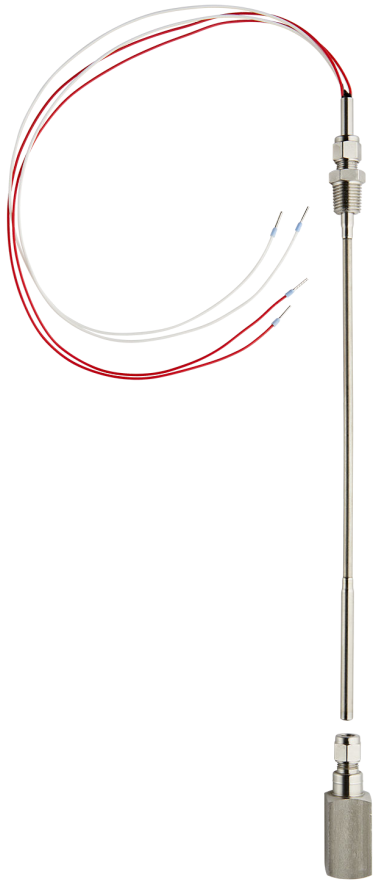
Product Data Sheet
00813-0100-5614, Rev AA
November 2023

Rosemount™ 614 Cryogenic Spot Temperature Sensor



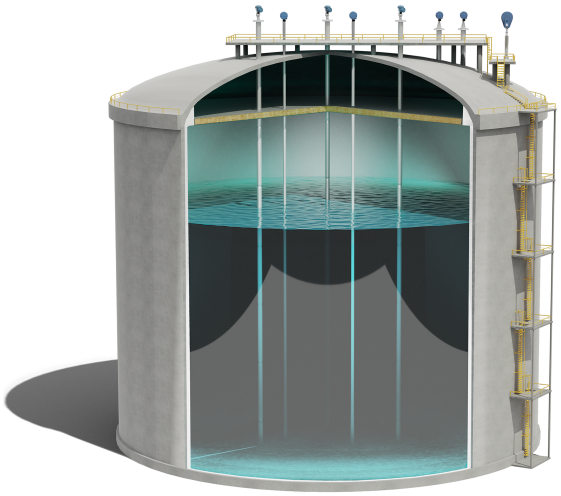
- Specially designed for temperature measurements in cryogenic and refrigerated tanks
- For single point temperature measurement, cool-down, leak detection, and skin temperature
- Connect any number of sensors to temperature transmitter via a conical connection or a junction box
- Select from a wide range of accessories

Rosemount 614 specially designed for cryogenic tanks

The Rosemount 614 Cryogenic Spot Temperature Sensor is a single spot temperature sensor designed for installation in demanding and harsh environments where high reliability and robustness is required.

The Rosemount 614 is an intrinsic safe sensor designed for gas atmospheres of category 1 zone 0. The spot elements are wired through a mineral-insulated flexible steel cable up to 300 m (980 ft). This allows temperature measurements inside a full containment tank during the cool-down procedure, and for leak detection in the tank's insulation space.

Figure 1: Full containment storage tank



The Rosemount 614 is available with single or dual elements, and either 3- or 4-wire technology.

The temperature sensors are easily integrated through a conical connection or a junction box to the Rosemount 2240S Multi-input Temperature Transmitter. Each Rosemount 2240S supports up to sixteen Rosemount 614 temperature sensors.

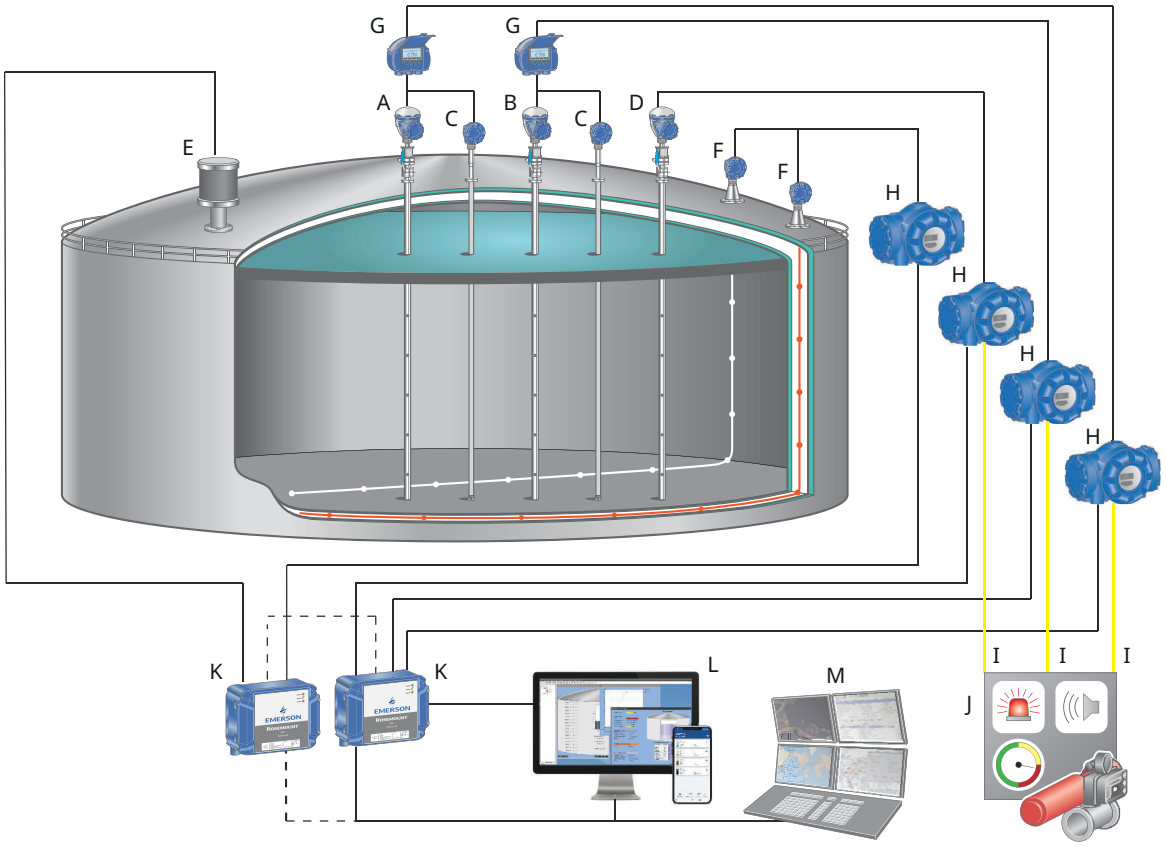
Contents

Complete temperature measurements for cryogenic and refrigerated full containment storage

Rosemount 614 Cryogenic Spot Temperature Sensor installed with the Rosemount 2240S Multi-Input Temperature Transmitters, in a Tank Gauging system for cool-down (white dotted line) and leak detection (red dotted line). The system includes the Rosemount 566 Multiple Spot Temperature Sensors installed with the Rosemount 2240S for temperature profile and stratification monitoring.

The measured values are distributed to the TankMaster Inventory Software, DCS/host or safety systems via the Rosemount 2410 Tank Hub.

Figure 2: Typical system configuration for cryogenic and refrigerated storage



A. Rosemount 5900S (primary level gauge)
B. Rosemount 5900S (secondary level gauge)
C. Rosemount 2240S temperature transmitter with Rosemount 566 cryogenic multiple spot temperature sensor
D. Rosemount 5900S (independent continuous level alarm)
E. Level, Temperature, and Density (LTD) Gauge for stratification detection
F. Rosemount 2240S temperature transmitter with Rosemount 614 cryogenic spot sensor for cool-down and leak detection
G. Rosemount 2230 Graphical Field Display
H. Rosemount 2410 Tank Hub
I. SIL 2/SIL 3 relay or 4-20 mA alarm signal
J. Independent alarm panel
K. Rosemount 2460 System Hub
L. Rosemount TankMaster Software
M. DCS/Host system

Ordering information

Model codes

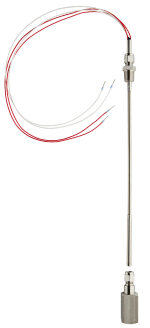
Model codes contain the details related to each product. Exact model codes will vary; an example of a typical model code is shown in Figure 3.

Figure 3: Model Code Example

614 M25000 S 4 A 1 00 1 0 (1) X4 Q4 (2)

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

Rosemount 614 Cryogenic Spot Temperature Sensor for skin temperature measurements



- Possible to have dual spot elements
- Up to 300 m (984 ft.) length
- Can be connected to Rosemount Tank Gauging infrastructure
- Can be used with junction box or cone
- Integrated mounting block
- Mineral insulated

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Required model components

Model

Code	Description
614	Cryogenic Spot Temperature Sensor

Overall length (L_o)

Code	Description
Mxxxxxx	Metric units, xxxxxx in millimeters (mm), range: 002000 to 300000 (Specify in steps of 10 millimeters.)
Exxxxxx	U.S. units, xxxxxx in inches (in.), range: 000080-011810 (Longer on request. Specify in steps of 1 inch.)

Number of elements

Code	Description
S	Single temperature element
D	Dual temperature element

Temperature sensor wiring

Code	Description
4	Four-wire
3	Three-wire, individual return

Sensor element accuracy

Code	Description
A	Class A, W 0.15 ±(0.15 + 0.002 |t|)°C -170 / +95 °C (IEC 60751)
B	Class B, W 0.3 ±(0.3 + 0.005 |t|)°C (IEC 60751)

Lead out type

Code	Description
1	Wired (order Rosemount 2240S mounting cone separately)
2	Cable (for junction box)
3	Wired with sliding fitting (for junction box with sliding fitting on sensor)

Related information

Installation examples

Lead out length

Code	Description
00(1)	Standard length 560 mm (22 in.)
XX(2)	Non-standard length 1-20 m (3-66 ft.). (Measurement units in meter or feet according to selected Overall length code)

(1) *Requires Lead out type code 1 or 3.*
(2) *Requires Lead out type code 2.*

Flange fitting

Code	Description
1(1)	⅛-in. NPT SS ferrule compression fitting
3	½-in. NPT SS ferrule compression fitting

(1) *Requires Lead out type code 3, or Lead out type code 1 together with Number of elements code S.*

Sensor tip fitting

Code	Description
0	None
S	Sensor block for sensor fitting

Additional options

Certificate

Code	Description
Q1	Certificate of conformance
Q4(1)	Calibration certificate according to IEC 60751 Ed.2
Q7	Hazardous location certificate
Q8	Material traceability certificate per EN 10204 3.1B
QG	Certificate of conformity of elements according to IEC 60751

(1) *Requires Sensor calibration code X4 or X9, and Temperature sensor wiring code 4.*

Sensor calibration

Requires Temperature sensor wiring code 4, and Certificate code Q4.

Code	Description
X4	Sensor calibration at 0 °C (+32 °F)
X9	Calibration at -195°C, -75 °C, 0 °C and +100 °C (-319, -103, +32 and +212 °F) with Callendar-Van Dusen constants

Rosemount 614 Flange

Required model components

Model

Code	Description
614-FLNG	Rosemount 614 Flange

Tank connection

Option code Q8 (material traceability certificate per EN 10204 3.1B) available upon request.

Code	Description
A	Flange 6-in. 150 Psi
B	Flange 6-in. 300 Psi
C	Flange 8-in. 150 Psi
D	Flange 8-in. 300 Psi
E	Flange 12-in. 150 Psi
F	Flange 12-in. 300 Psi
G	Flange 16-in. 150 Psi
H	Flange 16-in. 300 Psi
I	Flange 20-in. 150 Psi
J	Flange 20-in. 300 Psi
X	Customer specific, consult factory

Flange fitting

Code	Description
1	⅛-in. NPT SS ferrule compression fitting
3	½-in. NPT SS ferrule compression fitting

Amount of holes

Code	Description
XXX	Holes (Refer to Table 1 for maximum amount of holes per flange configuration)

Accessories

Rosemount 614 accessories

Item	Description
FAT	Factory acceptance test. Consult factory.
Cone	Conical connection to Rosemount 2240S.
Junction box	Junction box. Consult factory.

Specifications

General specifications

Material selection

Emerson provides a variety of Rosemount products 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.

Thermometer characteristics

IEC 60751:2022 is the standard that specifies the requirements, testing methods, calibration methods and measurement uncertainties for industrial platinum resistance thermometers (PRTs). The standard defines the nominal resistance-temperature relationship for PRTs and specifies the tolerances for various temperature ranges.

IEC 60751 standard section 5.2.1 defines how tolerance classes should be expressed. A thermometer that has a modified tolerance or temperature range of validity can still be compliant with the standard provided all applicable requirements, other than the tolerance or the temperature range of validity, and the modification is noted to the user.

Accessories

- Cone for Rosemount 2240S connection
- Flange
- Junction box (consult factory)

Related information

Accessories Drawing - Conical Connection
Accessories Drawing - Flange Example

Maximum number of sensor openings

Table 1: Maximum number of sensor openings per flange configuration

Standard flange	Maximum number of ⅛-in. NPT sensors	Maximum number of ½-in. NPT sensors
6-in. 150/300 with Junction box	24	10
6-in. 150/300 with Cone	16	8
8-in. 150/300 with Junction box	36	18
8-in. 150/300 with Cone	16	8
10-in. 150/300 with Junction box	61	37
10-in. 150/300 with Cone	16	8
12-in. 150/300 with Junction box	64	40
12-in. 150/300 with Cone	16	8
16-in. 150/300 with Junction box	106	62

Table 1: Maximum number of sensor openings per flange configuration *(continued)*

Standard flange	Maximum number of ⅛-in. NPT sensors	Maximum number of ½-in. NPT sensors
16-in. 150/300 with Cone(1)	16	8
20-in. 150/300 with Junction box	166	100
20-in. 150/300 with Cone(1)	16	8

(1) *The maximum number of sensors is per cone, large flanges can fit two cones on the same flange.*

Performance specifications

Element Type

Pt-100 spot elements according to IEC60751:2022

Sensor element accuracy

- Class A: W 0.15 ±(0.15 + 0.002 |t|)°C -170 / +95 °C (IEC 60751)
- Class B: W 0.3 ±(0.3 + 0.005 |t|)°C (IEC 60751)
- Calibrated: ±0.02 °C (±0.036 °F), refer to Unique sensor calibration for Rosemount 614

Liquid pressure range

≤ 50 bar

Liquid temperature range

-200 to +100 °C (-328 to +212 °F)

Number of elements

Single or dual elements

Mechanical specifications

Overall length

Maximum 300 m (984 ft)

Protective sheath

Material: AISI 316L. Sheet filled with compressed magnesium oxide powder.

Flange fittings

Fixed or sliding ⅛-in. NPT or ½-in. NPT depending on configuration.

Immersed material

Stainless steel (AISI 316L)

Sensor block for sensor fitting (AISI 304)

Bending radius

Do not install sensor with bending radius less than six times the diameter of the sensor.

Maximum tightening torque

- NPT fitting: 16-24 Nm
- Compression nut: 16 Nm

Unique sensor calibration for Rosemount 614

When the nominal thermometer tolerance class A and B are not sufficient for certain applications, like skin temperature and leakage detection, Emerson supplied thermometers have the option to be calibrated according to the so called Callendar-Van Dusen equation, this is to improve the overall temperature measurement performance of the platinum resistance thermometers.

Each thermometer is calibrated at three or four temperatures and the coefficients is individually calculated. After calibration, the calculated coefficients are included in the calibration certificate (option code X8). These values can then be entered into the Rosemount 2240S Temperature Transmitter via Rosemount TankMaster for superior accuracy.

It should be noted that calibration is done in a laboratory that has traceability to third part with certified reference instruments.

Installation examples

The most common temperature sensor configuration is a 3-wire sensor with dual elements and a ½-in. NPT flange fitting. Available options for the different lead out types are presented in the following sections.

Cone installations (Lead out type code 1)

For cone installations the Rosemount 614 temperature sensors are connected to the Rosemount 2240S Multi-Input Temperature Transmitters. The measured values are distributed to the TankMaster Inventory Software via the Rosemount 2410 Tank Hub.

Figure 4: Cone installation

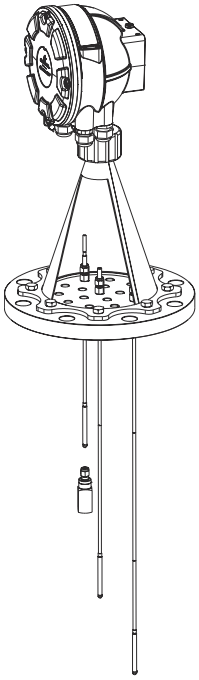


Table 2: Option codes for cone installations

Number of elements		
S	Single temperature element	✓
D	Dual temperature element	✓
Temperature sensor wiring		
4	Four-wire	✓
3	Three-wire, individual return	✓
Lead out type		
1	Wired	✓
Flange fitting		
1	⅛-in. NPT SS ferrule compression fitting	✓
3	½-in. NPT SS ferrule compression fitting	✓

Extended cable installations (Lead out type code 2)

For extended cable installations the temperature sensors are connected to another monitoring system. The sensor cables are routed to an external junction box with terminals. By using the cable lead out type, the cable routing is seamlessly integrated into the junction box.

Figure 5: Extended cable installation

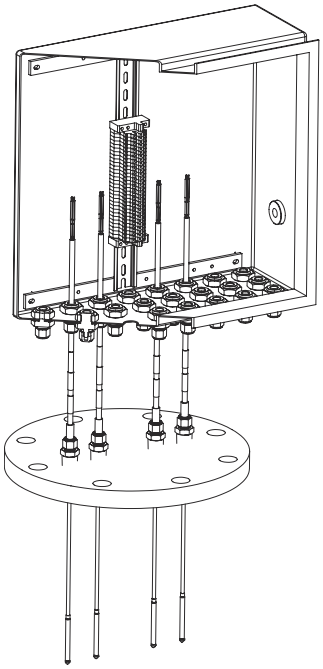


Table 3: Options codes for extended cable installations

Number of elements		
S	Single	✓
D	Dual	✓
Temperature sensor wiring		
4	Four-wire	✓
3	Three-wire, individual return	✓
Lead out type		
2	Cable	✓
Flange fitting		
3	½-in. NPT SS ferrule compression fitting	✓

Extended sensor installations (Lead out type code 3)

The temperature sensors are connected to another monitoring system. The Rosemount 614 protective sheet is extended into a junction box. Mostly used in installations where there is a requirement of stainless conduits as protection for surrounding environment.

Figure 6: Extended sensor installation

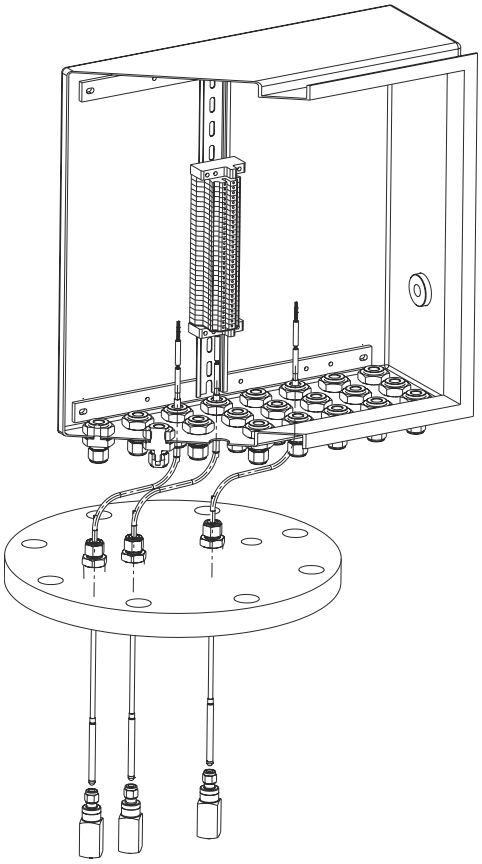


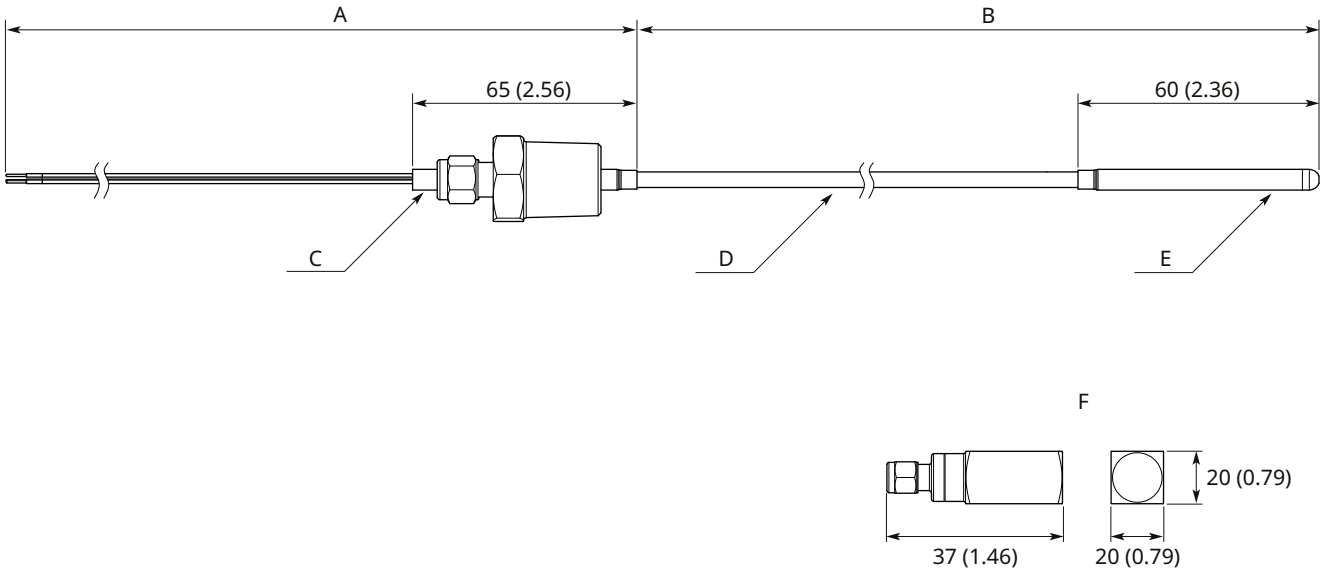
Table 4: Option codes for extended sensor installations

Number of elements		
S	Single temperature element	✓
D	Dual temperature element	✓
Temperature sensor wiring		
4	Four-wire	✓
3	Three-wire, individual return	✓
Lead out type		
3	Wired with sliding fitting	✓
Flange fitting		
1	⅛-in. NPT SS ferrule compression fitting	✓
3	½-in. NPT SS ferrule compression fitting	✓

Dimensional drawings

Rosemount 614 - Wired (Lead out type code 1)

Figure 7: Dimensional Drawing, Rosemount 614 - Wired



Dimensions are in millimeters (inches).

A. *LK= 560 mm (standard length), other lengths according to model code.*
B. *L1, ±50 mm + 0.1 % x L1.*
C. *Steel lead, for outer diameter dimensions see Table 5.*
D. *Protective sheath, for outer diameter dimensions see Table 5.*
E. *Tip, for diameter dimensions see Table 5.*
F. *Sensor block.*

Table 5: Sensor dimensions

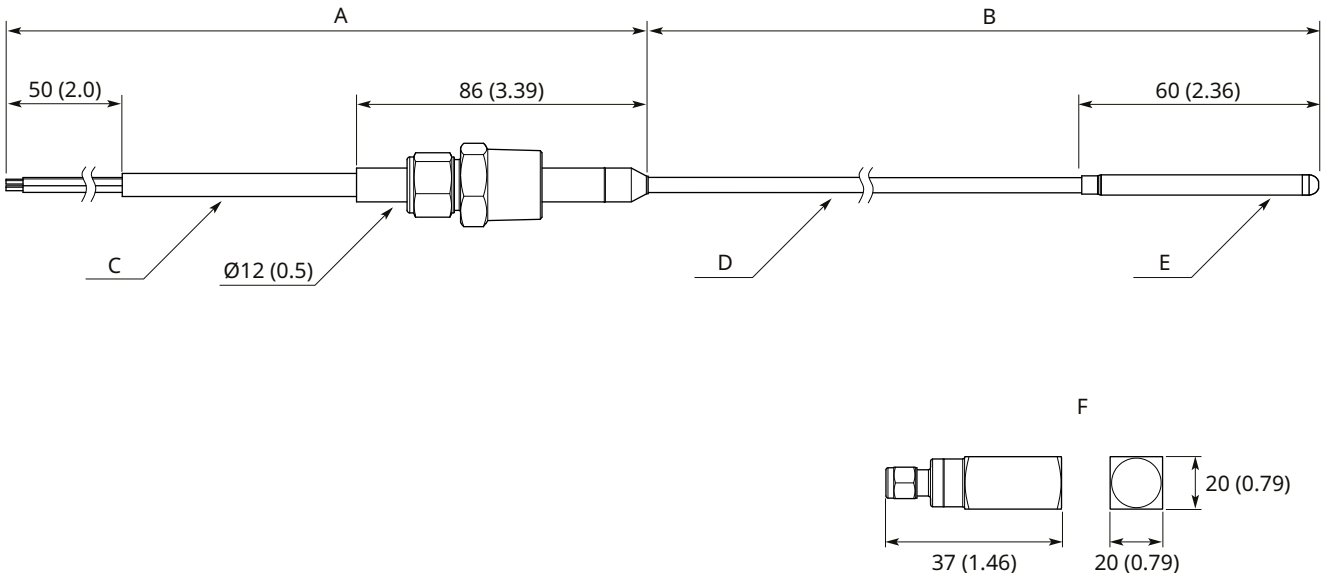
	Single temperature element		Dual temperature element	
	Three-wire	Four-wire	Three-wire	Four-wire
Steel lead outer diameter	6.0 mm	6.0 mm	10.0 mm	10.0 mm
Tip diameter	6.0 mm	6.0 mm	6.0 mm	8.0 mm
Protective sheath outer diameter	4.5 mm	4.5 mm	4.5 mm	6.0 mm

Related information

Type 1 Drawing - Lead out type code 1

Rosemount 614 - Cable (Lead out type code 2)

Figure 8: Dimensional Drawing, Rosemount 614 - Cable



Dimensions are in millimeters (inches).

A. *LK= length according to model code.*
B. *L1, ±50 mm + 0.1 % x L1.*
C. *Cable, for outer diameter dimensions see Table 6.*
D. *Protective sheath, for outer diameter dimensions see Table 6.*
E. *Tip, for diameter dimensions see Table 6.*
F. *Sensor block.*

Table 6: Sensor dimensions

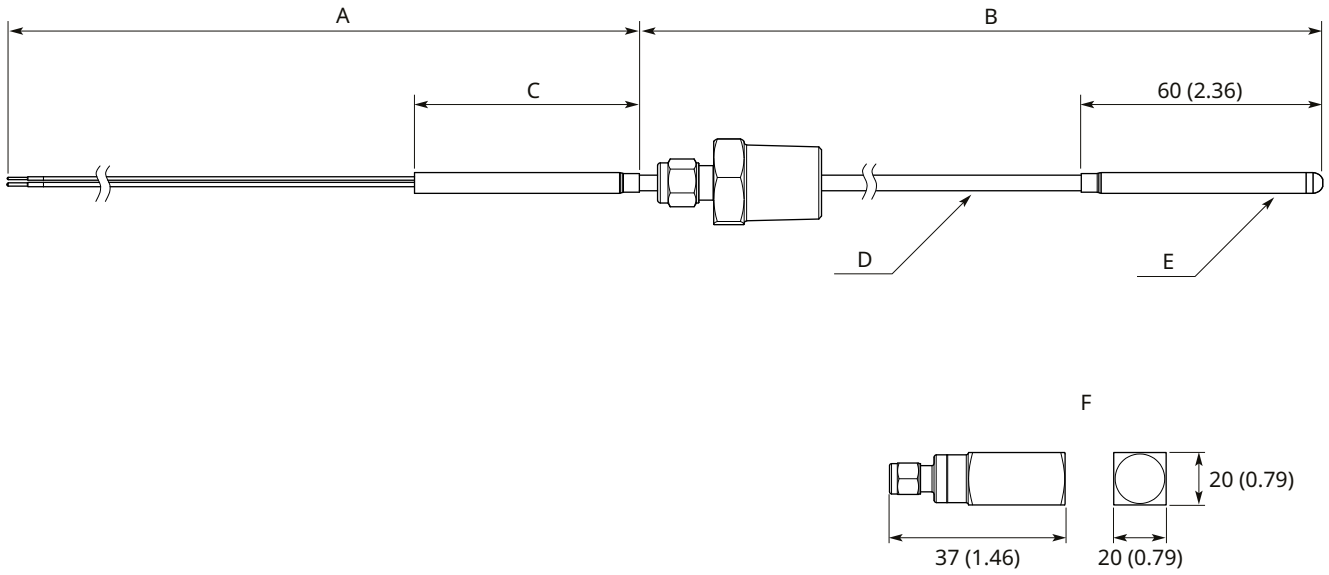
	Single temperature element		Dual temperature element	
	Three-wire	Four-wire	Three-wire	Four-wire
Cable outer diameter	6.9 mm	6.9 mm	7.3 mm	9.2 mm
Tip diameter	6.0 mm	6.0 mm	8.0 mm	8.0 mm
Protective sheath outer diameter	4.5 mm	4.5 mm	6.0 mm	6.0 mm

Related information

Type 1 Drawing - Lead out type code 2

Rosemount 614, Wired with sliding fitting (Lead Out Type Code 3)

Figure 9: Dimensional Drawing, Rosemount 614, Wired with sliding fitting



Dimensions are in millimeters (inches).

A. *LK= 560 mm (standard length), other lengths according to model code.*
B. *L1, ±50 mm + 0.1 % x L1.*
C. *Steel lead out, for length and outer diameter dimensions see Table 7.*
D. *Cable, for outer diameter dimensions see Table 7.*
E. *Protective sheath, for outer diameter dimensions see Table 7.*
F. *Tip, for diameter dimensions see Table 7.*
G. *Sensor block.*

Table 7: Sensor dimensions

	Single temperature element		Dual temperature element	
	Three-wire	Four-wire	Three-wire	Four-wire
Steel lead outer diameter	6.0 mm	6.0 mm	6.0 mm	12.0 mm
Steel lead outer length	65.0 mm	65.0 mm	65.0 mm	86.0 mm
Tip diameter	6.0 mm	6.0 mm	6.0 mm	8.0 mm
Protective sheath outer diameter	4.5 mm	4.5 mm	4.5 mm	6.0 mm

Related information

Type 1 Drawing - Lead out type code 3

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For more information: **Emerson.com/global**

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