

Rosemount™ 148 Temperature Transmitter



- Basic temperature transmitter offers a cost-effective solution for temperature monitoring points.
- Standard transmitter design provides flexible and reliable performance in process environments.
- Experience lower overall installation costs when compared to wiring sensor directly, reducing the need for expensive extension wires, and multiplexers.
- PC-based configuration interface delivers a programmer, cables, and the software needed for transmitter configuration.
- Explore the benefits of a complete point solution from Rosemount Temperature.

Rosemount 148 Temperature Transmitter

Basic temperature transmitter offers a cost-effective solution for temperature monitoring points

- DIN B style head mount transmitter
- Variety of DIN B enclosure options
- 4-20 mA analog protocol
- Single sensor capability with universal sensor inputs (RTD, T/C, ohms)
- PC-based configuration

Standard transmitter design provides flexible and reliable performance

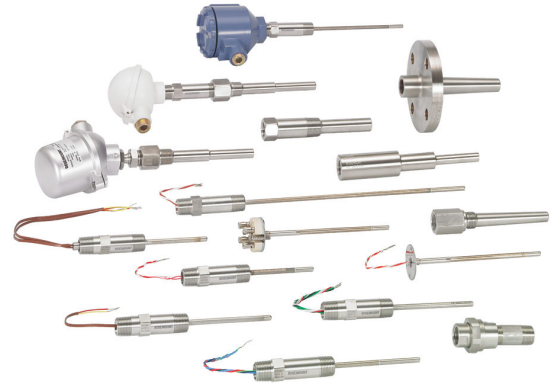
- Offers improved measurement accuracy and reliability over direct-wiring a sensor to the digital control system for a lower overall installation cost
- One-year stability rating reduces maintenance costs
- PC-based configuration interface delivers a programmer, cables, and the software needed for transmitter configuration
- Compensation for ambient temperature enhances transmitter performance

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Explore the benefits of a complete point solution from Rosemount Temperature Measurement

- An “Assemble To Sensor” option enables Emerson to provide a complete point temperature solution, delivering an installation-ready transmitter, and sensor assembly.
- Emerson offers a selection of RTDs, thermocouples, and thermowells that bring superior durability and Rosemount reliability to temperature sensing, complementing the Rosemount Transmitter portfolio.



Experience global consistency and local support from numerous worldwide Rosemount Temperature manufacturing sites



- World-class manufacturing provides globally consistent products from every factory and the capacity to fulfill the needs of any project, large or small.
 - Experienced Instrumentation Consultants help select the right product for any temperature application and advise on best installation practices.
 - An extensive global network of Emerson service and support personnel can be onsite when and where needed.
-
- Looking to measure more temperature points in a cost-effective way? Consider a wireless temperature solution. The Rosemount 148 Wireless Temperature Transmitter is solid performing, yet economical.
 - For temperature installations that require reliable measurement, the Rosemount 148 Temperature Transmitter is a cost-effective solution.

Ordering information



The Rosemount 148 Temperature Transmitter has a standard transmitter design that provides reliable performance in process environments.

Transmitter features include:

- 4-20 mA analog output
- Variety of DIN B enclosure options
- 3-Point calibration certificate (option code Q4)
- Assemble to sensor option (option code XA)

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Online product configurator

Many products are configurable online using our Product Configurator. Select the **Configure** button or visit [Emerson.com](https://emerson.com) to start. With this tool's built-in logic and continuous validation, you can configure your products more quickly and accurately.

Model codes

Model codes contain the details related to each product. Exact model codes will vary. An example of a typical model code is shown in [Figure 1](#).

Figure 1: Model code example

3144P D1 A 1 NA	M5 DA1 Q4
1	2

1. Required model components (choices available on most)
2. Additional options (variety of features and functions that may be added to products)

Specifications and options

The purchaser of the equipment must specify and select the product materials, options, or components.

Optimizing lead time

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

Required model components

Model

Code	Description	
148	PC – Programmable temperature transmitter	

Transmitter type

Code	Description	
H	DIN B head mount	★

Transmitter output

Code	Description	
N	Analog output	★

Product certifications

Code	Description	Enclosure option codes permitted	
I5	USA Intrinsic Safety and Class 1, Division 2	A, U, B, C, N, G, H, T	★
E5 ⁽¹⁾	USA Explosion-Proof	A, U, G, H	★
K5 ⁽¹⁾	USA Intrinsic Safety, Explosion-Proof, and Class 1, Division 2	A, U, G, H, T	★
I6	Canada Intrinsic Safety and Class 1, Division 2	A, U, B, C, N, G, H, T	★
K6 ⁽¹⁾	Canada Intrinsic Safety, Explosion-Proof, and Class 1, Division 2	A, U, G, H	★
I1	ATEX Intrinsic Safety	All enclosures	★
E1 ⁽¹⁾	ATEX Flameproof	A, U, G, H	★
N1 ⁽¹⁾	ATEX Type n with enclosure	A, U, G, H	★
NC	ATEX Type n Component without enclosure	N	★
ND ⁽¹⁾	ATEX Dust	A, U, G, H	★
I7	IECEx Intrinsic Safety	All enclosures	★
E7 ⁽¹⁾	IECEx Flameproof and Dust	A, U, G, H	★
N7 ⁽¹⁾	IECEx Type n with enclosure	A, U, G, H	★
NG	IECEx Type n without enclosure	N	★
NA	No approvals	All enclosures	★

⁽¹⁾ Approval Codes E1, N1, N7, ND, E5, K5, K6, and E7 require an enclosure.

Enclosure options

Code	Description	Material	IP Rating	
A	Connection head	Aluminum	IP68	★
U	Universal head (Junction Box)	Aluminum	IP68	★
B	BUZ head	Aluminum	IP65	★
C	BUZ head	Polypropylene	IP65	★
N	No enclosure	N/A	N/A	★
G	Connection head	SST	IP68	
H	Universal head (Junction Box)	SST	IP68	
S	Sanitary connection head, DIN B	Polished SST	IP66	
F	Sanitary connection head, DIN A	Polished SST	IP66/IP68	
T	TZ-A/BK	Polyamide	IP65	

Conduit entry size

Code	Description	
1	M20 × 1.5 (CM20)	★
2	½-14 in. NPT	★
0	No enclosure	★

Additional options

Alarm level configuration

Code	Description	
A1	NAMUR alarm and saturation levels, high alarm	★
CN	NAMUR alarm and saturation levels, low alarm	★

Calibration certificate

Code	Description	
Q4	Calibration certificate (3-point Calibration)	★

Line filter

Code	Description	
F6	60 Hz Line voltage filter	★

External ground option

Available with enclosures U and H.

Code	Description	
G1	External ground lug assembly	★

Cover chain option

Available with enclosures U and H.

Code	Description	
G3	Cover chain	★

Cable gland option

Code	Description	
G2	Cable gland – explosion proof – 7.5 mm – 11.9 mm (0.30 in. – 0.47 in.)	★
G4	Cable gland – explosion proof, thin wire – 3.0 mm - 8.0 mm (0.12 in. – 0.31 in.)	★

Conduit electrical connector

Code	Description	
GE	M12, 4-pin, male connector (eurofast®)	★
GM	A size Mini, 4-pin, male connector (minifast®)	★

Assemble to options

Code	Description	
XA	Sensor specified separately and assembled to transmitter	★

Typical model number:148 H N I5 U1 A1 XA

Rosemount 148 Configuration Interface Specifications

Configuration software

Note

The Rosemount™ configuration software is compatible with Microsoft® Windows™ XP, Windows 7 32-bit and Windows 7 64-bit. It is not compatible with Windows NT and Windows 2000.

The Rosemount 148 PC-based configuration software 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 148 Transmitters including the following parameters:

- Sensor type
- Number of wires
- Engineering units
- Transmitter tag information
- Damping
- Alarming parameters

Configuration hardware

The Rosemount™ 148 Configuration Interface has three hardware options as follows:

Software only

- (Part #: 00148-1601-0002)
- Customer must provide appropriate communications hardware (modem, power supply, etc.).

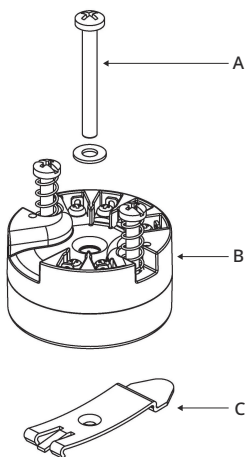
Serial modem and software

- (Part #: 00148-1601-0004)
- Serial modem
- Customer must provide separate loop power supply and resistor.
- Requires PC serial port
- Suitable for use with powered loops

USB modem and software

- (Part #: 00148-1601-0003)
- USB (Universal Serial Bus) modem
- Customer must provide separate loop power supply and resistor.
- Requires PC with USB port
- Suitable for use with powered loops

Figure 2: Rosemount 148 Transmitter Accessories



- A. *Mounting hardware*
- B. *Transmitter*
- C. *Rail clip*

Table 1: Rosemount 148 Transmitter Accessories

External ground screw assembly kit	00644-4431-0001
Kit, hardware for mounting a Rosemount 148 to a DIN rail (see left picture-top hat rail, symmetric)	00248-1601-0001
Snap rings kit (used for assembly to DIN plate style sensor)	00644-4432-0001

Transmitter specifications

Functional specifications

Inputs

User-selectable; sensor terminals rates to 42.4 Vdc. See [Transmitter accuracy and ambient temperature effects](#) for sensor options.

Output

Two wire 4–20 mA Dc, linear with temperature or input

Isolation

Input/Output isolation tested to 500 Vac rms (707 Vdc) at 50/60 Hz.

Supply voltage DC

Standard: 12 to 42.4 V

Intrinsic Safety: 12 to 30 V

Minimum voltage across terminals

12 Vdc

Humidity limits

0 - 95% relative humidity, non-condensing

NAMUR recommendations

The Rosemount™ 148 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

Temperature limits

Operating Limit

-40 to 85 °C (-40 to 185 °F)

Storage Limit

-50 to 120 °C (-58 to 248 °F)

Turn-on time

Specification performance is achieved less than six seconds after power is applied to the transmitter and when damping value is set to zero seconds.

Update rate

Less than 0.5 seconds

Damping

32 seconds maximum, 5 seconds default.

Recommended minimum measuring span

10 °C (18 °F)

Software detected failure mode

The values at which the transmitter drives its output in failure mode depends on device configuration. The device can be configured to meet NAMUR-compliant (NAMUR recommendation NE 43) operation. The values for standard and NAMUR-compliant operation are as follows:

Table 2: Available Alarm Range

Units - mA	Min	Max	Rosemount	Namur
High alarm	21	23	21.75	21
Low alarm ⁽¹⁾	3.5	3.75	3.75	3.6
High saturation	20.5	20.9 ⁽²⁾	20.5	20.5
Low saturation ⁽¹⁾	3.7 ⁽³⁾	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.

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

Performance specifications

Material selection

Emerson provides a variety of Rosemount™ products with various 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.

EMC (Electromagnetic Compatibility)

Meets all industrial environment requirements of EN61326 and NAMUR NE-21. Maximum deviation < 1% span during EMC disturbance.

Power supply effect

Less than ± 0.0055 of span per volt

Vibration effect

The Rosemount™ 148 is tested to the following specifications with no effect on performance:

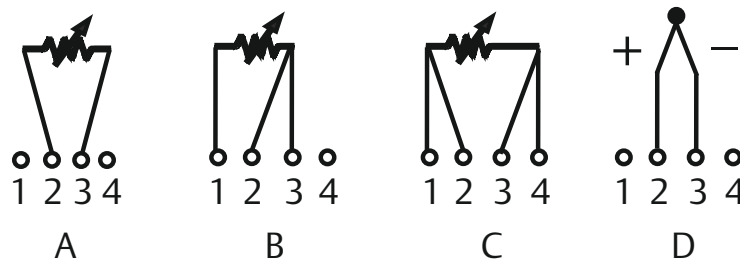
Frequency	Vibration
10 to 60 Hz	0.35 mm displacement
60 to 1000 Hz	5 g peak acceleration

Stability

For RTD and thermocouple inputs, the transmitter will have a stability of $\pm 0.15\%$ of reading or $0.15\text{ }^{\circ}\text{C}$ (whichever is greater) for twelve months.

Sensor connections

Figure 3: 148 Sensor Connections Diagram



- A. 2-wire and V
- B. 3-wire RTD and V
- C. 4-wire RTD and V⁽¹⁾
- D. T/C

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 [Transmitter accuracy example](#) and [Transmitter temperature effects example](#)).

(1) 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.

Table 3: Rosemount™ 148 Transmitter Input Options, Accuracy, and Ambient Temperature Effects

Sensor type	Input ranges ⁽¹⁾		Recommended min. span ⁽²⁾	Accuracy ⁽³⁾		Temperature effects ⁽³⁾⁽⁴⁾	
	°C	°F		°C (°F)	Fixed	% of span	Fixed
2-, 3-, 4-wire RTDs							
Pt 100 $\alpha = 0.00385$ (IEC 751)	-200 to 850	-328 to 1562	10 °C (18 °F)	0.3 °C	± 0.15	0.009 °C	0.006 %
Pt 100 $\alpha = 0.003916$ (JIS 1604)	-200 to 645	-328 to 1193	10 °C (18 °F)	0.3 °C	± 0.15	0.009 °C	0.006 %
Ni120 (Edison Curve No. 7)	-70 to 300	-94 to 572	10 °C (18 °F)	0.24 °C	± 0.15	0.006 °C	0.006 %
Cu 50 $\alpha = 0.00428$ (GOST 6651-94)	-185 to 200	-301 to 392	10 °C (18 °F)	0.51 °C	± 0.15	0.009 °C	0.006 %
Cu 100 $\alpha = 0.00426$ (GOST 6651-94)	-50 to 200	-58 to 392	10 °C (18 °F)	0.51 °C	± 0.15	0.009 °C	0.006 %
Cu 100 $\alpha = 0.00428$ (GOST 6651-94)	-185 to 200	-301 to 392	10 °C (18 °F)	0.51 °C	± 0.15	0.009 °C	0.006 %
Ohms	0 to 2000 Ω		20 Ω	1.1 Ω	± 0.15	0.042 Ω	0.006 %
Thermocouples⁽⁵⁾							
Type B (NIST monograph 175) ⁽⁶⁾	100 to 1820	212 to 3308	25 °C (45 °F)	2.25 °C	± 0.15	0.084 °C	0.006 %
Type J (NIST monograph 175)	-180 to 760	-292 to 1400	25 °C (45 °F)	0.75 °C	± 0.15	0.03 °C	0.006 %
Type K (NIST monograph 175) ⁽⁷⁾	-180 to 1372	-292 to 2502	25 °C (45 °F)	0.75 °C	± 0.15	0.03 °C	0.006 %
Type N (NIST monograph 175)	-200 to 1300	-328 to 2372	25 °C (45 °F)	1.2 °C	± 0.15	0.03 °C	0.006 %
Type R (NIST monograph 175)	0 to 1768	32 to 3214	25 °C (45 °F)	1.8 °C	± 0.15	0.09 °C	0.006 %
Type S (NIST monograph 175)	0 to 1768	32 to 3214	25 °C (45 °F)	1.5 °C	± 0.15	0.09 °C	0.006 %
MV	-10 to 100 mV		3 mV	0.045 mV	± 0.15	0.0015 mV	0.006 %

(1) Input ranges are for transmitter only. Actual sensor (RTD or Thermocouple) operating ranges may be more limited.

(2) No minimum or maximum span restrictions within the input ranges. Recommended minimum span will hold noise within accuracy specification with damping at zero seconds.

(3) Total accuracy/temperature effect is sum of fixed and percent of span.

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

(5) For thermocouple measurements additional 0.5 °C (CJC) is added to fixed accuracy.

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

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

Transmitter accuracy example

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

- Fixed accuracy = ± 0.30 °C
- % of span = $\pm 0.15\%$ of 100 °C or ± 0.15 °C
- Total accuracy = ± 0.45 °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 ($\alpha = 0.00385$) sensor input with a 0–100 °C span at 30 °C ambient temperature:

- Fixed temperature effects: $0.009\text{ °C} \times (30 - 20) = 0.09\text{ °C}$
- % of span effects: $[0.006\% \text{ of } 100] \times (30 - 20) = 0.06\text{ °C}$
- Total temperature effects: 0.15 °C

Total transmitter error

- Worst case error: Fixed accuracy + % of span + Fixed temperature effects + % of span effects = $0.30\text{ °C} + 0.15\text{ °C} + 0.09\text{ °C} + 0.06\text{ °C} = 0.60\text{ °C}$

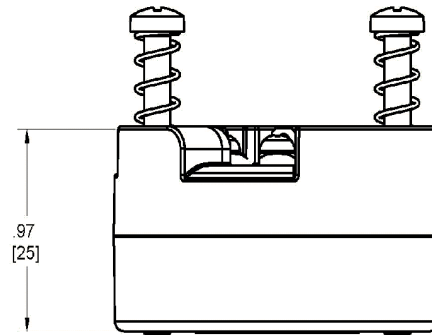
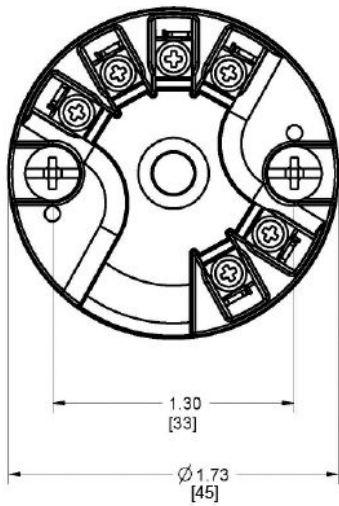
- Total Probable Transmitter Error: $\sqrt{0.30^2 + 0.15^2 + 0.09^2 + 0.06^2} = 0.352\text{ °C}$

Dimensional drawings

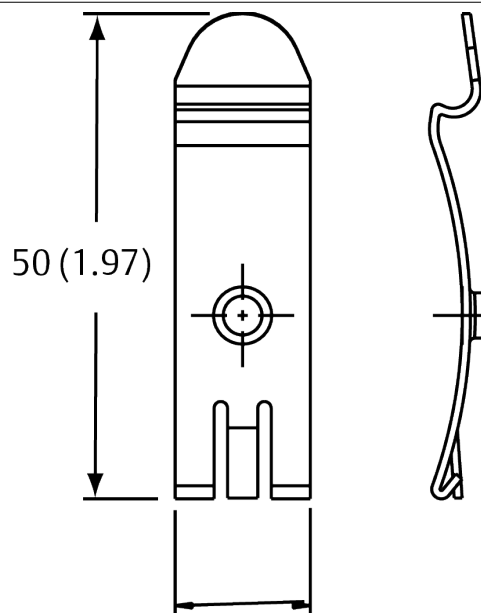
Figure 4: Rosemount™ 148 Temperature Transmitter

Top view

Side view



DIN Rail mounting kit



Dimensions are in millimeters (inches).

Product certifications

For Rosemount 148 product certifications, see the [Rosemount 148 Temperature Transmitter Quick Start Guide](#).

For more information: [Emerson.com/global](https://emerson.com/global)

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