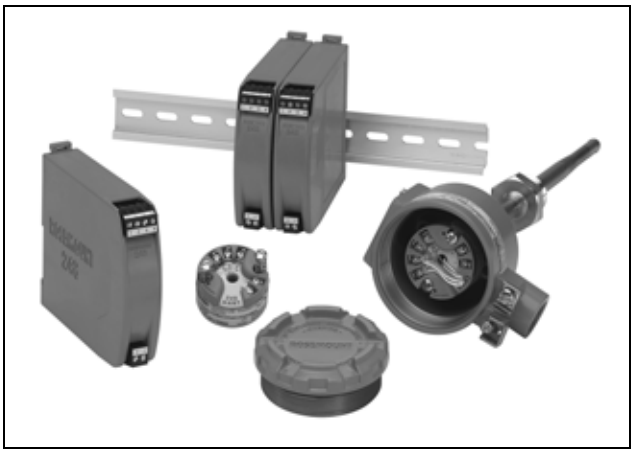
Rosemount 248 Temperature Transmitter and Monitoring Assembly

Product Data Sheet

00813-0100-4825, Rev EA
August 2005



- *Easy to Order – headmount transmitter and sensor assembly available in a single model number*
- *Ready–to–Install. Remove it from the box and install into the process*
- *Unsurpassed performance for temperature monitoring points*
- *Industry standard DIN Form B headmount transmitter size enables mounting in any connection head*
- *New compact railmount style for DIN railmounting*
- *Reliable EMC performance by meeting NAMUR NE21 recommendation*
- *Communicates using open 4–20 mA/HART® Protocol*
- *Available 248C PC-based HART configuration interface*

Content

ROSEMOUNT®

EMERSON™
Process Management

Transmitter Specifications

FUNCTIONAL SPECIFICATIONS

Inputs

User-selectable; sensor terminals rates to 42.4 V dc. See "Transmitter Accuracy and Ambient Temperature Effects" on page 4 for sensor options.

Output

2-wire 4–20 mA, linear with temperature or input; digital output signal superimposed on 4–20 mA signal, available for a *HART* communicator or control system interface.

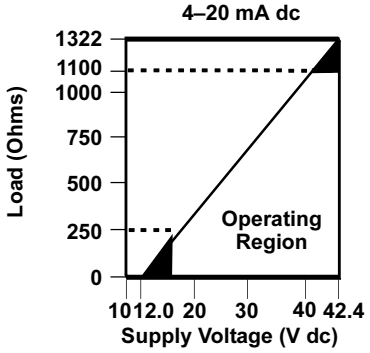
Isolation

Input/output isolation tested to 500 V ac rms (707 V dc) at 50/60 Hz.

Power Supply

An external power supply is required for *HART* devices. The transmitter operates on 12.0 to 42.4 VDC transmitter terminal voltage with load resistance between 250 and 1100 ohms. A minimum of 17.75 VDC power supply is required with a load of 250 ohms. Transmitter power terminals are rated to 42.4 V DC.

Maximum Load = 40.8 x (Supply Voltage – 12.0)



Humidity Limits

0–99% relative humidity, non-condensing

NAMUR Recommendations

The 248 meets the following NAMUR recommendations:

- NE 21 – Electromagnetic compatibility (EMC) for Process and Laboratory Apparatus
- NE 43 – Standard of the signal level breakdown information of digital transmitters
- NE 89 – Standard of temperature transmitters with digital signal processing

Transient Protection

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

Temperature Limits

Operating Limit

- –40 to 185 °F (–40 to 85 °C)(1)

Storage Limit

- –58 to 248 °F (–50 to 120 °C)

Turn-on Time

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

Update Rate

Less than 0.5 seconds

Damping

32 seconds maximum. 5 seconds default

Custom Alarm and Saturation Levels

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

Recommended Minimum Measuring Span

10 K

Software Detected Failure Mode

The values at which the transmitter drives its output in failure mode depends on whether it is configured to standard, custom, or NAMUR-compliant (NAMUR recommendation NE 43) operation. The values for standard and NAMUR-compliant operation are as follows:

TABLE 1. Operation Parameters

	Standard (1)	NAMUR NE43-Compliant(1)
Linear Output:	$3.9 \leq I \leq 20.5$	$3.8 \leq I \leq 20.5$
Fail High:	$21 \leq I \leq 23$ (default)	$21 \leq I \leq 23$ (default)
Fail Low:	$I \leq 3.75$	$I \leq 3.6$

(1) Measured in milliamperes

Certain hardware failures, such as microprocessor failures, will always drive the output to greater than 23 mA.

PHYSICAL SPECIFICATIONS

HART Communicator Connections

Communication Terminal: Clips permanently fixed to the terminals

Materials of Construction

Electronics Housing

- *Noryl*® glass reinforced

Universal (option code U and H) and Rosemount® Connection (option code A and G) Heads

- Housing: Low-copper aluminum (option codes U and A)
  Stainless Steel (option codes G and H)
- Paint: Polyurethane
- Cover O-Ring: Buna–N

(1) -60° F to 185° F (-51° C to 85° C) for K1005 option.

BUZ Head (option code B)

- Housing: Aluminum
- Paint: Aluminum lacquer
- O-Ring Seal: Rubber

Mounting

The 248R attaches directly to a wall or a DIN rail. The 248H installs in a connection head or universal head mounted directly on a sensor assembly or apart from a sensor assembly using a universal head. The 248H can also mount to a DIN rail using an optional mounting clip (see Table 18).

Weight

Code	Options	Weight
248H	Headmount Transmitter	42 g (1.5 oz)
248R	Railmount Transmitter	250 g (8.8 oz)
U	Universal Head	520 g (18.4 oz)
B	BUZ Head	240 g (8.5 oz)
C	Polypropylene Head	90 g (3.2 oz.)
A	Rosemount Connection Head	524 g (18.5 oz)
S	Polished Stainless Steel (SST) Head	537 g (18.9 oz)
G	Rosemount Connection Head (SST)	1700 g (60 oz)
H	Universal Head (SST)	1700 g (60 oz)

Enclosure Ratings

The Universal (option code U) and Rosemount Connection (option code A) Heads are NEMA 4X, IP66, and IP68. The Universal Head with $^1/_2$ NPT threads is CSA Enclosure Type 4X. The BUZ head (option code B) is NEMA 4 and IP65.

PERFORMANCE SPECIFICATIONS

EMC (ElectroMagnetic Compatibility) NAMUR NE21 Standard

The 248 meets the requirements for NAMUR NE21 Rating

Susceptibility	Parameter	Influence
ESD	• 6 kV contact discharge • 8 kV air discharge	None
Radiated	• 80 – 1000 MHz at 10 V/m AM	None
Burst	• 1 kV for I.O.	None
Surge	• 0.5 kV line–line • 1 kV line–ground (I.O. tool)	None
Conducted	• 150 kHz to 80 MHz at 10 V	None

CE Mark

The 248 meets all requirements listed under IEC 61326: Amendment 1, 1998.

Power Supply Effect

Less than ±0.005% of span per volt

Vibration Effect

The 248 is tested to the following specifications with no effect on performance:

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

Stability

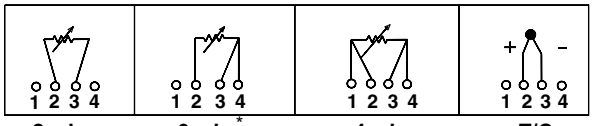
For RTD and thermocouple inputs the transmitter will have a stability of ±0.1% of reading or 0.1 °C (whichever is greater) for twelve months

Self Calibration

The analog-to-digital measurement circuitry automatically self-calibrates for each temperature update by comparing the dynamic measurement to extremely stable and accurate internal reference elements.

Sensor Connections

248 Sensor Connections Diagram



2-wire RTD and Ω | **3-wire* RTD and Ω** | **4-wire RTD and Ω** | **T/C and mV**

248-0000B01C

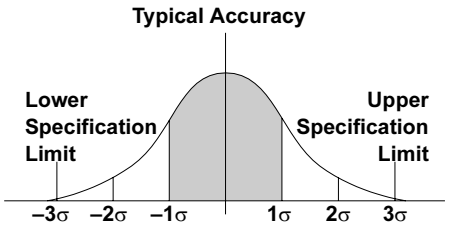
* *Rosemount Inc. provides 4-wire sensors for all single element RTDs. You can use these RTDs in 3-wire configurations by leaving the unneeded leads disconnected and insulated with electrical tape.*

Rosemount Conformance to Specifications

A Rosemount transmitter not only meets its published specifications, but most likely exceeds them. Advanced manufacturing techniques and the use of Statistical Process Control provide specification conformance to at least ± 3σ(1). Our commitment to continual improvement ensures that product design, reliability, and performance will improve annually.

For example, the Reference Accuracy distribution for the 248 Temperature Transmitter is shown to the right. Our Specification Limits are ± 0.2 °C, but, as the shaded area shows, approximately 68% of the units perform three times better than the limits. Therefore, it is very likely that you will receive a device that performs much better than our published specifications.

Conversely, a vendor who "grades" product without using Process Control, or who is not committed to ± 3σ performance, will ship a higher percentage of units that are barely within advertised specification limits.



3144-GRAPH

Accuracy distribution shown is for the 248 transmitter, configured fro use with Pt 100 RTD sensor, Range 0 to 100 °C

(1) Sigma (σ) is a statistical symbol to designate the standard deviation from the mean value of a normal distribution.

Transmitter Accuracy and Ambient Temperature Effects

NOTE
The accuracy and ambient temperature effect is the greater of the fixed and percent of span values (see example below).

TABLE 2. 248 Transmitter Input Options, Accuracy, and Ambient Temperature Effects

Sensor	Transmitter Input Ranges		Accuracy(12)		Temperature Effects per 1.0 °C (1.8 °F) Change in Ambient Temperature(1)(12)	
	°C	°F	Fixed	% of Span	Fixed	% of Span
2-, 3-, 4-wire RTDs						
Pt 100(2) (α = 0.00385)	–200 to 850	–328 to 1562	0.2 °C (0.36 °F)	±0.1	0.006 °C (0.011 °F)	±0.004
Pt 100(3) (α = 0.003916)	–200 to 645	–328 to 1193	0.2 °C (0.36 °F)	±0.1	0.006 °C (0.011 °F)	±0.004
Pt 200(2)	–200 to 850	–328 to 1562	1.17 °C (2.11 °F)	±0.1	0.018 °C (0.032 °F)	±0.004
Pt 500(2)	–200 to 850	–328 to 1562	0.47 °C (0.85 °F)	±0.1	0.018 °C (0.032 °F)	±0.004
Pt 1000(2)	–200 to 300	–328 to 572	0.23 °C (0.41 °F)	±0.1	0.010 °C (0.018 °F)	±0.004
Ni 120(4)	–70 to 300	–94 to 572	0.16 °C (0.29 °F)	±0.1	0.004 °C (0.007 °F)	±0.004
Cu 10(5)	–50 to 250	–58 to 482	2 °C (3.60 °F)	±0.1	0.06 °C (0.108 °F)	±0.004
Thermocouples(6)						
Type B(7) (8)	100 to 1820	212 to 3308	1.5 °C (2.70 °F)	±0.1	0.056 °C (0.101 °F)	±0.004
Type E(7)	–50 to 1000	–58 to 1832	0.4 °C (0.72 °F)	±0.1	0.016 °C (0.029 °F)	±0.004
Type J(7)	–180 to 760	–292 to 1400	0.5 °C (0.90 °F)	±0.1	0.016 °C (0.029 °F)	±0.004
Type K(7) (9)	–180 to 1372	–292 to 2502	0.5 °C (0.90 °F)	±0.1	0.02 °C (0.036 °F)	±0.004
Type N(7)	–200 to 1300	–328 to 2372	0.8 °C (1.44 °F)	±0.1	0.02 °C (0.036 °F)	±0.004
Type R(7)	0 to 1768	32 to 3214	1.2 °C (2.16 °F)	±0.1	0.06 °C (0.108 °F)	±0.004
Type S(7)	0 to 1768	32 to 3214	1 °C (1.80 °F)	±0.1	0.06 °C (0.108 °F)	±0.004
Type T(7)	–200 to 400	–328 to 752	0.5 °C (0.90 °F)	±0.1	0.02 °C (0.036 °F)	±0.004
DIN Type L(10)	–200 to 900	–328 to 1652	0.7 °C (1.26 °F)	±0.1	0.022 °C (0.040 °F)	±0.004
DIN Type U(10)	–200 to 600	–328 to 1112	0.7 °C (1.26 °F)	±0.1	0.026 °C (0.047 °F)	±0.004
Type W5Re/W26Re(11)	0 to 2000	32 to 3632	1.4 °C (2.52 °F)	±0.1	0.064 °C (0.115°F)	±0.004
Millivolt Input	–10 to 100 mV		0.03 mV	±0.1	0.001 mV	±0.004
2-, 3-, 4-wire Ohm Input	0 to 2000 ohms		0.7 ohm	±0.1	0.028 ohm	±0.004

(1) Change in ambient is with reference to the calibration temperature of the transmitter at 68 °F (20 °C) from factory.

(2) IEC 751, 1995

(3) JIS 1604, 1981

(4) Edison Curve No. 7

(5) Edison Copper Winding No. 15

(6) Total accuracy for thermocouple measurement: sum of accuracy +0.5 °C.

(7) NIST Monograph 175, IEC 584

(8) Fixed accuracy for NIST Type B is ±5.4 °F (±3.0 °C) from 212 to 572 °F (100 to 300 °C).

(9) Fixed accuracy for NIST Type K is ±1.3 °F (±0.7 °C) from -292 to -130 °F (-130 to -90 °C).

(10) DIN 43710

(11) ASTME 988-96

(12) Accuracy and Ambient Temperature Effects are tested and verified down to -60° F (-51° C) for K1005 option.

Transmitter Accuracy Example

When using a Pt 100 (a = 0.00385) sensor input with a 0 to 100 °C span, use the greater of the two calculated values. In this case the accuracy would be +/-0.2 °C.

Transmitter Temperature Effects Example

Transmitters can be installed in locations where the ambient temperature is between –40 and 85 °C (–40 and 185 °F). In order to maintain excellent accuracy performance, each transmitter is individually characterized over this ambient temperature range at the factory.

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

- Temperature Effects: 0.006 °C x (30 - 20) = 0.06 °C

Total Transmitter Error

Worst Case Transmitter Error: Accuracy + Temperature Effects = 0.2 °C + 0.06 °C = 0.26 °C

Total Probable Transmitter Error: $\sqrt{0.2^2 + 0.06^2} = 0.21°C$

Product Certifications

APPROVED MANUFACTURING LOCATIONS

Rosemount Inc. – Chanhassen, Minnesota, USA

Emerson Process Management Temperature GmbH – Germany

Emerson Process Management Asia Pacific – Singapore

EUROPEAN UNION DIRECTIVE INFORMATION

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting your local sales representative.

ATEX Directive (94/9/EC)

Rosemount Inc. complies with the ATEX Directive.

Electro Magnetic Compatibility (EMC) (89/336/EEC)

All Models: EN 50081-1: 1992; EN 50082-2:1995; EN 61326-1:1997 – Industrial

CE Mark

The 248 meets all requirements listed under IEC 61326:Amendment 1, 1998

HAZARDOUS LOCATIONS CERTIFICATIONS(1)

North American Certifications

Factory Mutual (FM)

I5 FM Intrinsic Safety and Non-incendive
Intrinsically Safe for Class I/II/III, Division 1, Groups A, B, C, D, E, F, and G. Non-incendive Field Circuit for Class I, Division 2, Groups A, B, C, and D. Intrinsically Safe and non-incendive when installed in accordance with Rosemount drawing 00248-1055.

Temperature Codes:
T5 (T_{amb} = –50 to 75 °C)
T6 (T_{amb} = –50 to 40 °C)

TABLE 5. Entity Parameters

Loop/Power	Sensor
U_i = 30 Vdc	U_o = 45 Vdc
I_i = 130 mA	I_o = 26 mA
P_i = 1.0 W	P_o = 290 mW
C_i = 3.6 nF	C_o = 0.4 nF
L_i = 13.8 µH	L_o = 49.2 mH

E5 FM Explosion-Proof
Explosion-Proof for Class I, Division 1, Groups B, C, and D. Dust Ignition Proof for Class II/III, Division 1, Groups E, F, G when installed in accordance with Rosemount drawing 00644-1049.

Temperature Code:
T5 (T_{amb} = –40 to 85 °C)

Combination Certifications

K5 Combination of I5 and E5.

Canadian Standards Association (CSA) Approvals

I6 CSA Intrinsically Safe and Class I, Division 2
Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D when installed in accordance with Rosemount drawing 00248-1056.

Temperature Codes:
T5 (T_{amb} = –50 to 60 °C)
T6 (T_{amb} = –50 to 40 °C)

Suitable for use in Class I, Division 2, Groups A, B, C, and D.

K6 CSA Intrinsically Safe, Explosion-Proof, and Class I, Division 2.
Combination of I6 and Explosion-Proof for Class I, Division 1, Groups B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1 hazardous locations, when installed in accordance with Rosemount drawing 00644-1059.

Suitable for Class I, Division 2, Groups A,B, C, and D.
Ambient Temperature Limit: –50 to 85°C

European Certifications

I1 ATEX Intrinsic Safety
Certificate Number: Baseefa03ATEX0030X
ATEX Marking: ⟨Ex⟩ II 1 G
CE 1180
EEx ia IIC

Temperature Codes:
T5 (–60 ≤ T_{amb} ≤ 80 °C)
T6 (–60 ≤ T_{amb} ≤ 60 °C)

TABLE 6. Entity Parameters

Loop/Power	Sensor
U_i = 30 Vdc	U_o = 45 Vdc
I_i = 130 mA	I_o = 26 mA
P_i = 1.0 W	P_o = 290 mW
C_i = 3.6 nF	C_i = 2.1 nF
L_i = 0	L_i = 0

Special Conditions for Safe Use (X):
The apparatus must be installed in an enclosure which affords it a degree of protection of at least IP20.
Non-metallic enclosures must have a surface resistance of less than 1 GOHM; light alloy or zirconium enclosures must be protected from impact and friction when installed.

(1) Consult factory for availability.

E1 ATEX Flame-Proof
Certificate Number: KEMA99ATEX8715
ATEX Marking: ⟨Ex⟩ II 2 G
CE 1180
EEx d IIC
TABLE 7. Input Parameters

U_{max} = 42.4 Vdc
I_{max} = 24 mA

Temperature Codes:
T6 (–40 ≤ T_{amb} ≤ 65 °C)

N1 ATEX Type n
Certificate Number: BAS00ATEX3145
ATEX Marking: ⟨Ex⟩ II 3
EEx nL IIC
TABLE 8. Input Parameters

U_{max} = 45 V

Temperature Codes:
T5 (–40 ≤ T_{amb} ≤ 70 °C)

NC ATEX Type n Component
Certificate Number: Baseefa03ATEX0032U
ATEX Marking: ⟨Ex⟩ II 3G
EEx nA IIC
TABLE 9. Input Parameters

U_i = 42.4 V
C_i = 3.6nF
L_i = 0

Temperature Codes:
T5 (–60 ≤ T_{amb} ≤ 80°C)
T6 (–60 ≤ T_{amb} ≤ 60°C)

ND ATEX Dust Ignition Proof
Certificate Number: KEMA99ATEX8715
ATEX Marking: II 1 D
CE 1180
T95 C (-40 ≤ T_{amb} ≤ 85 °C)
IP66
TABLE 10. Input Parameters

U_{max} = 42.4 Vdc
I_{max} = 24 mA

Australian Certifications

Standard Australia Quality Assurance Service (SAA) Approvals

E7 SAA Explosion-Proof
Certificate Number: AUS Ex 3706X
Ex d IIC
Temperature Codes:
T6 (–40 ≤ T_{amb} ≤ 65 °C)

Special Conditions for Safe Use (X):

1. A thermowell must be utilized on installations incorporating a DIN style or a spring loaded sensor assembly, with all threaded connections sealed with sealing tape to maintain the IP rating of IP66/IP68 (3 meters).
2. When a gland is utilized on installation, the gland must be Standards Australia certified and must be capable of maintaining the IP rating. This also requires the use of thread sealing tape on all gland entries.

Brazilian Certifications

Centro de Pesquisas de Energia Eletrica (CEPEL) Approval

I2 CEPEL Intrinsic Safety

Japanese Certifications

Japanese Industrial Standard (JIS) Approvals

I4 JIS Intrinsic Safety

E4 JIS Explosion-Proof

IECEx Certifications

I7 IECEx Intrinsic Safety (Zone 0)
Certificate Number: TSA IECEx 04.0004X
Ex ia IIC

Temperature Codes:
T5 (T_{amb} = -60 °C to 80 °C)
T6 (T_{amb} = -60 °C to 40 °C))

TABLE 11. Entity Parameters

Ex ia Terminals ±	Sensor
U_i = 30 Vdc	U_o = 45 Vdc
I_i = 130 mA	I_o = 26 mA
P_i = 1.0 W	P_o = 290 mW
C_i = 3.63 nF	C_i = 10 nF
L_i = 0 mH	L_i = 26 mH

Conditions of Certification:

1. It is a condition of safe use that the input entity parameters must be taken into account when connecting to a supply. For sensor output terminals, the sensor entity parameters shall be taken into account during installation.
2. It is a condition of safe use that the apparatus shall only be supplied from a galvanically isolated safety barrier with output current limited by a minimum 225 Ohms resistor.
3. It is a condition of safe use that the transmitter must be mounted in an enclosure that suits Group IIC application and affords a degree of protection of at least IP20 for Ex ia version, and of at least IP54 for Ex n version.
4. It is a condition of safe use that the apparatus shall be installed according to the installation drawing 00248-1057.

N7 IECEx Type n (Zone 2)
Certificate Number: TSA IECEx 04.0004X
Ex n IIC

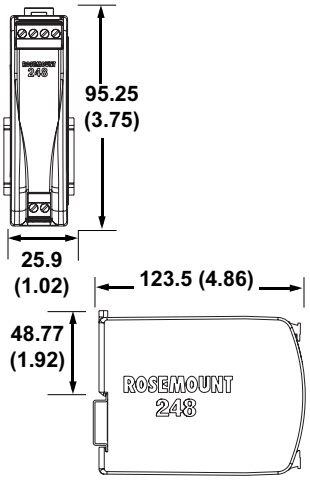
Temperature Codes:
T5 (T_{amb} = -60 °C to 70 °C)
T6 (T_{amb} = -60 °C to 50 °C)

TABLE 12. Ex n Input Parameters

Ex n Terminals ±
U_i = 45 V

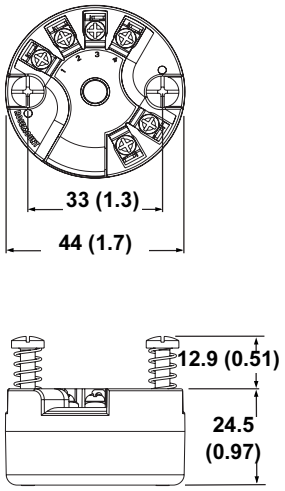
Dimensional Drawings

248R Railmount Transmitter



248H Headmount Transmitter

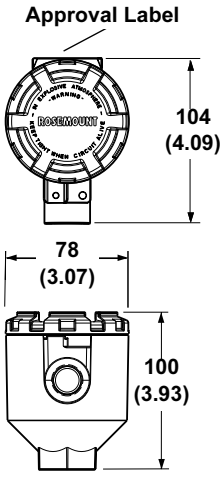
(enlarged)



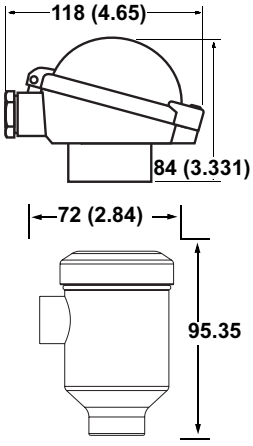
Dimensions are in millimeters (inches)

Enclosures

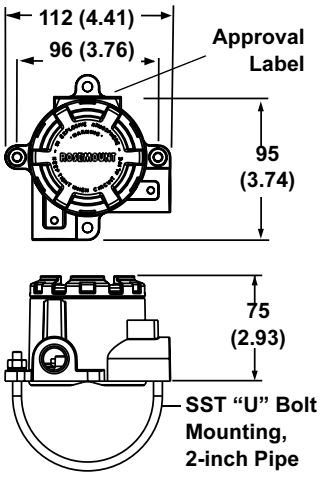
Connection Head



BUZ and Polypropylene Heads (option codes B and C) and Mini SST Head (option code S)



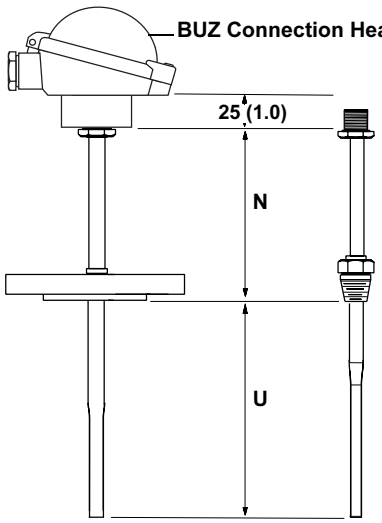
Universal Head[1] (option codes H and U)



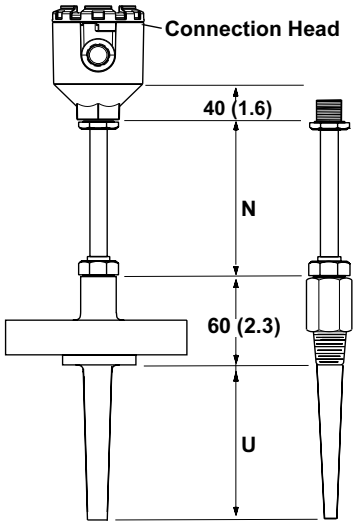
(1) *A "U" Bolt is shipped with each universal head unless a sensor is ordered assembled to the enclosure. However, since the head can be integrally mounted to the sensor it may not need to be used.*

Examples of 248 Transmitter and Sensor Assemblies with Thermowells

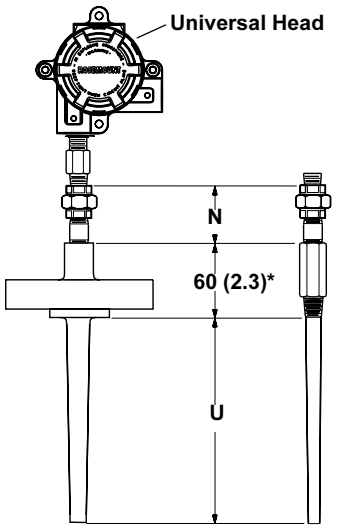
Tubular Thermowell and DIN Plate Style Sensor



Barstock Thermowell and DIN Plate Style Sensor



Barstock Thermowell, Nipple-Union Extension, and 1/2-in. NPT Spring Loaded Sensor



SENSORS_0000B01E, 0000C01C, 0000A01I

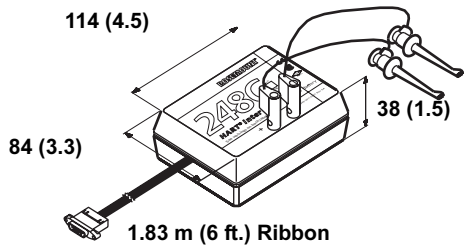
** 80 (3.2) for Class 900 flanges and larger*

N = Extension Length, U= Thermowell Immersion Length, Dimensions are in millimeters (inches)

SEE ORDERING TABLES FOR MORE ASSEMBLY OPTIONS

248C Configuration Interface

Option 1: HART Interface Box



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248 Ordering Information

TABLE 13. With or without DIN Plate Style Sensor and Tubular Thermowells (millimeters)

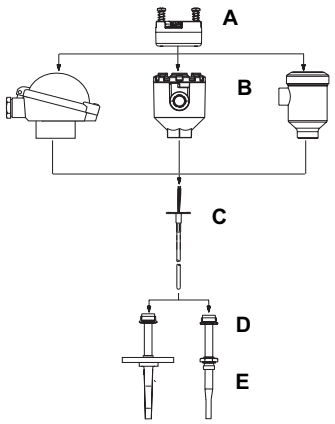
Model	Product Description
248H	Smart DIN B Head Mount Temperature Transmitter

Code	Output Protocol
A	4–20 mA with Digital Signal based on *HART* Protocol

Code	Product Certifications	Enclosure Option Codes Permitted
Hazardous Area Certificates (consult factory for availability)		
I1	ATEX Intrinsic Safety	A, B, N, S, G
E1	ATEX Flame-Proof	A, G
N1	ATEX Type n	A, G
NC(1)	ATEX Type n Component	N
ND	ATEX Dust Ignition Proof	A, G
I5	FM Intrinsic Safety and Class I, Division 2	A, B, N, G
E5	FM Explosion-Proof	A, G
K5	FM Intrinsic Safety, Explosion-Proof, and Class I, Division 2	A, G
I6	CSA Intrinsic Safety and Class I, Division 2	A, B, N, G
K6	CSA Intrinsic Safety, Explosion-Proof, and Class I, Division 2	A
I7	IECEx Intrinsic Safety	A, B, N, G
E7	SAA Flame-Proof	A, G
N7	IECEx Type n	A, B, G
I2	CEPEL Intrinsic Safety	A, B, N, G
I4	JIS Intrinsic Safety	A, B, N, G
E4	JIS Flame-Proof	A, G
NA	No Approvals	A, B, N, C, S, G

Code	Enclosures
A	Rosemount Connection Head, DIN IP68, Aluminum
B	BUZ Connection Head, DIN, Aluminum
C(5)	Polypropylene Connection Head, DIN
G	Rosemount Connection Head, DIN IP 68, Stainless Steel
S(5)	Connection Head, DIN B IP 66, Polished Stainless Steel
N	No Enclosure

Code	Cable/Conduit Entry for Enclosures
1	M20 x 1.5
2(2)	1/2-inch NPT
0	No Enclosure



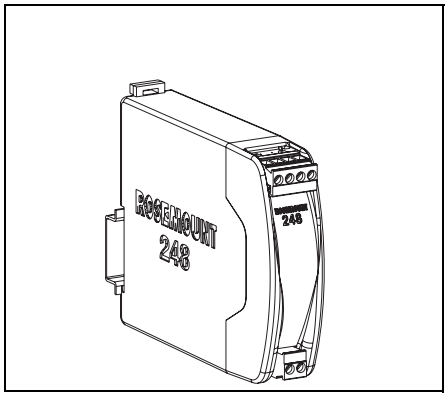
A = Transmitter
B = Enclosures
C = Sensors
D = Extensions
E = Thermowells

Code	Sensor Type	Style	Type
ZR	PT 100 RTD	DIN Plate	4-Wire, Single Element, IEC
ZJ	Type J Thermocouple	DIN Plate	Ungrounded, Single Element, IEC
ZK	Type K Thermocouple	DIN Plate	Ungrounded, Single Element, IEC
XA(3)	Sensor Specified Separately and Assembled to the Transmitter		NA
NS(4)	No Sensor	NA	NA

continued on next page

TABLE 16. 248R Railmount Transmitter

Model	Product Description
248R	Smart DIN Rail Mount Temperature Transmitter
Code	**Output Protocol**
A	4-20mA with Digital Signal based on HART Protocol
Code	**Product Certifications**
I1	ATEX Intrinsic Safety
NC	ATEX Type n Component
I5	FM Intrinsic Safety and Class I, Division 2
I6	CSA Intrinsic Safety and Class I, Division 2
I7(1)	IECEx Intrinsic Safety
I2(1)	CEPEL Intrinsic Safety
I4(1)	JIS Intrinsic Safety
NA	No Approvals



Code	Options
Special Options	
C1	Factory Customer Configuration of Alarm and Saturation Levels, Date, Descriptor and Message Field
A1	Analog Output Levels Compliant with NAMUR-Recommendations, NE43: High Alarm
CN	Analog Output Levels Compliant with NAMUR-Recommendations, NE43: Low Alarm
C4	5-Point Calibration (Use option code Q4 to generate a calibration certificate)
Q4	Calibration Certificate (3-Point standard; use option codes C4 with Q4 for a 5-Point Calibration Certificate)
F6	60 Hz Line Voltage Filter
Typical Model Number: 248R A I1 Q4	

(1) Consult Factory for availability

248C Configuration Interface Specifications

CONFIGURATION SOFTWARE

The 248C PC-based configuration software for the Rosemount 248 allows comprehensive configuration of the transmitters. Used in conjunction with various Rosemount or user-supplied hardware modems, the software provides the tools necessary to configure the 248 transmitters including the following parameters:

- Process Variable
- Sensor Type
- Number of Wires
- Engineering Units
- Transmitter Tag Information
- Damping
- Alarming Parameters

CONFIGURATION HARDWARE

The 248C Configuration Interface has 4 hardware options as follows:

Option “0”: Software Only

Customer must provide appropriate communications hardware (modem, power supply, etc.).

Option “1”: HART Interface Box

HART interface box including an integrated serial modem and battery-powered transmitter power supply. Only suitable for off-line transmitter configuration. Requires PC serial port. *Will not work with powered loops.*

Option “2”: Serial HART Modem

Serial HART modem. Customer must provide separate loop power supply and resistor. Requires PC serial port. *Suitable for use with powered loops.*

Option “3”: USB HART Modem

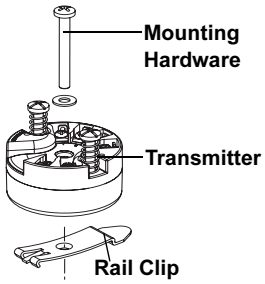
USB (Universal Serial Bus) HART modem. Customer must provide separate loop power supply and resistor. Requires PC with USB port. *Suitable for use with powered loops.*

TABLE 17. 248C Configuration Interface

Model	Product Description
248C(1)	PC-based HART Configuration Software
Code	**Communications Hardware Options**
0	Software Only (no Modem)
1	Software with 248C HART Interface Box (Serial Interface with Transmitter Power Supply)
2	Software with Serial HART Modem
3	Software with USB (Universal Serial Bus) HART Modem
Typical Model Number: 248C 1	

(1)Consult Factory for availability

TABLE 18. 248 Transmitter Accessories



Part Description	Part Number
Aluminum Alloy Universal Head – M20 Entries	00644-4420-0002
Aluminum Alloy Universal Head – 1/2 NPT Entries	00644-4420-0001
Aluminum Alloy Rosemount Connection Head – M20 Conduit Entry, M24 Instrument Entry	00644-4410-0023
Aluminum Alloy Rosemount Connection Head – 1/2 NPT Conduit Entry and M24 Instrument Entry	00644-4410-0013
Aluminum Alloy BUZ Head – M20 Conduit Entry, M24 Instrument Entry	00644-4196-0023
Aluminum Alloy BUZ Head – M20 Conduit Entry and 1/2 NPT Instrument Entry	00644-4196-0021
Aluminum Alloy BUZ Head – 1/2 NPT Conduit Entry	00644-4196-0011
External Ground Screw Assembly Kit	00644-4431-0001
Kit, Hardware for Mounting a 248 to a DIN Rail (see left picture-top hat rail, symmetric)	00248-1601-0001
Standard Cover for Universal or Rosemount Connection Heads	03031-0292-0001
Snap Rings Kit (used for assembly to DIN Plate Style sensor)	00644-4432-0001

Hardware Tag

- no charge
- 20 characters maximum
- transmitter enclosure, sensor, and thermowell if applicable will be tagged in accordance with customer requirements

Software Tag

- no charge
- the transmitter can store up to 8 characters. If no characters are specified, the first 8 characters of the hardware tag are the default.

Configuration

When ordering a transmitter and sensor assembly in one model number, the transmitter will be configured for the sensor that is ordered.

When a transmitter is ordered alone, the transmitter will be shipped as follows (unless specified):

Sensor Type	RTD, Pt 100 (α=0.00385, 4-wire)
4 mA Value	0 °C
20 mA Value	100 °C
Damping	5 seconds
Output	Linear with temperature
Failure Mode	High/Upscale
Line Voltage Filter	50 Hz
Tag	See Hardware Tag

Options

The following table lists the requirements necessary to specify a custom configuration.

Option Code	Requirements/ Specification
C1: Factory Configuration Data (CDS required)	Date: day/month/year Descriptor: 16 alphanumeric characters Message: 32 alphanumeric character Analog Output: Alarm and saturation levels
A1: NAMUR-Compliant, High Alarm	See Table 1 on page 2
CN: NAMUR-Compliant, Low Alarm	See Table 1 on page 2
Q4: Calibration Certificate	Will include 3-Point calibration at 0, 50, and 100% analog and digital output points
C4: Five Point Calibration	Will include 5-point calibration at 0, 25, 50, 75, and 100% analog and digital output points. Use with Calibration Certificate Q4.
F6: 60 Hz Line Filter	Calibrated to a 60 Hz line voltage filter instead of 50 Hz filter

Configuration Data Sheet

Customer Information

Customer

P.O. No

Model No.

Line Item

Input–Output Information (software selectable)

Sensor Type

- ☐ **Pt 100 α = 0.00385 ***
- ☐ Pt 100 α = 0.003916
- ☐ Pt 200 α = 0.00385
- ☐ Pt 500 α = 0.00385
- ☐ Pt 1000 α = 0.00385
- ☐ Cu 10
- ☐ Ni 120
- ☐ Ohms

No. of Leads

- ☐ 2-Wire
- ☐ 3-Wire
- ☐ **4-Wire ***

- ☐ NIST Type B T/C
- ☐ NIST Type E T/C
- ☐ NIST Type J T/C
- ☐ NIST Type K T/C
- ☐ NIST Type N T/C
- ☐ NIST Type R T/C
- ☐ NIST Type S T/C

- ☐ NIST Type T T/C
- ☐ DIN Type L T/C
- ☐ DIN Type U T/C
- ☐ W5Re/W26Re
- ☐ mV

4–20 mA Points and Damping

4 mA Value

- ☐ **0 °C ***
- ☐ _____ °C
- ☐ _____ °F
- ☐ _____ °R
- ☐ _____ K
- ☐ _____ mV
- ☐ _____ Ohms

20 mA Value

- ☐ **100 °C ***
- ☐ _____ °C
- ☐ _____ °F
- ☐ _____ °R
- ☐ _____ K
- ☐ _____ mV
- ☐ _____ Ohms

Damping

- ☐ **5 Seconds ***
- ☐ Other _____ (Value must be less than 32 sec.)

Tagging

Hardware Tag ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ (13 characters maximum)

Software Tag ___ ___ ___ ___ ___ ___ ___ ___ (8 characters maximum - default is first 8 characters of the hardware tag)

Transmitter Information

Descriptor (C1Option) ☐ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ (16 characters maximum)

Message (C1 Option) ☐ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___
___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ (32 characters max)

Date (C1 Option) ☐ Day __ __ (numeric) __ __ __ Month (alphabetic) __ __ Year (numeric)

Software Detected Failure Mode and Software Security

Software Detected Failure Mode ☐ **High** * ☐ Low

Software Security ☐ **Off** * ☐ On

Signal Selection

☐ **4-20 mA with simultaneous digital signal based on *HART* protocol***

☐ Burst mode of *HART* digital process variable

Burst mode output options:

- ☐ Primary variable, percent of range
- ☐ All dynamic variables in engineering units
- ☐ Primary variable in percent of range and mA
- ☐ All dynamic variables in engineering units and the primary variable mA value

☐ Multidrop Communication — Transmitter Address (1-15): ___ ___ (default = 1)

Alarm and Saturation Values

☐ **Rosemount Standard** *

☐ NAMUR-compliant. *Available with option code A1 or CN.*

☐ Custom

- ☐ High Alarm Level: _____ mA (must be between 21.0 and 23.0 mA)
- ☐ Low Alarm Level: _____ mA (must be between 3.5 and 3.75 mA)
- ☐ High Saturation Level: _____ mA (must be between 20.5 mA and the High Alarm Value minus 0.1 mA)
- ☐ Low Saturation Level: _____ mA (must be between the Low Alarm Value plus 0.1 mA and 3.9 mA)

*** = Standard configuration when no sensor is ordered in the model number**