNDATION Fieldbus digital signal (includes 2 AI function blocks and Backup LAS)       | •    |   |   | –    | ★ |
| W <sup>(2)</sup>  | PROFIBUS PA digital signal  | •    |   |   | –    | ★ |
| Product certifications  |   |      |   |   |      |   |
| Hazardous locations certificates (consult factory for availability <sup>(3)</sup> ) |   | A    | F | W | A    |   |
| NA  | No approval   | •    | • | • | •    | ★ |
| E5  | USA Explosion-proof; Dust Ignition-proof  | •    | • | • | –    | ★ |
|   |   | Head |   |   | Rail |   |
|   |   | A    | F | W | A    |   |
| I5  | USA Intrinsically Safe; Non-incendive   | •    | • | • | •    | ★ |
| K5  | USA Explosionproof; Intrinsically Safe; Non-incendive; Dust Ignition-proof              | •    | • | • | –    | ★ |
| NK  | IECEX Dust  | •    | • | – | –    | ★ |
| KC  | USA and Canada Intrinsically Safe and Non-incendive                                     | –    | – | – | •    | ★ |
| KB  | USA and Canada: Explosion-proof; Intrinsically Safe; Non-incendive; Dust Ignition-proof | •    | – | – | –    | ★ |
| KD  | USA, Canada, and ATEX Explosionproof, Intrinsically Safe                                | •    | • | • | –    | ★ |
| I6  | Canada Intrinsically Safe   | •    | • | • | •    | ★ |
| K6  | Canada Explosionproof; Intrinsically Safe; Non-incendive; Dust Ignition-proof           | •    | • | • | –    | ★ |
| I3  | China Intrinsic Safety  | •    | • | – | –    | ★ |
| E3  | China Flameproof  | •    | • | • | –    | ★ |
| N3  | China 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  | Canada and ATEX: Explosion proof; Intrinsically Safe; Non-incendive                     | •    | – | – | –    | ★ |
| I1  | ATEX Intrinsic Safety   | •    | • | • | •    | ★ |
| E7  | IECEX Flameproof  | •    | • | • | –    | ★ |

**Table 1: Rosemount 644 Temperature Transmitter Ordering Information (continued)**

| Model | Product description  |   |   |   |   |   |
|-------|--|---|---|---|---|---|
| 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    | Japan Flameproof   | • | • | – | – | ★ |
| I4    | Japan Intrinsic Safety   | • | • | – | – | ★ |
| 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, and Dust-Ignitionproof | • | • | • | – | ★ |

- (1) Consult factory on availability.
- (2) Only available with H (single sensor), not S (dual sensor).
- (3) See Table 2 for the validity of enclosures with individual approval options.

| Options                                     |  |          |            |                 |      |   |   |      |   |
|---|--|----------|------------|-----------------|------|---|---|------|---|
|   |  |          |            |                 | Head |   |   | Rail |   |
|   |  |          |            |                 | A    | F | W | A    |   |
| Plantweb™ standard diagnostic functionality |  |          |            |                 |      |   |   |      |   |
| DC <sup>(1)</sup>                           | Diagnostics: Hot Backup and sensor drift alert   |          |            |                 | •    | – | – | –    | ★ |
| DA1   | HART sensor and process diagnostic suite: Thermocouple diagnostic and min/max tracking |          |            |                 | •    | – | – | –    | ★ |
| Enclosure options                           |  |          |            |                 |      |   |   |      |   |
|   | Housing style  | Material | Entry size | Diameter        |      |   |   |      |   |
| J5 <sup>(2) (3)</sup>                       | Universal junction box, 2 entries  | Aluminum | M20 × 1.5  | 3-in. (76 mm)   | •    | • | • | –    | ★ |
| J6 <sup>(3)</sup>                           | Universal junction box, 2 entries  | Aluminum | ½–14 NPT   | 3-in. (76 mm)   | •    | • | • | –    | ★ |
| R1  | Rosemount connection head, 2 entries   | Aluminum | M20 × 1.5  | 3-in. (76 mm)   | •    | • | • | –    | ★ |
| R2  | Rosemount connection head, 2 entries   | Aluminum | ½–14 NPT   | 3-in. (76 mm)   | •    | • | • | –    | ★ |
| J1 <sup>(2)</sup>                           | Universal junction box, 3 entries  | Aluminum | M20 × 1.5  | 3.5-in. (89 mm) | •    | • | • | –    | ★ |
| J2  | Universal junction box, 3 entries  | Aluminum | ½–14 NPT   | 3.5-in. (89 mm) | •    | • | • | –    | ★ |

|  |  |              |                      |                 |      |   |   |      |   |
|--|--|--------------|----------------------|-----------------|------|---|---|------|---|
| D1 <sup>(1) (2) (4)</sup>                  | Field mount housing, separate terminal compartment                             | Aluminum     | M20 × 1.5            | 3.5-in. (89 mm) | –    | – | – | –    | ★ |
| D2 <sup>(1) (4)</sup>                      | Field mount housing, separate terminal compartment                             | Aluminum     | ½–14 NPT             | 3.5-in. (89 mm) | –    | – | – | –    | ★ |
| J3 <sup>(2)</sup>                          | Universal junction box, 3 entries  | Cast SST     | M20 × 1.5            | 3.5-in. (89 mm) | •    | • | • | –    |   |
| J4   | Universal junction box, 3 entries  | Cast SST     | ½–14 NPT             | 3.5-in. (89 mm) | •    | • | • | –    |   |
| J7 <sup>(2) (3)</sup>                      | Universal junction box, 2 entries  | Cast SST     | M20 × 1.5            | 3-in. (76 mm)   | •    | • | • | –    |   |
| J8 <sup>(3)</sup>                          | Universal junction box, 2 entries  | Cast SST     | ½–14 NPT             | 3-in. (76 mm)   | •    | • | • | –    |   |
| R3   | Rosemount connection head, 2 entries   | Cast SST     | M20 × 1.5            | 3-in. (76 mm)   | •    | • | • | –    |   |
| R4   | Rosemount connection head, 2 entries   | Cast SST     | ½–14 NPT             | 3-in. (76 mm)   | •    | • | • | –    |   |
| S1   | Connection head, 2 entries   | Polished SST | ½–14 NPT             | 3-in. (76 mm)   | •    | • | • | –    |   |
| S2   | Connection head, 2 entries   | Polished SST | ½–14 NPSM            | 3-in. (76 mm)   | •    | • | • | –    |   |
| S3   | Connection head, 2 entries   | Polished SST | M20 × 1.5            | 3-in. (76 mm)   | •    | • | • | –    |   |
| S4   | Connection head, 2 entries   | Polished SST | M20 × 1.5, M24 × 1.4 | 3-in. (76 mm)   | •    | • | • | –    |   |
| <b>Mounting bracket</b> <sup>(5)</sup>     |  |              |                      |                 |      |   |   |      |   |
| B4   | 316 SST U-bolt mounting bracket, 2-in. pipe mount                              |              |                      |                 | •    | • | • | •    | ★ |
| B5   | “L” mounting bracket for 2-in. pipe or panel mounting                          |              |                      |                 | •    | • | • | •    | ★ |
| <b>Display and interface options</b>       |  |              |                      |                 |      |   |   |      |   |
| M4   | LCD display with LOI   |              |                      |                 | •    | – | – | –    | ★ |
| M5   | LCD display  |              |                      |                 | •    | • | • | –    | ★ |
| <b>Software configuration</b>              |  |              |                      |                 |      |   |   |      |   |
| C1   | Custom configuration of date, descriptor and message (requires CDS with order) |              |                      |                 | •    | • | • | •    | ★ |
| <b>Enhanced performance</b> <sup>(6)</sup> |  |              |                      |                 |      |   |   |      |   |
| P8   | Enhanced transmitter accuracy and stability                                    |              |                      |                 | •    | – | – | –    | ★ |
| <b>Alarm level configuration</b>           |  |              |                      |                 |      |   |   |      |   |
| A1   | NAMUR alarm and saturation levels, high alarm                                  |              |                      |                 | •    | – | – | •    | ★ |
|  |  |              |                      |                 | Head |   |   | Rail |   |



|                                   |   | A | F | W | A |   |
|-----------------------------------|---|---|---|---|---|---|
| CN                                | NAMUR alarm and saturation levels, low alarm  | • | – | – | • | ★ |
| C8                                | Low alarm (standard Rosemount alarm and saturation values)  | • | – | – | • | ★ |
| <b>Line filter</b>                |   |   |   |   |   |   |
| F5                                | 50 Hz line voltage filter   | • | • | • | • | ★ |
| F6                                | 60 Hz line voltage filter   | • | • | • | • | ★ |
| <b>Sensor trim</b>                |   |   |   |   |   |   |
| C2                                | Transmitter sensor matching - trim to specific Rosemount RTD calibration schedule (CVD constants) | • | • | • | • | ★ |
| <b>5-Point calibration option</b> |   |   |   |   |   |   |
| C4                                | 5-point calibration (use option code Q4 to generate a calibration certificate)                    | • | • | • | • | ★ |
| <b>Calibration certificate</b>    |   |   |   |   |   |   |
| Q4                                | Calibration certificate (3-point calibration with certificate)                                    | • | • | • | • | ★ |
| QP                                | Calibration certification and tamper evident seal   | • | – | – | – | ★ |
| <b>Custody transfer</b>           |   |   |   |   |   |   |
| D4                                | MID Custody Transfer (Europe)   | • | – | – | – | ★ |
| Quality certification for safety  |   |   |   |   |   |   |
| QT                                | Safety Certified to IEC 61508 with certificate of FMEDA data                                      | • | – | – | – | ★ |
| <b>Shipboard certification</b>    |   |   |   |   |   |   |
| 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   | • | • | • | – | ★ |
| <b>External ground</b>            |   |   |   |   |   |   |
| G1                                | External ground lug assembly (see <a href="#">External ground screw assembly</a> )                | • | • | • | – | ★ |
| <b>Transient protection</b>       |   |   |   |   |   |   |
| T1 (7) (8)                        | Integral transient protector  | • | • | – | – | ★ |
| <b>Cable gland option</b>         |   |   |   |   |   |   |
| G2                                | Cable gland (7.5–11.99 mm)  | • | • | • | – | ★ |
| G7                                | Cable gland, M20 × 1.5, Ex e, blue polyamide (5–9 mm)   | • | • | • | – | ★ |
| <b>Cover chain option</b>         |   |   |   |   |   |   |
| G3                                | Cover chain   | • | • | • | – | ★ |
| Conduit Electrical Connector (9)  |   |   |   |   |   |   |
| GE                                | M12, 4-pin, male connector (eurofast®)  | • | • | • | – | ★ |
| GM                                | A size mini, 4-pin, male connector (minifast®)  | • | • | • | – | ★ |
| <b>External label</b>             |   |   |   |   |   |   |
| EL                                | External label for ATEX Intrinsic Safety  | • | • | • | – | ★ |

| HART revision configuration  |  |   |   |   |   |   |
|--|--|---|---|---|---|---|
| HR5  | Configured for HART Revision 5                           | • | – | – | – | ★ |
| HR7 <sup>(10)</sup>  | 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                                  | • | • | • | • | ★ |
| <b>Typical rail mount model number: 644 R A I5</b><br><b>Typical head mount model number: 644 S A I5 DC DA1 J5 M5</b><br><b>Typical field mount model number: 644 F A I5 DC DA1 D1 M4 T1</b> |  |   |   |   |   |   |

- (1) Only available with S (dual sensor), not H (single sensor).
- (2) When ordered with XA, ½-in. NPT enclosure will come equipped with an M20 adapter with the sensor installed as a process ready.
- (3) Enclosure ships equipped with 50.8 mm (2-in.) SST pipe U-bolt mounting kit.
- (4) Available with Transmitter Type 644F or 644D only.
- (5) Bracket assembly only available with J1, J2, J3, J4, D1, and D2.
- (6) See [Table 11](#) for Enhanced Accuracy specifications.
- (7) Transient Protection option requires the use of J1, J2, J3, or J4.
- (8) Transient Protection with Output option code F only available with NA, E3, I3, and N3 product certifications.
- (9) Available with Intrinsically Safe approvals only. For USA 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 representative.

**Table 2: Rosemount 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   | USA Explosion proof; Dust Ignition-proof  | J1, J2, J3, J4, R1, R2, R3, R4, J5, J6, J7, J8, D1, D2                 |
| I5   | USA Intrinsically Safe; Non-incendive   | J1, J2, J3, J4, R1, R2, R3, R4, J5, J6, J7, J8, D1, D2                 |
| K5   | USA Explosion proof; 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   | USA and Canada Intrinsically Safe and Non-incendive                                     | Only available with Rail mount device                                  |
| KB   | USA and Canada: Explosion proof; Intrinsically Safe; Non-incendive; Dust Ignition-proof | J2, J4, R2, R4, J6, J8, D2   |
| KD   | USA, Canada, and ATEX Explosion proof, Intrinsically Safe                               | J2, J4, R2, R4, J6, J8, D2   |
| I6   | Canada Intrinsically Safe   | J1, J2, J3, J4, R1, R2, R3, R4, J5, J6, J7, J8, D1, D2                 |
| K6   | Canada Explosion proof; 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, D1, D2                 |

**Table 2: Rosemount 644 Enclosure Options Valid with Individual Approval Codes (continued)**

| Code | Hazardous Location Approval Description   | Enclosure Options Valid with Approval                                  |
|------|---|--|
| E3   | China Flameproof  | R1, R2, R3, R4, J1, J2, J3, J4, J5, J6, J7, J8, D1, D2                 |
| N3   | China Type n  | R1, R2, R3, R4, J1, J2, J3, J4, J5, J6, J7, J8, D1, D2                 |
| 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   | Canada and ATEX: Explosion proof; 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   | Japan Flameproof  | J2, J6   |
| E2   | INMETRO Flameproof  | R1, R2, R3, R4, J1, J2, J3, J4, J5, J6, J7, J8, D1, D2                 |
| KM   | Technical Regulations Customs Union (EAC) Flameproof, Intrinsic Safety, and Dust-Ignition proof | J1, J2, J3, J4, J5, J6, J7, J8, R1, R2, R3, R4,                        |
| IM   | Technical Regulations Customs Union (EAC) Intrinsic Safety                                      | D1, D2, 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,                        |
| K2   | INMETRO Flameproof, Intrinsic Safety  | R1, R2, R3, R4, J1, J2, J3, J4, 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 32 characters for FOUNDATION Fieldbus and PROFIBUS PA or eight for HART protocol. If no characters are specified, the first eight 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, IM, IP, K5, K6, NA, I3, KB                             | No—order option code G1                  |
| E1, E2, E3, E4, E7, EM, EP, KM, KP, 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 - ½–14 NPT entries                 | 00644-4420-0001 |
| Universal head, aluminum, display cover, 2-conduit - ½–14 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 - ½–14 NPT entries                      | 00644-4433-0001 |
| Universal head, SST, display cover, 2-conduit - ½–14 NPT entries                       | 00644-4433-0101 |
| Connection head, aluminum, standard cover, 2-conduit - M20 × ½ ANPT entries            | 00644-4410-0021 |
| Connection head, aluminum, display cover, 2-conduit - M20 × ½ ANPT entries             | 00644-4410-0121 |
| Connection head, aluminum, standard cover, 2-conduit - ½–14 NPT × ½ ANPT entries       | 00644-4410-0011 |
| Connection head, aluminum, display cover, 2-conduit - ½–14 NPT × ½ ANPT entries        | 00644-4410-0111 |
| Connection head, SST, standard cover, 2-conduit - M20 × ½ ANPT entries                 | 00644-4411-0021 |
| Connection head, SST, display cover, 2-conduit - M20 × ½ ANPT entries                  | 00644-4411-0121 |
| Connection head, SST, standard cover, 2-conduit - ½–14 NPT × ½ ANPT entries            | 00644-4411-0011 |
| Connection head, SST, display cover, 2-conduit - ½–14 NPT × ½ ANPT entries             | 00644-4411-0111 |
| Connection head, polished SST, standard cover, 2-conduit - M20 × 1.5 entries           | 00079-0312-0033 |
| Connection head, polished SST, display cover, 2-conduit - M20 × 1.5 entries            | 00079-0312-0133 |
| Connection head, polished SST, standard cover, 2-conduit - M20 × 1.5/M24 × 1.5 entries | 00079-0312-0034 |
| Connection head, polished SST, display cover, 2-conduit - M20 × 1.5/M24 × 1.5 entries  | 00079-0312-0134 |
| Connection head, polished SST, standard cover, 2-conduit - ½–14 NPT entries            | 00079-0312-0011 |
| Connection head, polished SST, display cover, 2-conduit - ½–14 NPT entries             | 00079-0312-0111 |
| Connection head, polished SST, standard cover, 2-conduit - ½–14 NPSM entries           | 00079-0312-0022 |
| Connection head, polished SST, display cover, 2-conduit - ½–14 NPSM entries            | 00079-0312-0122 |
| Universal head, aluminum, standard cover, 3-conduit - M20 entries                      | 00644-4439-0001 |
| Universal head, aluminum, display cover, 3-conduit - M20 entries                       | 00644-4439-0101 |

**Table 3: Enclosure Spares (continued)**

| Description  | Part number     |
|--|-----------------|
| Universal head, aluminum, standard cover, 3-conduit - ½–14 NPT entries | 00644-4439-0002 |
| Universal head, aluminum, display cover, 3-conduit - ½–14 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 - ½ - 14 NPT entries    | 00644-4439-0004 |
| Universal head, SST, display cover, 3-conduit - ½ - 14 NPT entries     | 00644-4439-0104 |

**Table 4: Display Kit Spares**

| Description  | Part number     |
|--|-----------------|
| <b>Display only</b>  |                 |
| Rosemount 644 HART LCD display (option M5)                               | 00644-7730-0001 |
| Rosemount 644 HART LOI (option M4)                                       | 00644-7730-1001 |
| Rosemount 644 FOUNDATION Fieldbus LCD display (option M5)                | 00644-4430-0002 |
| Rosemount 644 PROFIBUS PA LCD display (option M5)                        | 00644-4430-0002 |
| Rosemount 644 HART Legacy display kit (option M5 - device rev 7)         | 00644-4430-0002 |
| <b>Display with aluminum cover</b>                                       |                 |
| Rosemount 644 HART LCD display (option M5)                               | 00644-7730-0011 |
| Rosemount 644 HART LCD display (option M5 - for use with options J1-J2)  | 00644-7730-0111 |
| Rosemount 644 HART LOI (option M4)                                       | 00644-7730-1011 |
| Rosemount 644 HART LOI (option M4 - for use with options J1-J2)          | 00644-7730-1111 |
| Rosemount 644 FOUNDATION Fieldbus LCD display (option M5)                | 00644-4430-0001 |
| Rosemount 644 PROFIBUS PA LCD display (option M5)                        | 00644-4430-0001 |
| 644 HART Legacy display kit (option M5)                                  | 00644-4430-0001 |
| <b>Display with SST meter cover</b>                                      |                 |
| Rosemount 644 HART LCD display (option M5) <sup>(1)</sup>                | 00644-7730-0021 |
| Rosemount 644 HART LCD display (option M5) <sup>(2)</sup>                | 00644-7730-0121 |
| Rosemount 644 HART LOI (option M4) <sup>(1)</sup>                        | 00644-7730-1021 |
| Rosemount 644 HART LOI (option M4) <sup>(2)</sup>                        | 00644-7730-1121 |
| Rosemount 644 FOUNDATION Fieldbus LCD display (option M5) <sup>(1)</sup> | 00644-4430-0011 |
| Rosemount 644 PROFIBUS PA LCD display (option M5) <sup>(1)</sup>         | 00644-4430-0011 |
| Rosemount 644 HART Legacy display kit (option M5) <sup>(1)</sup>         | 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     |
|--|-----------------|
| HART transient protector without enclosure | 00644-4537-0001 |

**Table 5: Transient Protection Spares (continued)**

| Description   | Part number     |
|---|-----------------|
| HART transient protector with universal head, aluminum, standard cover, 3-conduit - M20   | 00644-4538-0001 |
| HART transient protector with universal head, aluminum, display cover, 3-conduit - M20    | 00644-4538-0101 |
| HART transient protector with universal head, aluminum, standard cover, 3-conduit - ½ NPT | 00644-4538-0002 |
| HART transient protector with universal head, aluminum, display cover, 3-conduit - ½ NPT  | 00644-4538-0102 |
| HART transient protector with universal head, SST, standard cover, 3-conduit - M20        | 00644-4538-0003 |
| HART transient protector with universal head, SST, display cover, 3-conduit - M20         | 00644-4538-0103 |
| HART transient protector with universal head, SST, standard cover, 3-conduit - ½-NPT      | 00644-4538-0004 |
| HART transient protector with universal head, SST, display cover, 3-conduit - ½-NPT       | 00644-4538-0104 |
| FOUNDATION Fieldbus transient protector without enclosure                                 | 00644-4539-0001 |

**Table 6: Miscellaneous Accessories**

| Description   | Part number     |
|---|-----------------|
| Stainless steel meter housing cover, Fieldbus extended  | 03031-0199-0025 |
| Ground screw assembly kit <sup>(1)</sup>  | 00644-4431-0001 |
| 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 |
| Hardware kit for retrofitting a Rosemount 644 head mount in an existing threaded sensor connection head (former option code L1) | 00644-5321-0010 |
| U-bolt mounting kit for universal housing   | 00644-4423-0001 |
| U-bolt mounting bracket, 2-in. pipe mount - 316 SST (option B4)   | 00644-7610-0001 |
| L - mounting bracket for 2-in. pipe or panel mounting, SST, 2g vibration rating (option B5)                                     | 00644-7611-0001 |
| 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 for 2-conduit J-box  | 00644-4434-0001 |
| Cover clamp assembly for 3-conduit J-box  | 00644-4434-0002 |
| Terminal block, 13 mm M4 mounting screws  | 00065-0305-0001 |

(1) Compatible with the 3-in. (76 mm) universal junction box and Rosemount connection head enclosure styles.

**Table 7: Housing Covers**

| Description                               | Part number     |
|---|-----------------|
| Standard cover- aluminum (J5, J6, R1, R2) | 03031-0292-0001 |
| Standard cover- SST (J7, J8, R3, R4)      | 03031-0292-0002 |
| Aluminum meter cover. (J5, J6, R1, R2)    | 03031-0199-0015 |
| SST meter cover (J7, J8, R3, R4)          | 03031-0199-0025 |

## Specifications

### HART, FOUNDATION Fieldbus, and PROFIBUS PA Protocols

#### Functional specifications

##### Inputs

User-selectable; sensor terminals rated to 42.4 Vdc. See [Accuracy example \(FOUNDATION Fieldbus and PROFIBUS PA devices\)](#).

##### Output

Single two-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 620 Vrms.

#### Local display options

**LCD display** An optional 11 digit, two-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 LOI** An optional 14-digit, two-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 two-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 Rosemount 644 HART head mount and field mount transmitters.

For more information on the LOI configuration options or further functionality that the LOI offers, see the [Rosemount 644 Temperature Transmitter Reference Manual](#).

#### Humidity Limits

0–95 percent relative humidity

#### Update Time

≤0.5 second per sensor

#### Accuracy(default configuration) PT 100

HART Standard: ±0.15 °C

HART Enhanced: ±0.1 °C

FOUNDATION Fieldbus: ±0.15 °C

PROFIBUS PA:  $\pm 0.15$  °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 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 ( $\pm 3\sigma$ [Sigma])

Technology leadership, advanced manufacturing techniques, and statistical process control ensure specification conformance to at least  $\pm 3\sigma$ .

### Electrical connections

| Rosemount model                               | Power and Sensor Terminals  |
|---|---|
| 644 head mount (HART)                         | Captivated screw terminals permanently fixed to terminal block      |
| 644 head mount (FOUNDATION Fieldbus/PROFIBUS) | Compression screw terminals permanently fixed to the terminal block |
| 644 field mount (HART)                        | Captivated screw terminals permanently fixed to the terminal block  |
| 644 rail mount (HART)                         | Compression screw permanently fixed to front panel                  |

### Field Communicator Connections

| Communication Terminals        |   |
|--------------------------------|---|
| Rosemount 644 head/field mount | Clips permanently fixed to terminal block |
| Rosemount 644 rail mount       | Clips permanently fixed to front panel    |

### Materials of Construction

| Electronics Housing and Terminal Block                 |  |
|--|--|
| Rosemount 644 head/ field mount                        | GE polyphenylene oxide glass reinforced GFN -2 or -3 |
| Rosemount 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 Rosemount 644R attaches directly to a wall or a DIN rail. The Rosemount 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 for the special hardware that is available to:

- Mount a Rosemount 644H to a DIN rail. (see [Dimensional drawings](#))
- Retrofit a new Rosemount 644H to replace an existing Rosemount 644H Transmitter in an existing threaded sensor connection head. (see [Table 3](#))

## Weight

| Code   | Options  | Weight            |
|--------|--|-------------------|
| 644H   | HART, head mount transmitter   | 78 g (2.75 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  | 34 g (1.2 oz)     |
| M4     | LCD display with local operator interface                                    | 34 g (1.2 oz)     |
| J1, J2 | Universal head, 3-conduits, standard cover                                   | 718 g (25.33oz)   |
| J1, J2 | Universal head, 3-conduits, meter cover                                      | 826 g (29.14oz)   |
| J3, J4 | Cast SST universal head, 3-conduits, standard cover                          | 2073 g (73.12oz)  |
| J3, J4 | Cast SST universal head, 3-conduits, meter cover                             | 2148 g (75.77oz)  |
| J5, J6 | Aluminum 2-conduits, universal head, standard cover                          | 520g (18.43oz)    |
| J5, J6 | Aluminum 2-conduits, universal head, meter cover                             | 604 g (21.27oz)   |
| J7, J8 | Cast SST universal head 2-conduits, standard, cover                          | 577 g (20.35oz)   |
| J7, J8 | Cast SST universal head 2-conduits, meter cover                              | 667 g (23.53oz)   |
| 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) |

| Option Code | Standard Cover | Meter Cover   |
|-------------|----------------|---------------|
| S3          | 840 g (27 oz)  | 995 g (32 oz) |
| S4          | 840 g (27 oz)  | 995 g (32 oz) |

### Enclosure Ratings (Rosemount 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

### ElectroMagnetic Compatibility (EMC) NAMUR NE 21 Standard

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

| Susceptibility | Parameter  | Influence |
|----------------|--|-----------|
| ESD            | <ul style="list-style-type: none"> <li>■ 6 kV contact discharge</li> <li>■ 8 kV air discharge</li> </ul>     | None      |
| Radiated       | <ul style="list-style-type: none"> <li>■ 80 – 1000 MHz at 10 V/m AM</li> </ul>                               | < 1.0%    |
| Burst          | <ul style="list-style-type: none"> <li>■ 1 kV for I.O.</li> </ul>  | None      |
| Surge          | <ul style="list-style-type: none"> <li>■ 0.5 kV line–line</li> <li>■ 1 kV line–ground (I.O. tool)</li> </ul> | None      |
| Conducted      | <ul style="list-style-type: none"> <li>■ 10 kHz to 80 MHz at 10 V</li> </ul>                                 | < 1.0%    |

### CE Electromagnetic Compatibility Compliance Testing

The Rosemount 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  $\pm 0.005$  percent of span per volt

### Stability

RTDs and thermocouples have a stability of  $\pm 0.15$  percent of output reading or  $0.15$  °C (whichever is greater) for 24 months.

When ordered with the P8 option code:

- RTDs:  $\pm 0.25$  percent of reading or  $0.25$  °C, whichever is greater, for five years
- Thermocouples:  $\pm 0.5$  percent of reading or  $0.5$  °C, whichever is greater, for five 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 Rosemount 644 HART head mount and field mount are tested to the following specifications with no effect on performance per IEC 60770-1, 2010:



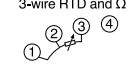
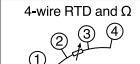
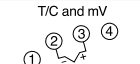
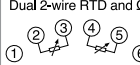

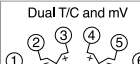




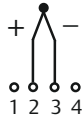
| Frequency     | Vibration                                   |
|---------------|---|
| 10 to 60 Hz   | 0.35 mm displacement                        |
| 60 to 1000 Hz | 5g (50 m/s <sup>2</sup> ) peak acceleration |

The Rosemount 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

Emerson 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.

|  |  |   |
|--|--|---|
| <p>- HART head mount</p>                               |    | <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"> <p><b>Single Input Wiring</b></p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>2-wire RTD and <math>\Omega</math></p>  </div> <div style="text-align: center;"> <p>3-wire RTD and <math>\Omega</math></p>  </div> </div> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>4-wire RTD and <math>\Omega</math></p>  </div> <div style="text-align: center;"> <p>T/C and mV</p>  </div> </div> </div> <div style="width: 50%;"> <p><b>Dual Input Wiring</b></p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Dual 2-wire RTD and <math>\Omega</math></p>  </div> <div style="text-align: center;"> <p>Dual 3-wire RTD and <math>\Omega</math></p>  </div> </div> <div style="text-align: center; margin-top: 10px;"> <p>Dual T/C and mV</p>  </div> </div> </div> |
| <p>- HART rail mount<br/>- Fieldbus<br/>- PROFIBUS</p> |  | <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>1 2 3 4<br/>2-wire<br/>RTD and <math>\Omega</math></p> </div> <div style="text-align: center;">  <p>1 2 3 4<br/>3-wire<br/>RTD and <math>\Omega^*</math></p> </div> <div style="text-align: center;">  <p>1 2 3 4<br/>4-wire<br/>RTD and <math>\Omega</math></p> </div> <div style="text-align: center;">  <p>+ -<br/>1 2 3 4<br/>T/C<br/>and mV</p> </div> </div>   |

|                           |   |  |                     |   |   |  |   |   |                   |   |   |  |   |  |
|---------------------------|---|--|---------------------|---|---|--|---|---|-------------------|---|---|--|---|--|
| <p>- HART field mount</p> |    | <table border="1"> <tr> <td data-bbox="1040 268 1133 310">Single Input Wiring</td> <td data-bbox="1144 268 1300 352">  </td> <td data-bbox="1312 268 1468 352">  </td> </tr> <tr> <td></td> <td data-bbox="1144 363 1300 447">  </td> <td data-bbox="1312 363 1468 447">  </td> </tr> <tr> <td data-bbox="1040 468 1133 510">Dual Input Wiring</td> <td data-bbox="1144 468 1300 552">  </td> <td data-bbox="1312 468 1468 552">  </td> </tr> <tr> <td></td> <td colspan="2" data-bbox="1144 562 1300 646">  </td> </tr> </table> | Single Input Wiring |  |  |  |  |  | Dual Input Wiring |  |  |  |  |  |
| Single Input Wiring       |  |   |                     |   |   |  |   |   |                   |   |   |  |   |  |
|                           |  |   |                     |   |   |  |   |   |                   |   |   |  |   |  |
| Dual Input Wiring         |  |   |                     |   |   |  |   |   |                   |   |   |  |   |  |
|                           |  |  |                     |   |   |  |   |   |                   |   |   |  |   |  |

## 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 zero 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 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 AI 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 zero 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

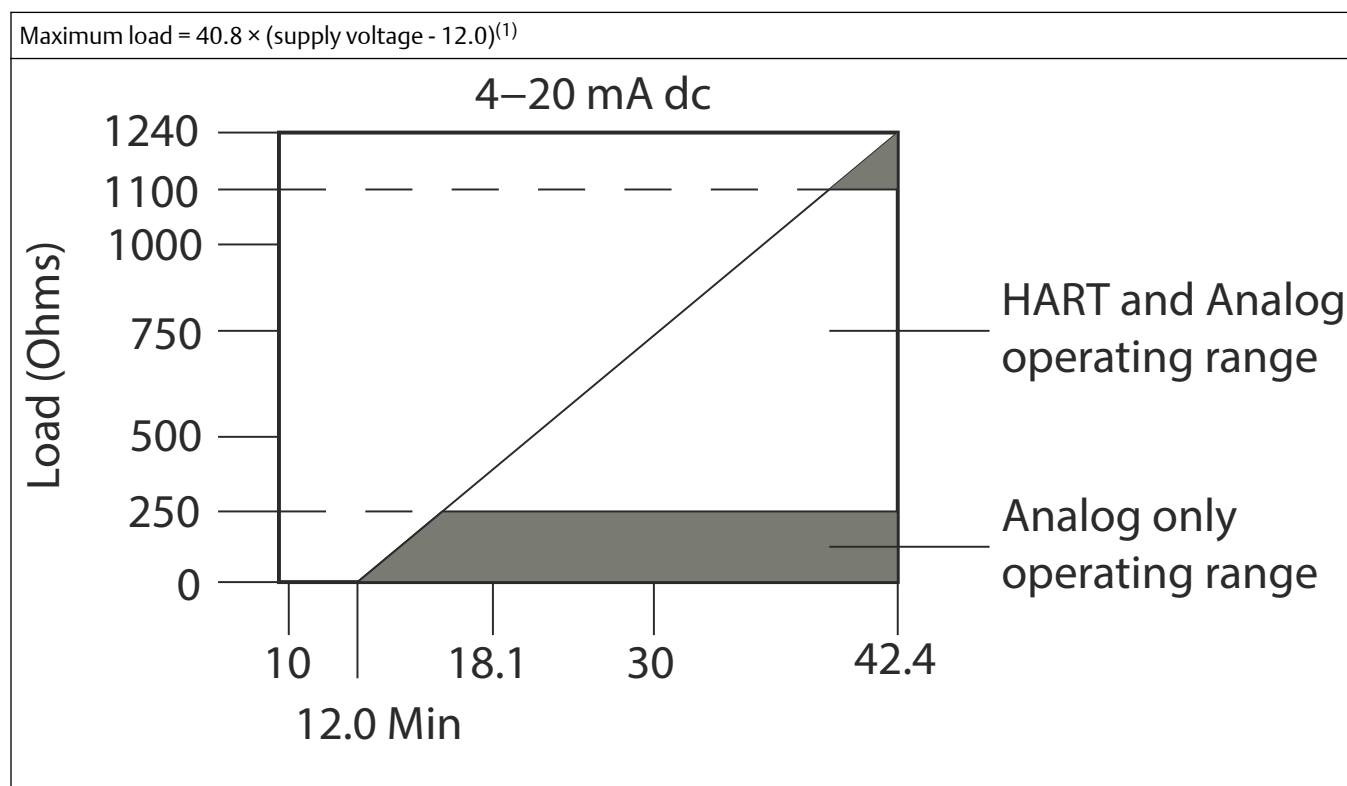
The AI function block allows the user to configure the alarms to HI-HI, HI, LO, or LO-LO with hysteresis settings.

## 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.

**Table 8: Load Limitations**



(1) Without transient protection (optional).

### Note

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

### Temperature Limits

| Description                     | Operating limit <sup>(1)</sup> | Storage limit <sup>(1)</sup>   |
|---------------------------------|--------------------------------|--------------------------------|
| With LCD display <sup>(2)</sup> | –40 to 185 °F<br>–40 to 85 °C  | –50 to 185 °F<br>–45 to 85 °C  |
| Without LCD display             | –40 to 185 °F<br>–40 to 85 °C  | –58 to 250 °F<br>–50 to 120 °C |

(1) The lower operating and storage temperature limit of a transmitter with option code BR6 is –76 °F (–60 °C)

(2) 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 Rosemount 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 9](#) shows the configuration alarm ranges.

**Table 9: Available Alarm Range**

| Units - mA                    | Min                | Max                 | Rosemount | Namur |
|-------------------------------|--------------------|---------------------|-----------|-------|
| High alarm                    | 21                 | 23                  | 21.75     | 21    |
| Low alarm <sup>(1)</sup>      | 3.5                | 3.75                | 3.75      | 3.6   |
| High saturation               | 20.5               | 20.9 <sup>(2)</sup> | 20.5      | 20.5  |
| Low saturation <sup>(1)</sup> | 3.7 <sup>(3)</sup> | 3.9                 | 3.9       | 3.8   |

(1) Requires 0.1 mA gap between low alarm and low saturation values.

(2) Rail mount transmitters have a high saturation max of 0.1 mA less than the high alarm setting, with a max value of 0.1 mA less than the high alarm max.

(3) Rail mount transmitters have a low saturation min of 0.1 mA greater than the low alarm setting, with a minimum of 0.1 mA greater than the low alarm min.

## 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 six seconds after power is applied, when damping value is set to zero 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](#). 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 C62.41-2002 (IEEE 587)/Location Categories B3. 6kV/3kA peak (1.2 50  $\Omega$   $\times$  Wave 8 20  $\Omega$  s Combination Wave) 6kV/0.5kA peak (100 kHz Ring Wave) EFT, 4kVpeak, 2.5kHz, 5  $\times$  50 nS
- Loop resistance added by protector: 22 ohms max.
- Nominal clamping voltages: 90 V (common mode), 77 V (normal mode)

## Accuracy example (FOUNDATION Fieldbus and PROFIBUS PA devices)

When using a Pt 100 ( $\alpha = 0.00385$ ) sensor input:

- Total accuracy =  $\pm 0.15$  °C
- No D/A accuracy effects apply.

**Table 10: Ambient Temperature Effect**

| Sensor Options                 | Sensor Reference             | Input Range (°C) | Temperature Effects per 1.0 °C (1.8 °F) Change in Ambient Temperature <sup>(1) (2)</sup> | Range                     | D/A Effect <sup>(3)</sup> |
|--------------------------------|------------------------------|------------------|--|---------------------------|---------------------------|
| 2-, 3-, 4-wire RTDs            |                              |                  |  |                           |                           |
| Pt 100 ( $\alpha = 0.00385$ )  | IEC 751                      | -200 to 850      | 0.003 °C (0.0054 °F)   | Entire sensor input range | 0.001% of span            |
| Pt 200 ( $\alpha = 0.00385$ )  | IEC 751                      | -200 to 850      | 0.004 °C (0.0072 °F)   | Entire sensor input range | 0.001% of span            |
| Pt 500 ( $\alpha = 0.00385$ )  | IEC 751                      | -200 to 850      | 0.003 °C (0.0054 °F)   | Entire sensor input range | 0.001% of span            |
| Pt 1000 ( $\alpha = 0.00385$ ) | IEC 751                      | -200 to 300      | 0.003 °C (0.0054 °F)   | Entire sensor input range | 0.001% of span            |
| Pt 100 ( $\alpha = 0.003916$ ) | JIS 1604                     | -200 to 645      | 0.003 °C (0.0054 °F)   | Entire sensor input range | 0.001% of span            |
| Pt 200 ( $\alpha = 0.003916$ ) | 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 ( $\alpha = 0.00391$ )   | GOST 6651-94                 | -200 to 550      | 0.004 °C (0.0072 °F)   | Entire sensor input range | 0.001% of span            |
| Pt 100 ( $\alpha = 0.00391$ )  | GOST 6651-94                 | -200 to 550      | 0.002 °C (0.0036 °F)   | Entire sensor input range | 0.001% of span            |
| Cu 50 ( $\alpha = 0.00426$ )   | GOST 6651-94                 | -50 to 200       | 0.008 °C (0.0144 °F)   | Entire sensor input range | 0.001% of span            |
| Cu 50 ( $\alpha = 0.00428$ )   | GOST 6651-94                 | -185 to 200      | 0.008 °C (0.0144 °F)   | Entire sensor input range | 0.001% of span            |
| Cu 100 ( $\alpha = 0.00426$ )  | GOST 6651-94                 | -50 to 200       | 0.004 °C (0.0072 °F)   | Entire sensor input range | 0.001% of span            |
| Cu 100 ( $\alpha = 0.00428$ )  | GOST 6651-94                 | -185 to 200      | 0.004 °C (0.0072 °F)   | Entire sensor input range | 0.001% of span            |
| Thermocouples                  |                              |                  |  |                           |                           |



**Table 10: Ambient Temperature Effect (continued)**

| Sensor Options    | Sensor Reference            | Input Range (°C) | Temperature Effects per 1.0 °C (1.8 °F) Change in Ambient Temperature <sup>(1) (2)</sup> | Range                                     | D/A Effect <sup>(3)</sup> |
|-------------------|-----------------------------|------------------|--|---|---------------------------|
| Type B            | NIST Monograph 175, IEC 584 | 100 to 1820      | 0.014 °C   | $T \geq 1000 \text{ °C}$                  | 0.001% of span            |
|                   |                             |                  | 0.032 °C – (0.0025% of (T – 300))  | $300 \text{ °C} \leq T < 1000 \text{ °C}$ | 0.001% of span            |
|                   |                             |                  | 0.054 °C – (0.011% of (T – 100))   | $100 \text{ °C} \leq T < 300 \text{ °C}$  | 0.001% of span            |
| Type E            | NIST Monograph 175, IEC 584 | –200 to 1000     | 0.005 °C + (0.00043% of T)   | All                                       | 0.001% of span            |
| Type J            | NIST Monograph 175, IEC 584 | –180 to 760      | 0.0054 °C + (0.00029% of T)  | $T \geq 0 \text{ °C}$                     | 0.001% of span            |
|                   |                             |                  | 0.0054 °C + (0.0025% of absolute value T)  | $T < 0 \text{ °C}$                        | 0.001% of span            |
| Type K            | NIST Monograph 175, IEC 584 | –180 to 1372     | 0.0061 °C + (0.00054% of T)  | $T \geq 0 \text{ °C}$                     | 0.001% of span            |
|                   |                             |                  | 0.0061 °C + (0.0025% of absolute value T)  | $T < 0 \text{ °C}$                        | 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   | $T \geq 200 \text{ °C}$                   | 0.001% of span            |
|                   |                             |                  | 0.023 °C – (0.0036% of T)  | $T < 200 \text{ °C}$                      | 0.001% of span            |
| Type S            | NIST Monograph 175, IEC 584 | 0 to 1768        | 0.016 °C   | $T \geq 200 \text{ °C}$                   | 0.001% of span            |
|                   |                             |                  | 0.023 °C – (0.0036% of T)  | $T < 200 \text{ °C}$                      | 0.001% of span            |
| Type T            | NIST Monograph 175, IEC 584 | –200 to 400      | 0.0064 °C  | $T \geq 0 \text{ °C}$                     | 0.001% of span            |
|                   |                             |                  | 0.0064 °C + (0.0043% of absolute value T)  | $T < 0 \text{ °C}$                        | 0.001% of span            |
| DIN Type L        | DIN 43710                   | –200 to 900      | 0.0054 °C + (0.00029% of T)  | $T \geq 0 \text{ °C}$                     | 0.001% of span            |
|                   |                             |                  | 0.0054 °C + (0.0025% of absolute value T)  | $T < 0 \text{ °C}$                        | 0.001% of span            |
| DIN Type U        | DIN 43710                   | –200 to 600      | 0.0064 °C  | $T \geq 0 \text{ °C}$                     | 0.001% of span            |
|                   |                             |                  | 0.0064 °C + (0.0043% of absolute value T)  | $T < 0 \text{ °C}$                        | 0.001% of span            |
| Type W5Re/W26Re   | ASTM E 988-96               | 0 to 2000        | 0.016 °C   | $T \geq 200 \text{ °C}$                   | 0.001% of span            |
|                   |                             |                  | 0.023 °C – (0.0036% of T)  | $T < 200 \text{ °C}$                      | 0.001% of span            |
| GOST Type L       | GOST R 8.585-2001           | –200 to 800      | 0.007 °C   | $T \geq 0 \text{ °C}$                     | 0.001% of span            |
|                   |                             |                  | 0.007 °C + (0.003% of absolute value T)  | $T < 0 \text{ °C}$                        | 0.001% of span            |
| Other input types |                             |                  |  |   |                           |
| Millivolt input   |                             | –10 to 100 mV    | 0.0005 mV  | Entire sensor input range                 | 0.001% of span            |

**Table 10: Ambient Temperature Effect (continued)**

| Sensor Options     | Sensor Reference | Input Range (°C) | Temperature Effects per 1.0 °C (1.8 °F) Change in Ambient Temperature <sup>(1) (2)</sup> | Range                     | D/A Effect <sup>(3)</sup> |
|--------------------|------------------|------------------|--|---------------------------|---------------------------|
| 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 ( $\alpha = 0.00385$ ) sensor input with a 0–100 °C span at 30 °C ambient temperature:

- Digital temperature effects:  $0.003 \text{ °C} \times (30 - 20) = 0.03 \text{ °C}$
- D/A effects:  $[0.001\% \text{ of } 100] \times (30 - 20) = 0.01 \text{ °C}$
- Worst case error: Digital + D/A + Digital Temperature Effects + D/A Effects =  $0.15 \text{ °C} + 0.03 \text{ °C} + 0.03 \text{ °C} + 0.01 \text{ °C} = 0.22 \text{ °C}$
- Total probable error:  $\sqrt{0.15^2 + 0.03^2 + 0.03^2 + 0.01^2} = 0.16 \text{ °C}$

### Temperature Effects Examples (FOUNDATION Fieldbus devices and PROFIBUS PA)

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

- Digital temperature effects:  $0.003 \text{ °C} \times (30 - 20) = 0.03 \text{ °C}$
- D/A effects: No D/A effects apply.
- Worst case error: Digital + Digital Temperature Effects =  $0.15 \text{ °C} + 0.03 \text{ °C} = 0.18 \text{ °C}$
- Total probable error:  $\sqrt{0.15^2 + 0.03^2} = 0.153 \text{ °C}$

**Table 11: Transmitter Accuracy when Ordered with Option Code P8**

| Sensor Options                 | Sensor Reference   | Input Ranges |              | Minimum Span <sup>(1)</sup> |    | Digital Accuracy <sup>(2)</sup> |        | D/A Accuracy <sup>(3) (4)</sup> |
|--------------------------------|--------------------|--------------|--------------|-----------------------------|----|---------------------------------|--------|---------------------------------|
|                                |                    | °C           | °F           | °C                          | °F | °C                              | °F     |                                 |
| 2-, 3-, 4-wire RTDs            |                    |              |              |                             |    |                                 |        |                                 |
| Pt 100 ( $\alpha = 0.00385$ )  | IEC 751            | -200 to 850  | -328 to 1562 | 10                          | 18 | ± 0.10                          | ± 0.18 | ±0.02% of span                  |
| Pt 200 ( $\alpha = 0.00385$ )  | IEC 751            | -200 to 850  | -328 to 1562 | 10                          | 18 | ± 0.22                          | ± 0.40 | ±0.02% of span                  |
| Pt 500 ( $\alpha = 0.00385$ )  | IEC 751            | -200 to 850  | -328 to 1562 | 10                          | 18 | ± 0.14                          | ± 0.25 | ±0.02% of span                  |
| Pt 1000 ( $\alpha = 0.00385$ ) | IEC 751            | -200 to 300  | -328 to 572  | 10                          | 18 | ± 0.10                          | ± 0.18 | ±0.02% of span                  |
| Pt 100 ( $\alpha = 0.003916$ ) | JIS 1604           | -200 to 645  | -328 to 1193 | 10                          | 18 | ± 0.10                          | ± 0.18 | ±0.02% of span                  |
| Pt 200 ( $\alpha = 0.003916$ ) | JIS 1604           | -200 to 645  | -328 to 1193 | 10                          | 18 | ± 0.22                          | ± 0.40 | ±0.02% of span                  |
| Ni 120                         | Edison Curve No. 7 | -70 to 300   | -94 to 572   | 10                          | 18 | ± 0.08                          | ± 0.14 | ±0.02% of span                  |

**Table 11: Transmitter Accuracy when Ordered with Option Code P8 (continued)**

|                              |                              |              |              |    |    |        |        |                |
|------------------------------|------------------------------|--------------|--------------|----|----|--------|--------|----------------|
| Cu 10                        | Edison Copper Winding No. 15 | -50 to 250   | -58 to 482   | 10 | 18 | ±1.00  | ± 1.80 | ±0.02% of span |
| Pt 50 ( $\alpha=0.00391$ )   | GOST 6651-94                 | -200 to 550  | -328 to 1022 | 10 | 18 | ±0.20  | ±0.36  | ±0.02% of span |
| Pt 100 ( $\alpha=0.00391$ )  | GOST 6651-94                 | -200 to 550  | -328 to 1022 | 10 | 18 | ±0.10  | ±0.18  | ±0.02% of span |
| Cu 50 ( $\alpha=0.00426$ )   | GOST 6651-94                 | -50 to 200   | -58 to 392   | 10 | 18 | ±0.20  | ±0.36  | ±0.02% of span |
| Cu 50 ( $\alpha=0.00428$ )   | GOST 6651-94                 | -185 to 200  | -301 to 392  | 10 | 18 | ±0.34  | ±0.61  | ±0.02% of span |
| Cu 100 ( $\alpha=0.00426$ )  | GOST 6651-94                 | -50 to 200   | -58 to 392   | 10 | 18 | ±0.17  | ±0.31  | ±0.02% of span |
| Cu 100 ( $\alpha=0.00428$ )  | GOST 6651-94                 | -185 to 200  | -301 to 392  | 10 | 18 | ±0.17  | ±0.31  | ±0.02% of span |
| Thermocouples <sup>(5)</sup> |                              |              |              |    |    |        |        |                |
| Type B <sup>(6)</sup>        | NIST Monograph 175, IEC 584  | 100 to 1820  | 212 to 3308  | 25 | 45 | ± 0.75 | ± 1.35 | ±0.02% of span |
| Type E                       | NIST Monograph 175, IEC 584  | -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 <sup>(7)</sup>        | 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/<br>W26Re          | ASTM E 988-96                | 0 to 2000    | 32 to 3632   | 25 | 45 | ± 0.70 | ± 1.26 | ±0.02% of span |

**Table 11: Transmitter Accuracy when Ordered with Option Code P8 (continued)**

|                          |                      |                |                 |        |    |           |        |                |
|--------------------------|----------------------|----------------|-----------------|--------|----|-----------|--------|----------------|
| GOST Type L              | GOST R<br>8.585-2001 | -200 to<br>800 | -392 to<br>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) Total digital accuracy for thermocouple measurement: sum of digital accuracy +0.25 °C (0.45 °F) (cold junction accuracy).
- (6) Digital accuracy for NIST Type B is ±3.0 °C (±5.4 °F) from 100 to 300 °C (212 to 572 °F).
- (7) Digital accuracy for NIST Type K is ±0.7 °C (±1.3 °F) from -180 to -90 °C (-292 to -130 °F).

### Reference accuracy example (HART only)

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

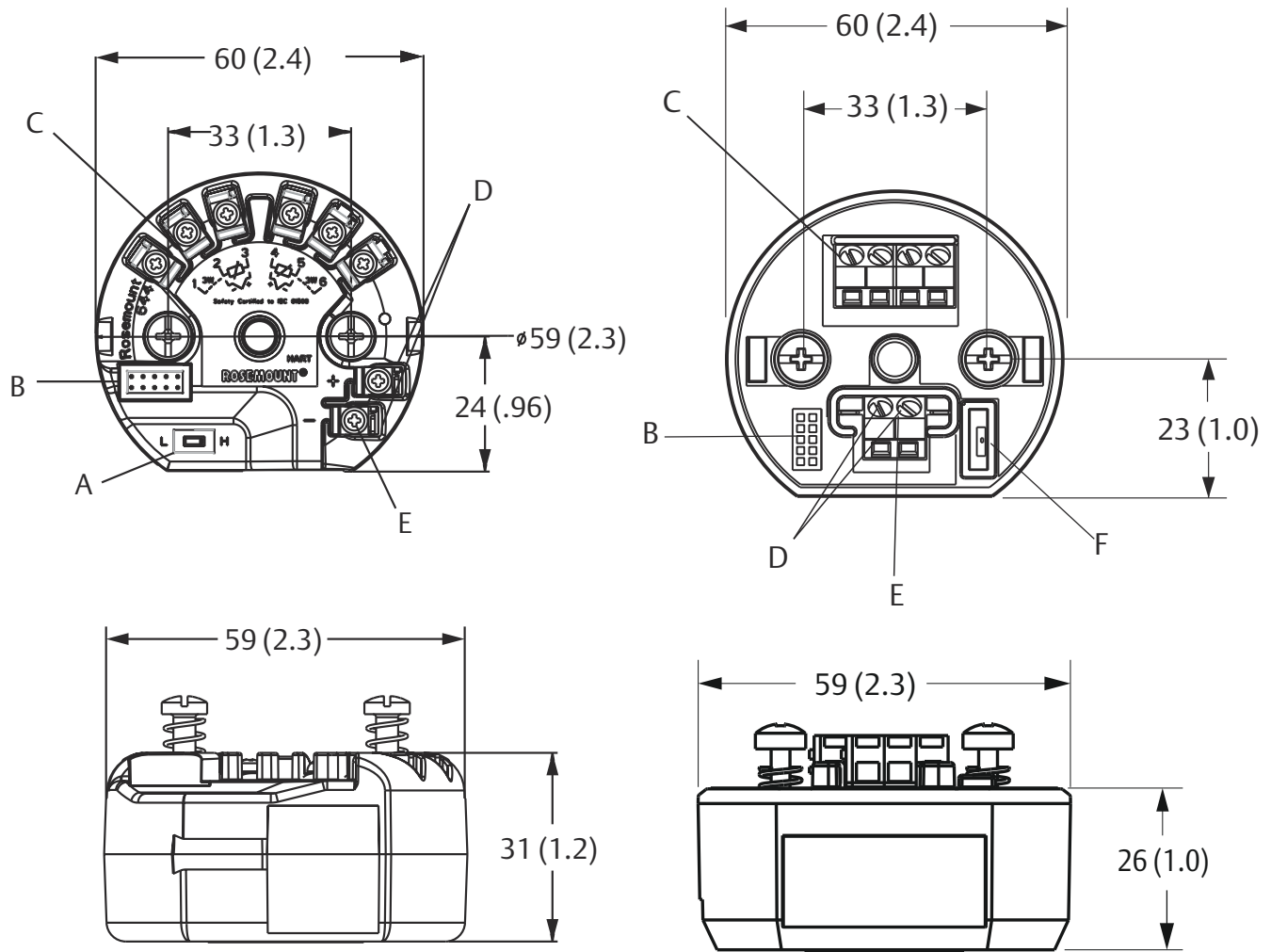
- X = Sensor 1 minimum – Sensor 2 maximum and
- Y = Sensor 1 maximum – Sensor 2 minimum

# Dimensional drawings

**Figure 1: Rosemount 644H (DIN A Head Mount)**

HART device shown with captivated screw terminals

FOUNDATION Fieldbus and PROFIBUS device shown with Standard Compression Screw Terminals



A. Failure mode switch

B. Meter connector

C. Sensor terminals

Dimensions are in millimeters (inches).

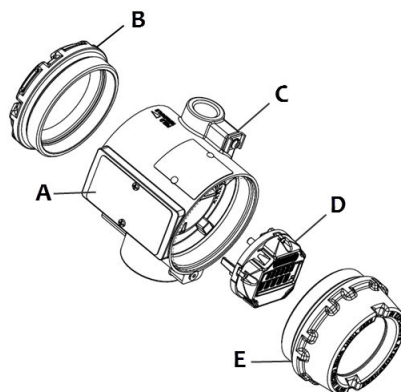
D. Communication terminals

E. Power terminals

F. Simulation switch

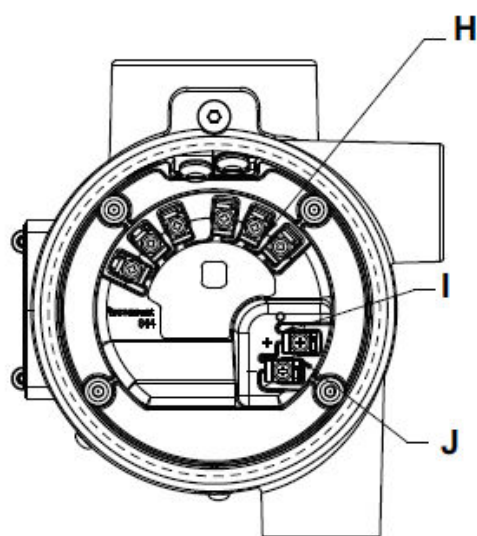
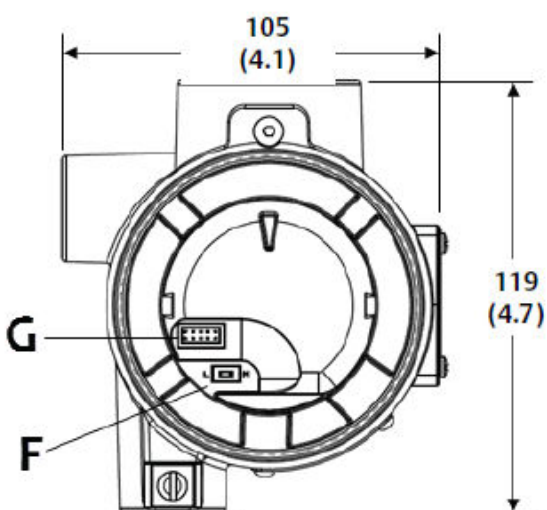
**Figure 2: Rosemount 644 Field Mount**

Transmitter exploded view



Display compartment

Terminal compartment



A. Nameplate

B. Cover

C. Housing with electronics module

D. LCD display

E. Display cover

Dimensions are in millimeters (inches).

F. Failure mode switch

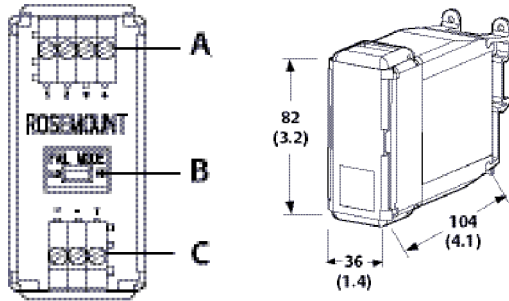
G. Meter connector

H. Sensor terminals

I. Communication terminals

J. Power terminals

**Figure 3: Rosemount 644 Rail Mount**



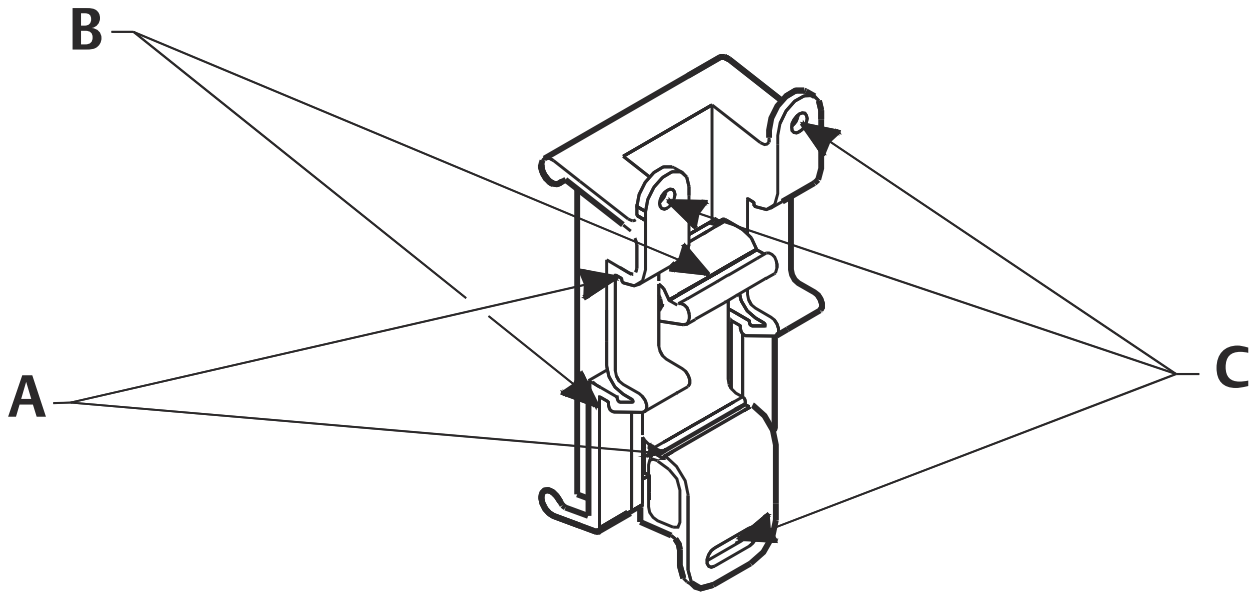
- A. Sensor terminals
- B. Failure mode switch
- C. Power terminals

Dimensions are in millimeters (inches).

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**Figure 4: Mounting kits for Rosemount 644H**

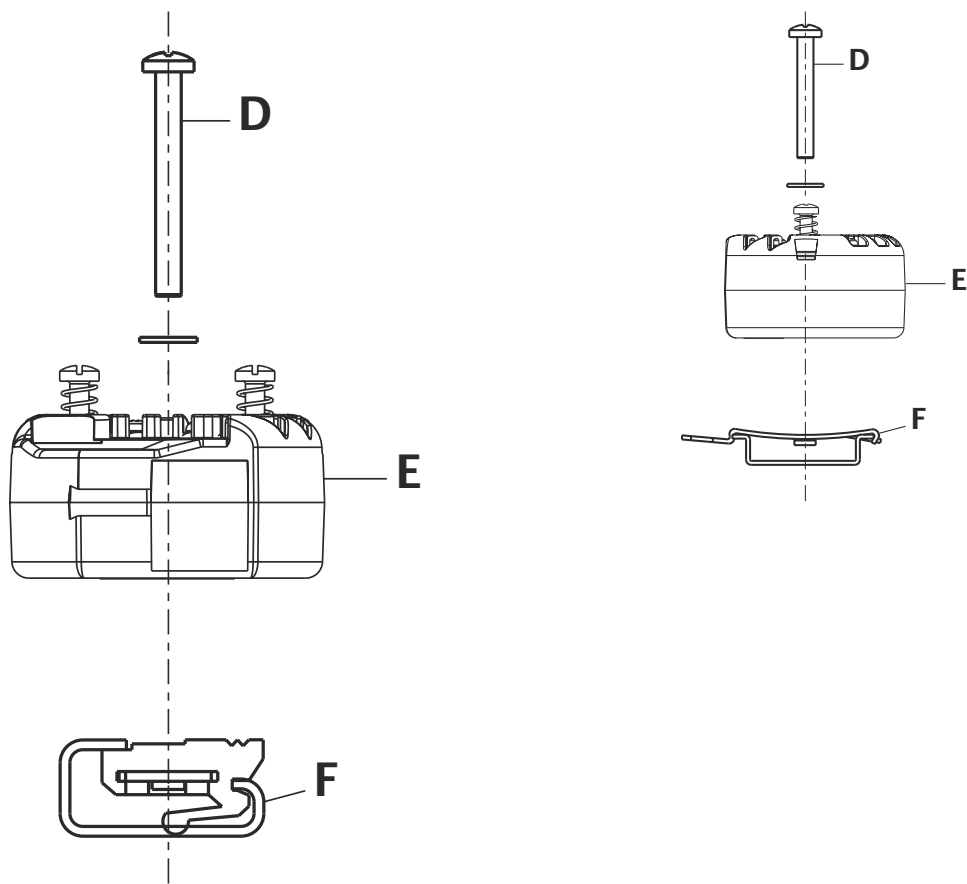
**Rosemount 644R Rail and Walls Clips**



- A. Top hat rail grooves
  - B. G-rail grooves
  - C. Screw holes for mounting to a wall
-

**Figure 5: Rosemount 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.



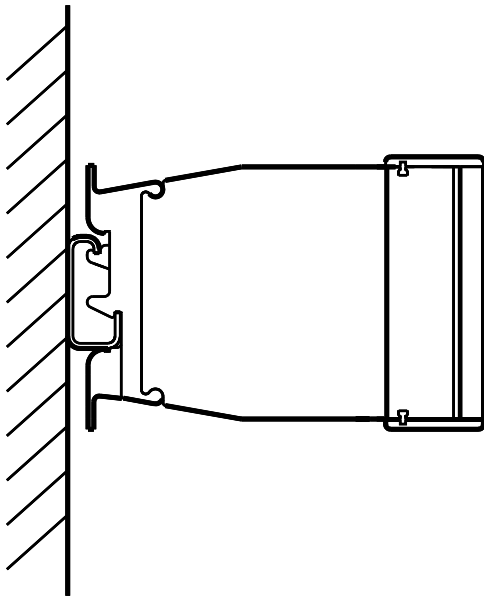
D. Mounting hardware

E. Transmitter

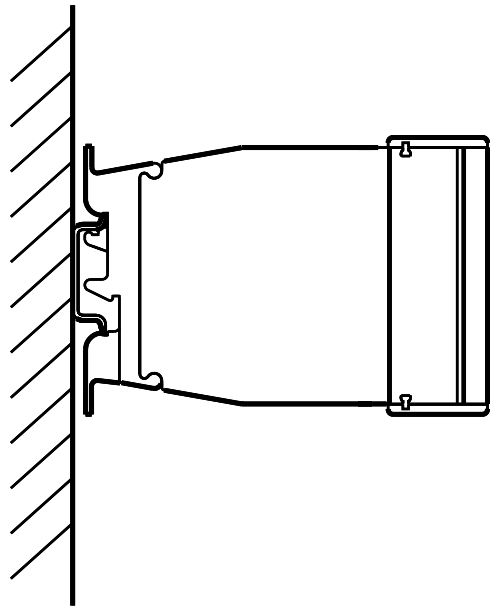
F. Rail clip



G-Rail (asymmetric)



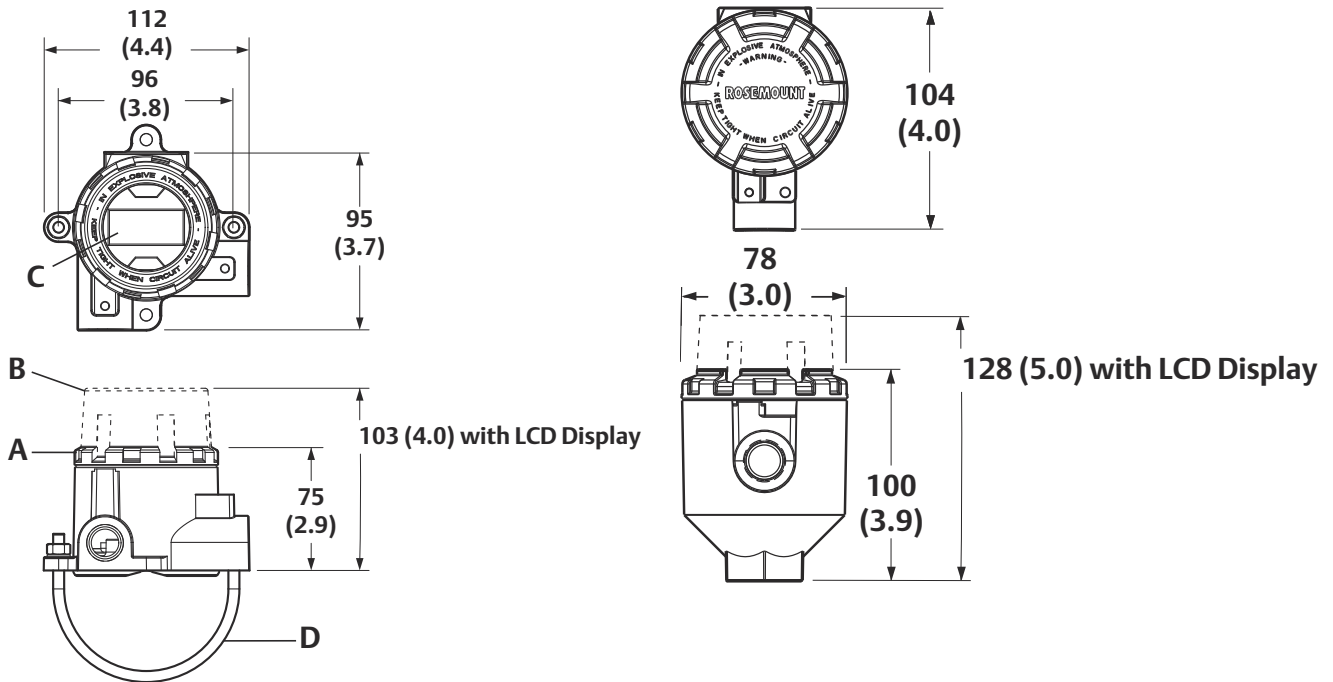
Top Hat Rail (symmetric)



**Note**

Part number 03044-4103-0001.

**Threaded-Sensor Universal Head (Option code J5, J6, J7 or J8) DIN Style Sensor Connection Head (Option code R1, R2, R3 or R4)**

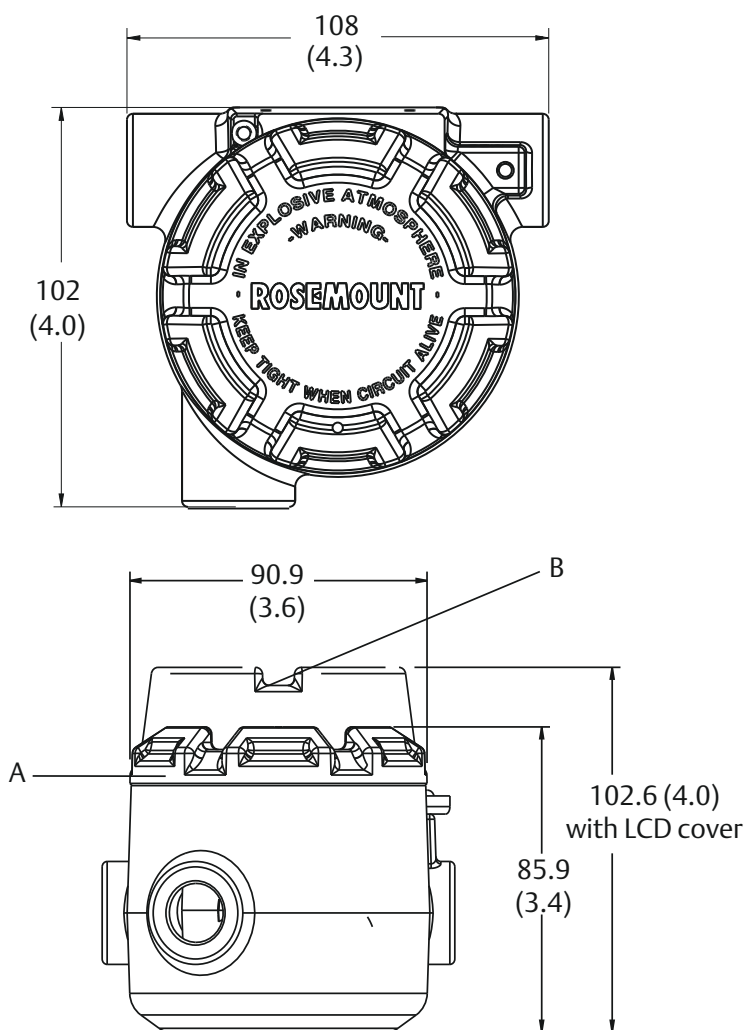


**Threaded-Sensor Universal Head (Option code J5, J6, J7 or J8) DIN Style Sensor Connection Head (Option code R1, R2, R3 or R4)**

- A. Standard cover
- B. Display cover
- C. LCD display
- D. SST "U" Bolt Mounting, 2-in. pipe (shipped with each connection head ordered with assembly option XA)

Dimensions are in millimeters (inches).

**Threaded Sensor Universal Head, 3-conduit (Option code J1 or J2)**

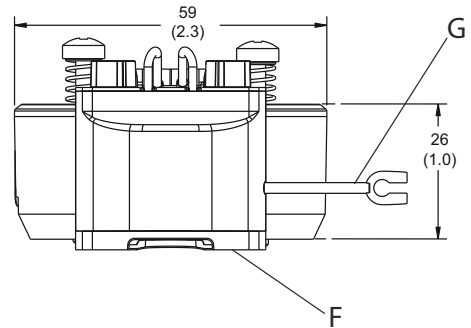
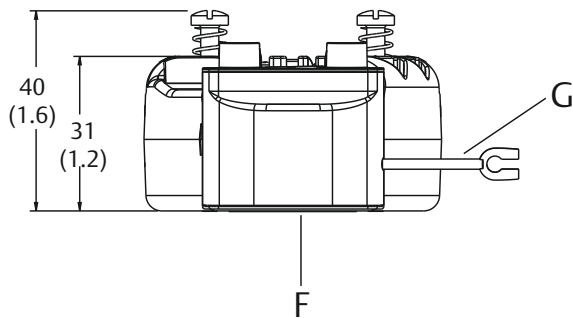
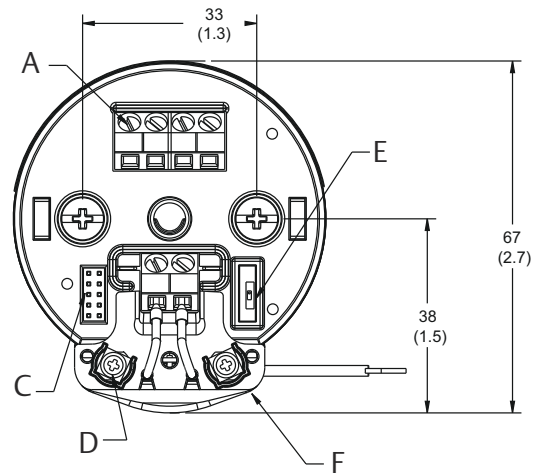
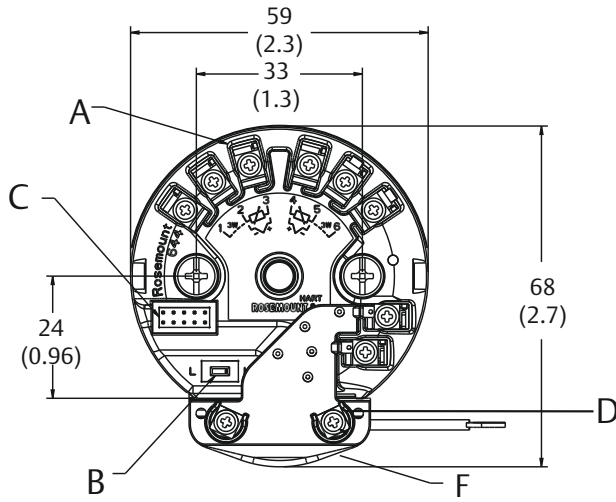


- A. Standard cover
- B. Display cover

Dimensions are in millimeters (inches).

**HART device shown with transient protector (Option code T1)**

**FOUNDATION Fieldbus device shown with transient protector (Option code T1)**



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

- A. Sensor terminals
- B. Failure mode switch
- C. Meter connector
- D. Power terminals
- E. Simulation switch
- F. Transient protector
- G. Ground wire

Dimensions are in millimeters (inches).

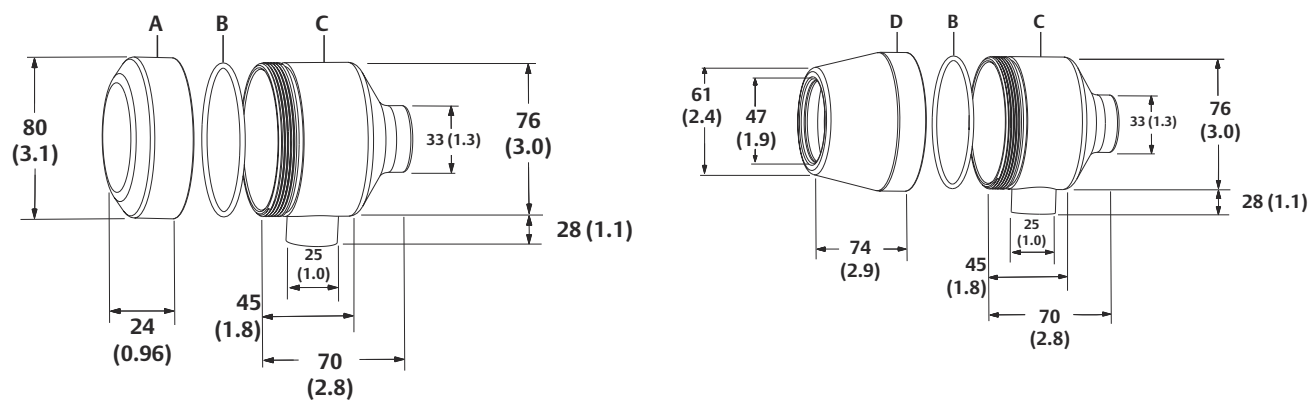
## Accessory dimensional drawings

Figure 6: 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

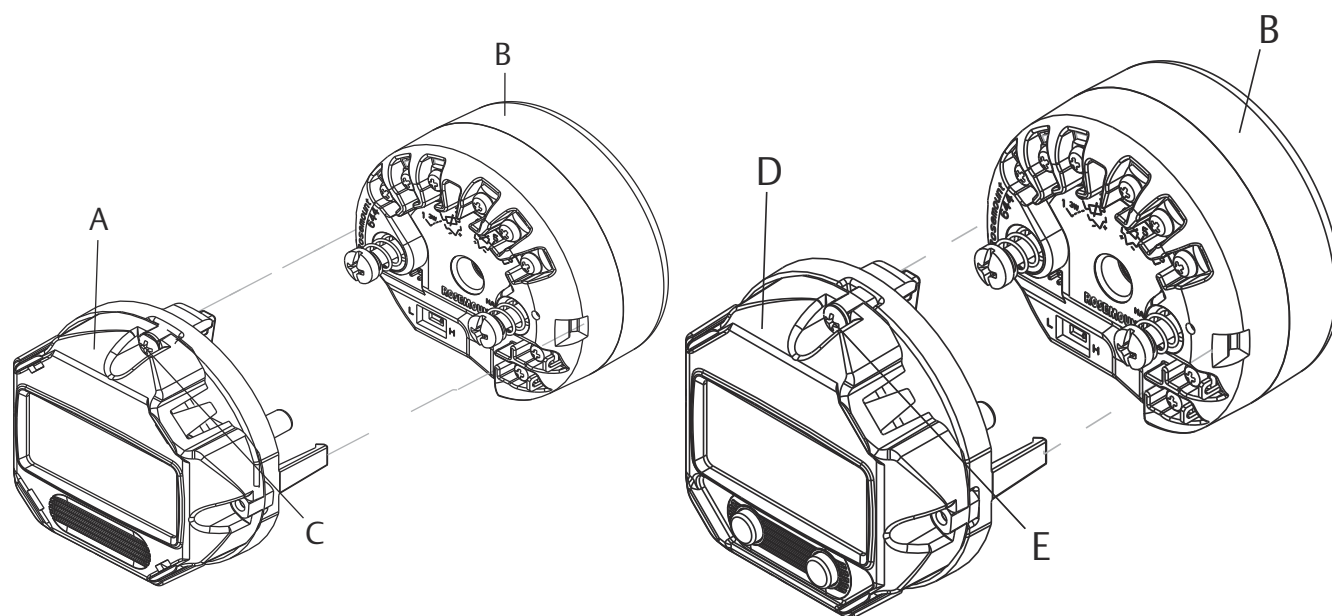
D. LCD display cover

Dimensions are in millimeters (inches).

Figure 7: Display

LCD display

Enhanced display with LOI



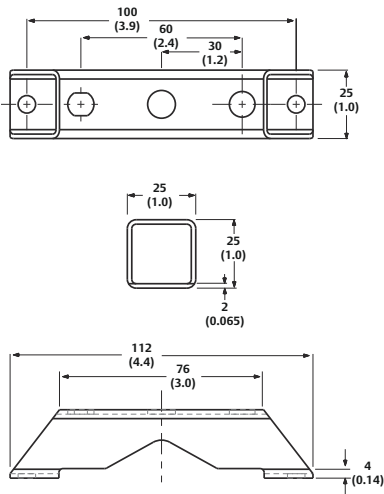
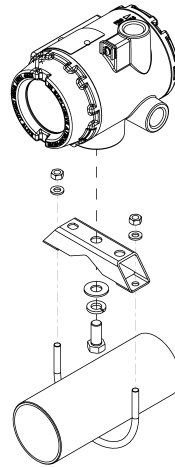
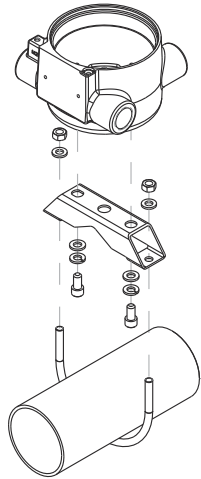
- A. LCD display
  - B. Rosemount 644 Transmitter
  - C. Display rotation
  - D. LCD display with LOI
  - E. Display rotation screws
- Dimensions are in millimeters (inches).

**Figure 8: Optional Mounting**

Optional Transmitter Mounting Brackets

Option Code B4 Bracket for enclosures j1, j2, j3, and j4

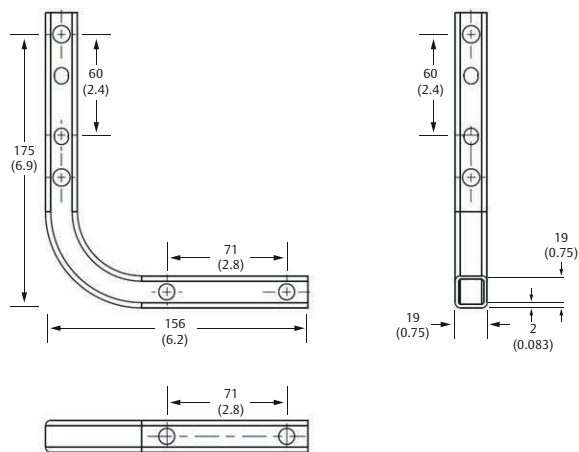
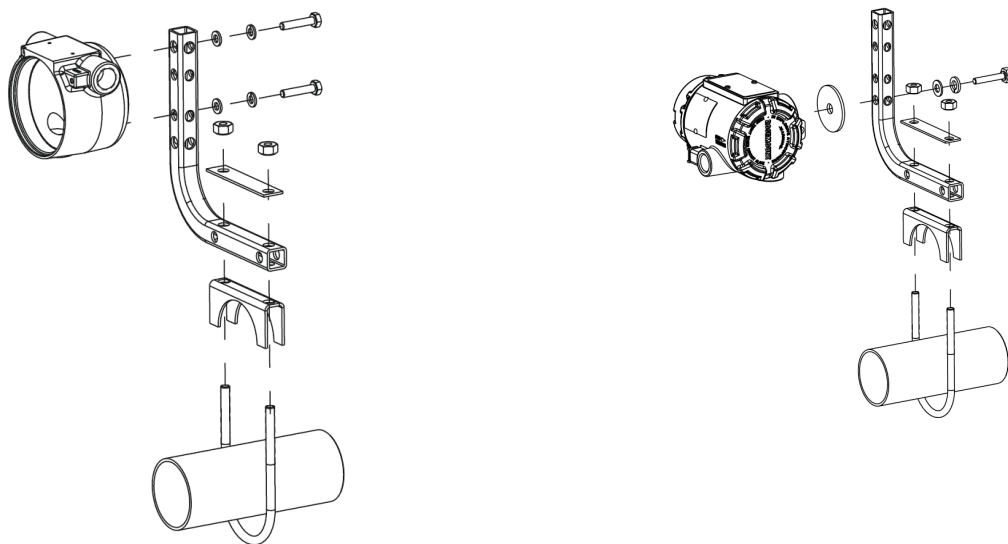
Option code B4 bracket for enclosures D1 and D2



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



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 DeltaV™, AMS Suite, handheld Field communicator or other host or configuration tool.

### Standard HART configuration

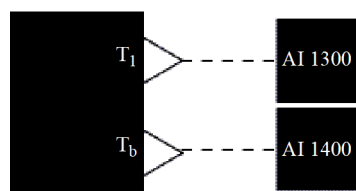
Unless specified, the transmitter will be shipped as follows:

|                              |  |
|------------------------------|--|
| Sensor type                  | RTD, Pt 100 ( $\alpha=0.00385$ , 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 seconds                                |
| Line voltage filter          | 50 Hz                                    |
| Alarm                        | High (21.75 mA)                          |
| LCD display (when installed) | Engineering units and mA                 |
| Tag                          | See <a href="#">Tagging</a> .            |

### Standard FOUNDATION Fieldbus configuration

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

|  |
|--|
| Sensor type: RTD, Pt 100 ( $\alpha=0.00385$ , 4-wire)  |
| Damping: 5 seconds   |
| Units of measurement: °C   |
| Line voltage filter: 50 Hz   |
| Software tag: See <a href="#">Tagging</a>  |
| Function block tags: <ul style="list-style-type: none"> <li>■ Resource block: Resource</li> <li>■ Transducer block: Transducer</li> <li>■ LCD display block: LCD display</li> <li>■ Analog input blocks: AI 1300, AI 1400</li> </ul> |
| PID block: PID 1500  |
| Alarm limits of AI 1300, AI 1400 <ul style="list-style-type: none"> <li>■ HI-HI: Infinity</li> <li>■ HI: Infinity</li> <li>■ LO: Infinity</li> <li>■ LO-LO: Infinity</li> </ul>  |
| Local display (when installed): Engineering units of temperature   |

**Figure 9: Standard Block Configuration**

- $T_1$ = Sensor Temperature
- $T_b$ = Terminal Temperature

### Final stations

AI blocks are scheduled for one 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 ( $\alpha=0.00385$ , 4-wire)  |
| Damping: 5 seconds   |
| Units of measurement: °C   |
| Line voltage filter: 50 Hz   |
| Software tag: see <a href="#">Tagging</a> .  |
| Alarm limits: <ul style="list-style-type: none"> <li>■ HI-HI: Infinity</li> <li>■ HI: Infinity</li> <li>■ LO: - Infinity</li> <li>■ LO-LO: Infinity</li> </ul> |
| 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 Protocol<br>C1: Factory Configuration Data (CDS required)<br>Also needs option code: | <ul style="list-style-type: none"> <li>■ Date: day/month/year</li> <li>■ Descriptor: Eight alphanumeric characters</li> <li>■ Message: 32 alphanumeric characters</li> <li>■ Hardware tag: 13 characters</li> <li>■ Software tag: Eight characters</li> <li>■ Sensor type and connection</li> <li>■ Measurement range and units</li> <li>■ Damping value</li> <li>■ Failure mode: High or Low</li> <li>■ Hot Backup: Mode and PV</li> <li>■ Sensor drift alert: Mode, limit and units</li> </ul> |
| ...M4 or M5<br><br>...DC<br><br>...DC   | <ul style="list-style-type: none"> <li>■ Display configuration: Select what will be shown on the LCD display.</li> <li>■ Custom alarm and saturation levels: Choose custom High and Low alarm and saturation levels.</li> <li>■ Security information: Write protection, HART Lock and LOI Password</li> </ul>  |
| C2: Transmitter – sensor matching   | <ul style="list-style-type: none"> <li>■ 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 Rosemount 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.</li> </ul>  |
| A1, CN, or C8: Alarm level configuration  | <ul style="list-style-type: none"> <li>■ A1: NAMUR Alarm and saturation levels, with high alarm configured</li> <li>■ CN: NAMUR Alarm and saturation levels, with low alarm configured</li> <li>■ C8: Low alarm (standard Rosemount alarm and saturation values)</li> </ul>  |
| Q4: Three-point calibration with certificate  | <ul style="list-style-type: none"> <li>■ Calibration certificate. Three-point calibration at 0, 50, and 100% with certificate.</li> </ul>  |
| C4: Five-point calibration  | <ul style="list-style-type: none"> <li>■ Will include five-point calibration at 0, 25, 50, 75, and 100% analog and digital output points. Use with Calibration Certificate Q4.</li> </ul>  |
| HR7: HART Revision configuration  | <ul style="list-style-type: none"> <li>■ Your Rosemount 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 Rosemount 644 Quick Start Guide or Reference Manual for more instructions.</li> <li>■ Long software tag: 32 characters</li> </ul>   |

|                            | Option code                                      | Requirements/specification  |
|----------------------------|--|---|
| FOUNDATION<br>FIELD<br>BUS | C1: Factory configuration data<br>(CDS required) | Date: day/month/year<br>Descriptor: 16 alphanumeric characters<br>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<br>PA | C1: Factory Configuration Data<br>(CDS required) | Date: day/month/year<br>Descriptor: 16 alphanumeric characters<br>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 Rosemount 644 HART (Device Revision 7 or Previous)

### Functional specifications

#### Inputs

User-selectable; sensor terminals rated to 42.4 Vdc. See [Accuracy example \(FOUNDATION Fieldbus and PROFIBUS PA devices\)](#).

#### Output

Single two-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 620 Vrms.

## Local display options

- LCD display** An optional 11 digit, two-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 LOI** An optional 14-digit, two-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 two-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 Rosemount 644 HART head mount and field mount transmitters.
- For more information on the LOI configuration options or further functionality that the LOI offers, see the [Rosemount 644 Temperature Transmitter Reference Manual](#).

## Humidity Limits

0–95 percent relative humidity

## Update Time

≤0.5 second 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 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

| Rosemount model                               | Power and Sensor Terminals  |
|---|---|
| 644 head mount (HART)                         | Captivated screw terminals permanently fixed to terminal block      |
| 644 head mount (FOUNDATION Fieldbus/PROFIBUS) | Compression screw terminals permanently fixed to the terminal block |
| 644 field mount (HART)                        | Captivated screw terminals permanently fixed to the terminal block  |
| 644 rail mount (HART)                         | Compression screw permanently fixed to front panel                  |

## Field Communicator Connections

| Communication Terminals        |   |
|--------------------------------|---|
| Rosemount 644 head/field mount | Clips permanently fixed to terminal block |
| Rosemount 644 rail mount       | Clips permanently fixed to front panel    |

## Materials of Construction

| Electronics Housing and Terminal Block                 |  |
|--|--|
| Rosemount 644 head/ field mount                        | GE polyphenylene oxide glass reinforced GFN -2 or -3 |
| Rosemount 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 Rosemount 644R attaches directly to a wall or a DIN rail. The Rosemount 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 for the special hardware that is available to:

- Mount a Rosemount 644H to a DIN rail. (see [Dimensional drawings](#))
- Retrofit a new Rosemount 644H to replace an existing Rosemount 644H Transmitter in an existing threaded sensor connection head. (see [Table 3](#))

## Weight

| Code   | Options                                     | Weight          |
|--------|---|-----------------|
| 644H   | HART, head mount transmitter                | 78 g (2.75 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                                 | 34 g (1.2 oz)   |
| M4     | LCD display with local operator interface   | 34 g (1.2 oz)   |
| J1, J2 | Universal head, 3-conduits, standard cover  | 718 g (25.33oz) |

| Code   | Options  | Weight            |
|--------|--|-------------------|
| J1, J2 | Universal head, 3-conduits, meter cover                                      | 826 g (29.14oz)   |
| J3, J4 | Cast SST universal head, 3-conduits, standard cover                          | 2073 g (73.12oz)  |
| J3, J4 | Cast SST universal head, 3-conduits, meter cover                             | 2148 g (75.77oz)  |
| J5, J6 | Aluminum 2-conduits, universal head, standard cover                          | 520g (18.43oz)    |
| J5, J6 | Aluminum 2-conduits, universal head, meter cover                             | 604 g (21.27oz)   |
| J7, J8 | Cast SST universal head 2-conduits, standard, cover                          | 577 g (20.35oz)   |
| J7, J8 | Cast SST universal head 2-conduits, meter cover                              | 667 g (23.53oz)   |
| 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 (Rosemount 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**

**ElectroMagnetic Compatibility (EMC) NAMUR NE 21 Standard**

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

| Susceptibility | Parameter                    | Influence |
|----------------|------------------------------|-----------|
| ESD            | ■ 6 kV contact discharge     | None      |
|                | ■ 8 kV air discharge         |           |
| Radiated       | ■ 80 – 1000 MHz at 10 V/m AM | < 1.0%    |
| Burst          | ■ 1 kV for I.O.              | None      |

| Susceptibility | Parameter  | Influence |
|----------------|--|-----------|
| Surge          | <ul style="list-style-type: none"> <li>■ 0.5 kV line–line</li> <li>■ 1 kV line–ground (I.O. tool)</li> </ul> | None      |
| Conducted      | <ul style="list-style-type: none"> <li>■ 10 kHz to 80 MHz at 10 V</li> </ul>                                 | < 1.0%    |

### CE Electromagnetic Compatibility Compliance Testing

The Rosemount 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  $\pm 0.005$  percent of span per volt

### Stability

RTDs and thermocouples have a stability of  $\pm 0.15$  percent of output reading or  $0.15$  °C (whichever is greater) for 24 months.

When ordered with the P8 option code:

- RTDs:  $\pm 0.25$  percent of reading or  $0.25$  °C, whichever is greater, for five years
- Thermocouples:  $\pm 0.5$  percent of reading or  $0.5$  °C, whichever is greater, for five 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 Rosemount 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 | 5g ( $50 \text{ m/s}^2$ ) peak acceleration |

The Rosemount 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

Emerson 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.

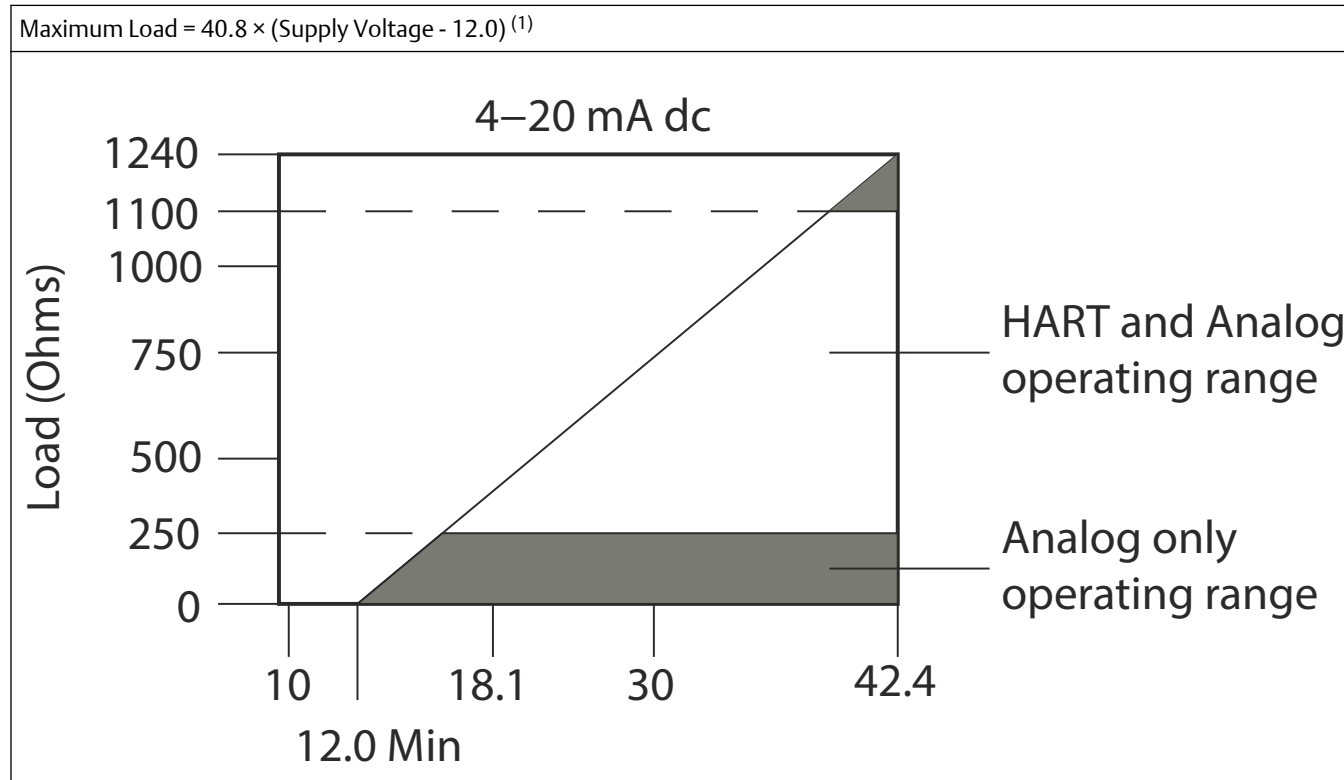
|                           |   |  |  |                         |                           |                         |            |                   |                              |                              |                 |  |
|---------------------------|---|--|--|-------------------------|---------------------------|-------------------------|------------|-------------------|------------------------------|------------------------------|-----------------|--|
| <p>- HART head mount</p>  |    | <table border="1"> <tr> <td rowspan="2">Single Input Wiring</td> <td>2-wire RTD and <math>\Omega</math></td> <td>3-wire RTD and <math>\Omega</math></td> </tr> <tr> <td>4-wire RTD and <math>\Omega</math></td> <td>T/C and mV</td> </tr> <tr> <td rowspan="3">Dual Input Wiring</td> <td>Dual 2-wire RTD and <math>\Omega</math></td> <td>Dual 3-wire RTD and <math>\Omega</math></td> </tr> <tr> <td colspan="2">Dual T/C and mV</td> </tr> </table> | Single Input Wiring  | 2-wire RTD and $\Omega$ | 3-wire RTD and $\Omega$   | 4-wire RTD and $\Omega$ | T/C and mV | Dual Input Wiring | Dual 2-wire RTD and $\Omega$ | Dual 3-wire RTD and $\Omega$ | Dual T/C and mV |  |
| Single Input Wiring       | 2-wire RTD and $\Omega$   | 3-wire RTD and $\Omega$  |  |                         |                           |                         |            |                   |                              |                              |                 |  |
|                           | 4-wire RTD and $\Omega$   | T/C and mV   |  |                         |                           |                         |            |                   |                              |                              |                 |  |
| Dual Input Wiring         | Dual 2-wire RTD and $\Omega$  | Dual 3-wire RTD and $\Omega$   |  |                         |                           |                         |            |                   |                              |                              |                 |  |
|                           | Dual T/C and mV   |  |  |                         |                           |                         |            |                   |                              |                              |                 |  |
|                           | <p>- HART rail mount<br/>- Fieldbus<br/>- PROFIBUS</p>                              |   | <table border="1"> <tr> <td>2-wire RTD and <math>\Omega</math></td> <td>3-wire RTD and <math>\Omega^*</math></td> <td>4-wire RTD and <math>\Omega</math></td> <td>T/C and mV</td> </tr> </table> | 2-wire RTD and $\Omega$ | 3-wire RTD and $\Omega^*$ | 4-wire RTD and $\Omega$ | T/C and mV |                   |                              |                              |                 |  |
| 2-wire RTD and $\Omega$   | 3-wire RTD and $\Omega^*$   | 4-wire RTD and $\Omega$  | T/C and mV   |                         |                           |                         |            |                   |                              |                              |                 |  |
| <p>- HART field mount</p> |  | <table border="1"> <tr> <td rowspan="2">Single Input Wiring</td> <td>2-wire RTD and <math>\Omega</math></td> <td>3-wire RTD and <math>\Omega</math></td> </tr> <tr> <td>4-wire RTD and <math>\Omega</math></td> <td>T/C and mV</td> </tr> <tr> <td rowspan="3">Dual Input Wiring</td> <td>Dual 2-wire RTD and <math>\Omega</math></td> <td>Dual 3-wire RTD and <math>\Omega</math></td> </tr> <tr> <td colspan="2">Dual T/C and mV</td> </tr> </table> | Single Input Wiring  | 2-wire RTD and $\Omega$ | 3-wire RTD and $\Omega$   | 4-wire RTD and $\Omega$ | T/C and mV | Dual Input Wiring | Dual 2-wire RTD and $\Omega$ | Dual 3-wire RTD and $\Omega$ | Dual T/C and mV |  |
| Single Input Wiring       | 2-wire RTD and $\Omega$   | 3-wire RTD and $\Omega$  |  |                         |                           |                         |            |                   |                              |                              |                 |  |
|                           | 4-wire RTD and $\Omega$   | T/C and mV   |  |                         |                           |                         |            |                   |                              |                              |                 |  |
| Dual Input Wiring         | Dual 2-wire RTD and $\Omega$  | Dual 3-wire RTD and $\Omega$   |  |                         |                           |                         |            |                   |                              |                              |                 |  |
|                           | Dual T/C and mV   |  |  |                         |                           |                         |            |                   |                              |                              |                 |  |

## 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



(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

| Descriptions                    | Operating Limit <sup>(1)</sup> | Storage Limit <sup>(1)</sup>   |
|---------------------------------|--------------------------------|--------------------------------|
| With LCD display <sup>(2)</sup> | -40 to 185 °F<br>-40 to 85 °C  | -50 to 185 °F<br>-45 to 85 °C  |
| Without LCD display             | -40 to 185 °F<br>-40 to 85 °C  | -60 to 250 °F<br>-50 to 120 °C |

(1) The lower operating and storage temperature limit of a transmitter with option code BR6 is -76 °F (-60 °C).

(2) 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 Rosemount 644 Transmitter 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 12](#) shows the configuration alarm ranges.

### Custom Alarm and Saturation Level

**Table 12: Available Alarm Range Measured in mA**

|               | Standard                     | NAMUR- NE 43 Compliant |
|---------------|------------------------------|------------------------|
| Linear output | $3.9 \leq I^{(1)} \leq 20.5$ | $3.8 \leq I \leq 20.5$ |
| 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)  $I$  = Process Variable (current output).

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 six seconds after power is applied, when damping value is set to zero 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](#).

### Accuracy

For complete accuracy tables by sensor type, see [Table 1](#).

### Configuration

For standard and custom configuration information, see [Configuration](#).

# Product Certifications

Rev 3.0

## European Directive Information

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

## Ordinary Location Certification

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

## North America

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 USA 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, ANSI/NEMA®-250: 2003, ANSI/IEC 60529: 2004

**Markings:** XP CL I, DIV 1, GP B, C, D; DIP CL II/III, DIV 1, GPE, F, G; T5 ( $-50\text{ °C} \leq T_a \leq +85\text{ °C}$ ); Type 4X; IP66; See I5 description for Non-Incendive markings.

**Certificate:** 1091070

**Standards:** FM Class 3600: 2011, FM Class 3615: 2006, FM Class 3616: 2011, UL Std. No. 61010-1-12, UL Std. No. 50E, CAN/CSA C22.2 No. 60529-05

**Markings:** XP CL I, DIV 1, GP B, C, D; DIP CL II / III, DIV 1, GPE, F, G; T5 ( $-50\text{ °C} \leq T_a \leq +85\text{ °C}$ ); Type 4X; IP66;

### I5 USA Intrinsic Safety and Non-Incendive

**Certificate:** 3008880 [Headmount Fieldbus/PROFIBUS®, Railmount HART]

**Standards:** FM Class 3600: 2011, 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 Rosemount 644 Temperature Transmitter shall be installed in an enclosure meeting the requirements of ANSI/ISA S82.01 and ANSI/ISA S82.03 or other applicable ordinary location standards.
2. Option code K5 is only applicable with a Rosemount enclosure. However, K5 is not valid with enclosure options S1, S2, S3, or S4.

3. An enclosure option 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; Type 4X; IP68

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

1. When no enclosure option is selected, the Rosemount 644 Temperature Transmitter shall be installed in an enclosure meeting the requirements of ANSI/ISA 61010-1 and ANSI/ISA 60079-0.
2. The Rosemount 644 Transmitter 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.

**Certificate:** 1091070

**Standards:** FM Class 3600: 2011, FM Class 3610: 2010, FM Class 3611: 2004, UL Std. No. 61010-1-12, UL Std. No. 50E, CAN/CSA C22.2 No. 60529-05, UL Std. No. 60079-11: Ed. 6

**Markings:** IS CL I / II / III, DIV I, GP A, B, C, D, E, F, G; CL I ZONE 0 AEx ia IIC; 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. Option code K5 is only applicable with a Rosemount enclosure. However, K5 is not valid with enclosure options S1, S2, S3, or S4.
3. An enclosure option must be selected to maintain a Type 4X rating.
4. 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 Canada 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, CAN/CSA C22.2 No. 60079-11:14, CAN/CSA Std. No. 61010-1-12

**Markings:** HART] IS CL I GP A, B, C, D T4/T6; 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 Canada Explosion proof, Dust-Ignition proof, 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, CAN/CSA C22.2 No. 60079-11:14, CAN/CSA Std. No. 61010-1-12

**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+A11:2013, EN 60079-1: 2014, EN 60529:1991 +A1:2000+A2:2013

**Markings:** Ⓢ II 2 G Ex db IIC T6...T1 Gb, T6(-50 °C ≤ T<sub>a</sub> ≤ +40 °C), T5...T1(-50 °C ≤ T<sub>a</sub> ≤ +60 °C); See [Table 22](#) for process temperatures.

#### *Specific Conditions of Use(X):*

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

### I1 ATEX Intrinsic Safety

**Certificate:** [Headmount HART]: Baseefa12ATEX0101X [Headmount Fieldbus/PROFIBUS]: Baseefa03ATEX0499X [Railmount HART]: BAS00ATEX1033X

**Standards:** EN IEC 60079-0: 2018, EN 60079-11: 2012

**Markings:** [HART]: Ⓢ II 1 G Ex ia IIC T6...T4 Ga; [Fieldbus/PROFIBUS]: Ⓢ II 1 G Ex ia IIC T4 Ga; See [Table 23](#) for entity parameters and temperature classifications.

#### *Special Conditions 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 resistances 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 EN60079-11:2012. This must be taken into account during installation.

### N1 ATEX Type n – with enclosure

**Certificate:** BAS00ATEX3145

**Standards:** EN 60079-0:2012+A11:2013, EN 60079-15: 2010

**Markings:** Ⓢ II 3 G Ex nA IIC T5 Gc (-40 °C ≤ T<sub>a</sub> ≤ +70 °C)

### NC ATEX Type n – without enclosure

**Certificate:** [Headmount Fieldbus/Profibus, Railmount HART]: Baseefa13ATEX0093X [Headmount HART]: Baseefa12ATEX0102U

**Standards:** EN IEC 60079-0: 2018, EN 60079-15: 2010

**Markings:** [Headmount Fieldbus/PROFIBUS, Railmount HART]: Ⓢ II 3 G Ex nA IIC T5 Gc (-40 °C ≤ T<sub>a</sub> ≤ +70 °C) [Headmount HART]: Ⓢ II 3 G Ex nA IIC T6...T5 Gc; T6(-60 °C ≤ T<sub>a</sub> ≤ +40 °C); T5(-60 °C ≤ T<sub>a</sub> ≤ +85 °C)

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

1. The Rosemount 644 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 500 V test as defined in clause 6.5 of EN 60079-15:2010. This must be taken into account during installation.

**ND ATEX Dust****Certificate:** FM12ATEX0065X**Standards:** EN 60079-0: 2012+A11:2013, EN 60079-31: 2014, EN 60529:1991 +A1:2000**Markings:** Ⓢ II 2 D Ex tb IIIC T130 °C Db, (-40 °C ≤ T<sub>a</sub> ≤ +70 °C); IP66; See [Table 22](#) 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 display cover against impact energies greater than 4 joules.
4. Flameproof joints are not intended for repair.
5. A suitable certified Ex d or Ex tb enclosure is required to be connected to temperature probes with Enclosure option "N".
6. Care shall be taken by the end user to ensure that the external surface temperature on the equipment and the neck of the DIN Style Sensor probe does not exceed 130°C.
7. Non-standard paint options may cause risk from electrostatic discharge. Avoid installations that cause electrostatic build-up on painted surfaces, and only clean the painted surfaces with a damp cloth. If paint is ordered through a special option code, contact the manufacturer for more information.

## International

**E7 IECEX Flameproof****Certificate:** IECEX FMG 12.0022X**Standards:** IEC 60079-0: 2011, IEC 60079-1: 2014**Markings:** Ex db IIC T6...T1 Gb, T6(-50 °C ≤ T<sub>a</sub> ≤ +40 °C), T5...T1(-50 °C ≤ T<sub>a</sub> ≤ +60 °C); See [Table 22](#) 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 display cover against impact energies greater than 4 joules.
4. Flameproof joints are not intended for repair.
5. A suitable certified Ex d or Ex tb enclosure is required to be connected to temperature probes with Enclosure option "N".
6. Care shall be taken by the end user to ensure that the external surface temperature on the equipment and the neck of the DIN Style Sensor probe does not exceed 130°C.
7. Non-standard paint options may cause risk from electrostatic discharge. Avoid installations that cause electrostatic build-up on painted surfaces, and only clean the painted surfaces with a damp cloth. If paint is ordered through a special option code, contact the manufacturer for more information.

**I7 IECEX Intrinsic Safety****Certificate:** [Headmount HART]: IECEX BAS 12.0069X [Headmount Fieldbus/PROFIBUS, Railmount HART]: IECEX BAS 07.0053X**Standards:** IEC 60079-0: 2017, IEC 60079-11: 2011

**Markings:** Ex ia IIC T6...T4 Ga See [Table 23](#) 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  $1G\Omega$ ; 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 ( $-40\text{ }^{\circ}\text{C} \leq T_a \leq +70\text{ }^{\circ}\text{C}$ )

**NG** **IECEX Type n – without enclosure**  
**Certificate:** [Headmount Fieldbus/PROFIBUS, Railmount HART]: IECEX BAS 13.0053X [Headmount HART]: IECEX BAS 12.0070U  
**Standards:** IEC 60079-0: 2017, IEC 60079-15: 2010  
**Markings:** [Headmount Fieldbus/PROFIBUS, Railmount HART]: Ex nA IIC T5 Gc ( $-40\text{ }^{\circ}\text{C} \leq T_a \leq +70\text{ }^{\circ}\text{C}$ ) [Headmount HART]: Ex nA IIC T6...T5 Gc; T6( $-60\text{ }^{\circ}\text{C} \leq T_a \leq +40\text{ }^{\circ}\text{C}$ ); T5( $-60\text{ }^{\circ}\text{C} \leq T_a \leq +85\text{ }^{\circ}\text{C}$ )

**Conditions of Certification (X):**

1. The Rosemount 644 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 500 V 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: 2013  
**Markings:** Ex tb IIIC T130 °C Db, ( $-40\text{ }^{\circ}\text{C} \leq T_a \leq +70\text{ }^{\circ}\text{C}$ ); IP66 See [Table 22](#) for process temperatures.

**Specific Conditions of Use(X):**

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

## Brazil

### E2 INMETRO Flameproof and Dust

**Certificate:** UL-BR 13.0535X

**Standards:** ABNT NBR IEC 60079-0:2013, ABNT NBR IEC 60079-1:2016, ABNT NBR IEC 60079-31:2014

**Markings:** Ex db IIC T6...T1 Gb; T6...T1: ( $-50\text{ }^{\circ}\text{C} \leq T_a \leq +40\text{ }^{\circ}\text{C}$ ), T5...T1: ( $-50\text{ }^{\circ}\text{C} \leq T_a \leq +60\text{ }^{\circ}\text{C}$ ) Ex tb IIIC T130 °C Db; IP66; ( $-40\text{ }^{\circ}\text{C} \leq T_a \leq +70\text{ }^{\circ}\text{C}$ )

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

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

### I2 INMETRO Intrinsic Safety

**Certificate:** [Fieldbus]: UL-BR 15.0264X [HART]: UL-BR 14.0670X

**Standards:** ABNT NBR IEC 60079-0:2008 + Corrigendum 1:2011, ABNT NBR IEC 60079-11:2011

**Markings:** [Fieldbus]: Ex ia IIC T\* Ga ( $-60\text{ }^{\circ}\text{C} \leq T_a \leq +**\text{ }^{\circ}\text{C}$ ) [HART]: Ex ia IIC T\* Ga ( $-60\text{ }^{\circ}\text{C} \leq T_a \leq +**\text{ }^{\circ}\text{C}$ ). See for [Table 23](#) 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. Non-metallic enclosures must have a surface resistances of less than 1 GΩ; light alloy or zirconium enclosures must be protected from impact and friction when installed in a Zone 0 environment.
3. When fitted with the Transient Protector Assembly, the equipment is not capable of withstanding the 500V test as defined on ABNT NBR IEC 60079-11. This must be taken into account during installation.
4. The ingress protection degree IP66 is provided only for the Model 644 Field Mount Assembly which is formed by installing an Enhanced Model 644 Temperature Transmitter within a dual-compartment Plantweb enclosure.

## China

### E3 China Flameproof

**Certificate:** GYJ16.1192X

**Standards:** GB3836.1-2010, GB3836.2-2010, GB12476.1-2013, GB12476.5-2013

**Markings:** Ex d IIC T6...T1; Ex tD A21 T130 °C; IP66

#### 产品安全使用特定条件

产品防爆合格证后缀“X”代表产品安全使用有特定条件：

1. 涉及隔爆接合面的维修须联系产品制造商。
2. 产品铭牌材质为非金属，使用时须防止产生静电火花，只能用湿布清理。

#### 产品使用注意事项

1. 产品使用环境温度与温度组别的关系为：

Table 13:

| 防爆标志                   | 温度组别    | 环境温度   |
|------------------------|---------|--|
| Ex d IIC T6~T1 Gb      | T6 ~ T1 | $-50\text{ }^{\circ}\text{C} \leq T_a \leq + 40\text{ }^{\circ}\text{C}$ |
|                        | T5 ~ T1 | $-50\text{ }^{\circ}\text{C} \leq T_a \leq + 60\text{ }^{\circ}\text{C}$ |
| Ex Td A21 IP66 T130 °C | /       | $-40\text{ }^{\circ}\text{C} \leq T_a \leq + 70\text{ }^{\circ}\text{C}$ |

- 产品外壳设有接地端子，用户在安装使用时应可靠接地。
- 现场安装时，电缆引入口须选用国家指定的防爆检验机构按检验认可、具有 Ex dIIC, Ex tD A21 IP66 防爆等级的电缆引入装置或堵封件，冗余电缆引入口须用堵封件有效密封。
- 用于爆炸性气体环境中，现场安装、使用和维护必须严格遵守“断电后开盖！”的警告语。用于爆炸性粉尘环境中，现场安装、使用、和维护必须严格遵守“爆炸性粉尘场所严禁开盖！”的警告语。
- 用于爆炸性粉尘环境中，产品外壳表面须保持清洁，以防粉尘堆积，严禁用压缩空气吹扫。
- 产品的安装、使用和维护应同时遵守产品使用说明书、GB3836.13-2013“爆炸性环境 第 13 部分：设备的修理、检修、修复和改造”、GB3836.15-2000“爆炸性气体环境用电气设备 第 15 部分：危险场所电气安装（煤矿除外）”、GB3836.16-2006“爆炸性气体环境用电气设备 第 16 部分：电气装置的检查和维护（煤矿除外）”和 GB50257-2014“电气装置安装工程爆炸和火灾危险环境电力装置施工及验收规范”和 GB15577-2007“粉尘防爆安全规程”、GB12476.2-2010“可燃性粉尘环境用电气设备 第 2 部分 选型和安装”的有关规定。

### I3 China Intrinsic Safety

|                     |  |
|---------------------|--|
| <b>Certificate:</b> | GYJ16.1191X                                  |
| <b>Standards:</b>   | GB3836.1-2010, GB3836.4-2010, GB3836.20-2010 |
| <b>Markings:</b>    | Ex ia IIC T4~T6 Ga                           |

#### 产品安全使用特殊条件

防爆合格证号后缀“X”代表产品安全使用有特定条件:

- 温度变送器须安装于外壳防护等级不低于国家标准 GB/T4208-2017 规定的 IP20 的壳体中，方可用于爆炸性危险场所，金属壳体须符合国家标准 GB3836.1-2010 第 8 条的规定，非金属壳体须符合 GB3836.1-2010 第 7.4 条的规定。
- 非金属外壳表面电阻必须小于  $1\text{G}\Omega$ ，轻金属或者铝外壳在安装时必须防止冲击和摩擦。
- 当 Transmitter Type 为 F、D 时，产品外壳含有轻金属，用于 0 区时需注意防止由于冲击或摩擦产生的点燃危险。
- 产品选用瞬态保护端子板（选项代码为 T1）时，此设备不能承受 GB3836.4-2010 标准中第 6.3.12 条规定的 500V 交流有效值试验电压的介电强度试验。

#### 产品使用注意事项

- 产品环境温度为:

Table 14: 当 Options 不选择 Enhanced Performance 时

| 输出代码  | 最大输出功率 ( W ) | 温度组别 | 环境温度   |
|-------|--------------|------|--|
| A     | 0.67         | T6   | $-60\text{ }^{\circ}\text{C} \leq T_a \leq + 40\text{ }^{\circ}\text{C}$ |
|       | 0.67         | T5   | $-60\text{ }^{\circ}\text{C} \leq T_a \leq + 50\text{ }^{\circ}\text{C}$ |
|       | 1            | T5   | $-60\text{ }^{\circ}\text{C} \leq T_a \leq + 40\text{ }^{\circ}\text{C}$ |
|       | 1            | T4   | $-60\text{ }^{\circ}\text{C} \leq T_a \leq + 80\text{ }^{\circ}\text{C}$ |
| F 或 W | 1.3          | T4   | $-50\text{ }^{\circ}\text{C} \leq T_a \leq + 60\text{ }^{\circ}\text{C}$ |
|       | 5.32         | T4   | $-50\text{ }^{\circ}\text{C} \leq T_a \leq + 60\text{ }^{\circ}\text{C}$ |



**Table 15:** 当 Options 选择 Enhanced Performance 时

| 最大输出功率 ( W ) | 温度组别 | 环境温度   |
|--------------|------|--|
| 0.67         | T6   | $-60\text{ }^{\circ}\text{C} \leq T_a \leq + 40\text{ }^{\circ}\text{C}$ |
| 0.67         | T5   | $-60\text{ }^{\circ}\text{C} \leq T_a \leq + 50\text{ }^{\circ}\text{C}$ |
| 0.80         | T5   | $-60\text{ }^{\circ}\text{C} \leq T_a \leq + 40\text{ }^{\circ}\text{C}$ |
| 0.80         | T4   | $-60\text{ }^{\circ}\text{C} \leq T_a \leq + 80\text{ }^{\circ}\text{C}$ |

## 2. 参数:

**Table 16:** 当 Options 不选择 Enhanced Performance 时 输入端(+, -)

| 输出代码            | 最高输入电压          | 最大输入电流           | 最大输入功率          | 最大内部等效参数         |                  |
|-----------------|-----------------|------------------|-----------------|------------------|------------------|
|                 |                 |                  |                 | $C_i(\text{nF})$ | $L_i(\text{mH})$ |
|                 | $U_i(\text{V})$ | $I_i(\text{mA})$ | $P_i(\text{W})$ |                  |                  |
| A               | 30              | 200              | 0.67/1          | 10               | 0                |
| F 或 W           | 30              | 300              | 1.3             | 2.1              | 0                |
| F 或 W ( FISCO ) | 17.5            | 380              | 5.32            | 2.1              | 0                |

**Table 17:** 传感器端 ( 1,2,3,4 )

| 输出代码  | 最高输出电压          | 最高输出电流           | 最大输出功率          | 最大内部等效参数         |                  |
|-------|-----------------|------------------|-----------------|------------------|------------------|
|       |                 |                  |                 | $C_o(\text{nF})$ | $L_o(\text{mH})$ |
|       | $U_o(\text{V})$ | $I_o(\text{mA})$ | $P_o(\text{W})$ |                  |                  |
| A     | 13.6            | 80               | 0.08            | 75               | 0                |
| F 或 W | 13.9            | 23               | 0.079           | 7.7              | 0                |

**Table 18:** 当 Options 选择 Enhanced Performance 时 输入端(+, -)

| 最高输入电压          | 最大输入电流                                       | 最大输入功率          | 最大内部等效参数         |                  |
|-----------------|--|-----------------|------------------|------------------|
| $U_i(\text{V})$ | $I_i(\text{mA})$                             | $P_i(\text{W})$ | $C_i(\text{nF})$ | $L_i(\text{mH})$ |
| 30              | $150(T_a \leq + 80\text{ }^{\circ}\text{C})$ | 0.67/0.8        | 3.3              | 0                |
|                 | $170(T_a \leq + 70\text{ }^{\circ}\text{C})$ |                 |                  |                  |
|                 | $190(T_a \leq + 60\text{ }^{\circ}\text{C})$ |                 |                  |                  |

**Table 19:** 传感器端 ( 1,2,3,4 )

| 最高输出电压          | 最大输出电流           | 最大输出功率          | 组别  | 最大内部等效参数           |                  |
|-----------------|------------------|-----------------|-----|--------------------|------------------|
| $U_o(\text{V})$ | $I_o(\text{mA})$ | $P_o(\text{W})$ |     | $C_o(\mu\text{F})$ | $L_o(\text{mH})$ |
| 13.6            | 80               | 0.08            | IIC | 0.816              | 5.79             |
|                 |                  |                 | IIB | 5.196              | 23.4             |
|                 |                  |                 | IIA | 18.596             | 48.06            |

注：本案电气参数符合 GB3836.19-2010 对 FISCO 现场仪表的参数要求。

3. 该产品必须与已通过防爆认证的关联设备配套共同组成本安防爆系统方可使用于爆炸性气体环境。其系统接线必须同时遵守本产品和所配关联设备的使用说明书要求，接线端子不得接错。

4. 用户不得自行更换该产品的零部件，应会同产品制造商共同解决运行中出现的故障，以杜绝损坏现象的发生。
5. 产品的安装、使用和维护应同时遵守产品使用说明书、GB3836.13-2013“爆炸性环境 第 13 部分：设备的修理、检修、修复和改造”、GB/T3836.15-2017“爆炸性环境 第 15 部分：电气装置的设计，选型和安装”、GB/T3836.16-2017“爆炸性环境 第 16 部分：电气装置的检查和维修”、GB/T3836.18-2017“爆炸性环境 第 18 部分：本质安全电气系统”和 GB50257-2014“电气装置安装工程爆炸和火灾危险环境电力装置施工及验收规范”的有关规定。

### N3 China Type n

|                     |                              |
|---------------------|------------------------------|
| <b>Certificate:</b> | GYJ15.1502                   |
| <b>Standards:</b>   | GB3836.1-2010, GB3836.8-2014 |
| <b>Markings:</b>    | Ex nA IIC T5/T6 Gc           |

1. 产品温度组别和使用环境温度范围之间的关系为：

**Table 20:** 当 Options 不选择 Enhanced Performance 时：

| 温度组别 | 环境温度  |
|------|---|
| T5   | $-40\text{ }^{\circ}\text{C} \leq T_a \leq +70\text{ }^{\circ}\text{C}$ |

**Table 21:** 当 Options 选择 Enhanced Performance 时：

| 温度组别 | 环境温度  |
|------|---|
| T6   | $-60\text{ }^{\circ}\text{C} \leq T_a \leq +40\text{ }^{\circ}\text{C}$ |
| T5   | $-60\text{ }^{\circ}\text{C} \leq T_a \leq +85\text{ }^{\circ}\text{C}$ |

2. 最高工作电压：45Vdc。
3. 现场安装时，电缆引入口须选用经国家指定的防爆检验机构检验认可、具有 Ex e IIC Gb 防爆等级的电缆引入装置或堵封件，冗余电缆引入口须用堵封件有效密封。电缆引入装置或堵封件的安装使用必须遵守其使用说明书的要求并保证外壳防护等级达到 IP54（符合 GB/T4208-2017 标准要求）以上。
4. 用户不得自行更换该产品的零部件，应会同产品制造商共同解决运行中出现的故障，以杜绝损坏现象的发生。
5. 产品的安装、使用和维护应同时遵守产品使用说明书、GB3836.13-2013“爆炸性环境 第 13 部分：设备的修理、检修、修复和改造”、GB/T3836.15-2017“爆炸性环境 第 15 部分：电气装置的设计、选型和安装”、GB/T3836.16-2017“爆炸性环境 第 16 部分：电气装置的检查和维修”和 GB50257-2014“电气装置安装工程爆炸和火灾危险环境电力装置施工及验收规范”的有关规定。

## EAC – Belarus, Kazakhstan, Russia

**EM** Technical Regulation Customs Union TR CU 012/2011 (EAC) Flameproof

**Standards:** GOST 31610.0-2014, GOST IEC 60079-1-2011

**Markings:** 1Ex d IIC T6...T1 Gb X, T6( $-50\text{ }^{\circ}\text{C} \leq T_a \leq +40\text{ }^{\circ}\text{C}$ ), T5...T1( $-50\text{ }^{\circ}\text{C} \leq T_a \leq +60\text{ }^{\circ}\text{C}$ ) See [Table 22](#) for process temperature.

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

1. See certificate TR CU 012/2011 for ambient temperature range.
2. Guard the LCD display cover against impact energies greater than 4 joules.
3. Flameproof joints are not intended for repair.
4. Non-standard paint options may cause risk from electrostatic discharge. Avoid installations that cause electrostatic build-up on painted surfaces, and only clean the painted surfaces with a damp cloth. If paint is ordered through a special option code, contact the manufacturer for more information.

**IM Technical Regulation Customs Union TR CU 012/2011 (EAC) Intrinsic Safety****Standards:** GOST 31610.0-2014, GOST 31610.11-2014**Markings:** [HART]: 0Ex ia IIC T6...T4 Ga X; [Fieldbus, FISCO, PROFIBUS PA]: 0Ex ia IIC T4 Ga X  
See [Table 23](#) 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 in accordance with the requirements of GOST 14254-96. Non-metallic enclosures must have a surface resistances of less than 1 GΩ; 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 GOST 31610.11-2014. This must be taken into account during installation.
3. See certificate TR CU 012/2011 for ambient temperature range.

**KM Technical Regulation Customs Union TR CU 012/2011 (EAC) Flameproof, Intrinsic Safety, and Dust-Ignition proof****Standards:** GOST 31610.0-2014, GOST IEC 60079-1-2011, GOST 31610.11-2014, GOST R IEC 60079-31-2010**Markings:** Ex tb IIIC T130°C Db X (-40 °C ≤ T<sub>a</sub> ≤ +70 °C); IP66; See [Table 22](#) for process temperatures. See EM for Flameproof Markings and see IM for Intrinsic Safety Markings.**Special Conditions for Safe Use (X):**

1. The non-metallic label may store an electrostatic charge and become a source of ignition in Group III environments. Label must be cleaned by a damp cloth with the antistatic to avoid storing an electrostatic charge.
2. Guard the LCD display cover against impact energies greater than 4 joules. See EM for Flameproof Specific Conditions of Use and see IM for Intrinsic Safety Specific Conditions of Use.

## Japan

**E4 Japan Flameproof****Certificate:** TC20671 [J2 with LCD], TC20672 [J2], TC20673 [J6 with LCD], TC20674 [J6]**Markings:** Ex d IIC T5**I4 Japan Intrinsic Safety****Certificate:** CML 18JPN2118X**Standards** JNIOH-TR-46-1, JNIOH-TR-46-6**Markings** [Fieldbus] Ex ia IIC T4 Ga (-60 °C ≤ T<sub>a</sub> ≤ +60 °C)**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. Non-metallic enclosures must have a surface resistances of less than 1 GΩ; light alloy or zirconium enclosures must be protected from impact and friction when installed in a Zone 0 environment.

## Combinations

**K1** Combination of E1, I1, N1, and ND**K2** Combination of E2 and I2**K5** Combination of E5 and I5

|           |                                       |
|-----------|---------------------------------------|
| <b>K7</b> | Combination of E7, I7, NK, and N7     |
| <b>KA</b> | Combination of K6, E1, and I1         |
| <b>KB</b> | Combination of K5 and K6              |
| <b>KC</b> | Combination of I5 and I6              |
| <b>KD</b> | Combination of E5, I5, K6, E1, and I1 |

## Additional certifications (not for railmount)

### **SBS** American Bureau of Shipping (ABS) Type Approval

**Certificate:** 16-HS1553094-PDA

### **SBV** Bureau Veritas (BV) Type Approval

**Certificate:** 26325 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:** TAA00000K8

**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 22: Process Temperatures**

|  |       | <b>T6</b>           | <b>T5</b>           | <b>T4</b>           | <b>T3</b>           | <b>T2</b>           | <b>T1</b>           | <b>T130</b>         |
|--|-------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Max Ambient                            |       | +40 °C<br>(+104 °F) | +60 °C<br>(+140 °F) | +60 °C<br>(+140 °F) | +60 °C<br>(+140 °F) | +60 °C<br>(+140 °F) | +60 °C<br>(+140 °F) | +70 °C<br>(+158 °F) |
| <b>Transmitter with LCD display</b>    |       |                     |                     |                     |                     |                     |                     |                     |
| Sensor extension                       | 0-in. | 55 °C (131 °F)      | 70 °C (158 °F)      | 95 °C (203 °F)      | 95 °C (203 °F)      | 95 °C (203 °F)      | 95 °C (203 °F)      | 95 °C (203 °F)      |
|  | 3-in. | 55 °C (131 °F)      | 70 °C (158 °F)      | 100 °C (212 °F)     | 100 °C (212 °F)     | 100 °C (212 °F)     | 100 °C (212 °F)     | 100 °C (212 °F)     |
|  | 6-in. | 60 °C (140 °F)      | 70 °C (158 °F)      | 100 °C (212 °F)     | 100 °C (212 °F)     | 100 °C (212 °F)     | 100 °C (212 °F)     | 100 °C (212 °F)     |
|  | 9-in. | 65 °C (149 °F)      | 75 °C (167 °F)      | 110 °C (230 °F)     | 110 °C (230 °F)     | 110 °C (230 °F)     | 110 °C (230 °F)     | 110 °C (230 °F)     |
| <b>Transmitter without LCD display</b> |       |                     |                     |                     |                     |                     |                     |                     |
|  | 0-in. | 55 °C (131 °F)      | 70 °C (158 °F)      | 100 °C (212 °F)     | 170 °C (338 °F)     | 280 °C (536 °F)     | 440 °C (824 °F)     | 100 °C (212 °F)     |

**Table 22: Process Temperatures (continued)**

|  |       | T6             | T5             | T4              | T3              | T2              | T1              | T130            |
|--|-------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|  | 3-in. | 55 °C (131 °F) | 70 °C (158 °F) | 110 °C (230 °F) | 190 °C (374 °F) | 300 °C (572 °F) | 450 °C (842 °F) | 110 °C (230 °F) |
|  | 6-in. | 60 °C (140 °F) | 70 °C (158 °F) | 120 °C (248 °F) | 200 °C (392 °F) | 300 °C (572 °F) | 450 °C (842 °F) | 110 °C (230 °F) |
|  | 9-in. | 65 °C (149 °F) | 75 °C (167 °F) | 130 °C (266 °F) | 200 °C (392 °F) | 300 °C (572 °F) | 450 °C (842 °F) | 120 °C (248 °F) |

**Table 23: Entity Parameters**

|                     | Fieldbus/PROFIBUS [FISCO]  | HART® legacy   | HART enhanced  |
|---------------------|--|--|--|
| U <sub>i</sub> (V)  | 30 [17.5]  | 30   | 30   |
| I <sub>i</sub> (mA) | 300 [380]  | 200  | 150 for T <sub>a</sub> ≤ 80 °C<br>170 for T <sub>a</sub> ≤ 70 °C<br>190 for T <sub>a</sub> ≤ 60 °C   |
| P <sub>i</sub> (W)  | 1.3 at T4(-50 °C ≤ T <sub>a</sub> ≤ +60 °C) [5.32 at T4(-50 °C ≤ T <sub>a</sub> ≤ +60 °C)] | .67 at T6(-60 °C ≤ T <sub>a</sub> ≤ +40 °C)<br>.67 at T5(-60 °C ≤ T <sub>a</sub> ≤ +50 °C)<br>1.0 at T5(-60 °C ≤ T <sub>a</sub> ≤ +40 °C)<br>1.0 at T4(-60 °C ≤ T <sub>a</sub> ≤ +80 °C) | .67 at T6(-60 °C ≤ T <sub>a</sub> ≤ +40 °C)<br>.67 at T5(-60 °C ≤ T <sub>a</sub> ≤ +50 °C)<br>.80 at T5(-60 °C ≤ T <sub>a</sub> ≤ +40 °C)<br>.80 at T4(-60 °C ≤ T <sub>a</sub> ≤ +80 °C) |
| C <sub>i</sub> (nF) | 2.1  | 10   | 3.3  |
| L <sub>i</sub> (mH) | 0  | 0  | 0  |





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