Product Data Sheet
00813-0100-4827, Rev BA
Catalog 2008 - 2009

Resistance Temperature Sensors for Hygienic and Sanitary Applications

- *Resistance temperature sensors for applications in the food and beverage, pharmaceutical and life-science industries*
- *Aseptic process connections suitable for CIP and SIP dead-pocked free measurement applications*
- *Exchangeable measuring insert to ensure process integrity*
- *Enhanced system accuracy with transmitter-sensor matching, meets pharmaceutical industry requirements*
- *Reliable temperature measurement with Hot-Backup and Sensor Drift Alert*

3-A® 37-01

Content

Introduction

Rosemount Series 65Q and 65B RTD temperature sensors are designed for use in hygienic and aseptic applications exclusively to meet the stringent quality requirements in the Food and Beverage, and Pharmaceutical industries. Series 65Q sensors represent a hygienic portfolio for applications in Food and Beverage, and low-end Pharmaceutical. Series 65B sterile and aseptic sensor assemblies instead are designed for use in Pharmaceutical and BioTech applications. Quality requirements, that relate to different properties of a measuring instrument. The hygienic design of production plant and thus of the measuring devices as well is a basic requirement of users in food processing, pharmaceuticals, and bio-technology for the production of faultless products. Rosemount temperature products are manufactured according to Good Manufacturing Practice (GMP) guidelines and comply with the standards of the European Hygienic Equipment Design Group (EHNEDG) as well as 3A standards.

NATIONAL AND INTERNATIONAL GUIDELINES

Products that may have a direct or indirect impact on public health, must be produced according to national and international guidelines. The guidelines contain rules for the implementation and organization of methods, production, production environments, and inspections.

The European Hygienic Equipment Design Group (EHEDG) is a foundation in which mainly users and manufacturers or hygienic equipment are represented. EHEDG provides guidance of the hygienic engineering aspects of manufacturing of safe and wholesome food, e.g. through production, publication, and updating of guidelines, equipment approval through certification to assist equipment suppliers and food manufacturers and advisory function to legislators and standards groups.

EHEDG Cooperation with 3-A

EHEDG cooperates with 3-A Sanitary Standards, Inc. in the development of hygienic construction material selection and design standards for food and dairy processing equipment. 3-A Sanitary Standards and Practices have been developed for use by the dairy industry, dairy equipment manufacturers, and milk regulatory agencies as voluntary guidelines. These voluntary guidelines are used as a benchmark for product performance, hygienic quality, and ultimately food safety. 3-A Sanitary Standards and Practices are generally accepted by federal, state, and local public health authorities in the United States and other public health authorities around the world.

While 3-A Sanitary Standards have been in development and use since the late 1920's. EHEDG is a fairly recent development that applies test criteria and laboratory test data for determining cleanability and acceptance for equipment use in the processing of foods or comestibles. Both EHEDG and 3-A Sanitary Standards may be applied not only to Food and Beverage processing equipment, but can also be applied to Biotech and Bio-pharm equipment to ensure product acceptance and safety.

MOUNTING CONFIGURATIONS

Series 65Q and 65B RTDs

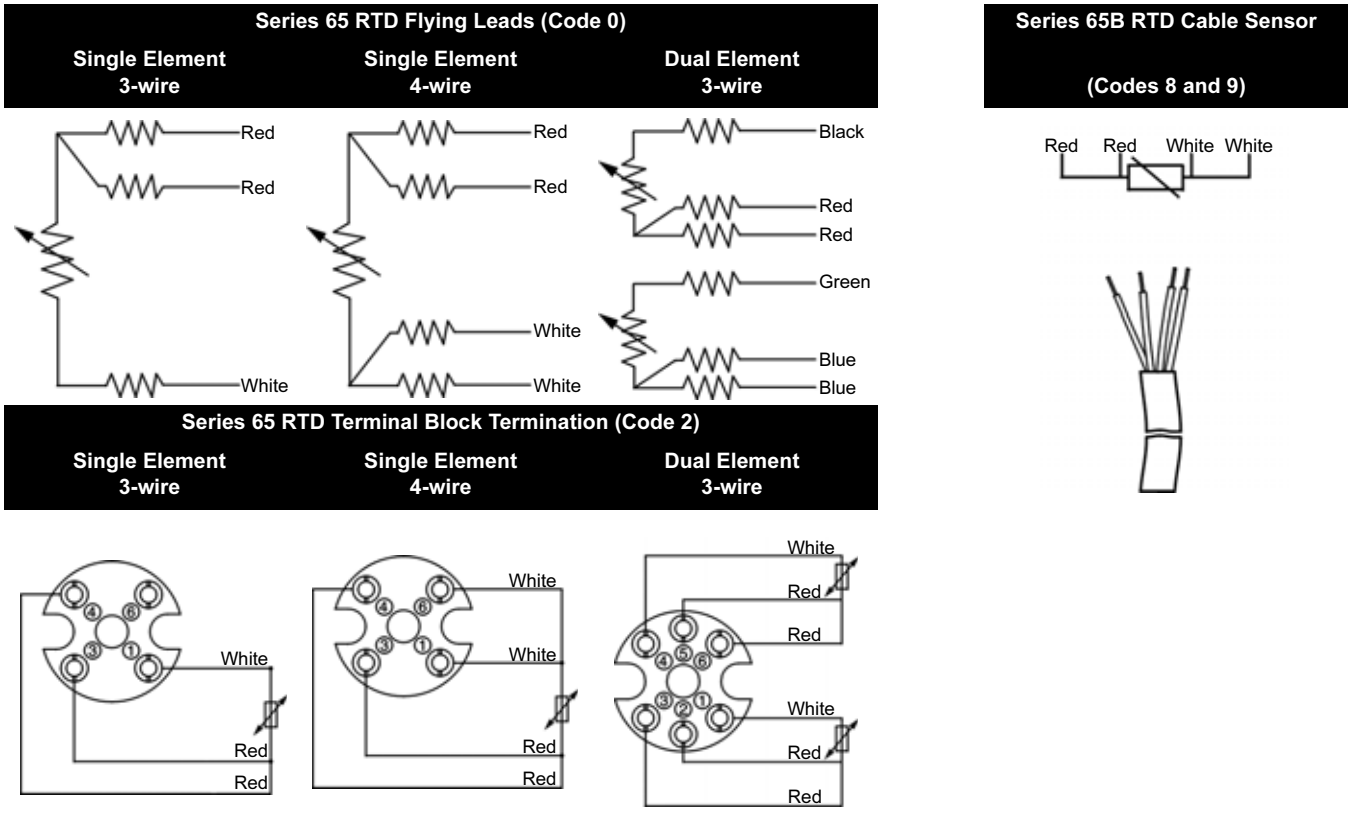
You may order the Series 65Q and 65B RTDs with flying leads or terminal block. Ordered with flying leads, the sensors are designed with an integral mounting plate, and are for use with a head-mount transmitter attached directly to the sensor. The flying lead configuration facilitates removal of the sensor and transmitter as one assembly. The configuration with terminal block allows only the mounting of transmitter into the cover of several DIN size connection heads or requires the use of field mount transmitter. 65B RTDs may also be ordered with a cable attached to the sensor. This assembly requires the use of field mount transmitters.

Rosemount 65Q and 65B Sensors

TABLE 1. Differentiation criteria between 65Q and 65B

Design Criteria	Series 65Q	Series 65B
Hygienic Design for Food and beverage Applications	Yes	Yes
Aseptic Design for Pharmaceutical/Biotech Applications	No	Yes
Sensor Lead Wire termination	• Flying leads • Terminal block	• Flying leads • Terminal block • Cable
Connection Head Material	• SST • Aluminum • Polyamide	• SST • Aluminum • Polyamide
Thermowell Material	1.4404 (316 L)	In-Line System with thermowell 1.4435 (316 L)
Thermowell Diameter	• 6 mm straight • 10 mm reduced to 6 mm	• No thermowell • 4.3 mm weld-in pocket as part of In-Line System
Process Connection	• Tri-Clamp • Tapered Union with Coupling Nut according to DIN 11851 (Dairy Connection) • Weld-in ball, adjustable • Threaded Connection • Varivent	• Hygienic In-Line System
Certificates	No	EHEDG 3-A

FIGURE 1. Series 65Q and 65B Lead Wire Termination



Series 65Q RTD – Sanitary Applications

Rosemount Series 65Q integral mount temperature sensors are designed for use in hygienic, food and beverage applications when fitted with the TriClamp, adjustable Weld-in Ball or Tapered Union with Coupling Nut according to DIN 11851 (Dairy Connection) process connections which do not need to meet as harsh aseptic requirements as requested for BioPharm applications. Alternatively for direct insertion into non-hygienic processes the Series 65Q temperature sensor can be ordered optional with G½-in. (½-in. BSPF) or ½-in. NPT thread mounting.

Those RTD sensors are available alone or as complete assemblies including connection heads, thermowells with weld-on process connections. This offering is designed to be used in complete temperature assemblies including Rosemount Temperature Transmitters. The RTD sensors meet most critical parameters of international standards - DIN EN 60751 incorporating Amendments 1 and 2. All sensors are available in a variety of lengths and ranges with terminal block or flying leads.

SPECIFICATIONS

Nominal Resistance

In accordance with DIN EN 60751, the nominal resistance is defined as follows:

- 100 Ω RTD at 0 °C
- Temperature coefficient α = 0.00385 Ω x °C/Ω), averaged between 0 and 100 °C

Limit Deviations

Tolerance Class A as standard: t = ± (0.15 + 0.002 x t);
valid for the temperature range from 0 to +350 °C

Lead Wire Configuration

As single element (1Pt 100) with 3 or 4 lead wires or dual element (2Pt 100) with 3 lead wires

Response Time

Less than 12 seconds to reach 63% step change in water flowing at 0.4 m/s

Process Temperature Range

-50 to +450 °C
The measurement range can be limited by the gasket in the process connection.

Ambient Temperature

Housing without head-mounted transmitter

- Metal housings: -40 to +130 °C
- Plastic housings: -40 to +85°C

Housing with head-mounted transmitter

- -40 to +85°C

Maximum Process Pressure

Lower maximum pressure can be due to the process connection
Pressure ratings at 20 °C:

- Tri-Clamp: 10 bar
- Weld-in Ball with PEEK-Seal: 6 bar
- Weld-in Ball with SST-Seal: 40 bar
- Threaded: 40 bar
- Tapered Union with Coupling Nut: 10 bar
- Varivent: 10 bar

Shock and Vibration Resistance

According to DIN EN 60751: 2.8 g peak / 10…500 Hz

Self Heating

0.15 °K/mW when measured per method defined in DIN EN 60751

Insulation Resistance

1,000 MΩ minimum insulation resistance when measured at 500 Vdc and at room temperature

Sheath Material

321 Stainless Steel with mineral-insulated cable construction

Lead Wire

PTFE insulated, silver coated copper wire

Identification Data

The model and serial numbers are marked on each sensor

Ingress Protection (IP) Ratings

The particular rating is applicable only for complete assemblies including a connection head and tubular thermowell. IP varies from 65 to 68 due to a wide selection on different connection heads, DIN A and B size, made of different materials such as aluminium, polyamide and stainless steel

SYSTEM COMPONENTS

Sensor

The 65Q sensor consists of an exchangeable mineral-insulated measuring insert, wherein a small, drop-form thin film RTD element is encapsulated. This design protects the relatively strain-free element, thereby maintaining accuracy and long-term stability. The sensor is mounted into a swaged or straight stainless steel sheath. The sensor outer diameter is 3.2 mm. The minimum sensor length for an exchangeable sensor is 100 mm. The RTD sensor is fitted into a housing with connection head and welded thermowell.

Extension

- Standard material Stainless Steel 1.4404 (316 L)
- Standard diameter of 10 mm
- Preferred standard lengths; 50, 65, and 130 mm

Thermowell

Thermowell stem styles:

- Straight thermowell with an outer diameter of 6 mm diameter must be used for immersion lengths less than 50 mm
- More stable Stepped Thermowell with an outer diameter of 10mm reduced to 6 mm must be used for immersion lengths greater than 50 mm (65 mm on parallel thread G$^1/_2$-in. ($^1/_2$-in. BSPF))

Thermowell materials:

- Stainless Steel 1.4404 (316L) for hygienic applications

· Thermowell surface qualities:

- R_a < 0,8 µm as standard, electropolishing
- R_a < 0,4 µm optional, electropolishing

Connection Heads (see Table 2)

The connection heads can be of different types (size DIN A and B) and materials (plastic, aluminium, stainless steel). Its fitting to the rest of the probe and the gland for the cable entry, assure an IP grade of 65 at minimum. All supplied heads have a process connection M24x1.5.

Polished Stainless Steel DIN A (sanitary applications)

- Smoothly contoured design which minimizes crevices for easy wipe-down
- Sanitary Stainless Steel housing for easy-to-clean applications
- Mounting of one DIN A or B sized transmitter on DIN plate
- Local indication with integral LCD Meter

Polished Stainless Steel DIN B (sanitary applications)

- Smoothly contoured design which minimizes crevices for easy wipe-down
- Sanitary Stainless Steel housing for easy-to-clean applications
- Mounting of one DIN B sized transmitter on DIN plate

Rosemount Aluminium DIN A

- Rosemount design
- Mounting of one or two transmitters on DIN plate and for second one optional by the use of extension ring

TZ-A/BL (BUZH)

- DIN B head with enlarger space for mounting a DIN A size (644H) or DIN B size transmitter into the cover by the use of terminal block or two transmitters with flying lead sensors

GR-A/BL (BUZ)

- DIN B head with enlarger space for mounting a DIN A size (644H) or DIN B size transmitter on DIN plates

TZ-A/BK

- DIN B head with enlarger space for mounting a DIN A size (644H) or DIN B size transmitter into the cover by the use of terminal block or two transmitters (248H) with flying lead sensors
- Suggested for use in high humidity environments and at low temperatures to avoid problems due to condensation

TABLE 2. Connection Head Features

Type	Material	IP Rating	Lid Version	Transmitter Mounting	Conduit Connection	LCD Meter Cover
Polished DIN A	SST	68	Threaded	DIN plate, 644, 248	M20 x 1.5, $^1/_2$-in. NPT	Yes
Polished DIN B	SST	66	Threaded	DIN plate, 248	M20 x 1.5, $^1/_2$-in. NPT	No
Rosemount	Aluminum	68	Threaded	DIN plate, 644, 248	M20 x 1.5, $^1/_2$-in. NPT	Yes
TZ-A/BK	Polyamide	65	Screw-on cap	On cover, terminal block 644, 248	M20 x 1.5	No
TZ-A/BL	Aluminum	65	Screw-on camp	On cover, terminal block 644, 248	M20 x 1.5	No
GR-A/BL	Aluminum	65	Screw-on camp	DIN plate, 644, 248	M20 x 1.5	No

Rosemount 65Q and 65B Sensors

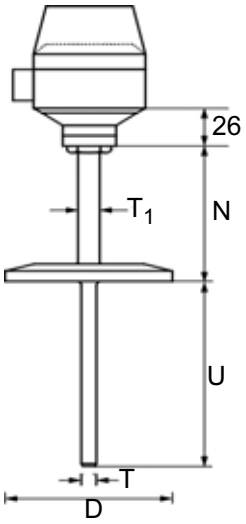
MOUNTING STYLE AND PROCESS CONNECTION

Achieving absolute control through every step of the manufacturing process is essential in order for the production of sanitary fittings to be successful. By achieving such control, each fitting will perform more satisfactorily when incorporated into the process installation, reducing installation time, and ensuring process integrity.

- Process connections are available in several sizes
- Process connection is continuously welded on the thermowell in such a way to obtain a welding radius of 3.2 mm at minimum, between the lower surface of the connection and the sensor stem according to 3A standards
- All process connections are available in material 1.4404 (316L)
- Surface roughness on wetted parts: R_a of ≤ 0.8 µm is available as standard, optional with R_a ≤ 0.4 µm, both electropolishing

Tri-Clamp

- Welded on the thermowell it allows immersion lengths from 25 to 500 mm, they depend on pipe nominal size used; see details on dimension table
- Available in 1/2 -to-4 in. (19 to 10.16 mm) tube OD sizes, larger sizes than 4-in. are available upon request
- available in material 1.4404 (316L), surface finish R_a of ≤ 0.8 µm is available as standard, optional with R_a of ≤ 0.4 µm, both electropolishing
- Can be cleaned in place, fast and easy to take down, provide lead-tight connections and readily adaptable to other forms of piping, allow in-line temperature measurement by the use of counter part and suitable seal o-ring on customer site
- Meet the 3-A Sanitary Standard
- Meets ASME BPE 2002 standards



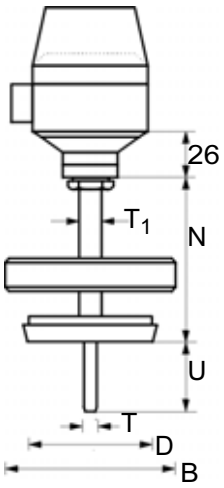
Dimensions (mm)			
Nominal Size	**D**	**T**	**T1**
1/2-in. (12.7 mm)	24.9	6(1)	10
3/4-in. (19 mm)	24.9	6(1)	10
1-in. (25.4 mm)	50.4	6(1)	10
1.5-in. (38 mm).	50.4	6(1)	10
2-in. (50.8 mm)	63.9	6(1)	10
2.5-in. (63.5 mm)	77.4	6(1)	10
3-in. (76.2 mm)	90.9	6(1)	10
4-in. (101.6 mm)	119.1	6(1)	10

(1) Diameter 6 mm as standard for immersion length U ≤ 50 mm. For U ≥ 50 mm Stepped thermowell diameter 10 mm with reduced measuring tip of 6 mm.

D = Process Connection Diameter
T1 = Extension Outer Diameter
T = Thermowell Outer Diameter
U = Immersion Length
N = Extension Length

Tapered Union with Coupling Nut according to DIN 11851 (Dairy Connection)

- Immersion lengths from 25 to 500 mm
- Available in DN10 - DN50 tube OD sizes, larger sizes than 50 DN are available upon request
- Available in material 1.4404 (316L), surface finish R_a of ≤ 0.8 µm is available as standard, optional with R_a of ≤ 0.4 µm, both electropolishing
- Self-centering, external coupling nut can be easily cleaned



Dimensions (mm)				
Nominal Size	**D**	**B**	**T**	**T_1**
DN 10	22.5	38	6(1)	10
DN 25	44	63	6(1)	10
DN 32	50	70	6(1)	10
DN 40	56	78	6(1)	10
DN 50	68.5	92	6(1)	10

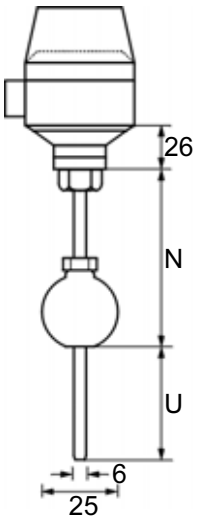
(1) Diameter 6 mm as standard for immersion length U ≤ 50 mm. For U ≥ 50 mm Stepped thermowell diameter 10 mm with reduced measuring tip of 6 mm.

D = Process Connection Diameter
T1 = Extension Outer Diameter
T = Thermowell Outer Diameter
U = Immersion Length
N = Extension Length
B = Coupling Nut Diameter

Rosemount 65Q and 65B Sensors

Weld-in Ball Connection

- Immersion lengths from 25 to 500 mm, mostly used for temperature measurement in vessels
- Available in material 1.4404 (316L), surface finish R_a of ≤ 0.8 µm is available as standard, optional with R_a of ≤ 0.4 µm, both electropolishing
- Used for Food and Beverage applications
- Available with PEEK or SST seal

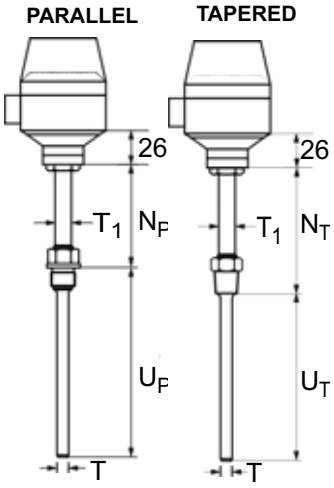


U = Immersion Length (adjustable)

N = Extension Length (adjustable)

Threaded Process Connection

- Immersion lengths from 25 mm (tapered threads) and 40 mm (parallel threads) to 500 mm
- Available in material 1.4404 (316L)
- Used for temperature measurement in non-hygienic processes



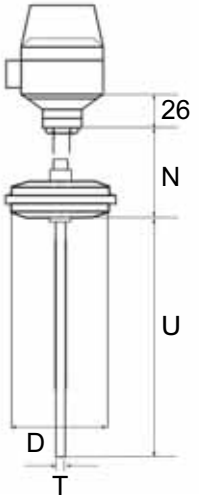
Dimensions (mm)	
T	T_1
6(1)	10

(1) Diameter 6 mm as standard for immersion length $U_T \leq 50$ mm or $U_p \leq 65$ mm. For $U_T \geq 50$ mm or $U_p \geq 65$ mm Stepped thermowell diameter 10 mm with reduced measuring tip of 6 mm.

D = Process Connection Diameter
T = Thermowell Outer Diameter
T_1 = Extension Outer Diameter
U_P = Immersion Length (parallel)
U_T = Immersion Length (tapered)
N_P = Extension Length (parallel)
N_T = Extension Length (tapered)

Varivent Process Connection

- Immersion lengths from 35 to 500 mm
- Available in D = 68 mm
- Suitable for hygienic and aseptic applications



Dimensions (mm)	
Nominal Size	D
DN 32 - 125	68

D = Process Connection Diameter
T = Thermowell Outer Diameter
U = Immersion Length
N = Extension Length

Rosemount 65Q and 65B Sensors

INSTALLATION

Series 65Q temperature sensors can be mounted on the wall of pipes or vessels. The counterparts for the process connections and the respective gaskets or sealing rings are generally not supplied with the sensors, and are on the customer's responsibility (FDA material certification, EHEDG and 3A requirements shall be observed).

As a general rule, the sensors should be installed in a manner which does not adversely affect their ability to be cleaned.

The immersion length may have an influence on the accuracy of the sensors, If it is too short, an error might be generated in the measured temperature, due to the lower temperatures of the process medium near the walls and the heat transfer which occurs through the sensor stem. To avoid this effect of inaccuracy, the immersion length should be, if possible, at least 90 to 120 mm. In pipes with smaller diameter, the axis line of the duct must be reached, and even slightly exceeded by the sensor tip.

In hygienic applications a strict installation rule exists so as not to leave any dead spaces along the run of process fluid.

In case of disassembling of the sensor, new gaskets equal to the originals and specific torques must be employed for the reassembly procedure, to assure the stated IP grade of the connection heads.

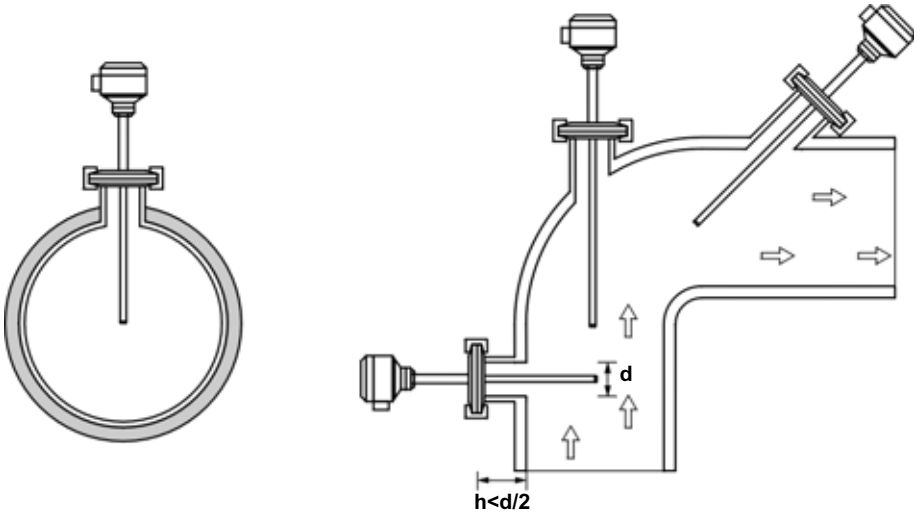
TriClamp Flange fulfills partly this requirement.

For **Weld-in Ball Connection** care should be taken by the user in the execution of the welding on the process side; e.g. suitable weld material, welding radius > 3 mm, absence of pits, crevices etc.)

Tapered Union with Coupling nut according to DIN 11581 (Dairy Process Connection) process connection doesn't meet as harsh aseptic requirements as requested for BioPharm applications.

Alternatively for direct insertion into non-hygienic processes the Series 65Q temperature sensor can be ordered optional with $G^1/_2$-in. **($^1/_2$-in. BSPF) or NPT thread mounting**.

FIGURE 2. Installation Drawings

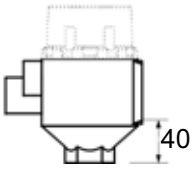


Rosemount 65Q and 65B Sensors

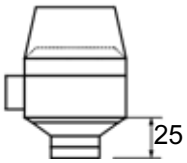
DIMENSIONAL DRAWINGS

Connection Heads

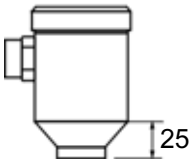
Rosemount
Aluminum
Codes C, D, 1, 2



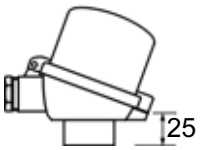
DIN A
SST
Codes, E, F, 5, 6



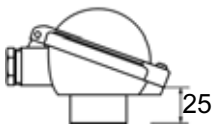
DIN B
Polished SST
Codes R, S



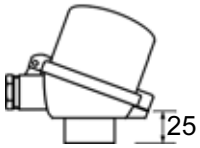
TZ-A/BL
Aluminum
Code L



FR-A/BL
Aluminum
Code J

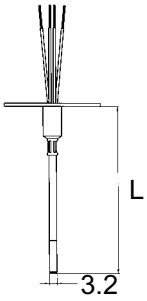


TZ-A/BK
Polyamide
Code T

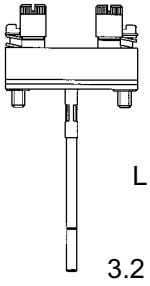


Sensor Lead Wire Terminations

Flying Leads
Code 0



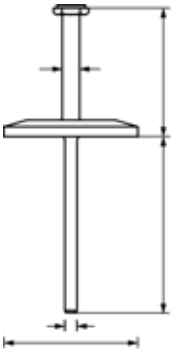
Terminal Block
Code 2



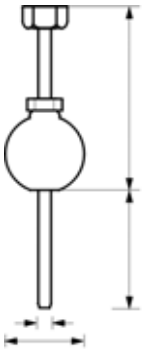
L = Sensor Length
N = Extension Length
N_P = Extension Length (parallel)
N_T = Extension Length (tapered)
U = Immersion Length
U_P = Immersion Length (parallel)
U_T = Immersion Length (tapered)
T = Thermowell Outer Diameter
T_1 = Extension Outer Diameter
D = Process Connection Diameter
B = Coupling Nut Diameter

Thermowells and Process Connections

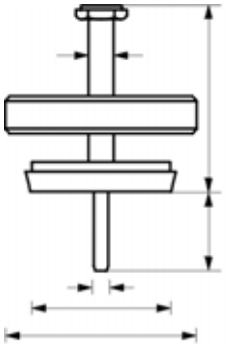
Tri-Clamp



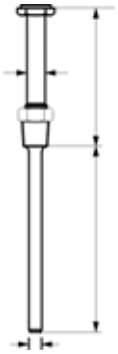
Weld-in Ball (adjustable)



Tapered Union with Coupling Nut

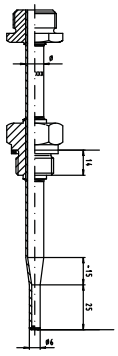


Threaded Tapered



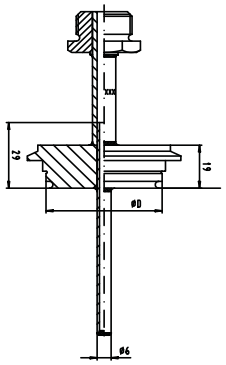
Threaded Parallel

Stepped Thermowell



Straight Thermowell

Varivent



All dimensions are in millimeters

Rosemount 65Q and 65B Sensors

ORDERING INFORMATION

65Q RTD Assembly (Pt 100) for Hygienic and Food and Beverage Applications

Model	Product Description		
0065Q	65Q RTD Temperature Sensor Assembly, Pt 100 according to DIN EN 60751 (IEC 751), Tolerance Class A, suitable for transmitter mounting		
Code	**Connection Head Material**	**IP Rating[1]**	**Conduit / Cable Entry**
C	Rosemount, Aluminum	68	M20 x 1.5
D	Rosemount, Aluminum	68	1/2-in. NPT
E	Connection Head DIN A Polished Stainless Steel	68	M20 x 1.5
F	Connection Head DIN A Polished Stainless Steel	68	1/2-in. NPT
J	GR-A/BL (BUZ), Aluminum	65	M20 x 1.5 (with cable gland)
L	TZ-A/BL (BUZH) Aluminum	65	M20 x 1.5 (with cable gland)
R	Connection Head DIN B Polished Stainless Steel	66	M20 x 1.5
S	Connection Head DIN B Polished Stainless Steel	66	1/2-in. NPT
T	TZ-A/BK, Polyamide, Black	65	M20 x 1.5 (with cable gland)
1	Rosemount, Aluminum with LCD Display Cover	68	M20 x 1.5
2	Rosemount, Aluminum with LCD Display Cover	68	1/2-in. NPT
5	Connection Head DIN A Polished Stainless Steel with LCD Display Cover	68	M20 x 1.5
6	Connection Head DIN A Polished Stainless Steel with LCD Display Cover	68	1/2-in. NPT
Code	**Sensor Lead Wire Termination**		
0	Flying leads – no springs on DIN plate		
2	Terminal Block, Form B – DIN 43762		
Code	**Sensor Type**	**Temperature Range**	
1	Single element, 4-wire	– 50 to 450 °C	
2	Dual element, 3-wire	– 50 to 450 °C	
5	Single element, 3-wire	– 50 to 450 °C	
Code	**Extension Type**		
S	Tubular with Extension, welded screw bush M24 x 1.5		
Z	Tubular with Extension, head connection adjustable loose screw nut M24 x 1.5		
Code	**Extension Length (N)**		
0050 [2]	50 mm		
0065[3]	65 mm		
0130	130 mm		
XXXX	Non-standard extension length – non-standard lengths are available from 50 to 990 mm		
Code	**Thermowell Material**	**Surface Roughness (R_a)**	
D	1.4404 (AISI 316L) Stainless Steel	≤ 0.8 µm electropolishing	
Code	**Immersion Length (U)**		
0025	25 mm – not available for Mounting Style code T02		
0050	50 mm		
0065	65 mm		
0100	100 mm		
0150	150 mm		
0200	200 mm		
0250	250 mm		
XXXX	Non-standard immersion length – non-standard lengths are available from 25 to 2500 mm		

65Q RTD Assembly (Pt 100) for Hygienic and Food and Beverage Applications

Code	Mounting Style	Process Connection	Stem Style
C02	Flanged	1-in. Tri-Clamp	Stepped, 10/6 mm(4)
C04	Flanged	1 1/2-in. Tri-Clamp	Stepped, 10/6 mm(4)
C06	Flanged	2-in. Tri-Clamp	Stepped, 10/6 mm(4)
C08	Flanged	2 1/2-in. Tri-Clamp	Stepped, 10/6 mm(4)
C10	Flanged	3-in. Tri-Clamp	Stepped, 10/6 mm(4)
C12	Flanged	4-in. Tri-Clamp	Stepped, 10/6 mm(4)
C14	Flanged	1/2-in. Tri-Clamp	Stepped, 10/6 mm(4)
C16	Flanged	3/4-in. Tri-Clamp	Stepped, 10/6 mm(4)
K02	Weld-in	Ball (adjustable), diameter 25 mm, PEEK Seal	Straight, 6 mm(5)
K04	Weld-in	Ball (adjustable), diameter 25 mm, SST Seal	Straight, 6 mm(5)
M10	Tapered Union with Coupling Nut(6)	Suitable connection for tube nominal size DN 10	Stepped, 10/6 mm(4)
M25	Tapered Union with Coupling Nut(6)	Suitable connection for tube nominal size DN 25	Stepped, 10/6 mm(4)
M32	Tapered Union with Coupling Nut(6)	Suitable connection for tube nominal size DN 32	Stepped, 10/6 mm(4)
M40	Tapered Union with Coupling Nut(6)	Suitable connection for tube nominal size DN 40	Stepped, 10/6 mm(4)
M50	Tapered Union with Coupling Nut(6)	Suitable connection for tube nominal size DN 50	Stepped, 10/6 mm(4)
T02	Threaded, parallel	G1/2 (1/2-in. BSPF)	Stepped, 10/6 mm(7)
T12	Threaded, tapered	1/2-in. NPT	Stepped, 10/6 mm(4)
V04	Varivent DN 1 1/2 - 3 inch (Dim. 68 mm) Standard		

Code	Options
A3	Single element Class 1/3 DIN B sensor (4-wire) from 0 to 100 °C (–32 to 212 °F)
A4	Dual element Class 1/3 DIN B sensor from 0 to 100 °C (–32 to 212 °F)
G2	Cable Gland for cable diameter 6.5 to 13.9 mm – only available with Connection Head Material codes C, E, R, 1, and 5)
G3	Cover Chain – only available with Connection Head Material codes C and D
G6	Aluminum Extension Ring for Dual Transmitter mounting in Connection Head – only available with Connection Head Material codes C and D)
Q8	Thermowell Material Certification, DIN EN 10204 3.1B including surface finish report (valid for wetted parts, stamped surface finish)
R20	Electropolishing Surface Finish of wetted surfaces R_a = 0.4 μm
I1	EEx ia ATEX Intrinsic Safety Approval
XA(8)	Assemble sensor to specific temperature transmitter (fully wired)
V10	Works Certificate – sensor calibration from –50 to 450 °C with A, B, C, and Callendar-van Dusen constants
V11	Works Certificate – sensor calibration from 0 to 100 °C with A, B, C, and Callendar-van Dusen constants
V18	Works Certificate – sensor calibration from –50 to 150 °C (–58 to 302 °F) with A, B, C, and Callendar-van Dusen constants
X8	Works certificate – sensor calibration over specified temperature range with A, B, C, and Callendar-van Dusen constants

Typical Model Number: 0065Q C 0 1 S 0050 D 0200 C04 XA

(1) IP 68 rating requires a suitable cable gland on the conduit connection thread. All threads must be sealed.

(2) Standard length for use with Connection Head codes C, D, 1, and 2.

(3) Standard length for use with Connection Head codes E, F, J, L, R, S, T, 5,and 6.

(4) For U < 50 mm, outer diameter 6 mm straight, below part of process connection.

(5) Valid for DIN B connection heads only.

(6) According to DIN 11851.

(7) For $U_p \leq 65$ mm, the outer diameter is 6 mm for straight stem styles.

(8) If ordering XA with a transmitter, specify the same option on the transmitter model number.

Rosemount 65Q and 65B Sensors

65Q RTD Sensor without Thermowell (Pt 100) for Hygienic and Food and Beverage Applications

Model	Product Description		
0065Q	65Q RTD Temperature Sensor without Thermowell, Pt 100, according to DIN EN 60751 (IEC 751), Tolerance Class A, suitable for transmitter mounting		
Code	**Connection Head Material**	**IP Rating(1)**	**Conduit / Cable Entry**
C	Rosemount, Aluminum	68	M20 x 1.5
D	Rosemount, Aluminum	68	1/2-in. NPT
E	Connection Head DIN A Polished Stainless Steel	68	M20 x 1.5
F	Connection Head DIN A Polished Stainless Steel	68	1/2-in. NPT
J	GR-A/BL (BUZ), Aluminum	65	M20 x 1.5 (with cable gland)
L	TZ-A/BL (BUZH) Aluminum	65	M20 x 1.5 (with cable gland)
R	Connection Head DIN B Polished Stainless Steel	68	M20 x 1.5
S	Connection Head DIN B Polished Stainless Steel	68	1/2-in. NPT
T	TZ-A/BK, Polyamide, Black	65	M20 x 1.5 (with cable gland)
1	Rosemount, Aluminum with LCD Display Cover	68	M20 x 1.5
2	Rosemount, Aluminum with LCD Display Cover	68	1/2-in. NPT
5	Connection Head DIN A Polished Stainless Steel with LCD Display Cover	68	M20 x 1.5
6	Connection Head DIN A Polished Stainless Steel with LCD Display Cover	68	1/2-in. NPT
N	No Connection Head – use when ordering the sensor alone		
Code	**Sensor Lead Wire Termination**		
0	Flying leads – no springs on DIN plate		
2	Terminal Block, Form B – DIN 43762		
Code	**Sensor Type**	**Temperature Range**	
1	Single element, 4-wire	– 50 to 450 °C	
2	Dual element, 3-wire	– 50 to 450 °C	
5	Single element, 3-wire	– 50 to 450 °C	
Code	**Extension Type**		
N	No Extension – use when ordering the sensor alone		
W	No Extension – use when ordering a sensor and connection head assembly		
Code	**Extension Length (N)**		
0000	No Extension		
Code	**Thermowell Material**		
N	No Thermowell		

Code	Sensor Length (L)
0100	100 mm
0125	125 mm
0150	150 mm
0175	175 mm
0200	200 mm
0250	250 mm
0275	275 mm
0315	315 mm
0375	375 mm
0435	435 mm
XXXX	Non-standard immersion length – non-standard lengths are available from 100 to 2000 mm

Code	Options
A3	Single element Class 1/3 DIN B sensor (4-wire) from 0 to 100 °C (–32 to 212 °F)
A4	Dual element Class 1/3 DIN B sensor from 0 to 100 °C (–32 to 212 °F)
G2	Cable Gland for cable diameter 6.5 to 13.9 mm – only for use with Connection Head Material codes C, E, R, 1, and 5)
G3	Cover Chain – only available with Connection Head Material codes C and D
G6	Aluminum Extension Ring for Dual Transmitter mounting in Connection Head – only available with Connection Head Material codes C and D
I1	EEx ia ATEX Intrinsic Safety Approval
XA(2)	Assemble sensor to specific temperature transmitter (fully wired)
V10	Works Certificate – sensor calibration from –50 to 450 °C with A, B, C, and Callendar-van Dusen constants
V11	Works Certificate – sensor calibration from 0 to 100 °C with A, B, C, and Callendar-van Dusen constants
V18	Works Certificate – sensor calibration from –50 to 150 °C (–58 to 302 °F) with A, B, C, and Callendar-van Dusen constants
X8	Works certificate – sensor calibration over specified temperature range with A, B, C, and Callendar-van Dusen constants

Typical Model Number: 0065Q N 0 1 N 0000 N 0200 V18

(1) IP 68 rating requires a suitable cable gland on the conduit connection thread. All threads must be sealed.

(2) If ordering XA with a transmitter, specify the same option on the transmitter model number.

Series 65B RTD — Biopharm, Hygienic and Food & Beverage Applications

Rosemount Series 65B integral mount temperature sensors are designed for use in BioPharm and Hygienic applications when fitted with Hygienic In-Line Systems which does meet sterile/aseptic requirements according to EHEDG and 3A guidelines. This Hygienic In-Line System is particularly suitable for temperature measurement in small pipes beginning with DN 10 to DN 15. Larger In-Line housings are also available as standard up to DN 80. The compact and dead-pocket free sensor design is easy to install and allows to maintain process integrity during exchange of sensor for calibration or replacement purposes. The close dimension tolerance of sensor to weld-in pocket inside the In-Line housing reduces the response time obviously.Those RTD sensors are available as complete assemblies including connection heads or extension cable and process connection thread G$^1/_2$-in. (1/2-in. BSPF), thermowells and mounting fittings. All components are made of Stainless Steel for easy-to-clean ability in CIP/SIP applications. The In-Line system housing is electropolished as standard and available with material certificate 3.1B upon request. The use of In-Line system allows a quick mounting by the use orbital welding device. Especially with small pipes or later installations the In-Line System offers important advantages to hygienic mounting in comparison with conventional installation with standard sleeves.

This offering is designed to be used in complete temperature assemblies that include Rosemount 248 and 644 Head Mount Temperature Transmitters built in wide range of connection heads. In addition the sensor can be ordered as a compact, complete assembly with cable as cold end termination. The RTD sensors meet most critical parameters of international standards - DIN EN 60751 incorporating Amendments 1 and 2. All sensors are available in a variety of lengths and ranges with terminal block or flying leads.

SPECIFICATIONS

Nominal Resistance

In accordance with DIN EN 60751, the nominal resistance is defined as follows:

- 100 Ω RTD at 0 °C
- Temperature coefficient α = 0.00385 Ω (°C/Ω), averaged between 0 and 100 °C

Limit Deviations

Tolerance Class A as standard: t = ± (0.15 + 0.002 x t); valid for the temperature range from 0 to +250 °C

Lead Wire Configuration

As single element (1Pt 100) with 4 lead wires

Response Time

Less than 12 seconds to reach 63% step change in water flowing at 0.4 m/s

Process Temperature Range

-50 to +250 °C

Ambient Temperature

Housing without head-mounted transmitter

- Metal housings: -40 to +130 °C

Housing with head-mounted transmitter

- -40 to +85°C

Maximum Process Pressure

16 bar at 0 °C

Shock and Vibration Resistance

According to DIN EN 60751: 2.8 g peak / 10…500 Hz

Self Heating

0.15 °K/mW when measured per method defined in DIN EN 60751

Insulation Resistance

1,000 MΩ minimum insulation resistance when measured at 500 Vdc and at room temperature

Sheath Material

321 SST with mineral-insulated cable construction

Lead Wire

PTFE insulated, silver coated copper wire

Identification Data

The model and serial number are marked on each sensor

Ingress Protection (IP) Ratings

The particular rating is applicable only for complete assemblies including a connection head and tubular thermowell. IP varies from 65 to 68 due to a wide selection on different connection heads, DIN A and DIN B size, made of different materials such as aluminum, polyamide, and stainless steel.

65B SENSOR DESIGN WITH CONNECTION HEAD

System Components

Sensor

The 65B sensor consists of a 3.2 mm exchangeable measuring insert, wherein a small, drop-form thin film RTD element is encapsulated. The single Class A platinum element is firmly secured within the sheath by compacted magnesium oxide. This design protects the relatively strain-free element, thereby maintaining accuracy and long-term stability. The sensor is mounted into a weld-in pocket inside the In-Line system by the use of the G$^{1}/_{2}$-in. ($^{1}/_{2}$-in. BSPF) threaded bush as process connection.

Connection Heads (see Table 3)

The connection heads can be of different types (size DIN A and B) and materials (plastic, aluminium, stainless steel). Its fitting to the rest of the probe and the gland for the cable entry, assure an IP grade of 65 at minimum. All supplied heads have a process connection M24x1.5. Preferred connection head material for the use in hygienic applications due to improved corrosion resistance is stainless steel which is available in both DIN A and DIN B size.

Polished Stainless Steel DIN A (sanitary applications)

- Rosemount design
- Smoothly contoured design which minimizes crevices for easy wipe-down
- Sanitary Stainless Steel housing for easy-to-clean applications
- Mounting of one DIN A or B sized transmitter on DIN plate
- Local indication with integral LCD Meter

Polished Stainless Steel DIN B (sanitary applications)

- Rosemount design
- Smoothly contoured design which minimizes crevices for easy wipe-down
- Sanitary Stainless Steel housing for easy-to-clean applications
- Mounting of one DIN B sized transmitter on DIN plate

Connection head styles in other materials than stainless steel can be used in environments where lower hygienic criteria are present.

Rosemount Aluminium DIN A

- Rosemount design
- Mounting of one or two transmitters on DIN plate and for second one optional by the use of extension ring

TZ-A/BL (BUZH)

- DIN B head with enlarger space for mounting a DIN A size (644H) or DIN B size transmitter into the cover by the use of terminal block or two transmitters with flying lead sensors

GR-A/BL (BUZ)

- DIN B head with enlarger space for mounting a DIN A size (644H) or DIN B size transmitter on DIN plates

TZ-A/BK

- DIN B head with enlarger space for mounting a DIN A size (644H) or DIN B size transmitter into the cover by the use of terminal block or two transmitters (248H) with flying lead sensors
- Suggested for use in high humidity environments and at low temperatures to avoid problems due to condensation

TABLE 3. Connection Head Features

Type	Material	IP Rating	Lid Version	Transmitter Mounting	Conduit Connection	LCD Meter Cover
Polished DIN A	SST	68	Threaded	DIN plate, 644, 248	M20 x 1.5, $^{1}/_{2}$-in. NPT	Yes
Polished DIN B	SST	66	Threaded	DIN plate, 248	M20 x 1.5, $^{1}/_{2}$-in. NPT	No
Rosemount	Aluminium	68	Threaded	DIN plate, 644, 248	M20 x 1.5, $^{1}/_{2}$-in. NPT	Yes
TZ–A/BK	Polyamide	65	Screw-on cap	On cover, terminal block 644, 248	M20 x 1.5	No
TZ–A/BL	Aluminium	65	Screw-on cap	On cover, terminal block 644, 248	M20 x 1.5	No
GR–A/BL	Aluminium	65	Screw-on cap	DIN plate, 644, 248	M20 x 1.5	No

Extension

Standard material: SST

Standard diameter: 12 mm

Standard length: 30 mm

Welded screw bush: M24 x 1.5 for easy to clean applications

Applications

- Monitoring of CIP / SIP processes
- If local indication of process variable and diagnostics required by the use of LCD meter on the transmitter
- Enhanced system accuracy with transmitter-sensor matching with HART and FOUNDATION fieldbus protocol for critical control applications involving temperature measurements fermentation and bio-reactors.

Rosemount 65Q and 65B Sensors

65B CABLE SENSOR

System Components

Sensor

The 65B sensor consists of a 3.2 mm measuring insert, wherein a small, drop-form thin film RTD element is encapsulated. The single, class A platinum element is firmly secured within the sheath by compacted magnesium oxide. This design protects the relatively strain-free element, thereby maintaining accuracy and long-term stability. The sensor is mounted into a weld-in pocket inside the In-Line system by the use of the G 1/2-in. (1/2-in. BSPF) threaded bush as process connection. The cold end termination is provided with an extension cable.

Cable

- Isolation material PTFE/Wire/PTFE
- Standard cable length: 3 or 5 m
- Cable mounting provided by the use of M12 cable gland made from PVDF (Polyvinylidenfluorid), FDA conform

In-Line System (available for both sensor designs)

The In-Line System housings have a straight or elbow design to meet different installation requirements on site.

- Pipes according DIN 11850 Series 2 available as standard; DN10 to DN80 / 1/2-in. to 3-in.
- Thread connection to the sensor: G 1/2-in. (1/2-in. BSPF): loose screw bush allows the connection head mounting in any direction
- Housing material: 1.4435 (316L), optional with material certificate 3.1B
- Weld-in pocket immersion length depends on housing size.
- Electropolishing inner and outer the housing with a surface roughness $R_a \leq 0.8$ µm is available as standard
- Sealing method: weld-in pocket without the use of additional seal components
- EHEDG and 3A compliant housing design (pending)

Extension

- Standard material Stainless Steel
- Standard diameter: 12 mm
- Standard length: 30 mm

Applications

- For use in skid environments connected to 848T Eight Sensor Input Transmitter with Foundation Fieldbus protocol
- For use in fermentors or reactors connected to 3144P Dual Input Transmitter with HART or Foundation Fieldbus protocol

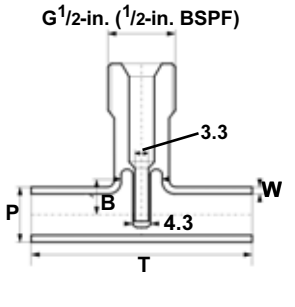
Installation

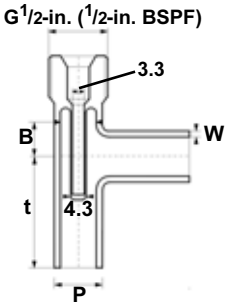
65B temperature sensors with In-Line system housings can be mounted on pipes according to DIN and ISO standards. As a general rule, the In-line systems should be installed in a manner which does not adversely affect their ability to be cleaned. In hygienic applications a strict installation rule consists in not to leave any dead spaces along the run of process fluid.

Care should be taken by the user in the execution of the welding on the process side e.g. between pipe and weld-in pocket; e.g. suitable weld material, welding radius > 3 mm, absence of pits, crevices etc.

Two installation variants are shown on following drawings:

Straight Pipe Design	Elbow Pipe Design

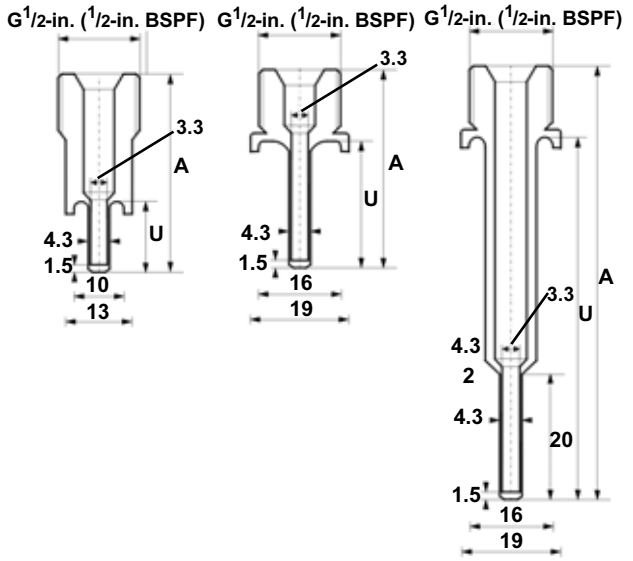




Drawings continued on page Temperature-17

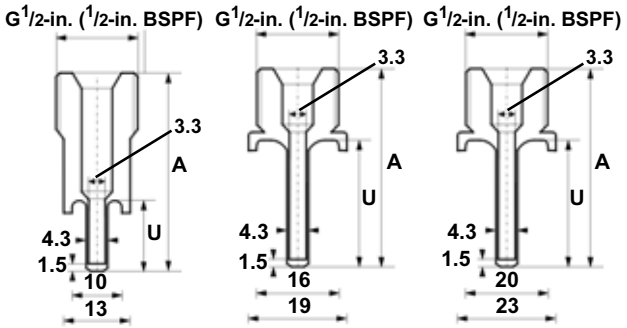
Weld-in Pockets for Straight Pipe Design

U = 16 mm | U = 25 mm | U = 40 mm



Weld-in Pockets for Elbow Pipe Design

U = 27 mm | U = 33 mm | U = 37 mm



Dimensional Table

TABLE 4. Immersion Length according to. Standard (dimensions are in millimeters)

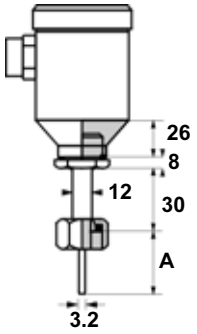
	Nominal Size	Pipe Length (T)	Dimensions (B)	Pipe Outer Diameter (P) x Wall Thickness (W)	Immersion Length (U)	Pocket Length (A)
Straight Design	**DIN 11852 in Metric**			**DIN 11850 in Metric, Row 2**		
	DN 15	70	11	19 x 1.5	16	39
	DN 20	80	13	23 x 1.5	16	39
	DN 25	100	16	29 x 1.5	16	39
	DN 32	110	19.5	35 x 1.5	25	43
	DN 40	120	23	41 x 1.5	25	43
	DN 50	160	30	53 x 1.5	25	43
	DN 65	210	40	70 x 2.0	40	60
	DN 80	260	47.5	85 x 2.0	40	60
	DIN 11866 in Inches			**DIN 11866**		
	DN 1	108	14.2	25.4 x 1.65	16	39
	DN 1 1/2	120.6	21.1	38.1 x 1.65	25	43
	DN 2	146	28.9	50.8 x 1.65	25	43
	DN 2 1/2	158.8	35.3	63.5 x 1.65	25	43
	DN 3	171.4	43.1	76.2 x 1.65	40	60
Elbow Design	**DIN 11865 in Metric**			**DIN 11866**		
	DN 10	35	11	13 x 1.5	30	50
	DN 15	35	11	19 x 1.5	33	51
	DN 20	40	13	23 x 1.5	37	55
	DIN 11865 in Inches			**DIN 11866**		
	DN 1/2	47.6	7.7	12.7 x 1.65	27	50
	DN 3/4	50.8	11	19.05 x 1.65	33	51

Rosemount 65Q and 65B Sensors

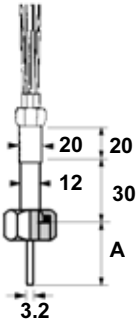
DIMENSIONAL DRAWINGS

Dimensions are in millimeters

Sensor Design with Connection Head

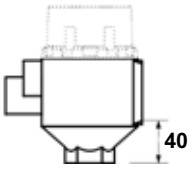


Cable Sensor Design

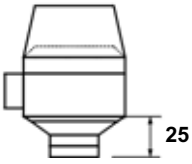


Connection Heads

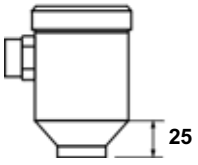
Rosemount
Aluminum
Codes C, D, 1, 2



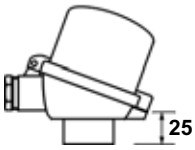
DIN A
SST
Codes E, F, 5, and 6



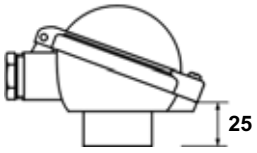
DIN B
Polished SST
Codes R, S



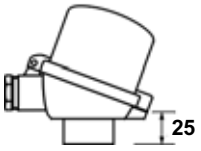
TZ-A/BL
Aluminum
Code L



GR-A/BL
Aluminum
Code J

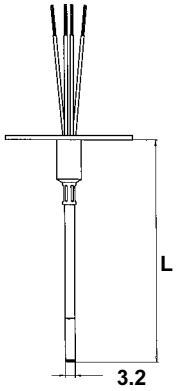


TZ-A/BK
Polyamide
Code T

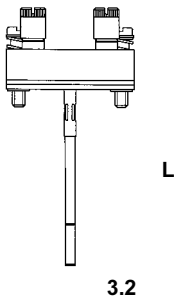


Sensor Lead Wire Terminations

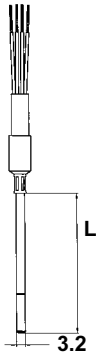
Flying Leads
Code 0



Terminal Block
Code 2

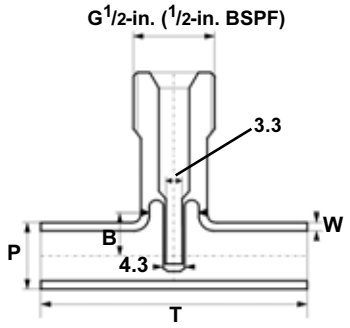


Cable Sensor
Codes 8 and 9

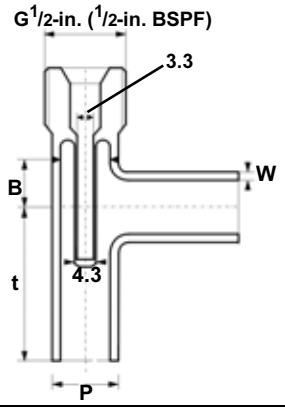


In-Line System

Straight



Elbow



A = Pocket Length
L = Sensor Length
B = Dimension "B"
P = Pipe Outer Diameter
T = Pipe Length
W = Wall Thickness
t = PIpe Length (1/2 T)

ORDERING INFORMATION

65B RTD Assembly (Pt 100) for BioPharm, Hygienic, and Food and Beverage Applications

Model	Product Description		
0065B	65B RTD Temperature Sensor Assembly, Pt 100, according to DIN EN 60751 (IEC 751), Tolerance Class A, suitable for transmitter mounting		
Code	**Connection Head Material**	**IP Rating(1)**	**Conduit / Cable Entry**
C	Rosemount, Aluminum	68	M20 x 1.5
D	Rosemount, Aluminum	68	1/2-in. NPT
E	Connection Head DIN A Polished Stainless Steel	68	M20 x 1.5
F	Connection Head DIN A Polished Stainless Steel	68	1/2-in. NPT
J	GR-A/BL (BUZ), Aluminum	65	M20 x 1.5 (with cable gland)
L	TZ-A/BL (BUZH) Aluminum	65	M20 x 1.5 (with cable gland)
R	Connection Head DIN B Polished Stainless Steel	66	M20 x 1.5
S	Connection Head DIN B Polished Stainless Steel	66	1/2-in. NPT
T	TZ-A/BK, Polyamide, Black	65	M20 x 1.5 (with cable gland)
1	Rosemount, Aluminum with LCD Display Cover	68	M20 x 1.5
2	Rosemount, Aluminum with LCD Display Cover	68	1/2-in. NPT
5	Connection Head DIN A Polished Stainless Steel with LCD Display Cover	68	M20 x 1.5
6	Connection Head DIN A Polished Stainless Steel with LCD Display Cover	68	1/2-in. NPT
N	No Connection Head – use with Cable Sensor, Sensor Lead Wire Termination codes 8 and 9		
Code	**Sensor Lead Wire Termination**		
0	Flying leads – no springs on DIN plate – use with Connection Heads only		
2	Terminal Block, Form B – DIN 43762 – use with Connection Heads only		
8	Cable Sensor with 3 m extension cable		
9	Cable Sensor with 5 m extension cable		
Code	**Sensor Type**	**Temperature Range**	
1	Single element, 4-wire	– 50 to 250 °C	
Code	**Extension Type**		
S	Extension, welded screw bush M24 x 1.5 – use with Connection Heads and Sensor Lead Wire Termination codes 0 and 2 only		
C	Extension, cable gland – use with Cable Sensors and Sensor Lead Wire Termination codes 8 and 9 only		
Code	**Extension Length (N)**		
0030	30 mm		
Code	**Thermowell Material**		
N	No Thermowell		
Code	**Immersion Length (U)**		
	Refer to Table 4 on page 17	0016, 0025, 0033, 0037, 0038, 0040	
Code	**Mounting Style**	**Process Connection**	**Stem Style**
H02	Hygienic In-Line System, electropolishing $R_a \leq 0.8$ µm	G1/2-in. (1/2-in. BSPF)	Straight
H04	Hygienic In-Line System, electropolishing $R_a \leq 0.8$ µm	G1/2-in. (1/2-in. BSPF)	Elbow
Code	**Nominal Size of Process Pipe / Material 1.4435 (316L)**	**Pipe Diameter / Wall Thickness**	
DN010	DN10, metric, DIN 11850 Row 2	13 x 1.5 – for use with elbow stem style only	
DN015	DN15, metric, DIN 11850 Row 2	19 x 1.5	
DN020	DN20, metric, DIN 11850 Row 2	23 x 1.5	
DN025	DN25, metric, DIN 11850 Row 2	29 x 1.5 – for use with straight stem style only	
DN032	DN32, metric, DIN 11850 Row 2	35 x 1.5 – for use with straight stem style only	
DN040	DN40, metric, DIN 11850 Row 2	41 x 1.5 – for use with straight stem style only	
DN050	DN50, metric, DIN 11850 Row 2	53 x 1.5 – for use with straight stem style only	
DN065	DN65, metric, DIN 11850 Row 2	70 x 2.0 – for use with straight stem style only	
DN080	DN80, metric, DIN 11850 Row 2	85 x 2.0 – for use with straight stem style only	
IN050	DN 1/2-in., DIN 11866	12.7 x 1.65 – for use with elbow stem style only	
IN075	DN 3/4-in., DIN 11866	19.05 x 1.65 – for use with elbow stem style only	
IN100	DN 1-in., DIN 11866	25.4 x 1.65 – for use with straight stem style only	

Rosemount 65Q and 65B Sensors

65B RTD Assembly (Pt 100) for BioPharm, Hygienic, and Food and Beverage Applications

IN150	DN 1 1/2-in., DIN 11866	38.1 x 1.65 – for use with straight stem style only
IN200	DN 2-in., DIN 11866	50.8 x 1.65 – for use with straight stem style only
IN250	DN 2 1/2-in., DIN 11866	63.5 x 1.65 – for use with straight stem style only
IN300	DN 3-in., DIN 11866	76.2 x 1.65 – for use with straight stem style only
Code	**Seal Material**	
N	Without Seal, no seal required	
Code	**Options**	
A3	Single element Class 1/3 DIN B sensor (4-wire) from 0 to 100 °C (–32 to 212 °F)	
G2	Cable Gland for cable diameter 6.5 to 13.9 mm – only available with Connection Head Material codes C, E, R, 1, and 5)	
G3	Cover Chain – only available with Connection Head Material codes C and D	
Q8	Hygienic In-Line System Material Certification, DIN EN 10204 3.1 including surface finish report	
I1	EEx ia ATEX Intrinsic Safety Approval	
XA(2)	Assemble sensor to specific temperature transmitter (fully wired)	
V10	Works Certificate – sensor calibration from –50 to 450 °C with A, B, C, and Callendar-van Dusen constants	
V11	Works Certificate – sensor calibration from 0 to 100 °C with A, B, C, and Callendar-van Dusen constants	
V18	Works Certificate – sensor calibration from –50 to 150 °C (–58 to 302 °F) with A, B, C, and Callendar-van Dusen constants	
X8	Works certificate – sensor calibration over specified temperature range with A, B, C, and Callendar-van Dusen constants	

Typical Model Number: 0065B E 0 1 S 0030 N 0025 H02 DN050 N Q8 XA

(1) IP 68 rating requires a suitable cable gland on the conduit connection thread. All threads must be sealed.

(2) If ordering XA with a transmitter, specify the same option on the transmitter model number.

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