Temperature Measurement Devices

Bimetal Thermometers and Thermowells

- Accurate to ± 1 % of full scale in accordance with ASME B40.200
- Easy-to-read dial sizes with single and dual scales
- Dampened movement for protection against vibration
- Stainless steel construction

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Dampened-Movement Bimetal Thermometers

Swagelok® thermometers are actuated by a bimetal helix coil. Silicone-free gel dampens vibration effects, and cases are hermetically sealed in accordance with ASME B40.200 to prevent fogging and moisture damage to internal components.

Features

- Glass, polycarbonate, and safety-glass lenses to meet application requirements
- All-welded 304 stainless steel construction standard; 316 stainless steel process connection and stem available
- Adjustable-angle, center-back, and lower-back mount process connections
- External adjustment for field calibration
- 50 % over- and under-range protection against damage to internal components up to 500°F (260°C)
- Anti-parallax dial for easy reading

Technical Data

Dial

- Temperature measurement ranges:
  - –100 to 150° through 200 to 1000°F
  - –70 to 70°C through 100 to 540°C.

Case

- Stem angle adjusts more than 180°; case rotates 360°.
- Maximum ambient operating temperature 200°F (93°C)

Stem

- Stem is welded at tip and process connection.
- Temperature-sensing bimetal helix is carefully sized and tested, heat treated, and aged to relieve inherent stresses and ensure continued accuracy.

Materials of Construction

Component	Material
Stem	*304 SS*
Case, bezel, staff rod, bellows, bracket, screws	304 SS
Adjustment screw	303 SS
O-ring	EPDM
Dial, pointer	Aluminum
Bimetal element	Varies with temperature range
Dampening media	Silicone-free inert gel
Lens gasket	Neoprene (dial ranges 500°F [260°C] and under); EPDM (dial ranges over 500°F [260°C])
Lens	Glass, polycarbonate, or safety glass

Wetted components listed in *italics*.

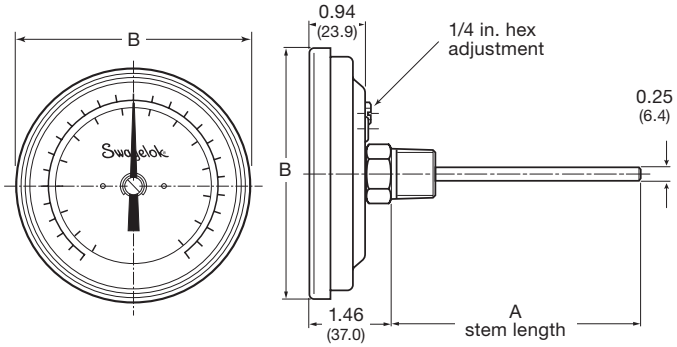
Testing

Every Swagelok dampened-movement bimetal thermometer is factory calibrated to meet ASME B40.200.

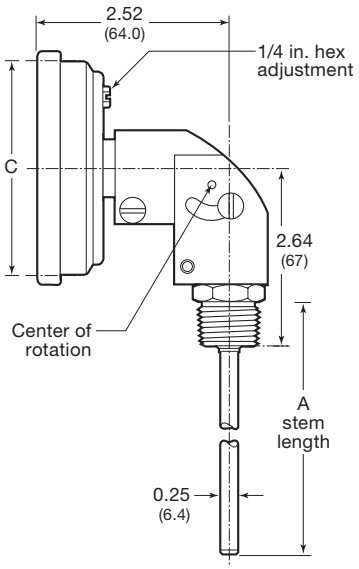
Dampened-Movement Bimetal Thermometers

Dimensions

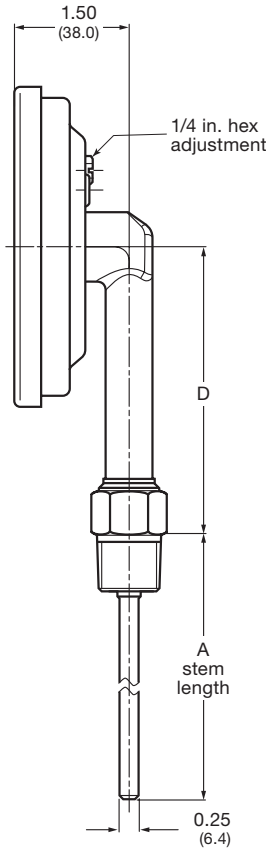
Dimensions, in inches (millimeters), are for reference only and are subject to change.



Center-Back Mount



Adjustable-Angle Mount



Lower-Back Mount

Dial Size in. (mm)	Dimensions, in. (mm)			
	A	B	C	D
Adjustable-Angle Mount				
3 (76.2)	2.5 (63.5), 4 (102), 6 (152), 9 (229), or 12 (305)	3.25 (82.6)	3.00 (76.2)	—
5 (127)		5.25 (133)	5.00 (127)	—
Center-Back Mount				
3 (76.2)	2.5 (63.5), 4 (102), 6 (152), 9 (229), or 12 (305)	3.25 (82.6)	3.00 (76.2)	—
5 (127)		5.25 (133)	5.00 (127)	—
Lower-Back Mount				
3 (76.2)	2.5 (63.5), 4 (102), 6 (152), 9 (229), or 12 (305)	3.25 (82.6)	3.00 (76.2)	3.31 (84)
5 (127)		5.25 (133)	5.00 (127)	4.29 (109)

Ordering Information

Build a dampened-movement bimetal thermometer ordering number by combining the designators in the sequence shown below.

1	2	3	4	5	6	7
T48A	- 025	- FS	- 01	- G	- 8	- NT

1 Dial Size, Mounting
- **T48A** = 3 in. (76.2 mm), adjustable angle
- **T48C** = 3 in. (76.2 mm), center back
- **T48L** = 3 in. (76.2 mm), lower back
- **T80A** = 5 in. (127 mm), adjustable angle
- **T80C** = 5 in. (127 mm), center back
- **T80L** = 5 in. (127 mm), lower back

2 Stem Length
- **025** = 2.5 in. (63.5 mm)
- **040** = 4 in. (102 mm)
- **060** = 6 in. (152 mm)
- **090** = 9 in. (229 mm)
- **120** = 12 in. (305 mm)

3 Scale
- **CS** = Celsius
- **DS** = Dual Fahrenheit (primary) and Celsius (secondary)
- **FS** = Fahrenheit

4 Dial Range

See below.

Dial Ranges

Fahrenheit (°F)	Celsius (°C)	Designator
–100 to 150	–70 to 70	01
–40 to 160	–40 to 70	19
0 to 200	–15 to 90	05
0 to 250	–20 to 120	06
50 to 300	10 to 150	08
50 to 550	10 to 290	16①
150 to 750	65 to 400	11①
200 to 1000	100 to 540	12①②

① Dial range not available with silicone liquid fill.
② Not recommended for continuous use over 800°F (426°C).

5 Lens Material
- **G** = Glass (standard)
- **P** = Polycarbonate
- **S** = Laminated safety glass

6 Process Connection
- **8** = 1/2 in. male NPT
- **9** = Male G1/2B

7 Options
- **ND** = No dampening
- **NT** = NIST-traceable calibration certificate
- **SF** = Silicone liquid fill (not available with standard dampening, with glass lens options, or for dial ranges over 500°F [260°C])
- **SS** = 316 stainless steel process connection and stem
- **UN** = NPT union lock nut

Thermowells

Thermowells are recommended to protect Swagelok dampened-movement bimetal thermometers from damage that could result from contact with pressurized, corrosive, flowing, viscous, or abrasive process fluids. They also enable removal of thermometers for replacement or service without affecting the process or system.

Features

- 304 stainless steel construction standard; 316 stainless steel available
- Accommodate 2.5 through 12 in. (63.5 through 305 mm) thermometer stem lengths in reduced-, straight-, and tapered-shank configurations
- Available with lag extensions for use in insulated piping applications

Technical Data

Instrument Connection

1/2 in. female NPSM straight pipe thread for mechanical joints standard; female G1/2B connection available

Process Connection

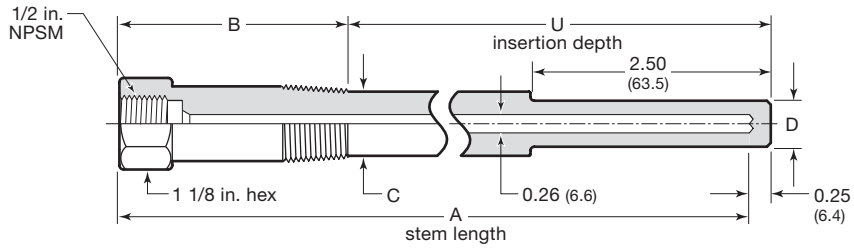
- ASME B16.5 raised-face flange
- 3-A–compliant sanitary Kwik-Clamp
- Threaded (NPT)
- Weld socket

Dimensions

Dimensions, in inches (millimeters), are for reference only and are subject to change.

The U dimension is the depth the thermowell is inserted into the fluid system and is specified in the ordering number. See **Ordering Information,** page 6.

Threaded (TWT) Process Connection

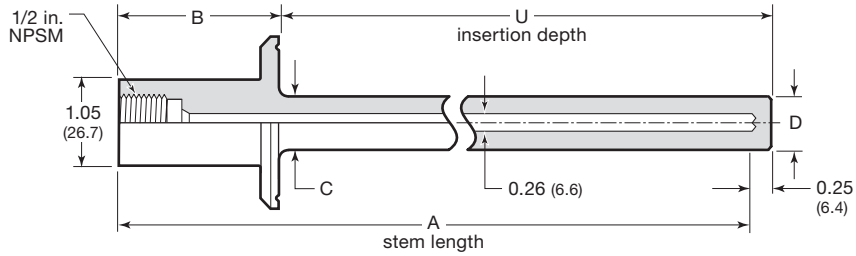


Lag and Reduced Shank Shown

Dimensions, in. (mm)														
A Stem Length	B		1/2 in. Size						3/4 in. Size					
	No Lag	With Lag	C			D			C			D		
			R	S	T	R	S	T	R	S	T	R	S	T
2.5 (63.5) 4 (102)	1.75 (44.4)	—	0.50 (12.7)	0.62 (15.7)	—	0.50 (12.7)	0.62 (15.7)	—	0.50 (12.7)	0.62 (15.7)	—	0.50 (12.7)	0.62 (15.7)	—
6 (152)		3.75 (95.2)	0.62 (15.7)		0.62 (15.7)			0.50 (12.7)	0.75 (19.0)		088 (22.4)			0.62 (15.7)
9 (229) 12 (305)		4.75 (121)												

R denotes reduced shank; **S** denotes straight shank; **T** denotes tapered shank.

Kwik-Clamp (TWS) Process Connection



No Lag and Straight Shank Shown

Dimensions, in. (mm)								
A Stem Length	B		C			D		
	No Lag	With Lag	R	S	T	R	S	T
4 (102)	1.75 (44.4)	—	0.50 (12.7)	0.50 (12.7)	—	0.50 (12.7)	0.50 (12.7)	—
6 (152)		3.75 (95.2)	0.75 (19.0)		0.88 (22.4)			0.62 (15.7)
9 (229) 12 (305)		4.75 (121)						

R denotes reduced shank; **S** denotes straight shank; **T** denotes tapered shank.

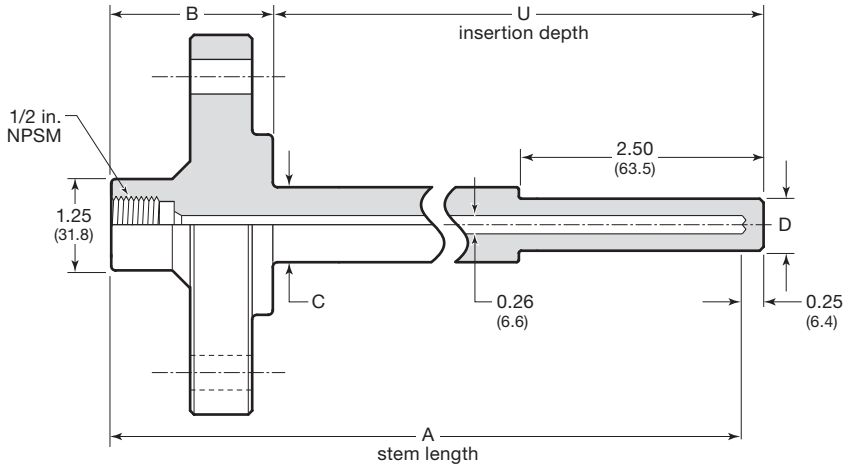
Thermowells

Dimensions

Dimensions, in inches (millimeters), are for reference only and are subject to change.

The U dimension is the depth the thermowell is inserted into the fluid system and is specified in the ordering number. See **Ordering Information,** page 6.

Raised-Face Flange (TWF) Process Connection

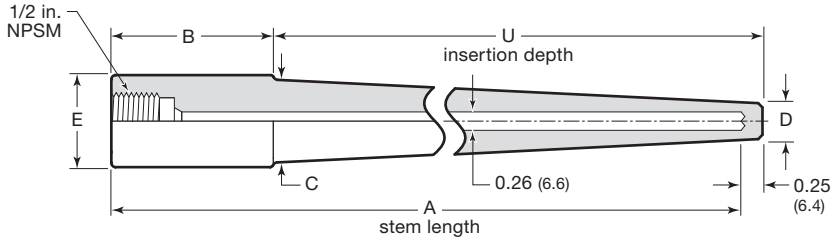


No Lag and Reduced Shank Shown

Dimensions, in. (mm)								
A Stem Length	B		C			D		
	No Lag	With Lag	R	S	T	R	S	T
4 (102)	2.25 (57.2)	—	0.88 (22.4)	0.75 (19.0)	—	0.50 (12.7)	0.75 (19.0)	—
6 (152)		4.25 (108)			0.88 (22.4)			0.62 (15.7)
9 (229) 12 (305)		5.25 (133)						

R denotes reduced shank; **S** denotes straight shank; **T** denotes tapered shank.

Weld Socket (TWW) Process Connection

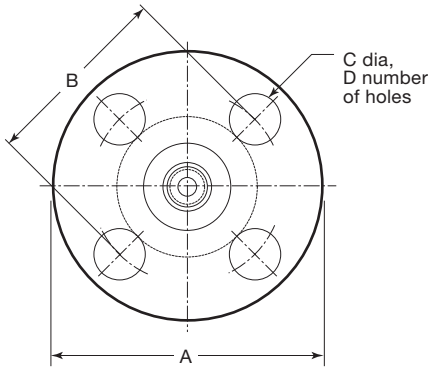


No Lag and Tapered Shank Shown

Dimensions, in. (mm)										
A Stem Length	B		C			D			E	
	No Lag	With Lag	R	S	T	R	S	T	3/4 in. Size	1 in. Size
4 (102)	1.75 (44.4)	—	0.62 (15.7)	0.75 (19.0)	—	0.50 (12.7)	0.75 (19.0)	—	1.05 (26.7)	—
6 (152)		3.75 (95.2)			0.88 (22.4)			0.62 (15.7)		1.35 (34.3)
9 (229) 12 (305)		4.75 (121)								

R denotes reduced shank; **S** denotes straight shank; **T** denotes tapered shank.

Flange Dimensions



ASME Class 150

Nominal Flange Size in.	Dimensions in. (mm)			Mounting Holes
	A	B	C	D
1	4.25 (108)	3.12 (79.2)	0.62 (15.7)	4
1 1/2	5.00 (127)	3.88 (98.6)	0.62 (15.7)	
2	6.00 (152)	4.75 (121)	0.75 (19.0)	

ASME Class 300

Nominal Flange Size in.	Dimensions in. (mm)			Mounting Holes
	A	B	C	D
1	4.88 (124)	3.50 (88.9)	0.75 (19.0)	4
1 1/2	6.12 (155)	4.50 (114)	0.88 (22.4)	4
2	6.50 (165)	5.00 (127)	0.75 (19.0)	8

⚠ **Qualified personnel should perform welding.**

Thermowells

Ordering Information

Build a thermowell ordering number by combining the designators in the sequence shown below.

1		2		3	4		5		6		7
TWF	-	110	-	R	-	1	-	L	-	2.00	-	CS

1 Process Connection

TWF = ASME B16.5 raised-face flange
TWS = Sanitary clamp
TWT = Threaded
TWW = Weld socket

2 Process Connection Size

TWF Process Connection
110 = 1 in. ASME class 150
115 = 1 1/2 in. ASME class 150
120 = 2 in. ASME class 150
310 = 1 in. ASME class 300
315 = 1 1/2 in. ASME class 300
320 = 2 in. ASME class 300

TWS Process Connection
C15 = 1 1/2 in. Kwik-Clamp
C20 = 2 in. Kwik-Clamp

TWT Process Connection
008 = 1/2 in. male NPT
012 = 3/4 in. male NPT

TWW Process Connection
P12 = 3/4 in. pipe
P16 = 1 in. pipe

3 Shank

R = Reduced
S = Straight
T = Tapered①

① Tapered shanks are not available for thermowells with U dimensions of 4.00 in. (102 mm) or less.

4 Bore Diameter

1 = 0.260 in. (6.6 mm)

5 Lag Extension

L = Lag extension①
N = No lag extension

① Not available for thermometer stems less than 6 in. (152 mm) long. Lag is 2 in. (50.8 mm) for 6 in. (152 mm) thermometer stems and 3 in. (76.2 mm) for thermometer stems longer than 6 in. (152 mm).

6 U Dimension

Connections with Lag Extensions

TWF Process Connection
2.00 = 2.00 in. (50.8 mm) (6 in. stem)
4.00 = 4.00 in. (102 mm) (9 in. stem)
7.00 = 7.00 in. (178 mm) (12 in. stem)

TWS and TWW Process Connections
2.50 = 2.50 in. (63.5 mm) (6 in. stem)
4.50 = 4.50 in. (114 mm) (9 in. stem)
7.50 = 7.50 in. (190 mm) (12 in. stem)

TWT Process Connection
2.50 = 2.50 in. (63.5 mm) (6 in. stem)
4.50 = 4.50 in. (114 mm) (9 in. stem)
7.50 = 7.50 in. (190 mm) (12 in. stem)

Connections with No Lag Extensions

TWF Process Connection
2.00 = 2.00 in. (50.8 mm) (4 in. stem)
4.00 = 4.00 in. (102 mm) (6 in. stem)
7.00 = 7.00 in. (178 mm) (9 in. stem)
10.0 = 10.0 in. (254 mm) (12 in. stem)

TWS and TWW Process Connections
2.50 = 2.50 in. (63.5 mm) (4 in. stem)
4.50 = 4.50 in. (114 mm) (6 in. stem)
7.50 = 7.50 in. (190 mm) (9 in. stem)
10.5 = 10.5 in. (267 mm) (12 in. stem)

TWT Process Connection
1.00 = 1.00 in. (25.4 mm) (2.5 in. stem, 1/2 in. connection)
1.63 = 1.63 in. (41.4 mm) (2.5 in. stem, 3/4 in. connection)
2.50 = 2.50 in. (63.5 mm) (4 in. stem)
4.50 = 4.50 in. (114 mm) (6 in. stem)
7.50 = 7.50 in. (190 mm) (9 in. stem)
10.5 = 10.5 in. (267 mm) (12 in. stem)

7 Options

CS = Protective stainless steel cap and chain
G1 = Female G1/2B instrument connection
SS = 316 stainless steel material

TTW Series Thermowell Tees

Thermowells are recommended to protect thermometers from damage that could result from contact with pressurized, corrosive, flowing, viscous, or abrasive process fluids. They also enable removal of thermometers for replacement or service without affecting the process.

Features

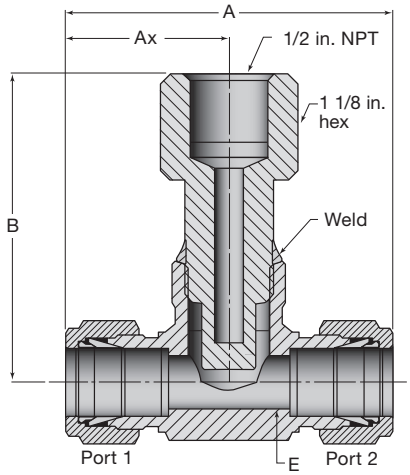
- 316 stainless steel construction
- Seal-welded connection between tee and thermowell
- Instrument connection: 1/2 in. female NPT straight pipe threads
- Instrument stem length: 2.5 in (63.5 mm)

Ordering Information

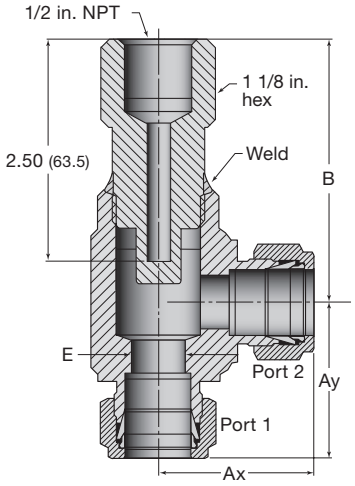
Select an ordering number. Dimensions, in inches (millimeters), are for reference only and are subject to change.

End Connections			Straight Pattern Ordering Number	Angle Pattern Ordering Number	Dimensions, in. (mm)					Pressure Rating psig (bar)
Port 1	Port 2	Size			A	Ax	Ay	B	E	
Swagelok Tube Fittings		3/8 in.	SS-TTW-S6	—	2.84 (72.1)	1.42 (36.1)	1.42 (36.1)	2.86 (72.7)	0.28 (7.1)	4900 (337)
		1/2 in.	SS-TTW-S8	SS-TTW-S8-A	3.06 (77.7)	1.53 (38.9)	1.53 (38.9)	2.86 (72.7)	0.41 (10.4)	4900 (337)
		5/8 in.	SS-TTW-S10	—	3.06 (77.7)	1.53 (38.9)	1.53 (38.9)	2.86 (72.7)	0.50 (12.7)	4900 (337)
		3/4 in.	SS-TTW-S12	SS-TTW-S12-A	3.52 (89.4)	1.76 (44.7)	1.76 (44.7)	2.96 (75.2)	0.62 (15.7)	4600 (316)
		1 in.	SS-TTW-S16	SS-TTW-S16-A	3.86 (98.0)	1.93 (49.0)	1.93 (49.0)	2.96 (75.2)	0.88 (22.4)	4600 (316)
		12 mm	SS-TTW-S12MM	SS-TTW-S12MM-A	3.06 (77.7)	1.53 (38.9)	1.53 (38.9)	2.86 (72.7)	0.37 (9.5)	4900 (337)
		16 mm	SS-TTW-S16MM	SS-TTW-S16MM-A	3.06 (77.7)	1.53 (38.9)	1.53 (38.9)	2.86 (72.7)	0.50 (12.7)	4900 (337)
		18 mm	SS-TTW-S18MM	SS-TTW-S18MM-A	3.52 (89.4)	1.76 (44.7)	1.76 (44.7)	2.96 (75.2)	0.59 (15.0)	4600 (316)
Male NPT	Female NPT	1/2 in.	SS-TTW-M8-F8	SS-TTW-M8-F8-A	3.12 (79.2)	1.56 (39.6)	1.56 (39.6)	2.93 (74.4)	0.47 (11.9)	5600 (385)
		3/4 in.	SS-TTW-M12-F12	SS-TTW-M12-F12-A	3.59 (91.2)	1.92 (48.8)	1.67 (42.4)	3.26 (82.7)	0.62 (15.7)	5100 (351)
Female NPT		1/2 in.	SS-TTW-F8	SS-TTW-F8-A	3.12 (79.2)	1.56 (39.6)	1.56 (39.6)	2.93 (74.4)	0.94 (23.9)	5600 (385)
		3/4 in.	SS-TTW-F12	SS-TTW-F12-A	3.84 (97.5)	1.92 (48.8)	1.92 (48.8)	3.26 (82.7)	1.17 (29.7)	5100 (351)

Straight Pattern



Angle Pattern



Safe Product Selection
When selecting a product, the total system design must be considered to ensure safe, trouble-free performance. Function, material compatibility, adequate ratings, proper installation, operation, and maintenance are the responsibilities of the system designer and user.

Warranty Information

Swagelok products are backed by The Swagelok Limited Lifetime Warranty. For a copy, visit swagelok.com or contact your authorized Swagelok representative.

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