Thermometers with Rigid Stem Mount

Case and Bayonet Ring Stainless Steel
Standard (TSCh) or with Case Filling (TSChG)

Accuracy Class 1

Nom. Sizes 100 mm **(4")**
160 mm **(6")**

Models
TSCh
TSChG

Application
These thermometers are designed to meet the requirements of industrial temperature measurement, for fluid or gaseous media. The appropriate versions are suitable also for aggressive media as you find in chemical industries, petrochemistry, process technology, or apparatus engineering, and for food and beverage industries.

Nominal Case Sizes
100 (4"), 160 (6")

Accuracy Class
Class 1 according to EN 13 190

Temperature Ranges (EN 13 190)
-50/+50 °C (-58/+122 °F) up to +100/+600 °C (+212/+1112 °F), compare table (reverse side)

Temperature Limitations
Ambient temperature : -20 / +60 °C (-4 °F / +140 °F)

Operation Pressure Limitation
25 bar (350 psi) max. static pressure at the stem

Protection Type (EN 60529 / IEC 529)
IP 55 dry version / IP 65 filled version

Standard Configuration

Case	Bayonet ring case 304 stainless steel (1.4301); TSCh dry version (IP55), TSChG with case filling silicone oil (IP65)
Window	Single strength glass
Connection	Bottom connection, optional: lower back (**r**), stem (exit at the case bottom, see pg.2) right-angled to the left (**wl**), to the right (**wr**),or to the backside (**w**), obtused-angled to the backside (**wst**); Stem and connection types see pg. 4.
Stem material	316 stainless steel (1.4571)
Principle of Measurement	Inert gas expansion system (measuring system nitrogen-filled, non-toxic and enviromentally safe)
Movement	Brass / German silver
Dial	Aluminum alloy, black figures, white background
Pointer	Aluminum black
Adjustment	± 6 % with adjustment screw from outside

Temperature range (°C)	Measuring range (°C)	Subdivision (°C)	Temperature difference ΔT (K)
-50 / 50	-40 / 40	1	100
-30 / 50	-20 / 40	1	80
-30 / 120	-10 / 100	2	150
-30 / 170	-10 / 150	5	200
-20 / 60	-10 / 50	1	80
-20 / 80	-10 / 70	1	100
0 / 80	10 / 70	1	80
0 / 100	10 / 90	1	100
0 / 120	20 / 100	2	120
0 / 150	20 / 130	2	150
0 / 160	20 / 140	2	160
0 / 200	20 / 180	5	200
0 / 300	30 / 270	5	300
0 / 350	50 / 300	5	350
0 / 400 [2]	50 / 350	10	400
0 / 500 [2]	50 / 450	10	500
0 / 600 [1] [2]	100 / 500	10	600
50 / 300	80 / 270	5	250
50 / 400	100 / 350	5	350
100 / 500	150 / 450	10	400
100 / 600 [1]	150 / 550	10	500

[1] Temperature ranges for stem Ø 6 mm (.24") upon request
[2] Not available with electrical accessories.

Optional Special Configurations

- Other thread types and sizes upon request
- Stem type A5 with clamp fitting carbon steel
- Stem with capillary line (i.e. without stem tube) between turnable union nut (**A 3.2**) or turnable male connection thread **(A 4.2**) and vessel
- Other temperature ranges or units upon request, e.g. °F or K
- Dual scales, for example dual scale °C / °F
- Red mark on the dial
- Stationary red pointer, internal or external adjustment
- Movement stainless steel
- Maximum indicating pointer, external adjustment (acrylic or polycarbonate lens; details upon request)
- Acrylic glass; laminated safety glass lens upon request
- GL resp. DNV approvement
- Other than vertical installation
- Electrical accessories, see page 3 and catalogue heading 9

How to Order

Please specify when ordering:

Model code:	**TSCh** or **TSChG**
Nominal case size:	**100** or **160**
Code letters for case configuration:	**r**, **wl**, **wr, w** or **wst** (see pg. 2) (Standard = bottom connection = without additional code letter)
Temperature range:	acc. to DIN resp. table left, e.g. **0/100 °C** or **-30/120 °C**
Stem version:	– stem type **A1**, **A3**, **A4**, **A4.1**, **A5, A6** – stem **Ø 6**, **8**, **10** or **12** mm – stem length **L** resp. **L1** and immersion length **ET** – process connection, e.g. G ½ B (½" BSP), M20 x 1.5 (compare pg. 4)
Special options:	see above

Examples for Ordering Information:

- TSCh 100, 0/100 °C, A3, Ø 12 mm, L = 300 mm, ET 80 mm, M 20 x 1.5
- TSChG 160, wst, -30/170 °C, A6, Ø 8 mm, L1=180 mm, ET 75 mm, G ½ B

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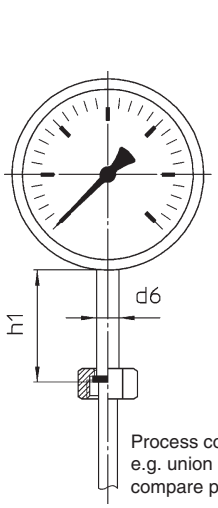
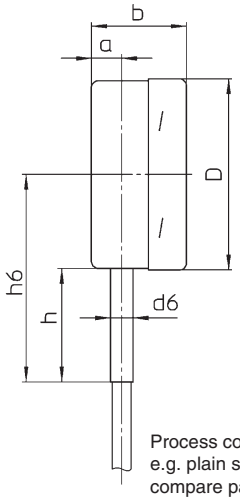
Case Configurations, Code Letters, and Dimensions

Bottom connection
(without additional code letter)

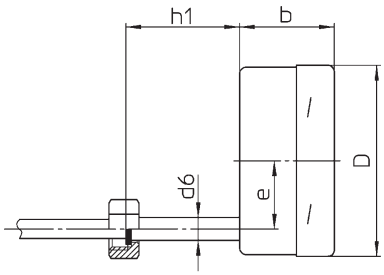


Process connection:
e.g. union nut (A3),
compare page 4

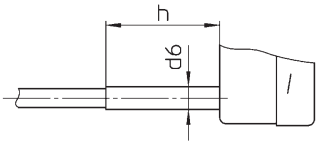


Process connection:
e.g. plain stem (A1),
compare page 4

Lower back connection,
code letter: **r**

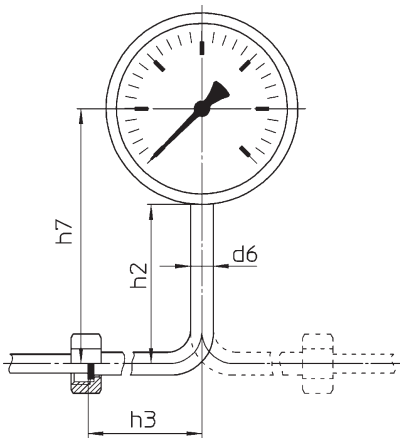


Process connection:
e.g. union nut (A3),
compare page 4



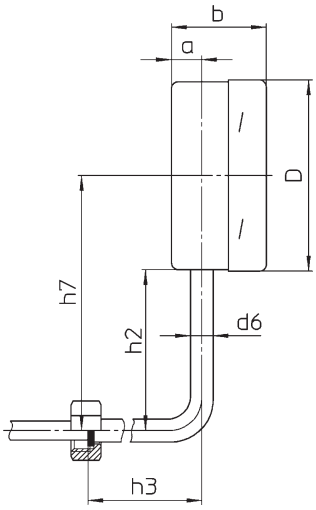
Process connection:
e.g. plain stem (A1),
compare page 4

Bottom connection,
stem right-angled to the left,
ordering code letters: **wl**

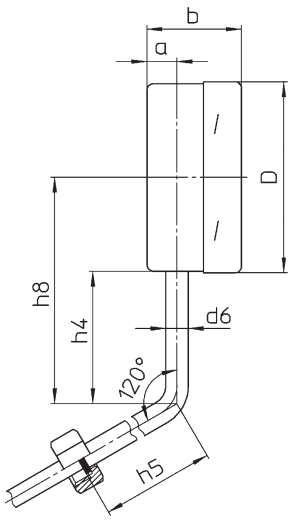


Bottom connection,
stem right-angled to the right,
ordering code letters: **wr**

Bottom connection,
stem right-angled to the backside,
ordering code letter: **w**



Bottom connection,
stem obtused-angled to the backside,
ordering code letters: **wst**



Dimensional Data (mm **/ inches) and Weight (** kg **/ lb)**

Nom. Size	a	b	D	d6	e	h [1]	h1 [1]	h2	h3	h4	h5	h6	h7	h8	Weight (approx.) TSCh	Weight (approx.) TSChG
100 **4"**	16 **.63**	50 **1.97**	101 **3.98**	12 **.47**	36 **1.42**	60 **2.36**		85 **3.35**	120 **4.72**	70 **2.76**	120 **4.72**	109.5 **4.31**	134.5 **5.30**	119.5 **4.70**	.60 **1.32**	.90 **1.98**
160 **6"**			161 **6.34**		53 **2.09**							139.5 **5.49**	164.5 **6.48**	149.5 **5.89**	1.10 **2.420**	2.00 **4.41**

[1] 80 mm (**3"**) for temperature ranges > 500 °C (**> 932 °F**) and stem length ≥ 120 mm (**4.72"**), other lengths and special versions upon request

Versions with Electrical Accessories

When electrical accessories such as standard or magnetic contacts, inductive or electronic limit switches, or resistance/electronic transducers are installed into the case, all outside dimensions remain unchanged exept of the front-to-back sizes (dimension b).

For detailed information about use and operation of mechanical, inductive, or electronic limit-switch contact assemblies see our general information leaflet 9000.

Further information, especially about the available make/break operations, are to find in the data sheets for the individual models of limit-switch contact assemblies:

Mechanical (standard- and magnetic contacts)	Data sheet **9100**
Inductive	Data sheet **9200**
Electronic	Data sheet **9201**

Lens
Acrylic glass lens respectively polycarbonate (details upon request); optional available upon request: single strength glass or laminated safety glass lens (extra charges)

Case Filling
The model code for the liquid filled version with built-in electrical accessories is **TSChOe**. The instrument configuration is similar to model TSChG (except front-to-back size and port for the electrical connection) but the filling liquid is a special oil.

Minimum Temperature Range
Full span 100 K

4-fold limit-switch contact assemblies
cannot be built into cases of nom. size 100 (4").

Electrical Connection
Our models TSCh and TSChOe with built-in standard or magnetic contact are supplied with a universal plug connector.
With built-in inductive and electronic limit-switch contact assembly they are supplied with a terminal box.

The universal plug connector has 6 terminals and a ground terminal. The terminal box has 6 terminals only.

The terminal box resp. universal plug connector is usually mounted on the right side of the case (right side from the viewer's perspective when looking on the dial).

Another position of the electrical connection is possible only upon request at extra charges.

Other electrical connections are availble upon request.

How to Order:

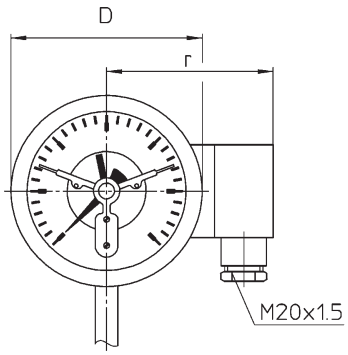
Please add to the ordering information discribed on page 1 as follows:

- ***Ordering letter*** for the limit-switch contact assembly **S**, **M**, **I** or **E**
- ***Ordering number*** for he make/break operation, e.g. **1**, **2**, **11**, **12**, **21**, **22** (compare data sheets 9100 ff)

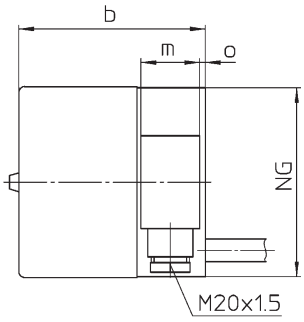
Version with liquid filled case = model code **TSChOe**

Examples for Ordering Information:
- TSCh 100, r, 0/100 °C, A3, Ø12 mm, L= 300 mm, ET 80 mm, M 20x1,5, **M 12**
- TSChOe160, wst, -30/170 °C, A6, Ø8 mm, L1=180 mm, ET 75 mm, G ½ B, **I 22**

Bottom connection
Universal plug connector or terminal box



Lower back connection (r)
Universal plug connector or terminal box



Dimensional Data (mm / inches) and Weight (kg / lb)

Nom. Size	b	D	m	o	o2	r	Weight (approx.) TSCh	Weight (approx.) TSChOe
100 **4"**	98.5 **3.88**	101 **3.98**	31 **1.22**	3 **.12**	25 **.98**	88 **3.46**	.80 **1.76**	1.6 **3.52**
160 **6"**	105 **4.13**	161 **6.34**		3.25 **.13**		119 **4.69**	1.4 **3.08**	2.8 **6.17**

Stem Types and Connections (For thermowells see data sheet 8310 to 8320).

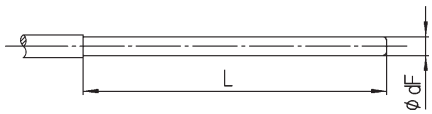
Material: Stem and connection fittings made of 316 stainless steel (1.4571) [6].

Dimensions (mm / inches)

Stem Type A1

Plain stem (without thread)
Stem length = **L** = free choice, but minimum length has to be considered (see below);
Basic model for stem type A5 with adjustable clamp fitting;
Suitable thermowells are to find in data sheet 8320.

Ø d_F [2]	6 [1]	8	10	12
	.24	**.31**	**.39**	**.47**



Stem Type A3

Stem with turnable union nut
Female thread ½" BSP or M 20 x 1.5
Stem length* = **L** = free choice, but minimum length has to be considered (see below);
Basic model for stem type A6 with male adapter fitting;
Suitable thermowells are to find in data sheet 8312.

*(immersion length up to the sealing face of the union nut)

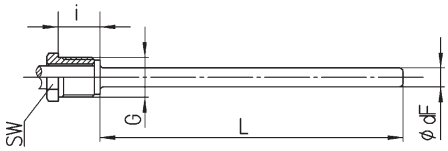
Ø d_F [2]	G	SW	i
6 [1]	M20x1.5	27	10
8			
10	½"BSP	**1.06**	**.39**
12			

Stem Type A4

Stem with turnable male connection thread
Male thread ½"BSP or M 20 x 1.5
Stem length* = **L** = free choice, but minimum length has to be considered (see below);
Suitable thermowells are to find in data sheets 8310 and 8311.

*(immersion length up to the sealing face of the thread nipple stop)

Ø d_F [2]		G	SW	i
6 [1]	**.24**	M20x1.5	22	20
8	**.31**			
10	**.39**	½"BSP	**.87**	**.79**
12	**.47**			

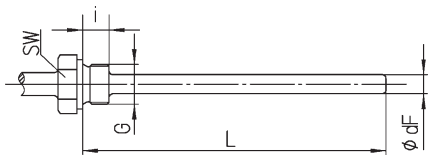


Stem Type A4.1

Stem with rigid male connection thread
Male thread ½" BSP, M 20 x 1.5, ¾" BSP, or M 27 x 2
Stem length* = **L** = free choice, but minimum length has to be considered (see below);
Suitable thermowells are to find in data sheets 8310 and 8311.

*(immersion length up to the upper sealing face of the thread connection)

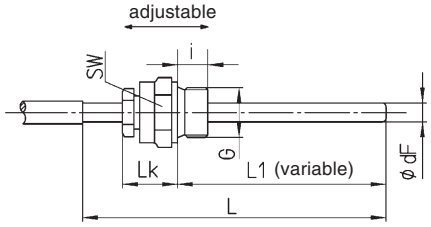
Ø d_F [2]		G	SW	i
6 [1]	**.24**	M20x1,5	27	14
8	**.31**			
10	**.39**	½" BSP	**1.06**	**.55**
6 [1]	**.24**	M27x2	32	16
8	**.31**			
10	**.39**	¾" BSP	**1.26**	**.63**
12	**.47**			



Stem Type A5

Stem type A1 with clamp- or compression fitting, adjustable on the stem (To consider: **L1** has to remain in any case ≥ minimum length of stem type **A1**, compare table below!)
Male thread ¼" BSP or ½" BSP
Stem length* = **L** = free choice, but minimum length has to be considered (see below)

Ø d_F [2]		G	SW	i	L_K
6 [1]	**.24**	¼"BSP	19	12	27
8	**.31**		**.75**	**.47**	**1.06**
10	**.39**	½"BSP	27	14	35
12	**.47**		**1.06**	**.55**	**1.38**

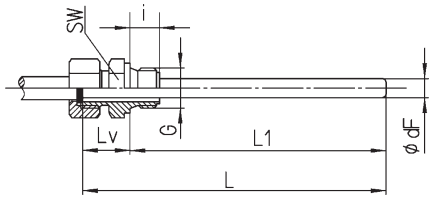


Stem Type A6

Stem type A3 with male adapter fitting
Male thread ½"BSP or M 20 x 1.5
¾" BSP, M 24 x 1.5, or M 27 x 2
Stem length* = **L1** = free choice, but minimum length has to be considered (see below)

*(immersion length up to the upper sealing face of the connection fitting)

Ø d_F [2]		G	SW	i	L_V
6 [1]	**.24**	M20x1.5	27	14	25
8	**.31**		**1.06**	**.55**	**.98**
10	**.39**	½"BSP			
6 [1]	**.24**	M24x1.5	27		
8	**.31**		**1.06**		
10	**.39**	M27 x 2	32	16	27
12	**.47**		**1.26**	**.63**	**1.06**
		¾" BSP			



		Minimum Immersion Length ET min [3] (mm/**inches**)				**Minimum Stem Length [4] L resp. L 1 [5] (mm/inches)**											
Stem type		**all**				**A 1, A 4 (L) [5]**				**A 3 , A 4.1 (L) [5] / A 6 (L1) [5]**				**A 5 (L) [5]**			
Stem diameter-Ø [2] (mm/**inches**)		12 **.47**	10 **.39**	8 **.31**	6 [1] **.24**	12 **.47**	10 **.39**	8 **.31**	6 **.24**	12 **.47**	10 **.39**	8 **.31**	6 **.24**	12 **.47**	10 **.39**	8 **.31**	6 **.24**
Full span	≤ 500 °C	35	45	75	120	40	50	80	125	50	60	90	135	75	85	115	160
	≤ **932 °F**	**1.38**	**1.77**	**2.95**	**4.72**	**1.57**	**1.97**	**3.15**	**4.92**	**1.97**	**2.36**	**3.54**	**5.31**	**2.95**	**3.35**	**4.53**	**6.30**
	> 500 °C	75	105	165	285	80	110	170	290	90	120	180	300	115	145	205	325
	> **932 °F**	**2.95**	**4.13**	**6.50**	**11.22**	**3.15**	**4.33**	**6.69**	**11.42**	**3.54**	**4.72**	**7.09**	**11.81**	**4.53**	**5.71**	**8.07**	**12.80**

[1] Stem Ø 6 mm (.24"): delivery time and price upon request
[2] Other stem Ø upon request.
[3] The minimum immersion length of the stem is the length of that part of the vessel, which has to be completely immersed into the medium to receive an accurate temperature measurement.
[4] The minimum immersion length depends on the stem diameter and the temperature range. Out of the required minimum immersion length and the stem type results the minimum stem length.
[5] Depending on the stem type either the stem length L or L1 has to be stated when ordering, see the quoted dimension in brackets next to the stem type in this table.
[6] Stem type A5: clamp fitting optional available made of carbon steel