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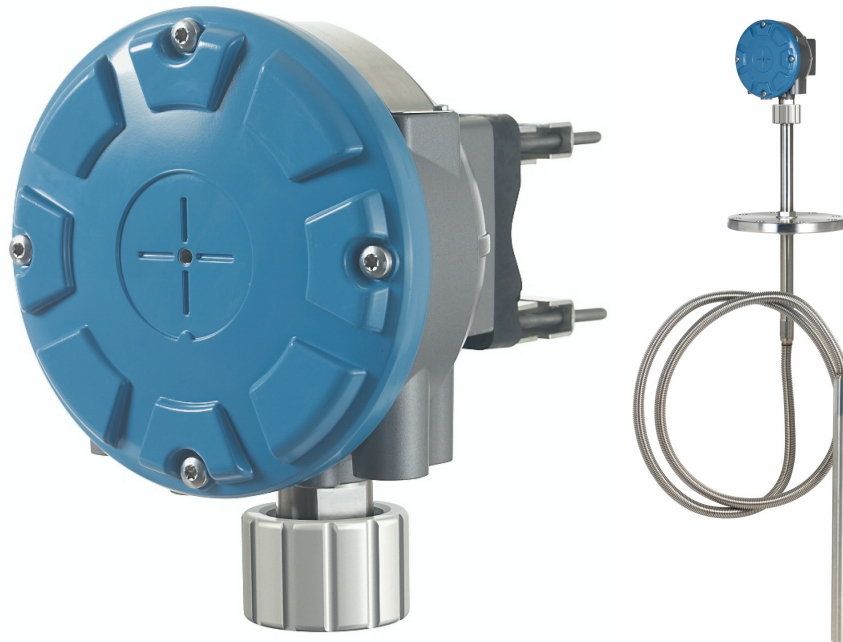
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PRODUCT DATASHEET

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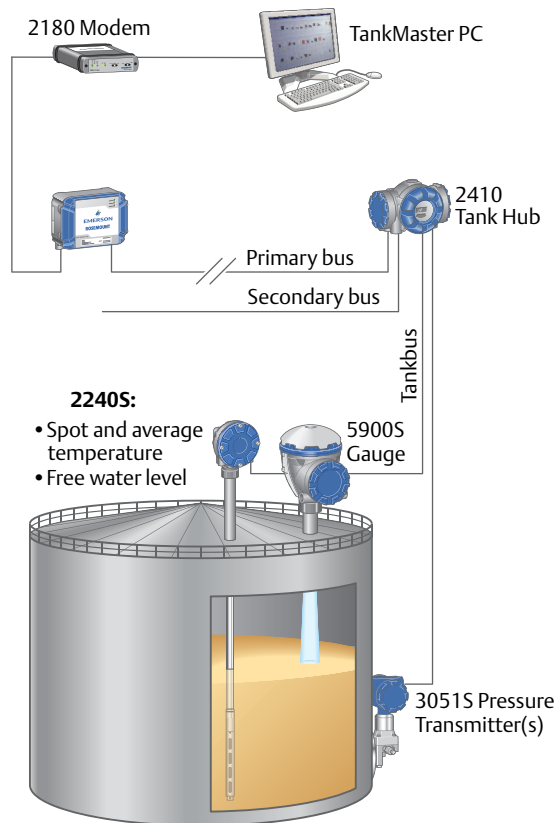
Rosemount 2240S Multi-input Temperature Transmitter

for tank gauging systems



- Get ultra-stable temperature measurement for precise inventory calculations and custody transfer for API chapter 7.3 compliance
- Obtain outstanding temperature conversion accuracy of ± 0.05 °C (± 0.09 °F)
- Connect up to 16 three- or four-wire temperature elements
- Include integrated water level sensor
- Benefit from convenient and safe installation with 2-wire IS bus power supply

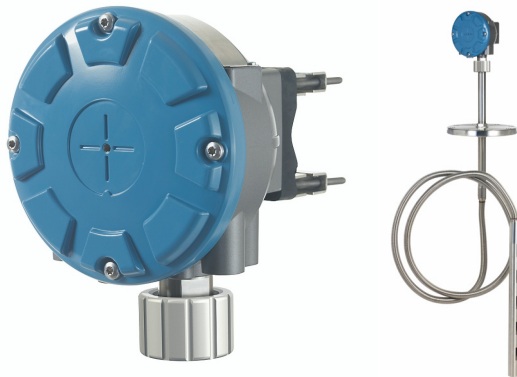
Rosemount 2240S Multi-input Temperature Transmitter



2240S:

- Spot and average temperature
- Free water level

Rosemount 2240S Multi-input Temperature Transmitter installed together with a sensor



Rosemount 2240S can be installed on top of a Rosemount multiple spot temperature / water level sensor, or it can be remotely installed on a pipe or wall

The high performance 2240S Multi-input Temperature Transmitter is approved for demanding custody transfer applications, which require very accurate level and temperature measurements for net standard volume calculations.

2240S can connect up to 16 three or four wire temperature spot elements and an integrated water level sensor. The value from each individual spot temperature element, in combination with the level value from the radar gauge is used for average liquid temperature calculation.

Available temperature sensor versions are:

- Rosemount 565 Multiple Spot Temperature Sensor
- Rosemount 566 Multiple Spot Temperature Sensor for cryogenic applications such as LNG
- Rosemount 765 Multiple Spot Temperature Sensor with Integrated Water Level Sensor

2240S has an ultra high temperature conversion accuracy of $\pm 0.05\text{ }^{\circ}\text{C}$ ($\pm 0.09\text{ }^{\circ}\text{F}$).

The 2240S supplies measured data to the Tankbus, which utilizes the FOUNDATION™ fieldbus communication protocol.

The IP 66/67 and Nema 4X certified robust design makes it suitable for installation in harsh environments. The water level sensor is factory calibrated. If any adjustment is necessary during installation, it can easily be done with the 2240S built-in on-line calibration feature.

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Ordering Information



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Table 1. Rosemount 2240S Multi-input Temperature Transmitter ordering information

Model	Product Description
2240S	Multi-input Temperature Transmitter
Performance Class	
P	Premium: ± 0.05 °C (0.09 °F) instrument accuracy
Number of Temperature Sensor Inputs	
16 ⁽¹⁾	Up to 16xRTD spot elements
08 ⁽¹⁾	Up to 8xRTD spot elements
04 ⁽¹⁾	Up to 4xRTD spot elements
00 ⁽²⁾	None
Leads per Temperature Element	
4	4-wire or 3-wire (individual or common return)
3	3-wire (individual or common return)
0 ⁽²⁾	None (for water level only, no temperature sensors)
Auxiliary Inputs	
A ⁽²⁾	Rosemount 765 temperature and water level sensor input
0	None
Tankbus: Power and Communication	
F	Bus powered 2-wire FOUNDATION fieldbus (IEC 61158)
Hazardous Location Certification	
I1	ATEX Intrinsic Safety
I2	Brazil Inmetro Intrinsic Safety
I5	FM-US Intrinsic Safety
I6	FM-Canada Intrinsic Safety
I7	IECEX Intrinsic Safety
KA	ATEX Intrinsic Safety + FM-US Intrinsic Safety
KC	ATEX Intrinsic Safety + IECEX Intrinsic Safety

Table 1. Rosemount 2240S Multi-input Temperature Transmitter ordering information

KD	FM-US Intrinsic Safety + FM-Canada Intrinsic Safety
NA	No Hazardous Location Certification
Custody Transfer Type Approval	
0	None
C ⁽³⁾	PTB (German W&M approval)
Housing	
A	Standard enclosure (polyurethane-covered aluminum IP 66/67)
Cable/Conduit Connections	
1	½-14 NPT, female thread (Includes 2 plugs)
2	M20 x 1.5 Adapters, female thread (Includes 2 plugs, and 3 adapters)
G ⁽⁴⁾	Metal cable glands (½-14 NPT)
E	Eurofast male connector and ½-14 NPT (Includes 2 plugs)
M	Minifast male connector and ½-14 NPT (Includes 2 plugs)
Mechanical Installation	
M ⁽⁵⁾	Integrated installation with Rosemount 565, 566, or 765 (standard)
W ⁽⁶⁾	Mounting kit for wall installations
P ⁽⁶⁾	Mounting kit for wall and pipes (1-2 in. vertical and horizontal pipes)
0	None
Options - none or multiple selections are possible	
WR3	Extended Product Warranty: 3-year limited warranty
WR5	Extended Product Warranty: 5-year limited warranty
ST	Engraved SST tag plate
Q4	Calibration Certificate
Typical Model Number: 2240S P 16 4 A F I1 0 A 1 M ST	

- (1) Temperature sensors of Pt-100 or Cu-90 type, for use in -200 to 250 °C (-328 to 482 °F), can be connected to the Rosemount 2240S.
- (2) Water level sensor only requires Number of Temperature Sensor Inputs code 00, Leads per Temperature Element code 0, and Auxiliary Inputs code A.
- (3) Approval plate, sealing kit and Eich adapter included. One spot position used for external reference.
Available spot elements in Number of Temperature Sensor Inputs = 15, 7 or 3.
Requires Rosemount 2410 Tank Hub with corresponding Custody Transfer Type Approval.
Requires one out of following displays: 2410 with integral display, Rosemount 2230 with corresponding Custody Transfer Type Approval, or TankMaster.
- (4) Min. temperature -20 °C (-4 °F). ATEX / IECEx. Exe approved. Includes 2 plugs, and 3 glands (Includes an M32 gland if combined with Mechanical Installation code W or P).
- (5) M33x1.5 female threaded connection. As standard, the transmitter is not pre-assembled with any temperature sensor.
- (6) For separate installation of temperature sensor and transmitter.

Specifications

Performance specifications

Temperature conversion accuracy

±0.05 °C (±0.09 °F)
Over measuring range and ambient temperature 20 °C (68 °F)

Ambient temperature effect

±0.05 °C (±0.09 °F)

Temperature measuring range

Supports -200 to 250 °C (-328 to 482 °F) for Pt-100

Resolution

± 0.1 °C (± 0.1 °F) according to API chapter 7 and 12

Update time

4 s

General specifications

Number of spot elements and wiring

Up to 16 RTD spot elements or averaging sensors can be connected to a 2240S.

Rosemount temperature / water level sensors (models 565, 566, and 765)

Three wiring types can be used:

- 3-wire RTD with common return (1-16 spot elements)
- 3-wire RTD individual (1-16 spot elements with Rosemount 565, 1-6 spot elements with Rosemount 566, and 1-14 spot elements with Rosemount 765)
- 4-wire RTD individual (1-16 spot elements with Rosemount 565, 1-4 spot elements with Rosemount 566, and 1-10 spot elements with Rosemount 765)

Standard temperature sensor types

Supports Pt-100 (according to IEC/EN60751, ASTM E1137) and Cu-90

Metrology sealing possibility

Yes

Write protect switch

Yes

Configuration specifications

Configuration tool

TankMaster WinSetup is the recommended tool for easy configuration of 2240S. The Tankbus autoconfiguration feature, handled by the Rosemount 2410 Tank Hub, supports 2240S.

Configuration parameters (examples)

Temperature:

- Number of temperature sensor elements
- Temperature element type (spot or average)
- Temperature element position in tank

Water Level Sensor:

- Level offset (difference between tank zero level and water zero level)
- Probe length (autoconfigured by Rosemount 765)

Output variables and units

Spot and average temperature: °C (Celsius), and °F (Fahrenheit)
Free water level (FWL): meter, centimeter, millimeter, feet, or inch

FOUNDATION fieldbus characteristics

Polarity sensitive

No

Quiescent current draw

30 mA

Lift-off minimum voltage

9.0 VDC

Device capacitance / inductance

See "[Product Certifications](#)" on page 8

Class (Basic or Link Master)

Link Master (LAS)

Number of available VCRs

Maximum 20, including one fixed

Links

Maximum 40

Minimum slot time / maximum response delay / minimum intermessage delay

8 / 5 / 8

Blocks and Execution time

1 Resource block,
 3 Transducer blocks (Temperature, Register, AVG_Temp),
 2 Multiple Analog Input (MAI) blocks: 15 ms,
 6 Analog Input (AI) blocks: 10 ms,
 1 Analog Output (AO) block: 10 ms,
 1 Signal Characterizer (SCCR) blocks: 10 ms,
 1 Proportional/Integral/Derivate (PID) block: 15 ms,
 1 Integrator (INT) block: 10 ms
 1 Arithmetic (ARTH) block: 10 ms,
 2 Input Selector (ISEL) block: 10 ms
 1 Control Selector (CS) block: 10 ms,
 1 Output Splitter (OS) block: 10 ms

For more information, see the Foundation™ fieldbus Blocks manual (document number 00809-0100-4783)

Instantiation

Yes

Conforming FOUNDATION fieldbus

ITK 5.2

PlantWeb alert support

Yes

Action support wizards

Restart/stop measurement, write protect device, factory reset - measurement configuration, reset statistics, start/stop device simulation

Advanced diagnostics

Failures/Maintenance/Advisory alerts:
 Software, memory/database, electronics, internal communication, simulation, auxiliary device, auxiliary device measurement, ambient temperature, average temperature measurement, temperature measurement, configuration

Electrical specifications

Power supply

- FISCO: 9.0-17.5 VDC polarity insensitive
- Entity: 9.0-30.0 VDC polarity insensitive

Internal power consumption

0.5 W

Bus current draw

30 mA

Tankbus cabling

0.5-1.5 mm² (AWG 22-16), twisted shielded pairs

Built-in Tankbus terminator

Yes (to be connected if required)

Tankbus to sensor isolation

Minimum 700 V_{AC}

Auxiliary sensor input

Digital bus connection for water level sensor

Mechanical specifications

Housing material

Polyurethane-coated die-cast aluminum

Cable entry (connection/glands)

Three ½ - 14 NPT entries for cable glands or conduits. Two metal plugs to seal any unused ports are enclosed in the delivery

Optional:

- M20 x 1.5 conduit / cable adapter
- Cable glands in metal (½ - 14 NPT)
- 4-pin male Eurofast connector or A size Mini 4-pin male Minifast connector

565/566/765 connection

M33 x 1.5 female threaded connection

Optional:

- An M32 adapter or M32 gland can be used if the 2240S is installed away from the sensor

Installation

The 2240S can be installed directly on top of the temperature / water level sensor or remotely installed on a 33.4-60.3 mm (1 to 2-in) pipe or on a wall

Weight

2.8 kg (6.2 lbs)

Environmental specifications

Ambient temperature

-40 to 70 °C (-40 to 158 °F).

Minimum start-up temperature -50 °C (-58 °F)

Storage temperature

-50 to 85 °C (-58 to 185 °F)

Humidity

0-100% relative humidity

Ingress protection

IP 66 and 67 (Nema 4X)

Transient / built-in lightning protection

According to IEC 61000-4-5, level 1 kV line to ground. Complies with IEEE 587 Category B transient protection and IEEE 472 surge protection

Product Certifications

European ATEX Directive information

EC-Type Examination Certificate Number: FM09ATEX0047X
Control Drawing: 9240 040-976

Special conditions for safe use (x-marking), ATEX & IECEx: Special conditions of use, FM-US & FM-C:

The enclosure contains aluminum and is considered to present a potential risk of ignition by impact or friction. Care must be taken during installation and use to prevent impact or friction.

Rating II 2(1) G Ex ib [ia IIC] IIC T4 Ta=-50 °C to 70 °C FISCO 9240040-976; IP 66/IP 67 is only applicable when supplied from a certified Ex [ib] FISCO Power Supply with triplicated output voltage limitation meeting the requirements for two faults ("ia" voltage limitation) e.g. a Rosemount 2410 Tank Hub.

The Rosemount 2240S Multi-input Temperature Transmitter will not pass the 500 Vrms dielectric strength test and this must be taken into account during installation.

11 Intrinsically Safe

FISCO Field Device (Fieldbus Terminals):



II 1G **CE**⁰⁵⁷⁵

Ex ia IIC T4 (-50 °C ≤ T_a ≤ +70 °C)

U_i=17.5 VDC, I_i=380 mA, P_i=5.32 W, C_i=2.2 nF, L_i=2.0 μH

When supplied from a certified Ex [ib] FISCO Power Supply with triplicated voltage limitation meeting the requirements for two faults ("ia" voltage limitation), e.g. a Rosemount 2410 Tank Hub:



II 2(1)G **CE**⁰⁵⁷⁵

Ex ib [ia IIC] IIC T4 (-50 °C ≤ T_a ≤ +70 °C)

U_i=17.5 VDC, I_i=380 mA, P_i=5.32 W, C_i=2.2 nF, L_i=2.0 μH

Entity (Fieldbus Terminals):



II 1G **CE**⁰⁵⁷⁵

Ex ia IIC T4 (-50 °C ≤ T_a ≤ +70 °C)

U_i=30 VDC, I_i=300 mA, P_i=1.3 W, C_i=2.2 nF, L_i=2.0 μH

RTD Terminals:

U_o=5.9 VDC, I_o=398 mA, P_o=585 mW

Group IIC: C_o ≤ 43 μF, L_o ≤ 0.2 mH

Group IIB: C_o = unlimited, L_o ≤ 0.7 mH

Group IIA: C_o = unlimited, L_o ≤ 1.8 mH

Sensorbus Terminal:

U_o=6.6 VDC, I_o=223 mA, P_o=363 mW

Group IIC: C_o ≤ 22 μF, L_o ≤ 0.7 mH

Group IIB: C_o ≤ 500 μF, L_o ≤ 3.3 mH

Group IIA: C_o = unlimited, L_o ≤ 6 mH

US Factory Mutual (FM-US) certification



Certificate of Compliance: 3035518

Control Drawing: 9240 040-910

15 Intrinsically Safe

FISCO Field Device (Fieldbus Terminals):

Intrinsically safe for Class I, II, III Division 1, Groups A, B, C, D, E, F and G

Temperature Class T4, Ambient Temperature Limits: -50 to +70 °C
Class I Zone 0 AEx ia IIC T4 (-50 °C ≤ T_a ≤ +70 °C)

U_i=17.5 VDC, I_i=380 mA, P_i=5.32 W, C_i=2.2 nF, L_i=2.0 μH

When supplied from a certified AEx [ib] FISCO Power Supply with triplicated voltage limitation meeting the requirements for two faults ("ia" voltage limitation), e.g. a Rosemount 2410 Tank Hub:
Class 1 Zone 1 AEx ib [ia IIC] IIC

U_i=17.5 VDC, I_i=380 mA, P_i=5.32 W, C_i=2.2 nF, L_i=2.0 μH

Entity (Fieldbus Terminals):

Intrinsically safe for Class I, II, III, Division 1, Groups A, B, C, D, E, F and G

Temperature Class T4, Ambient Temperature Limits: -50 to +70 °C
Class I Zone 0 AEx ia IIC T4 (-50 °C ≤ T_a ≤ +70 °C)

U_i=30 VDC, I_i=300 mA, P_i=1.3 W, C_i=2.2 nF, L_i=2.0 μH.

RTD Terminals:

U_o=5.9 VDC, I_o=398 mA, P_o=585 mW

Group A, B, IIC: C_o ≤ 43 μF, L_o ≤ 0.2 mH

Group C, E, IIB: C_o = unlimited, L_o ≤ 0.7 mH

Group D, F, G, IIA: C_o = unlimited, L_o ≤ 1.8 mH

When no connections are made to the Sensorbus Terminal:

U_o=5.9 VDC, I_o=100 mA, P_o=150 mW, C_o=43 μF, L_o=3 mH

Sensorbus Terminal:

U_o=6.6 VDC, I_o=223 mA, P_o=363 mW

Group A, B, IIC: C_o ≤ 22 μF, L_o ≤ 0.7 mH

Group C, E, IIB: C_o ≤ 500 μF, L_o ≤ 3.3 mH

Group D, F, G, IIA: C_o = unlimited, L_o ≤ 6 mH

Canadian Factory Mutual (FM-C) certification

Certificate of Compliance: 3035518C
Control Drawing: 9240 040-910

**16 Intrinsically Safe**

FISCO Field Device (Fieldbus Terminals):

Intrinsically safe for Class I, II, III Division 1, Groups A, B, C, D, E, F and G

Temperature Class T4, Ambient Temperature Limits: -50 to +70 °C
Class I Zone 0 Ex ia IIC T4 (-50 °C ≤ T_a ≤ +70 °C)
U_i=17.5 VDC, I_i=380 mA, P_i=5.32 W, C_i=2.2 nF, L_i=2.0 μH

When supplied from a certified Ex [ib] FISCO Power Supply with triplicated voltage limitation meeting the requirements for two faults ("ia" voltage limitation), e.g. a Rosemount 2410 Tank Hub: Class 1 Zone 1 Ex ib [ia IIC] IIC FISCO system
U_i=17.5 VDC, I_i=380 mA, P_i=5.32 W, C_i=2.2 nF, L_i=2.0 μH

Entity (Fieldbus Terminals):

Intrinsically safe for Class I, II, III, Division 1, Groups A, B, C, D, E, F and G

Temperature Class T4, Ambient Temperature Limits: -50 to +70 °C
Class I Zone 0 Ex ia IIC T4 (-50 °C ≤ T_a ≤ +70 °C)
U_i=30 VDC, I_i=300 mA, P_i=1.3 W, C_i=2.2 nF, L_i=1.5 μH.

RTD Terminals:

U_o=5.9 VDC, I_o=398 mA, P_o=585 mW
Group A, B, IIC: C_o ≤ 43 μF, L_o ≤ 0.2 mH
Group C, E, IIB: C_o = unlimited, L_o ≤ 0.7 mH
Group D, F, G, IIA: C_o = unlimited, L_o ≤ 1.8 mH

When no connections are made to the Sensorbus Terminal:

U_o=5.9 VDC, I_o=100 mA, P_o=150 mW, C_o=43 μF, L_o=3 mH

Sensorbus Terminal:

U_o=6.6 VDC, I_o=223 mA, P_o=363 mW
Group A, B, IIC: C_o ≤ 22 μF, L_o ≤ 0.7 mH
Group C, E, IIB: C_o ≤ 500 μF, L_o ≤ 3.3 mH
Group D, F, G, IIA: C_o = unlimited, L_o ≤ 6 mH

RTD Terminals:

U_o=5.9 VDC, I_o=398 mA, P_o=585 mW
Group IIC: C_o ≤ 43 μF, L_o ≤ 0.2 mH
Group IIB: C_o = unlimited, L_o ≤ 0.7 mH
Group IIA: C_o = unlimited, L_o ≤ 1.8 mH

When no connections are made to the Sensorbus Terminal:

U_o=5.9 VDC, I_o=100 mA, P_o=150 mW, C_o=43 μF, L_o=3 mH

Sensorbus Terminal:

U_o=6.6 VDC, I_o=223 mA, P_o=363 mW
Group IIC: C_o ≤ 22 μF, L_o ≤ 0.7 mH
Group IIB: C_o ≤ 500 μF, L_o ≤ 3.3 mH
Group IIA: C_o = unlimited, L_o ≤ 6 mH

Combination Approvals

KA=I1+I5 (ATEX + FM-US)
KC=I1+I7 (ATEX + IECEx)
KD=I5+I6 (FM-US+FM-C)

For more information on product certificates, refer to the Rosemount 2240S Reference manual (document number 300550EN).

IECEx certification

Certification of Conformity Number: IECEx FMG 10.0010X
Control Drawing: 9240 040-976

17 Intrinsically Safe

FISCO Field Device (Fieldbus Terminals):

Ex ia IIC Ga T4 (-50 °C ≤ T_a ≤ +70 °C)
U_i=17.5 VDC, I_i=380 mA, P_i=5.32 W, C_i=2.2 nF, L_i=2.0 μH

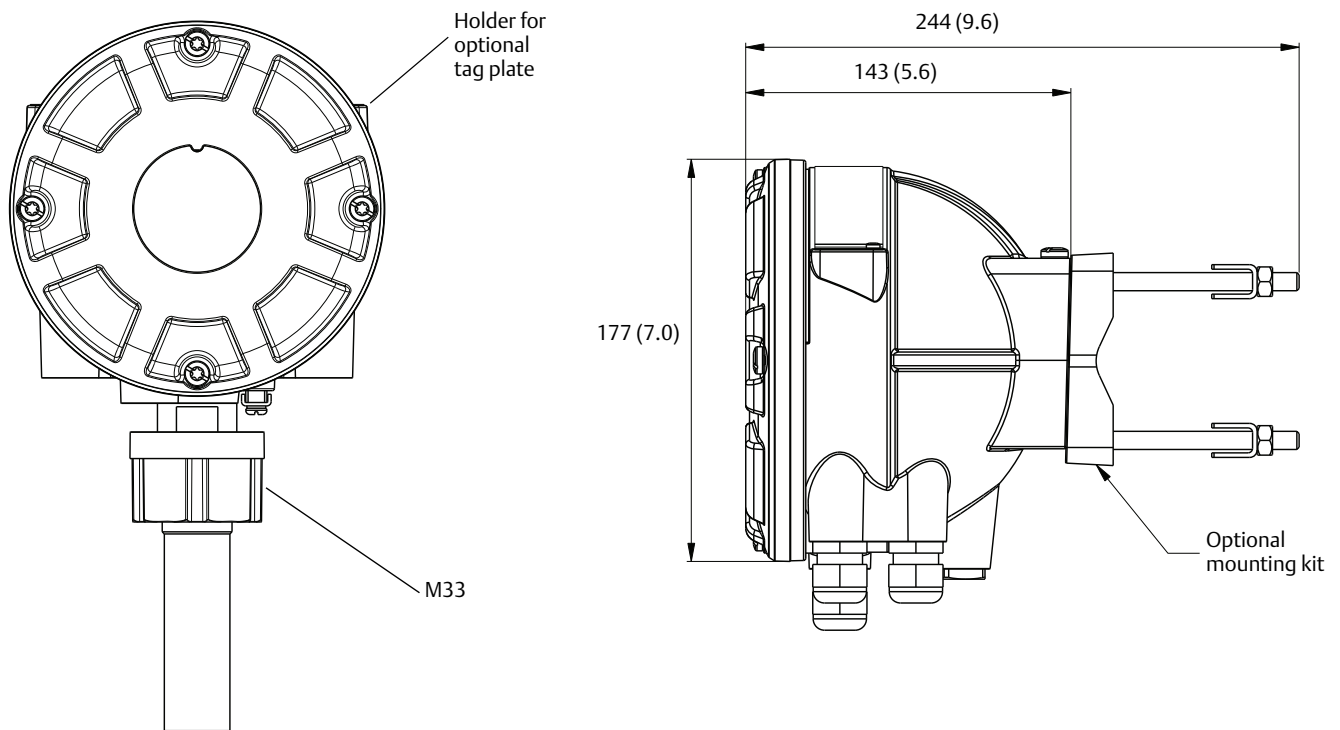
When supplied from a certified Ex [ib] FISCO Power Supply with triplicated voltage limitation meeting the requirements for two faults ("ia" voltage limitation), e.g. a Rosemount 2410 Tank Hub: Ex ib IIC [ia IIC Ga] Gb T4 (-50 °C ≤ T_a ≤ +70 °C)
U_i=17.5 VDC, I_i=380 mA, P_i=5.32 W, C_i=2.2 nF, L_i=2.0 μH

Entity (Fieldbus Terminals):

Ex ia IIC Ga T4 (-50 °C ≤ T_a ≤ +70 °C)
U_i=30 VDC, I_i=300 mA, P_i=1.3 W, C_i=2.2 nF, L_i=2.0 μH

Dimensional Drawings

Figure 1. Rosemount 2240S Multi-input Temperature Transmitter dimensions



Can be installed together with a multiple spot temperature sensor or separately on a 33.4-60.3 mm (1 to 2-in.) pipe, or on a wall













Dimensions are in millimeters (inches)



HIGH ACCURACY

measurement instruments

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