

Rosemount™ 565/765/566 Temperature and Water Level Sensors



- Get custody transfer net volume accuracy with four-wire multiple spot temperature sensors for bulk liquid storage tanks
- Improve accuracy with unique sensor calibration
- Measure liquid temperature with up to 16 spot elements
- Combine with integrated water level sensor measurement
- Include temperature sensors for measurements in cryogenic and refrigerated gas applications such as LNG
- Select from a wide range of accessories such as anchor weights and vapor boots

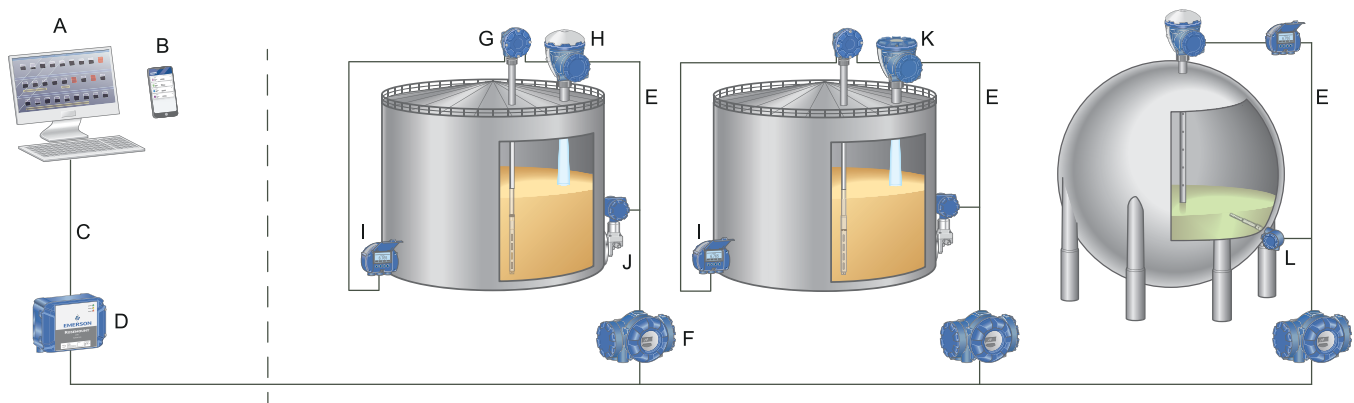
Precise temperature measurement

The highly accurate four-wire multiple spot temperature sensors in Rosemount Tank Gauging System measure liquid temperature with up to 16 spot elements. The available versions are:

- Rosemount 565 Multiple Spot Temperature Sensor
- Rosemount 765 Multiple Spot Temperature Sensor with integrated water level sensor
- Rosemount 566 Multiple Spot Temperature Sensor for cryogenic applications such as LNG

The multiple spot temperature sensor is connected to a Rosemount 2240S Multi-input Temperature Transmitter. The measured values are distributed to the Rosemount TankMaster™ Inventory Software or a DCS/host system via the Rosemount 2410 Tank Hub.

Figure 1: Tank Gauging System Overview



- A. Rosemount TankMaster Inventory Management
- B. Rosemount TankMaster Mobile Inventory Management
- C. Modbus® RTU/TCP
- D. Rosemount 2460 System Hub
- E. Tankbus
- F. Rosemount 2410 Tank Hub
- G. Rosemount 2240S Multi-input Temperature Transmitter with Rosemount 765 Multiple Spot Temperature and Water Level Sensor
- H. Rosemount 5900S Radar Level Gauge
- I. Rosemount 2230 Graphical Field Display
- J. Rosemount 3051S Pressure Transmitter
- K. Rosemount 5900C Radar Level Gauge
- L. Rosemount 3144P Temperature Transmitter with Rosemount 114C or 214C Single Point Temperature Sensor

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Rosemount 565 Multiple Spot Temperature Sensor measures liquid temperature with up to 16 spot elements

The Rosemount 565 measures temperature with number of Pt-100 spot elements placed at different heights to provide a tank temperature profile and an average temperature. Only fully immersed elements are used to determine product temperature. Each sensor is connected to a Rosemount 2240S Multi-input Temperature Transmitter. The calculated average liquid temperature is used as an input for accurate volume calculations in storage tanks.

The spot elements are placed in a flexible gas-tight protection tube, made from convoluted stainless steel, for easier handling during installation. All spot elements are attached to a wire, which runs from the top to the bottom of the sensor. An anchor weight can be hung at the bottom, or the tube can be fixed to the bottom to keep the sensor vertical and avoid floating when the tank is filled.

The Rosemount 565 is designed for atmospheric tanks up to 0.2 bar (2.9 psi). For pressurized tanks it must be installed in a closed thermowell enabling service or inspection while the tank is in operation.

Rosemount 765 Multiple Spot Temperature Sensor with integrated water level sensor

The Rosemount 765 has an integrated water level sensor attached to the temperature sensor tube to measure free water level at the bottom of the tank. It enables correct product volume calculations.

Rosemount multiple spot temperature sensors measure temperature with a number of Pt-100 spot elements placed at different heights to provide a tank temperature profile and an average temperature. Only fully immersed elements are used to determine product temperature. One of the temperature sensor elements may be installed inside the water level probe allowing temperature measurements at low levels. Each sensor is connected to the Rosemount 2240S transmitter.

The Rosemount 765 sensor is hung vertically from the top of the tank, and the position/length is chosen according to the actual bottom water range. It should be anchored to the tank bottom to ensure a fixed position in case of turbulence. Rosemount 765 is delivered in a stainless steel (AISI 316) housing, welded to the flexible temperature sensor tube to get a hermetic design. It has a heavy duty design with no moving parts.

The water level sensor is available in two versions:

- Open model: Recommended for crude oil and heavy duty products.
- Closed model: Recommended for lighter fuels such as diesel oil.

Figure 2: Rosemount 2240S Transmitter with Rosemount 765 Multiple Spot Temperature and Water Level Sensor



Rosemount 566 Temperature Sensor for cryogenic applications

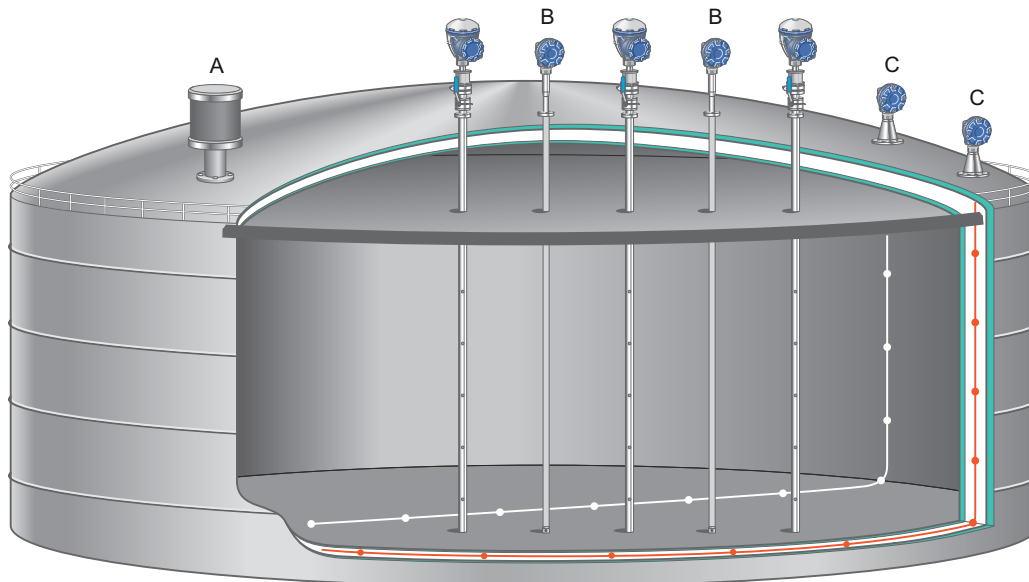
The Rosemount 566 Multiple Spot Temperature Sensor measures temperature with a number of Pt-100 spot elements placed at different heights to provide a tank temperature profile and an average temperature in cryogenic and refrigerated storage tanks. Only fully immersed elements are used to determine product temperature. Each sensor is connected to a Rosemount 2240S Multi-input Temperature Transmitter.

The Rosemount 566 is equipped with Class A sensors, suitable for low temperatures. There is also a unique calibration option process to get highest accuracy meeting International Group of Liquefied Natural Gas Importers (GIIGNL) requirements for stratification detection, enabling continuous product stratification monitoring.

The spot elements are encapsulated in a stainless steel tube, filled with argon gas to prevent the condensation of water inside the sensor at low temperatures.

Cryogenic temperature sensors for highly accurate temperature measurements

Figure 3: Full Containment Tank Gauging System for LNG and other Liquefied Gases



- A. *Optional separate device for temperature and density profiling (LTD)*
- B. *Rosemount 2240S Multi-input Temperature Transmitter with Rosemount 566 Multiple Spot Temperature Sensor*
- C. *Rosemount 2240S Multi-input Temperature Transmitter with Rosemount 614 Cryogenic Spot Temperature Sensor*

Complete temperature measurements for cryogenic and refrigerated full containment storage includes:

Rosemount 566 Multiple Spot Temperature Sensors for:

- Precise spot and average product temperature
- Continuous measurements for stratification profile

Rosemount 614 Cryogenic Spot Temperature Sensors for:

- Distributed cool-down monitoring during first fill
- Distributed leak detection between inner and outer tank

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

Ordering information

Specifications and options

Specification and selection of product materials, options, and/or components must be made by the purchaser of the equipment.

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 4](#).

Figure 4: Model Code Example

<u>0565 M25000 A 0 4 16 P 2 2 00</u>	<u>Q8 AE VE</u>
1	2

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

Rosemount 565 Multiple Spot Temperature Sensor



- Custody transfer accuracy
- The highest reliability
- Rugged design for harsh environments
- Wide range of accessories such as anchor weights and vapor boots

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Required model components

Model

Code	Description
0565	Multiple Spot Temperature Sensor

Overall length (L_o)

Code	Description
Mxxxxx	Metric units, xxxxx in millimeters (mm), range: 02000-70000 (Specify in steps of 10 millimeters.)
Exxxxx	U.S. units, xxxxx in inches (in.), range: 00080-02700 (Longer on request. Specify in steps of 1 inch.)

Sheath type

Code	Description
A	1-in. AISI 316 SST

Tank connection

Code	Description
ANSI flanges (SST AISI 316) - Raised face	
A	1½-in. Class 150
B	1½-in. Class 300
C	2-in. Class 150
D	2-in. Class 300
E	3-in. Class 150
F	3-in. Class 300
G	4-in. Class 150
H	4-in. Class 300
J	6 in. Class 150
L	8 in. Class 150

Code	Description
EN flanges (SST AISI 316) - Flat face	
1	DN 50 PN 16
2	DN 50 PN 40
3	DN 65 PN 16
4	DN 65 PN 40
5	DN 80 PN 16
6	DN 80 PN 40
7	DN 100 PN 16
Threaded connection	
0	M33x1.5

Temperature sensor wiring

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

Number of temperature spot elements

Code	Description
01 to 16	Specify number

Element type, platinum resistor

Code	Description
P	Pt-100

Thermometer tolerance class

Code	Description
1	1/6 B-sp $\pm(0.3 + 0.005 t)$ °C (IEC 60751)
2 ⁽¹⁾	1/10 B-sp $\pm(0.3 + 0.005 t)$ °C (IEC 60751)

(1) Requires Temperature sensor wiring code 4.

Thermometer temperature range

Code	Description
1	-50 to +120 °C (-58 to +248 °F)
2	-20 to +250 °C (-4 to +482 °F)

Lead wires

Code	Description
00	For integrated installation with Rosemount 2240S (standard)
04-10	Specify other length in meters
13-33	Specify other length in feet

Additional options**Certificate**

Code	Description
Q1	Certificate of conformance
Q4 ⁽¹⁾	Calibration certificate
Q7	Hazardous location certificate
Q8	Material traceability certificate per EN 10204 3.1B

(1) Requires Sensor calibration code X4, X5, X6, X7, or X8, 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)
X5	Sensor calibration at +40 °C (+104 °F)
X6	Sensor calibration at +80 °C (+176 °F)
X7	Sensor calibration at 0 and +80 °C (+32 and +176 °F)
X8	Sensor calibration at 0, +40 and +80 °C (+32, +104 and +176 °F) with Callendar-Van Dusen constants

Country-specific hazardous location certification

Code	Description
I2	INMETRO Intrinsic Safety (Brazil)
IP	KC Intrinsic Safety (South Korea)
I3	China Intrinsic Safety
I4	Japan Intrinsic Safety
IM	Technical Regulations Customs Union (EAC) Intrinsic Safety

Anchor weight

Mutually exclusive options under this category.

Code	Description
AA ⁽¹⁾	2 kg (4.4 lbs), Ø=40; LW=200 mm (Ø=1.6; LW=7.9 in.)
AB ⁽¹⁾	3 kg (6.6 lbs), Ø=50; LW=200 mm (Ø=2.0; LW=7.9 in.)
AC ⁽¹⁾	4 kg (8.8 lbs), Ø=45; LW=330 mm (Ø=1.8; LW=13.0 in.)
AD ⁽²⁾	5 kg (11 lbs), Ø=100; LW=85 mm (Ø=3.9; LW=3.3 in.)
AE ⁽²⁾	10 kg (22 lbs), Ø= 95; LW=175 mm (Ø=3.7; LW=6.9 in.)
AF ⁽²⁾	15 kg (33 lbs), Ø=140; LW=130 mm (Ø=5.5; LW=5.1 in.)
AP ⁽³⁾	3 kg (6.6 lbs), Ø=48.5; L=255; LW=152.4 mm (Ø=1.9; L=10; LW=6 in.)
AR ⁽³⁾	6 kg (13.2 lbs), Ø=48.5; L=625; LW=152.4 mm (Ø=1.9; L=24.6; LW=6 in.)
AS ⁽³⁾	9 kg (19.8 lbs), Ø=48.5; L=998; LW=152.4 mm (Ø=1.9; L=39.3; LW=6 in.)
AT ⁽³⁾	12 kg (26.4 lbs), Ø=48.5; L=1365; LW=152.4 mm (Ø=1.9; L=53.7; LW=6 in.)
AU ⁽³⁾	15 kg (33.1 lbs), Ø=48.5; L=1735; LW=152.4 mm (Ø=1.9; L=68.3; LW=6 in.)

(1) For still-pipes.

(2) For free-hanging.

(3) For 2-in. still-pipes.

Vapor boot

Mutually exclusive options under this category.

Code	Description
VA	2-in. NPS threaded tank connection
VB	3-in. NPS threaded tank connection
VC	3-in. ANSI Class 150 flange
VD	4-in. ANSI Class 150 flange
VE	6-in. ANSI Class 150 flange
VF	8-in. ANSI Class 150 flange

Hose kit

Mutually exclusive options under this category.

Cable, galvanized steel, and nickel-plated brass material.

Code	Description
HA	Hose kit including glands, 3 m (10 ft), 1/2-in. 14 NPT connection
HB	Hose kit including glands, 10 m (33 ft), 1/2-in. 14 NPT connection

Adapters

Code	Description
IA	Adapter M33x1.5 female to 1-in. NPT female
IB	Adapter 1-in. NPT female to M33x1.5 male

Tag plate

Code	Description
ST	Engraved SST tag plate (tag shall be submitted with order)

Placement of temperature spots

From bottom of sensor (excluding anchor weight). Metric units in millimeters (mm), U.S. units in inches (in.).

Code	Description
/xxxxx	First spot
/xxxxx	Second spot
/xxxxx	Third spot
/xxxxx	Fourth spot
/xxxxx	Fifth spot
/xxxxx	Sixth spot
/xxxxx	Seventh spot
/xxxxx	Eighth spot
/xxxxx	Ninth spot
/xxxxx	Tenth spot
/xxxxx	Eleventh spot
/xxxxx	Twelfth spot
/xxxxx	Thirteenth spot
/xxxxx	Fourteenth spot
/xxxxx	Fifteenth spot
/xxxxx	Sixteenth spot

Extended product warranty

Rosemount extended warranties have a limited warranty of three or five years from date of shipment.

Code	Description
WR3	3-year limited warranty
WR5	5-year limited warranty

Rosemount 765 Multiple Spot Temperature Sensor with water level sensor



- Custody transfer accuracy
- The highest reliability
- Rugged design for harsh environments
- Close to bottom measurements
- Special crude version available

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Required model components

Model

Code	Description
0765	Multiple Spot Temperature Sensor with integrated water level sensor

Overall length (L_o)

Code	Description
Mxxxxx	Metric units, xxxxx in millimeters (mm), range: 02000-60000 (Specify in steps of 10 millimeters.)
Exxxxx	U.S. units, xxxxx in inches (in.), range: 00080-02300 (Longer on request. Specify in steps of 1 inch.)

Sheath type

Code	Description
A	1-in. AISI 316 SST

Tank connection

Code	Description
ANSI flanges (SST AISI 316) - Raised face	
A	1½-in. Class 150
B	1½-in. Class 300
C	2-in. Class 150
D	2-in. Class 300
E	3-in. Class 150
F	3-in. Class 300
G	4-in. Class 150
H	4-in. Class 300
J	6 in. Class 150
L	8 in. Class 150

Code	Description
EN flanges (SST AISI 316) - Flat face	
1	DN 50 PN 16
2	DN 50 PN 40
3	DN 65 PN 16
4	DN 65 PN 40
5	DN 80 PN 16
6	DN 80 PN 40
7	DN 100 PN 16
Threaded connection	
0	M33x1.5

Temperature sensor wiring

Code	Description
4 ⁽¹⁾	Four-wire
3 ⁽²⁾	Three-wire, individual return
C ⁽³⁾	Three-wire, common return
0	No temperature sensor - water level sensor only

- (1) *Maximum 10 Temperature spot elements.*
- (2) *Maximum 14 Temperature spot elements.*
- (3) *Maximum 16 Temperature spot elements.*

Number of temperature spot elements

Code	Description
01 to 16	Specify number
00	No temperature sensor - water level sensor only

Element type, platinum resistor

Code	Description
P	Pt-100
0	No temperature sensor - water level sensor only

Thermometer tolerance class

Code	Description
0	No temperature sensor - water level sensor only
1 ⁽¹⁾	1/6 B-sp $\pm(0.3 + 0.005 t)$ °C (IEC 60751)
2 ⁽¹⁾⁽²⁾	1/10 B-sp $\pm(0.3 + 0.005 t)$ °C (IEC 60751)

- (1) *Requires Element type code P.*
- (2) *Requires Temperature sensor wiring code 4.*

Thermometer temperature range

Code	Description
1	0 to +120 °C (+32 to +248 °F)

Lead wires

Code	Description
00	For integrated installation with Rosemount 2240S (standard)
04-10	Specify other length in meters
13-33	Specify other length in feet

Water level sensor

Code	Description
C05	Closed, suitable for light products, 500 mm (19 in.) range
C10	Closed, suitable for light products, 1000 mm (39 in.) range
H05	Open, suitable for crude and heavy duty products, 500 mm (19 in.) range
H10	Open, suitable for crude and heavy duty products, 1000 mm (39 in.) range

Additional options**Certificate**

Code	Description
QD	Water level sensor calibration certificate
Q1	Certificate of conformance
Q4 ⁽¹⁾	Calibration certificate
Q7	Hazardous location certificate
Q8	Material traceability certificate per EN 10204 3.1B

(1) Requires Sensor calibration code X4, X5, X6, X7, or X8, 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)
X5	Sensor calibration at +40 °C (+104 °F)
X6	Sensor calibration at +80 °C (+176 °F)
X7	Sensor calibration at 0 and +80 °C (+32 and +176 °F)
X8	Sensor calibration at 0, +40 and +80 °C (+32, +104 and +176 °F) with Callendar-Van Dusen constants

Country-specific hazardous location certification

Code	Description
I2	INMETRO Intrinsic Safety (Brazil)
IP	KC Intrinsic Safety (South Korea)
I3	China Intrinsic Safety
I4	Japan Intrinsic Safety
IM	Technical Regulations Customs Union (EAC) Intrinsic Safety

Anchor weight

Mutually exclusive options under this category.

Code	Description
AA ⁽¹⁾	2 kg (4.4 lbs), Ø=40; LW=200 mm (Ø=1.6; LW=7.9 in.)
AB ⁽¹⁾	3 kg (6.6 lbs), Ø=50; LW=200 mm (Ø=2.0; LW=7.9 in.)
AC ⁽¹⁾	4 kg (8.8 lbs), Ø=45; LW=330 mm (Ø=1.8; LW=13.0 in.)
AD ⁽²⁾	5 kg (11 lbs), Ø=100; LW=85 mm (Ø=3.9; LW=3.3 in.)
AE ⁽²⁾	10 kg (22 lbs), Ø= 95; LW=175 mm (Ø=3.7; LW=6.9 in.)
AF ⁽²⁾	15 kg (33 lbs), Ø=140; LW=130 mm (Ø=5.5; LW=5.1 in.)
BA ⁽³⁾	Top weight, water level sensor, 5 kg (11 lbs), Ø= 80; L=165 mm (Ø=3.15; L=6.5 in.)

(1) For still-pipes.

(2) For free-hanging.

(3) Inside hole Ø=42 mm (1.65 in.). If possible, use anchor weight.

Vapor boot

Mutually exclusive options under this category.

Code	Description
VA	2-in. NPS threaded tank connection
VB	3-in. NPS threaded tank connection
VC	3-in. ANSI Class 150 flange
VD	4-in. ANSI Class 150 flange
VE	6-in. ANSI Class 150 flange
VF	8-in. ANSI Class 150 flange

Hose kit

Mutually exclusive options under this category.

Cable, galvanized steel, and nickel-plated brass material.

Code	Description
HA	Hose kit including glands, 3 m (10 ft), 1/2-in. 14 NPT connection
HB	Hose kit including glands, 10 m (33 ft), 1/2-in. 14 NPT connection

Adapters

Code	Description
IA	Adapter M33x1.5 female to 1-in. NPT female
IB	Adapter 1-in. NPT female to M33x1.5 male

Tag plate

Code	Description
ST	Engraved SST tag plate (tag shall be submitted with order)

Placement of temperature spots

From bottom of sensor (excluding anchor weight). Metric units in millimeters (mm), U.S. units in inches (in.).

Code	Description
/xxxxx	First spot
/xxxxx	Second spot
/xxxxx	Third spot
/xxxxx	Fourth spot
/xxxxx	Fifth spot
/xxxxx	Sixth spot
/xxxxx	Seventh spot
/xxxxx	Eighth spot
/xxxxx	Ninth spot
/xxxxx	Tenth spot
/xxxxx	Eleventh spot
/xxxxx	Twelfth spot
/xxxxx	Thirteenth spot
/xxxxx	Fourteenth spot
/xxxxx	Fifteenth spot
/xxxxx	Sixteenth spot

Extended product warranty

Rosemount extended warranties have a limited warranty of three or five years from date of shipment.

Code	Description
WR3	3-year limited warranty
WR5	5-year limited warranty

Rosemount 566 Multiple Spot Temperature Sensor for cryogenic use (NL-Cryo)



- Custody transfer accuracy
- The highest reliability
- Rugged design for harsh environments
- Equipped with type A elements, suitable for low temperatures
- Supplied with a non-adjustable flange

[VIEW PRODUCT >](#)

Required model components

Model

Code	Description
0566	Multiple Spot Temperature Sensor for cryogenic applications

Overall length (L_o)

Code	Description
Mxxxxx	Metric units, xxxxx in millimeters (mm), range: 02000-70000 (Specify in steps of 10 millimeters.)
Exxxxx	U.S. units, xxxxx in inches (in.), range: 00080-02700 (Longer on request. Specify in steps of 1 inch.)

Sheath type

Code	Description
A	1-in. AISI 316 SST

Tank connection

Code	Description
ANSI flanges (SST AISI 316) - Raised face	
A	1½-in. Class 150
B	1½-in. Class 300
C	2-in. Class 150
D	2-in. Class 300
E	3-in. Class 150
F	3-in. Class 300
G	4-in. Class 150
H	4-in. Class 300
J	6 in. Class 150
L	8 in. Class 150

Code	Description
EN flanges (SST AISI 316) - Flat face	
1	DN 50 PN 16
2	DN 50 PN 40
3	DN 65 PN 16
4	DN 65 PN 40
5	DN 80 PN 16
6	DN 80 PN 40
7	DN 100 PN 16

Temperature sensor wiring

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

Number of temperature spot elements

Code	Description
01 to 16	Specify number

Element type, platinum resistor

Code	Description
P	Pt-100

Thermometer tolerance class

Code	Description
A	$A \pm(0.15 + 0.002 t) ^\circ\text{C} -170 / +95$ (IEC 60751)

Thermometer temperature range

Code	Description
3	-170 to +95 °C (-274 to +203 °F)

Lead wires

Code	Description
00	For integrated installation with Rosemount 2240S (standard)
04-10	Specify other length in meters
13-33	Specify other length in feet

Additional options

Certificate

Code	Description
Q1	Certificate of conformance
Q4 ⁽¹⁾	Calibration certificate
Q7	Hazardous location certificate
Q8	Material traceability certificate per EN 10204 3.1B

(1) Requires Sensor calibration code X4 or X8, 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)
X8	Sensor calibration at 0, +40 and +80 °C (+32, +104 and +176 °F) with Callendar-Van Dusen constants

Country-specific hazardous location certification

Code	Description
I2	INMETRO Intrinsic Safety (Brazil)
IP	KC Intrinsic Safety (South Korea)
I3	China Intrinsic Safety
I4	Japan Intrinsic Safety
IM	Technical Regulations Customs Union (EAC) Intrinsic Safety

Anchor weight

Mutually exclusive options under this category.

Code	Description
AA ⁽¹⁾	2 kg (4.4 lbs), Ø=40; LW=200 mm (Ø=1.6; LW=7.9 in.)
AB ⁽¹⁾	3 kg (6.6 lbs), Ø=50; LW=200 mm (Ø=2.0; LW=7.9 in.)
AC ⁽¹⁾	4 kg (8.8 lbs), Ø=45; LW=330 mm (Ø=1.8; LW=13.0 in.)
AD ⁽²⁾	5 kg (11 lbs), Ø=100; LW=85 mm (Ø=3.9; LW=3.3 in.)
AE ⁽²⁾	10 kg (22 lbs), Ø= 95; LW=175 mm (Ø=3.7; LW=6.9 in.)
AF ⁽²⁾	15 kg (33 lbs), Ø=140; LW=130 mm (Ø=5.5; LW=5.1 in.)

(1) For still-pipes.

(2) For free-hanging.

Hose kit

Mutually exclusive options under this category.

Cable, galvanized steel, and nickel-plated brass material.

Code	Description
HA	Hose kit including glands, 3 m (10 ft), 1/2-in. 14 NPT connection
HB	Hose kit including glands, 10 m (33 ft), 1/2-in. 14 NPT connection

Adapters

Code	Description
IA	Adapter M33x1.5 female to 1-in. NPT female
IB	Adapter 1-in. NPT female to M33x1.5 male

Purge nipple

Code	Description
DN	Purge nipple on flange

Tag plate

Code	Description
ST	Engraved SST tag plate (tag shall be submitted with order)

Placement of temperature spots

From bottom of sensor (excluding anchor weight). Metric units in millimeters (mm), U.S. units in inches (in.).

Code	Description
/xxxxx	First spot
/xxxxx	Second spot
/xxxxx	Third spot
/xxxxx	Fourth spot
/xxxxx	Fifth spot
/xxxxx	Sixth spot
/xxxxx	Seventh spot
/xxxxx	Eighth spot
/xxxxx	Ninth spot
/xxxxx	Tenth spot
/xxxxx	Eleventh spot
/xxxxx	Twelfth spot
/xxxxx	Thirteenth spot
/xxxxx	Fourteenth spot
/xxxxx	Fifteenth spot
/xxxxx	Sixteenth spot

Extended product warranty

Rosemount extended warranties have a limited warranty of three or five years from date of shipment.

Code	Description
WR3	3-year limited warranty
WR5	5-year limited warranty

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 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.

Performance specifications

Element Type

Pt-100 spot elements according to IEC60751:2022

Thermometer accuracy

Sensor type	Thermometer accuracy
Rosemount 565/765	1/10 B-sp $\pm(0.3 + 0.005 t)$ °C (IEC 60751)
	1/6 B-sp $\pm(0.3 + 0.005 t)$ °C (IEC 60751)
Rosemount 566	A $\pm(0.15 + 0.002 t)$ °C -170 / +95 (IEC 60751)

Liquid pressure range

0-4 Bar (0-58 Psi)

Designed for atmospheric non-pressurized tanks. Handles liquid pressure from hydrocarbons and petrochemical products equivalent to a level of 40 m (130 ft).

Liquid temperature range

- -50 to +250 °C (-58 to +482 °F)
- -170 to +100 °C (-265 to +212 °F) for cryogenic use

Number of elements

Sensor type	Number of elements
Rosemount 565	16
Rosemount 765	10/14/16 ⁽¹⁾
Rosemount 566	16

(1) Depending on option model code temperature sensor wiring.

Mechanical specifications

Overall length

Standard length is 5-70 m (16.4-230 ft). Maximum 60 m (197 ft) for Rosemount 765. Other lengths on request.

Protective sheath

Stainless steel, AISI 316. Wall thickness 0.3 mm (0.012 in.).

Ø= 1 in.

Top fitting/mounting thread

Steel pipe with M33 x 1.5.

Thread length: 257 mm (10.12 in.)

Tank opening

Minimum Ø= 2 in. (50.8 mm)

Wire insulation

Sensor type	Insulation
Rosemount 565 (-50 to +120 °C)	ETFE
Rosemount 565 (-20 to +250 °C)	PTFE
Rosemount 765	ETFE
Rosemount 566	PTFE (lead out wire is ETFE)

Immersed material

Stainless steel (AISI 316)

Bottom weights: stainless steel (AISI 304)

Lead wire length

0.4 m (16 in.) is standard for integrated installation with Rosemount 2240S Multi-input Temperature Transmitter.

Longer wires up to 10 m (32.8 ft) are available as an option.

Number of wires

Three or four wires, individual or common return

Bottom weight

2-15 kg (4.4 to 31.1 lbs), stainless steel (AISI 304)

Ingress protection

IP 68, only applies when sensor is attached to the Rosemount 2240S Multi-input Temperature Transmitter

Rosemount 765's water level sensor specifications

Available versions

- Open model, for crude oil and heavy duty products
- Closed model, for lighter fuels such as diesel oil

Active measuring range

500 mm (20 in.), 1000 mm (40 in.)

Output

High-speed RS485/Modbus® communication with Rosemount 2240S Multi-input Temperature Transmitter

Level accuracy

± 2 mm (±0.08 in.) [500 mm active length]

± 4 mm (±0.16 in.) [1000 mm active length]

Repeatability

± 0.5 mm (0.02 in.)

Measuring principle

Capacitive

Calibration

Zero to full range factory calibration, and on-tank calibration possibility

Storage temperature

-40 to +80 °C (-40 to +180 °F)

Operating temperature

0 to +120 °C (+32 to +250 °F)

Maximum temperature at mounting flange is +80 °C (+180 °F)

Operating pressure

0-4 bar (0-58 Psi)

Designed for atmospheric non-pressurized tanks. Handles liquid pressure from hydrocarbons and petrochemical products equivalent to a level of 40 m (130 ft).

Mechanical dimensions

Connection thread M33x1.5 mm

Immersed material

Stainless steel (ANSI 304 coated with PTFE), FEP, PTFE, and PEEK with 30% glass

Length of water level sensor

Active length + 140 mm (5.5 in.)

Outer diameter of water level sensor

Closed: Ø=38 mm (1.5 in.)

Open: Ø=48 mm (1.9 in.)

Unique sensor calibration procedure

When the nominal thermometer tolerance class A and B are not sufficient for certain applications, 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.

See [Table 1](#) for a comparison between standard 1/6 Class B and calibrated Rosemount 565 and 765.

Table 1: Thermometer uncertainty for Rosemount 565 or 765

Four-wire connection	Tolerance @ 0°C (32°F)	Tolerance @ 70°C (158°F)	Uncertainty 0-70°C (32-158°F)
1/6 B-sp $\pm(0.3 + 0.005 t)$ °C	± 5 mK	± 400 mK	± 400 mK
Callendar-Van Dusen constants	± 20mK for option X8 calibration		± 20 mK

Table 2: Net Standard Volume (NSV) uncertainty in a tank with radius 20 m (66 ft) and level 18.5 m (60.7 ft)

Thermometer type	Tolerance 0-70°C (32-158°F)	NSV uncertainty in a 20 m (66 ft) tank and a level at 18.5 m (60.7 ft)
Un-branded 3-Wire one single spot sensor	± 4°C	70.4 m ³
Emerson 565/765 Accuracy 1/6 Class B	± 0.4°C	7 m ³
Emerson 565/765 Calibrated ± 20 mK	± 0.02°C	0.4 m ³

See [Table 3](#) for a comparison between standard and calibrated Rosemount 566.

Table 3: Thermometer uncertainty for Rosemount 566

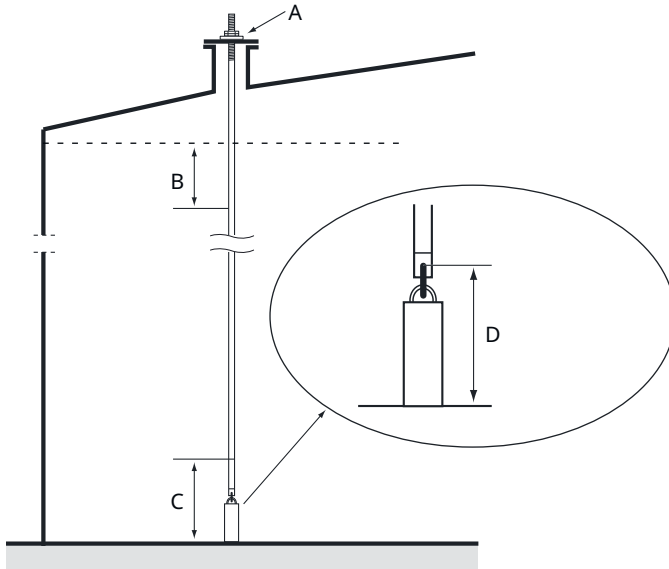
Four-wire connection	Tolerance @ -165°C (-329°F)	Tolerance @ 100°C (212°F)	Combined -165°C - 100°C (329-212°F)
Class A $\pm(0.15 + 0.002 t)$ °C	± 480 mK	± 350 mK	± 480 mK
Callendar-Van Dusen constants	± 20mK for option X8 calibration		± 20 mK

Installation examples

Installation on fixed roof tanks

On fixed roof tanks the Multiple Spot Temperature sensor is attached to a flange mounted on a suitable nozzle. The complete sensor can be height adjusted ± 125 mm with the flange nuts. There are 17 standard flange fittings available.

Figure 5: Installation of multiple spot temperature elements on fixed roof tanks

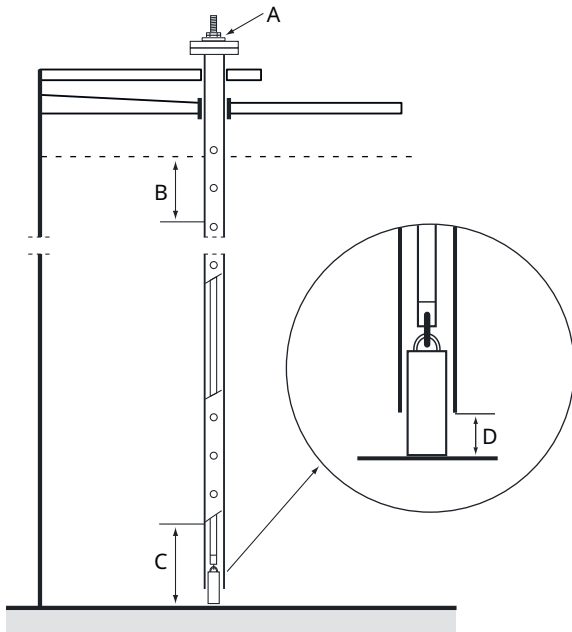


- A. Flange nuts
- B. Top spot element position: 0.5-1 m (19.7 to 39.4 in.) from maximum level
- C. First spot element position: 0.5-1 m (19.7 to 39.4 in.) from bottom
- D. Anchor weight, available from 2-15 kg with different heights

Installation on floating roof tanks

On floating roof tanks the temperature elements can be mounted in a still-pipe with a nozzle as illustrated in [Figure 6](#) or in other suitable roof openings. The complete sensor can be height adjusted ± 125 mm with the flange nuts. There are 17 standard flange fittings available.

Figure 6: Installation of multiple spot temperature elements in still-pipe

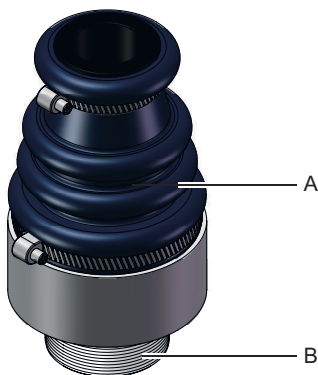


- A. Flange nuts
- B. Top spot element position: 0.5-1 m (19.7 to 39.4 in.) from maximum level
- C. First spot element position: 0.5-1 m (19.7 to 39.4 in.) from bottom
- D. Anchor weight, available from 2-15 kg with different heights

Vapor boot

A vapor boot is used to guide and protect the multiple spot temperature sensor if installed on a floating roof tank.

Figure 7: Vapor Boot



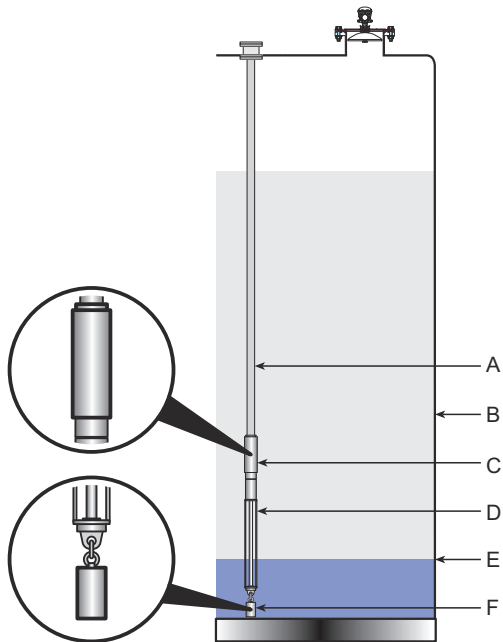
- A. Rubber fuel-resistant
- B. Lower part: AISI 304 Threaded connection 2-in. or 3-in. NPS for flange connections

Weight

An anchor weight can be used for any of the Rosemount 565/765/566 sensors to keep it in position. It can alternatively be clamped to the tank bottom.

For Rosemount 765, a weight can be mounted in the bottom eye bolt and/or above the water level sensor, in which case the weight is hollow and fitted on the temperature sensor. The eye bolt can be removed for close bottom measurements.

Figure 8: Top and Anchor Weights Mounted on Rosemount 765



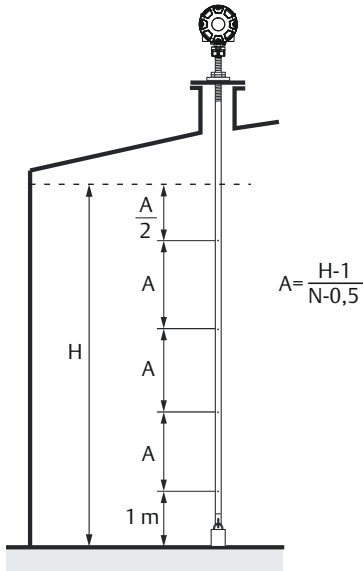
- A. Multiple spot temperature sensor
- B. Tank wall
- C. Top weight
- D. Water level sensor
- E. Interface level
- F. Anchor weight

Temperature elements position for Custody Transfer applications (Rosemount 565/566)

For Custody Transfer applications, API chapter 7 recommends a minimum of one temperature element per 3 meters (10 feet) as illustrated in [Figure 9](#).

The sensor should be positioned at least 1 m (3 ft) from tank shell, inlets, and outlets to avoid a misrepresentation of the average, caused by ambient temperature effects.

Figure 9: Recommended position of temperature elements for Custody Transfer applications



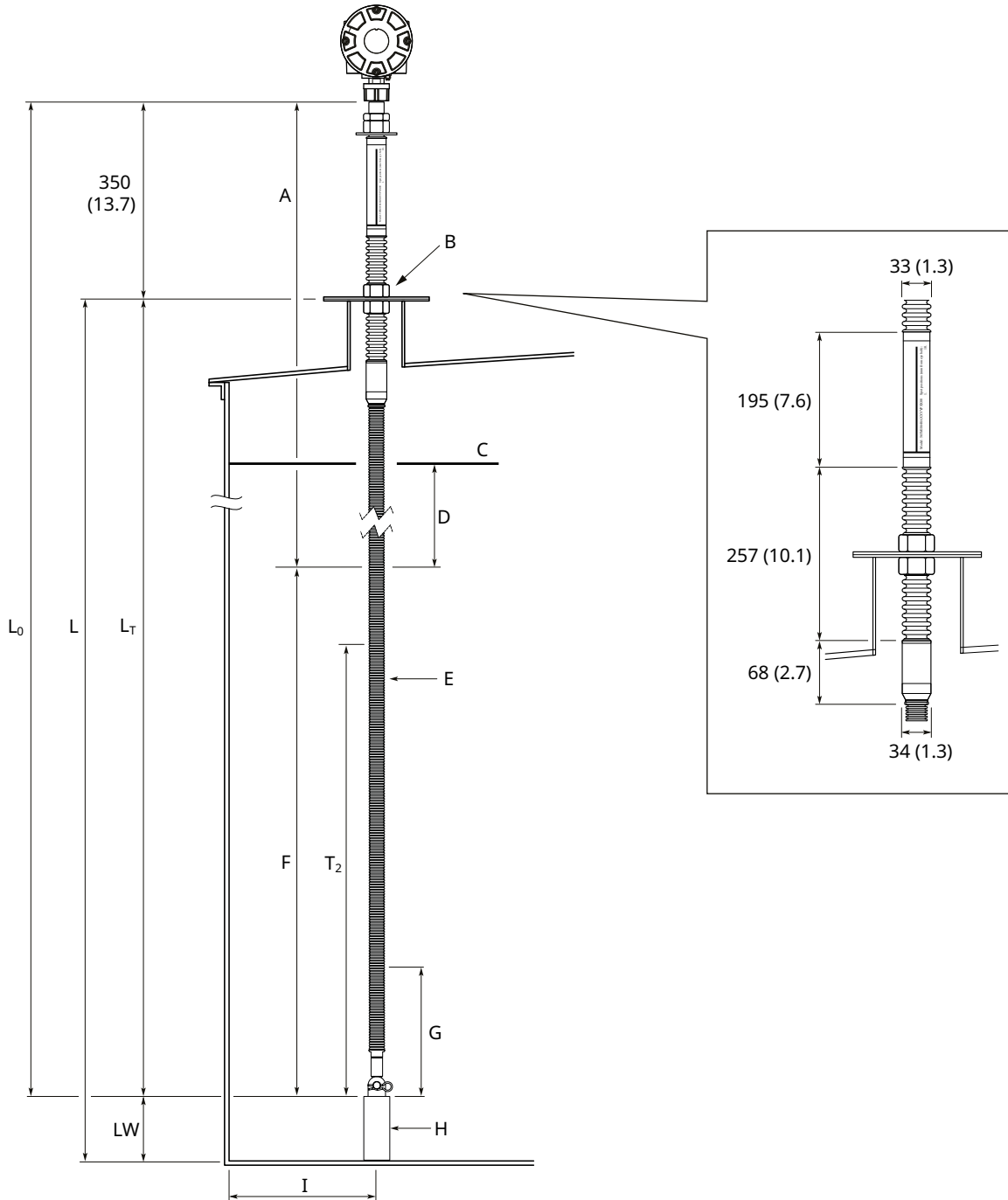
Example: 4 spot elements, $H=8\text{ m}$. $A=2\text{ m}$.

Product certifications

See the Rosemount 565/765/566 [Product Certifications](#) document for detailed information on the existing approvals and certifications.

Dimensional drawings

Figure 10: Rosemount 565 Multiple Spot Temperature Sensor

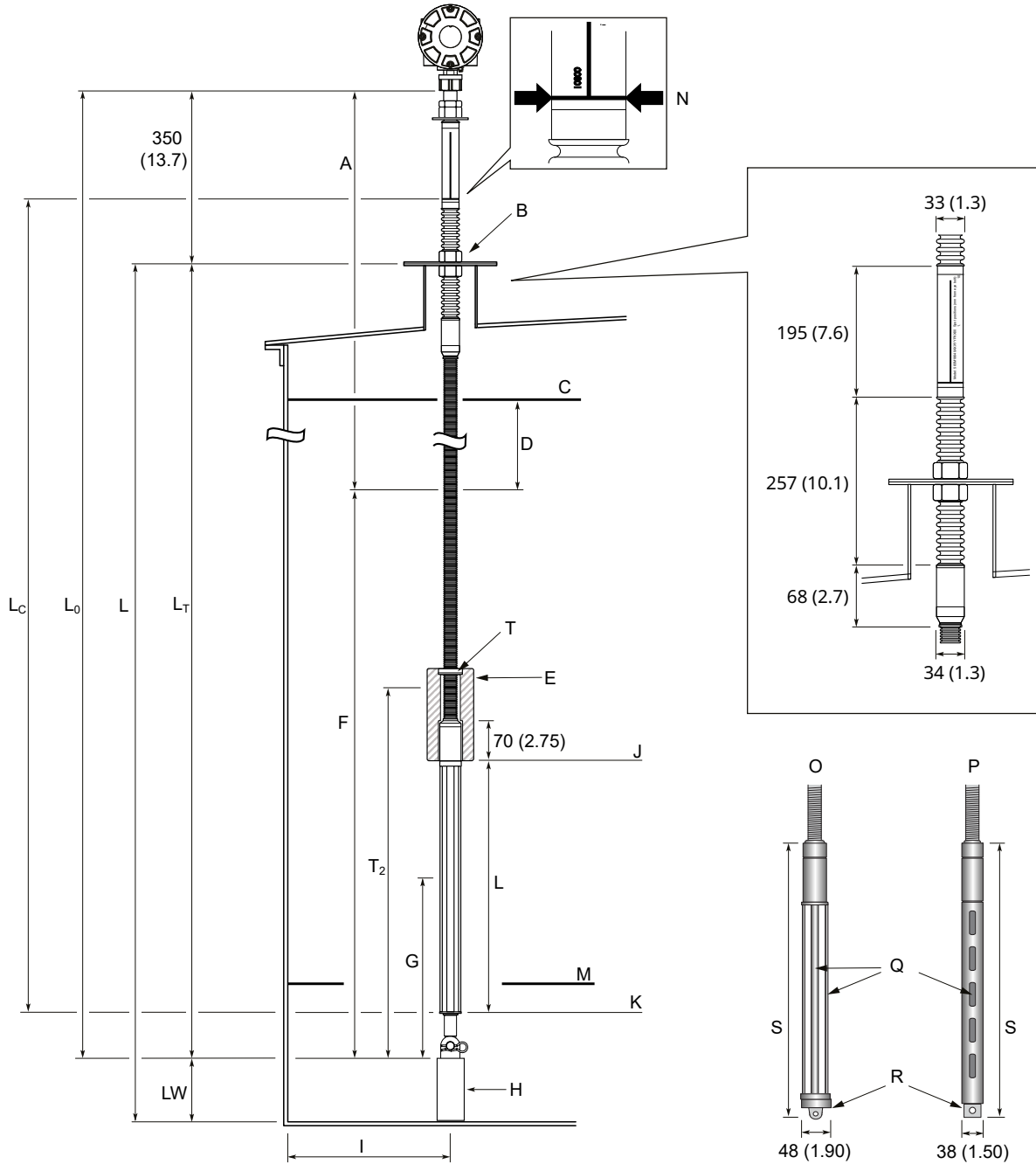


Dimensions are in millimeters (inches).

- A. Minimum 1000 mm (39.3 in.)
- B. Nuts to adjust sensor position. Adjustable threads: ± 125 mm (4.92 in.).
- C. Maximum filling level
- D. Minimum 500 mm (19.6 in.) to highest spot element

- E. 1-in. flex tube*
- F. Highest temperature element $\leq T_{16}$*
- G. T_1 (minimum 150 mm (5.9 in.))*
- H. Weight (always use the largest possible weight that your tank/application allows)*
- I. Recommended minimum distance: 1m (39.4 in.)*

Figure 11: Rosemount 765 Multiple Spot Temperature Sensor Dimensions

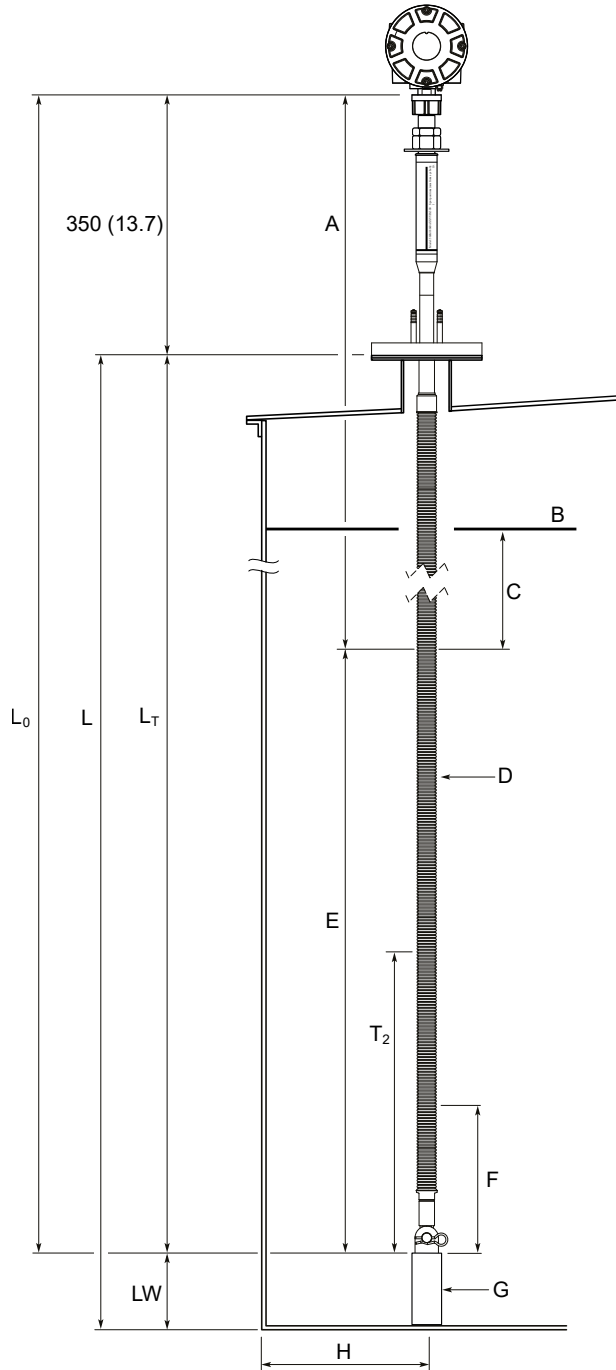


Dimensions are in millimeters (inches).

- A. Minimum 1000 mm (39.3 in.)
- B. Nuts to adjust sensor position. Adjustable threads: ± 125 mm (4.92 in.).
- C. Maximum filling level
- D. Minimum 500 mm (19.6 in.) to highest spot element
- E. Top weight BA
- F. Highest temperature element $\leq T_{16}$
- G. T_1 (minimum 300 mm (11.8 in.))
- H. Weight (always use the largest possible weight that your tank/application allows)
- I. Recommended minimum distance: 1m (39.4 in.)

- J. Maximum level*
- K. Minimum*
- L. Active length: 500 mm (19.6 in.) as standard, or 1000 mm (39.3 in.) as an option*
- M. Tank zero level*
- N. The mark on the label shows the distance to the sensor zero level. Ideally this zero level should correspond to the tank zero level. If not an offset is defined during calibration.*
- O. Open version*
- P. Closed version*
- Q. Sensor electrode*
- R. Anchoring facility (eye bolt)*
- S. L+140 mm (5.5) in.*
- T. PTFE protection ring*

Figure 12: Rosemount 566 Multiple Spot Temperature Sensor Dimensions

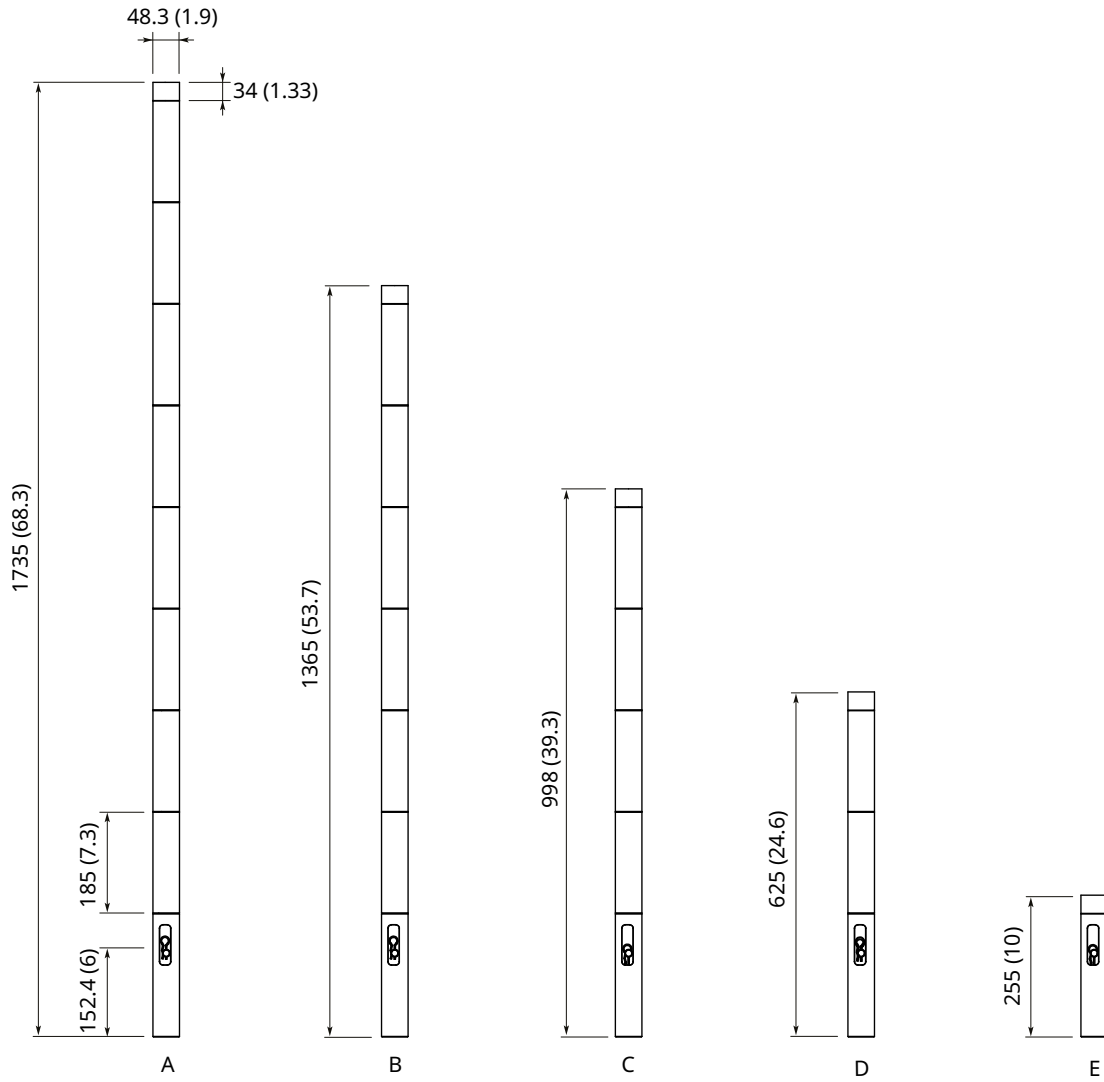


Dimensions are in millimeters (inches).

- A. Minimum 1000 mm (39.3 in.)
- B. Maximum filling level
- C. Minimum 500 mm (19.6 in.) to highest spot element
- D. 1 in. flex tube
- E. Highest temperature element $\leq T_{16}$
- F. T_1 (minimum 150 mm (5.9 in.))
- G. Weight (always use the largest possible weight that your tank/application allows)

H. Recommended minimum distance: 1m (39.4 in.)

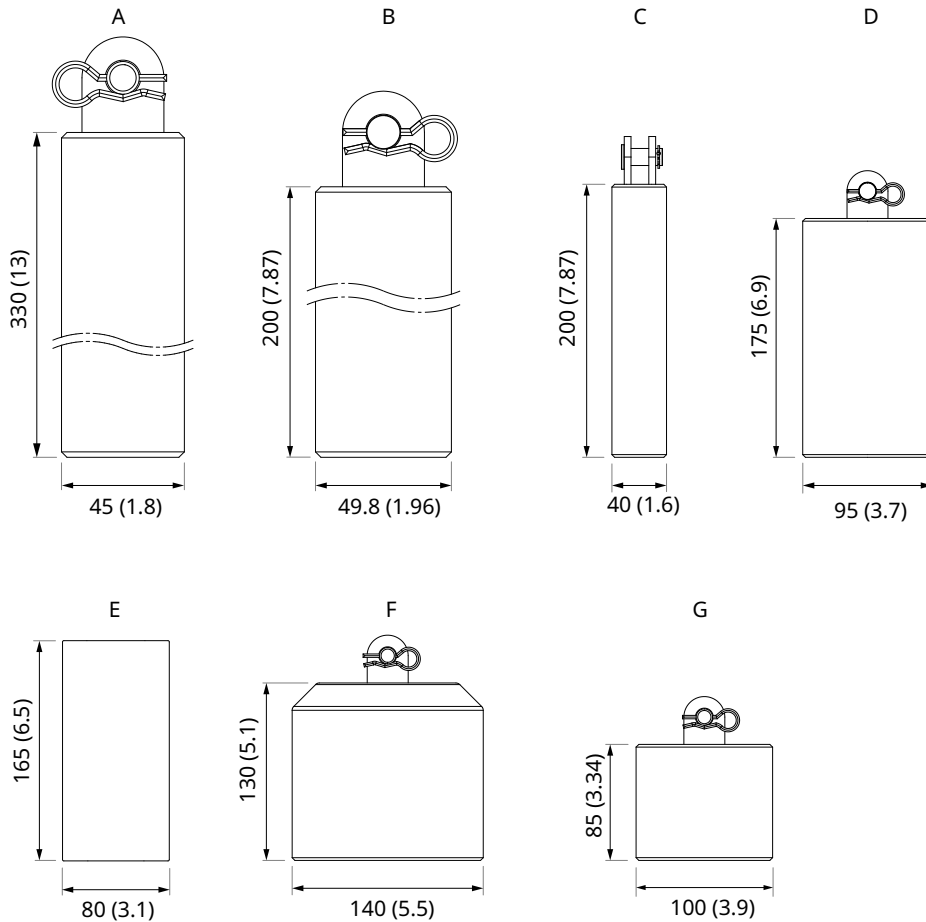
Figure 13: Modular Weights for 2-in. Still-Pipes



Dimensions are in millimeters (inches).

- A. Code AU (15 kg)
- B. Code AT (12 kg)
- C. Code AS (9 kg)
- D. Code AR (6 kg)
- E. Code AP (3 kg)

Figure 14: Standard Weights



Dimensions are in millimeters (inches).

- A. Code AC (4 kg)
- B. Code AB (3 kg)
- C. Code AA (2 kg)
- D. Code AE (10 kg)
- E. Code BA (5 kg)
- F. Code AF (15 kg)
- G. Code AD (5 kg)

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

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