



## Model Overview

**Thermometers  
Thermowells  
Accessories**

**8000**  
10/11

## Contents

In this model overview we present you our product range of thermometers and thermowells.

- Bimetal thermometers
  - Gas-actuated thermometers
  - Machine glass thermometers
- and according to that
- Thermowells according to DIN 43 772
  - Accessories

Following you will find a short overview of our catalogue-heading 8 of the thermometers. Furthermore we are going to explain the use of thermowells and their differences.

- Selection p. 3
- Advices concerning the selection p. 4
- Metrological features p. 5
- Case filling, temperature resistance, standard temperature sensors p. 6
- Model overview
  - Bimetal thermometers p. 7
  - Gas-actuated thermometers p. 8 – 9
  - Special thermometers p. 10
  - Special stems for thermometers p. 11
  - Thermowells p. 12 – 13
  - Machine glass thermometers / accessories p. 14
  - Electrical additional accessories p. 15

## Further Catalogue Headings

- No. 1 Bourdon tube pressure gauges class 1.0 to 2.5 according to EN 837-1, pressure ranges 0.6 to 4000 bar
- No. 2 Test gauges with bourdon tube according to EN 837-1 class 0.6 and better, pressure ranges 0.6 to 1.600 bar
- No. 3 Diaphragm pressure gauges with horizontal diaphragm, pressure ranges 10 mbar to 40 bar
- No. 4 Diaphragm pressure gauges with vertical diaphragm, pressure ranges 0.6 to 40 bar
- No. 5 Duplex gauges, Differential pressure gauges
- No. 6 Capsule gauges for low pressure, 2.5 mbar to 600 mbar  
Liquid column pressure gauges, 10 mbar to 100 mbar
- No. 7 Chemical seals (diaphragm seals, in-line seals)
- No. 8 Thermometers (bimetal thermometers, gas-actuated thermometers, machine glass thermometers, thermowells, accessories)**
- No. 9 Electronics
  - 9.1 Limit switch contact assemblies for pressure gauges and thermometers
  - 9.2 Pressure transmitters
  - 9.3 Digital displays
- No. 10 Pressure gauge test equipment (dead weight testers, comparison pumps)
- No. 11 Pressure gauge accessories

## Certificates

### Quality management according to DIN EN ISO 9001:2008



GOST-type certification Russia



GOST-R for custom purposes Russia



GOST type certification Ukraine



GOST type certification Kazakhstan



German Lloyd



Russian Sea Register



EHEDG

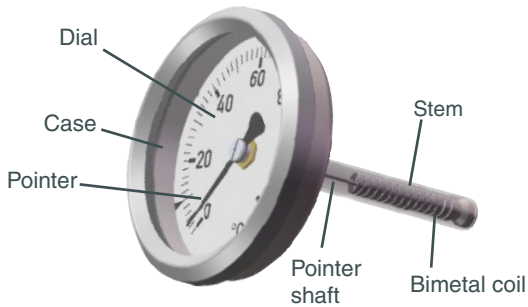


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## Pointer Thermometer

**Bimetal thermometers (DIN EN 13 190)** are pointer thermometers, that are driven by helical bimetal stripes.

The temperature-dependent rotation of the bimetal is being transferred directly to the pointer by the pointer shaft.

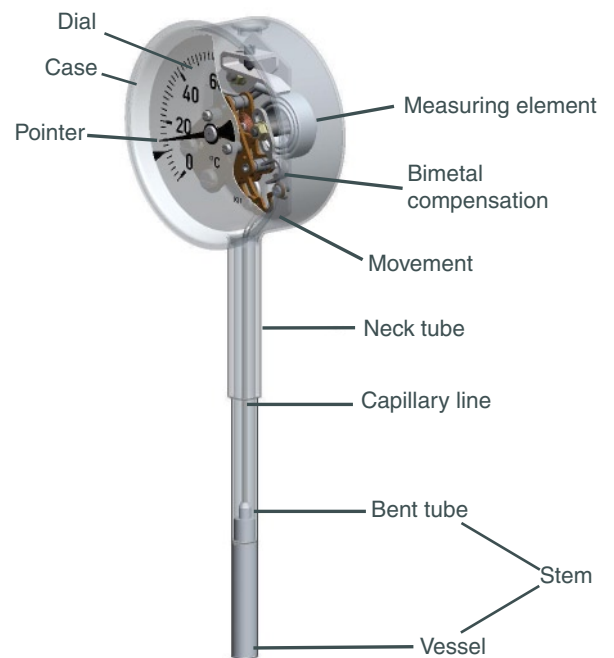


**Gas-actuated thermometers (DIN EN 13 190)**

use the temperature-dependent pressure of a separately closed quantity of gas as measure for the temperature.

The measuring unit consists of a vessel (active part of the stem), capillary line and measuring element. It is filled with an inert gas, mostly nitrogen or helium.

The indication is being realised via movement and pointer.

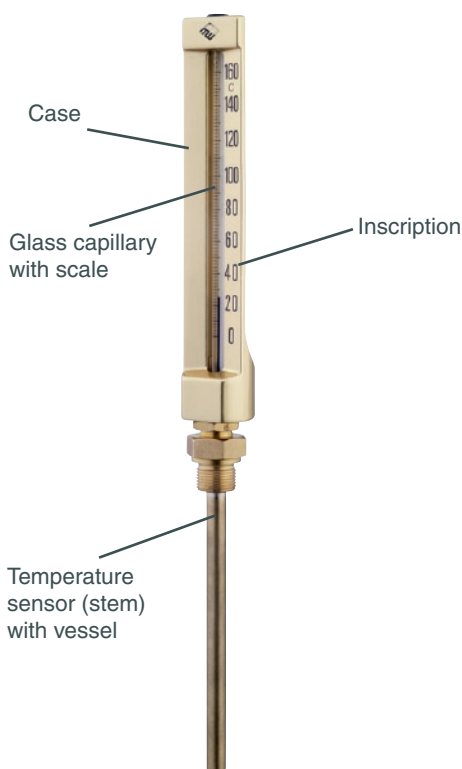


## Machine Glass Thermometers

**Machine glass thermometers (DIN EN 16 195)** are based upon the temperature-dependent expansion of a fluid.

The measuring unit is provided in the robust metal case, consisting of a fluid-filled vessel with connected capillary made of glass.

The fluid level of the scaled glass capillary indicates the temperature altitude.

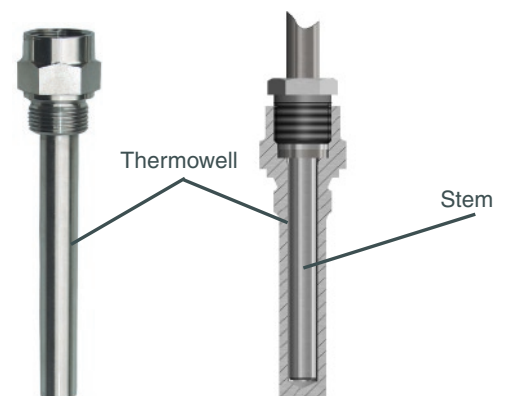


## Thermowells

**Thermometer thermowells (DIN 43 772)** separate temperature sensor (stem) and medium mechanically.

They are being applied, if

- a thermometer is being replaced during an ongoing process. The thermowell remains in the machine.
- stem models, whose connections can not reach a sufficient density towards the process, are being applied.
- the process carries out too high mechanical loads onto the stem, e.g. high process pressures or flow rates.
- compared to the medium, the stem material is not chemically resistant. In this case thermowells can be coated suitably upon request or being made of resistant material.



## Analysis of the operating conditions

To select a suitable thermometer for a particular measuring problem, the following operating conditions have to be regarded:

- mechanical operating conditions, as maximum process pressure, flow rate and occurring vibrations
- thermal operating conditions: process- and ambient temperature
- data concerning the medium, important for the evaluation of the chemical resistance of the stem material
- specific process conditions resp. -requirements, as complicated installation conditions for the stem, no direct reading because of not visible or difficult accessible measuring points, the necessity to replace thermometers during ongoing processes etc.

When disregarding these operating conditions, additional errors, malfunctions or breakdowns could occur.

### Examples

The medium pressure is 100 bar.

➔ The application of a thermowell is required

Vibrations do occur.

➔ Thermometers with case filling are advantageous

Strong ambient deviations do occur.

➔ Bimetal thermometers are suitable

### Advice

We are pleased to help you selecting the suitable thermometer for your particular case of application.

## Selection Criteria

	thermometer model	
	bimetal	gas-actuated
Temperature ranges	- 50 °C to + 600 °C	-100 °C to +600 °C
Accuracy class	Class 1	Class 1
Stem length	up to 800 mm	up to 2.50 m
Version with capillary line possible	no	yes, up to 15 m > 15 m upon request
Version with limit switch contact assembly	no	yes
Version with eGauge	yes (not for all models)	yes (not for all models)
Influence of ambient temperature	no influence	yes (see metrological advices)
Compensation of the influence of the ambient temperature	on the case	
	not required	partial compensation
	on the capillary line	
	–	no
Resistance against vibrations	without case filling	
	not suitable	suitable to a limited extent
	with case filling	
	suitable to a limited extent	good
Dependence of the position	no	no
Environmental sustainability	good	good

## Metrological Advices

The active part of the stem (vessel resp. bimetal coil) has to be immersed completely into the medium. Information concerning the active length  $L_a$  and the resulting minimum stem length can be found on the data sheets of the particular model.

## Gas-actuated Thermometers

- Due to the measuring principle environmental additional errors will occur at gas-actuated thermometers, if the temperature at the capillary line and/or the case deviates from the reference temperature ( $23\text{ °C} \pm 2\text{ °C}$ ).
- The ambient temperature influence on the measuring result can be minimised, if the active gas volume (vessel content) is very large in comparison to the inactive gas volume (capillary line and measuring element). We manufacture thermometer stems whose vessel volume is adjusted on the concrete case of application.
- To avoid temperature influence on the capillary line, it has to be isolated thermally when it is being installed.
- For cases of application with constant ambient temperature it is possible to configure the measuring system on a particular capillary line temperature.
- In large part, the additional error by ambient temperature influence of the measuring arrangement is in the range of  $< 5\%$  of the span / 10 K

## Bimetal Thermometers

- Bimetal thermometers do not have ambient temperature-related additional errors.

## Thermowells

- The use of thermowells increases the reaction time of thermometers, mainly based on the air space between thermowell and thermometer stem.
- For the most cases of application this fact is not relevant, as the temperature processes proceed slowly. Only at sudden, escalating temperature changes the adaption time has to be increased according to the medium temperature.
- For a decrease of the reaction time the use of heat transfer paste has proved of value.
- We can do a thermowell calculation for your special case of application upon request.

## Dial

Dial inscriptions, temperature ranges, scale divisions and figures of the scale are executed according to DIN EN 13 190.

The standard dial is white with a black inscription.  
See table below for standard temperature ranges and scale divisions.

The scale angle is  $270 \pm 20^\circ$

All pointer thermometers are being supplied with a clearly identifiable instrument number on the dial.

## Indication- / Measuring Range / Error Limits DINEN13190

The **indication range** shows the scale range of the thermometer.

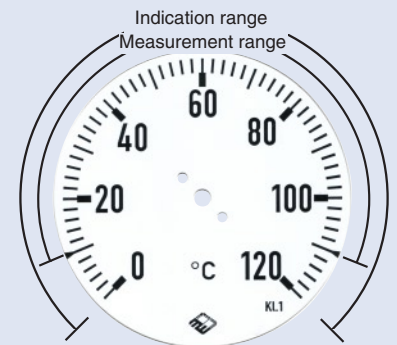
The **measuring range** corresponds to the range, in which the error limits are valid.  
The range is being marked with arrows at the external scale.

The **error limit** of our thermometers corresponds to class 1 according to DIN EN 13 190 and is being indicated by absolute values (see tables below), e.g.  $\pm 1^\circ\text{C}$ . The indication of the accuracy class is marked down to the right of the dial.

Example for adjoining scale:

Indication range:  $0^\circ\text{C}$  to  $120^\circ\text{C}$   
Measuring range:  $10^\circ\text{C}$  to  $110^\circ\text{C}$

Error limit ( acceptable error )  
according to DIN EN 13 190:  $\pm 2^\circ\text{C}$



Indication ranges, measuring ranges, smallest subdivision and error limits class 1 acc. to DIN EN 13 190

Indication range $^\circ\text{C}$	Measuring range $0 - ^\circ\text{C}$	Smallest subdivision $^\circ\text{C}$ :	Error limits acc. to class 1, $\pm$ $^\circ\text{C}$	available for measuring units:
0 — 60 $^\circ\text{C}$	10 — 50 $^\circ\text{C}$	1	1	bimetal
0 — 80 $^\circ\text{C}$	10 — 70 $^\circ\text{C}$	1	1	bimetal and gas- actuated
0 — 100 $^\circ\text{C}$	10 — 90 $^\circ\text{C}$	1	1	
0 — 120 $^\circ\text{C}$	10 — 110 $^\circ\text{C}$	2	2	
0 — 160 $^\circ\text{C}$	20 — 140 $^\circ\text{C}$	2	2	
0 — 200 $^\circ\text{C}$	20 — 180 $^\circ\text{C}$	2	2	
0 — 250 $^\circ\text{C}$	30 — 220 $^\circ\text{C}$	5	2.5	
0 — 300 $^\circ\text{C}$	30 — 270 $^\circ\text{C}$	5	5	
0 — 400 $^\circ\text{C}$	50 — 350 $^\circ\text{C}$	10	5	
0 — 500 $^\circ\text{C}$	50 — 450 $^\circ\text{C}$	10	5	
0 — 600 $^\circ\text{C}$	100 — 500 $^\circ\text{C}$	10	10	
-100 — 100 $^\circ\text{C}$	-80 — -80 $^\circ\text{C}$	2	2	gas-actuated
-50 — 50 $^\circ\text{C}$	-40 — 40 $^\circ\text{C}$	1	1	bimetal and gas- actuated
-40 — 40 $^\circ\text{C}$	-30 — 30 $^\circ\text{C}$	1	1	
-40 — 60 $^\circ\text{C}$	-30 — 50 $^\circ\text{C}$	1	1	
-30 — 50 $^\circ\text{C}$	-20 — 40 $^\circ\text{C}$	1	1	
-30 — 70 $^\circ\text{C}$	-20 — 60 $^\circ\text{C}$	1	1	bimetal
-20 — 40 $^\circ\text{C}$	10 — 30 $^\circ\text{C}$	1	1	bimetal and gas- actuated
-20 — 60 $^\circ\text{C}$	-10 — 50 $^\circ\text{C}$	1	1	
-20 — 80 $^\circ\text{C}$	-10 — 70 $^\circ\text{C}$	1	1	
50 — 300 $^\circ\text{C}$	80 — 270 $^\circ\text{C}$	5	2.5	
50 — 400 $^\circ\text{C}$	100 — 350 $^\circ\text{C}$	5	5	
100 — 500 $^\circ\text{C}$	150 — 450 $^\circ\text{C}$	10	5	gas-actuated

Indication ranges, measuring ranges, smallest subdivision and error limits class 1 acc. to DIN EN 13 190

Indication range $^\circ\text{F}$	Measuring range $0 - ^\circ\text{F}$	Smallest subdivision $^\circ\text{F}$ :	Error limits acc. to class 1, $\pm$ $^\circ\text{F}$	available for measuring units:	
0 — 150 $^\circ\text{F}$	20 — 130 $^\circ\text{F}$	2	1.8	bimetal and gas- actuated	
0 — 200 $^\circ\text{F}$	20 — 180 $^\circ\text{F}$	5	3.6		
0 — 250 $^\circ\text{F}$	20 — 230 $^\circ\text{F}$	5	3.6		
0 — 300 $^\circ\text{F}$	40 — 260 $^\circ\text{F}$	5	3.6		
-50 — 130 $^\circ\text{F}$	-30 — 110 $^\circ\text{F}$	2	1.8		
-40 — 160 $^\circ\text{F}$	-20 — 140 $^\circ\text{F}$	5	3.6		
-30 — 120 $^\circ\text{F}$	-10 — 100 $^\circ\text{F}$	2	1.8		
-10 — 100 $^\circ\text{F}$	10 — 80 $^\circ\text{F}$	2	1.8		bimetal
20 — 240 $^\circ\text{F}$	40 — 220 $^\circ\text{F}$	5	3.6		bimetal and gas-actuated
30 — 140 $^\circ\text{F}$	50 — 120 $^\circ\text{F}$	2	1.8		bimetal
40 — 400 $^\circ\text{F}$	80 — 360 $^\circ\text{F}$	5	3.6	bimetal and gas- actuated	
50 — 300 $^\circ\text{F}$	70 — 280 $^\circ\text{F}$	5	3.6		
50 — 500 $^\circ\text{F}$	100 — 450 $^\circ\text{F}$	5	4.5		
100 — 800 $^\circ\text{F}$	150 — 750 $^\circ\text{F}$	10	9.0		
100 — 1000 $^\circ\text{F}$	190 — 910 $^\circ\text{F}$	10	9.0		
150 — 700 $^\circ\text{F}$	200 — 650 $^\circ\text{F}$	10	9.0		

# Case Filling, Temperature Resistance, Standard Temperature Sensor

## Case Filling

Pointer thermometers are optionally being filled with a damping fluid, to protect them from vibrations and impulses. The damping avoids an exceeding wear of the susceptible, mechanically affected parts and improves the reading. Except of the case of bimetal thermometers also the stems are being filled, to protect the bimetal coil.

Thermometer model	Damping fluid	Indication ranges
Gas-actuated thermometers	Silicone oil	all indication ranges
Bimetal thermometers	Glycerine	-20 °C to +100 °C
	Silicone oil	-40 °C to 250 °C +100 °C and above to 250 °C

## Temperature Resistance

- Storage temperature:** - 40 °C to + 70 °C  
- 20 °C to + 70 °C for case filling

- Ambient temperature:**
  - unfilled (dry) version - 40 °C to + 60 °C
  - special version - 60 °C to + 60 °C
  - filled version - 20 °C to + 60 °C
  - special version - 60 °C to + 60 °C

Please regard possible limitations of storage and ambient temperature in the data sheets. Please do not hesitate to contact us if you require instruments with a higher or lower storage resp. ambient temperature.

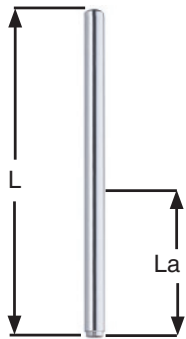
- Reference temperature:** + 23 °C ± 2 °C

- Medium temperature:** has to be within the measurement limits of the particular thermometer. Over- resp. under temperature resistant versions are available for some models upon request.

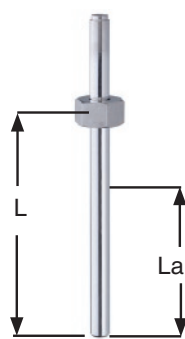
## Standard Temperature Sensor (stem)

A..= stem for gas-actuated thermometers  
B..= stem for bimetal thermometers

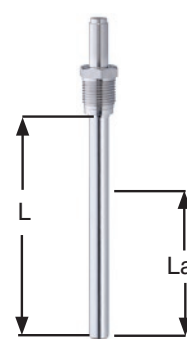
L, L1 = stem length  
La = active stem length



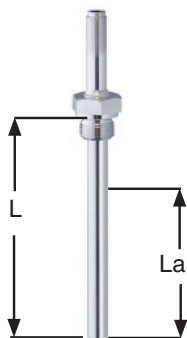
**Stem model:** A1, B1  
**Process connection:** without screw fitting, plain stem



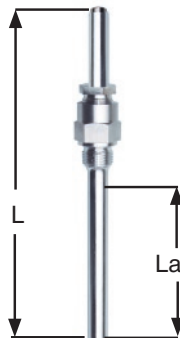
**Stem model:** A3, B3  
**Process connection:** union nut



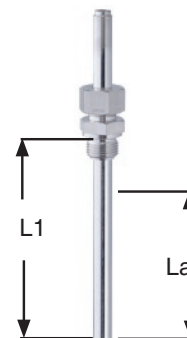
**Stem model:** A4, B4  
**Process connection:** male thread, turnable (thermowell required)



**Stem model:** A4.1, B4.1  
**Process connection:** male thread, rigid



**Stem model:** A5, B5  
**Process connection:** male thread / compression fitting adjustable at the stem  
stem A1/B1 with compression fitting



**Stem model:** A6, B6  
**Process connection:** male thread, turnable / double male adapter  
stem A3/B3 with double male adapter



## Standard Bimetal Thermometer



Rigid stem

Case	Stainless steel	Stainless steel
Ring	Bayonet ring Stainless steel	Crimped-on ring Stainless steel
Model / case filling	TBiSch / without case filling	TBiSchg / without case filling TBiSchgG / with case filling
Nominal case size	63, 100, 160	63, 80, 100, 125, 160
Temperature sensor (stem)	316 stainless steel (1.4571)	316 stainless steel (1.4571)
Stem models	B1, B3, B4, B4.1, B5 or B6	B1, B3, B4, B4.1, B5 or B6
Stem-Ø	6 or 8 mm	6 or 8 mm
Stem length	Lmin resp. L1 min up to max. 800 mm	Lmin resp. L1 min up to max. 800 mm
Temperature ranges	see table on page 5	see table on page 5
Accuracy (DIN EN 13190)	Class 1	Class 1
Data sheets	8101	8102



Every angle,  
turnable and adjustable

Case	Stainless steel	Stainless steel
Ring	Bayonet ring Stainless steel	Crimped-on ring Stainless steel
Model / case filling	TBiGelCh / without case filling	TBiGelChg / without case filling TBiGelChgG / with case filling
Nominal case size	63, 100, 160	63, 80, 100, 125, 160
Temperature sensor (stem)	316 stainless steel (1.4571)	316 stainless steel (1.4571)
Stem models	B1, B3, B4, B4.1, B5 or B6	B1, B3, B4, B4.1, B5 or B6
Stem-Ø	6 or 8 mm	6 or 8 mm
Stem length	Lmin resp. L1 min up to max. 800mm	Lmin resp. L1 min up to max. 800mm
Temperature ranges	see table on page 5	see table on page 5
Accuracy (DIN EN 13190)	Class 1	Class 1
Data sheets	8111	8112

# Standard Gas-actuated Thermometers

## Rigid stem



<b>Case</b>	<b>Stainless steel</b>	<b>Stainless steel</b>
<b>Ring</b>	<b>Bayonet ring</b> Stainless steel	<b>Crimped-on ring</b> Stainless steel
<b>Model / case filling</b>	<b>TSCh</b> / without case filling <b>TSChG</b> / with case filling	<b>TSChg</b> / without case filling <b>TSChgG</b> / with case filling
<b>Nominal case size</b>	63, 100, 160, 250 (TSCh)	63, 80, 100, 160
<b>Temperature sensor (stem)</b>	316 stainless steel (1.4571)	316 stainless steel (1.4571)
<b>Stem models</b>	A1, A3, A4, A4.1, A5 or A6	A1, A3, A4, A4.1, A5 or A6
<b>Stem-Ø</b>	8, 10 or 12 mm	8, 10 or 12 mm
<b>Stem length</b>	Lmin resp. L1 min up to 2.50m	Lmin resp. L1 min up to max. 2.50m
<b>Temperature ranges</b>	see table on page 5	see table on page 5
<b>Accuracy (DIN EN 13190)</b>	Class 1	Class 1
<b>Data sheets</b>	<b>8201</b>	<b>8202</b>

## Every angle, turnable and adjustable

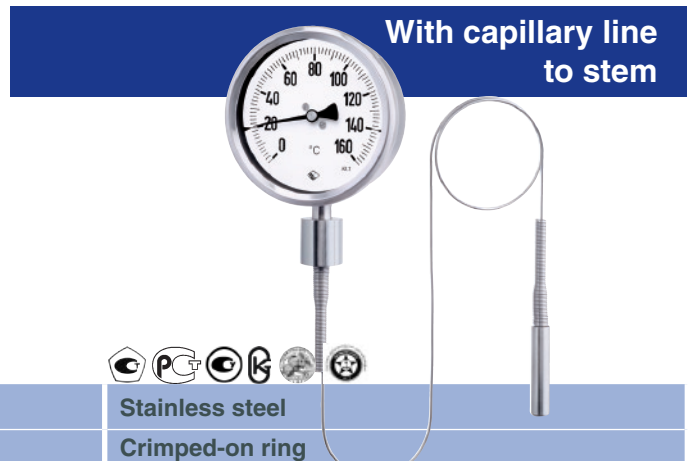


<b>Case</b>	<b>Stainless steel</b>	<b>Stainless steel</b>
<b>Ring</b>	<b>Bayonet ring</b> Stainless steel	<b>Crimped-on ring</b> Stainless steel
<b>Model / case filling</b>	<b>TGeICh</b> / without case filling <b>TGeIChG</b> / with case filling	<b>TGeIChg</b> / without case filling <b>TGeIChgG</b> / with case filling
<b>Nominal case size</b>	63, 100, 160	63, 80, 100, 160
<b>Temperature sensor (stem)</b>	316 stainless steel (1.4571)	316 stainless steel (1.4571)
<b>Stem models</b>	A1, A3, A4, A4.1, A5 or A6	A1, A3, A4, A4.1, A5 or A6
<b>Stem-Ø</b>	8, 10 or 12 mm	8, 10 or 12 mm
<b>Stem length</b>	Lmin resp. L1 min up to max. 2.50m	Lmin resp. L1 min up to max. 2.50m
<b>Temperature ranges</b>	see table on page 5	see table on page 5
<b>Accuracy (DIN EN 13190)</b>	Class 1	Class 1
<b>Data sheets</b>	<b>8211</b>	<b>8212</b>

Case configurations, process connections see data sheets



## Standard Gas-actuated Thermometers



<b>Case</b>	Stainless steel	Stainless steel
<b>Ring</b>	Bayonet ring Stainless steel	Crimped-on ring CrNi-Stahl
<b>Model / case filling</b>	TFCh / without case filling TFChG / with case filling	TFChg / without case filling TFChgG / with case filling
<b>Nominal case size</b>	63, 100, 160, 250 (TFCh)	63, 80, 100, 160
<b>Temperature sensor (stem)</b>	316 stainless steel (1.4571)	316 stainless steel (1.4571)
<b>Stem models</b>	A1, A3, A4, A5 or A6	A1, A3, A4, A5 or A6
<b>Stem-Ø</b>	8, 10 or 12 mm	8, 10 or 12 mm
<b>Stem length L / length of capillary line L<sub>FL</sub></b>	L <sub>min</sub> resp. L <sub>1</sub> min up to max. 2.50m L <sub>FL</sub> 1 m up to 15 m	L <sub>min</sub> resp. L <sub>1</sub> min up to max. 2.50m L <sub>FL</sub> 1 m up to 15 m
<b>Temperature ranges</b>	see table on page 5	see table on page 5
<b>Accuracy (DIN EN 13190)</b>	Class 1	Class 1
<b>Data sheets</b>	8221	8222

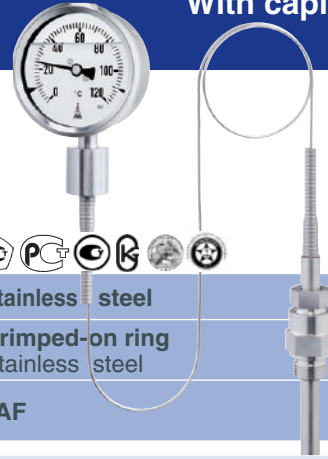
## Special Diesel Exhaust Thermometers

### Rigid stem



Case	Stainless steel
Ring	Crimped-on ring Stainless steel
Model / case filling	TAS
Nominal case size	63, 80, 100
Temperature sensor (stem)	316 stainless steel (1.4571)
Stem models	A5.5, A1.5 or A3.5
Stem-Ø	10, 12 or 13 mm
Stem length / stem length of capillary line $L_{FL}$	150, 200, 250, 300 or 400 mm $L_{min} = 150$ mm
Temperature ranges	0 - 120 °C 50 - 650 °C
Accuracy (DIN EN 13190)	Class 1
Data sheets	8291

### With capillary line to stem



Case	Stainless steel
Ring	Crimped-on ring Stainless steel
Model / case filling	TAF
Nominal case size	63, 80, 100
Temperature sensor (stem)	316 stainless steel (1.4571)
Stem models	A5.5, A1.5 or A3.5
Stem-Ø	10, 12 or 13 mm
Stem length / stem length of capillary line $L_{FL}$	150, 200, 250, 300 or 400 mm $L_{min} = 150$ mm $L_{FL}$ 1 m up to 15 m
Temperature ranges	0 - 120 °C 50 - 650 °C
Accuracy (DIN EN 13190)	Class 1
Data sheets	8292

### Ambient Thermometers



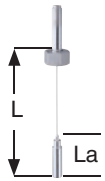

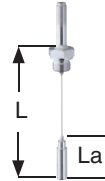



Case	Stainless steel
Ring	Bayonet ring Stainless steel
Model / case filling	TRCh
Nominal case size	100, 160
Temperature sensor (stem)	316 stainless steel (1.4571)
Stem models	–
Stem-Ø	–
Stem length / stem length of capillary line $L_{FL}$	–
Temperature ranges	-40 / +40 °C -30 / +50 °C -20 / +60 °C
Accuracy (DIN EN 13190)	Class 1
Data sheet	8293

### Square Thermometers for Switch Panels

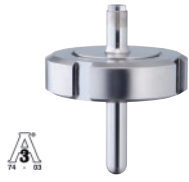


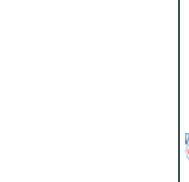



Case	Stainless steel
Ring	Square case, front narrow rim black, Clamp for switch panel mounting
Model / case filling	TFQS
Nominal case size	96x96, 144x144
Temperature sensor (stem)	316 stainless steel (1.4571)
Stem models	A1, A3, A4, A5 or A6
Stem-Ø	8, 10 or 12 mm
Stem length / stem length of capillary line $L_{FL}$	$L_{min}$ resp. $L_1$ min up to max. 2.50 m $L_{FL}$ 1 m up to 15 m
Temperature ranges	see table on page 5
Accuracy (DIN EN 13190)	Class 1
Data sheet	8225

**Stems without bent tube  
for difficult installation conditions and overlong thermowells**





						
<b>Stem model:</b>	<b>A3.2</b>	<b>A4.2</b>	<b>A4.3</b>	<b>A2</b>	<b>A7</b>	<b>A7.1</b>
<b>Construction type</b>	<b>Rigid stem with neck tube between thermometers and stem</b> , capillary line between connection screw fitting and vessel (active length), capillary line wetted, if applicable			<b>Capillary line between thermometer and vessel (active stem length)</b> , compression fitting, turnable and movable at the capillary line, capillary line wetted, if applicable		
<b>Material</b>	316 stainless steel (1.4571)			316 stainless steel (1.4571)		
<b>Ø-vessel</b>	optionally Ø 8, 10 or 12 mm			optionally Ø 8, 10 or 12 mm		
<b>Stem length L / Capillary line length L<sub>FL</sub></b>	L : 200 mm to 15 m			L <sub>FL</sub> : 1 m to 15 m		
<b>Process connection</b>	union nut	turnable male thread	rigid male thread	union nut	turnable male thread / double male adapter	turnable male thread / double male adapter, clamp-connection at capillary line
<b>Capillary line</b>	Stainless steel, Ø 2 mm			1 m, stainless steel, Ø 2 mm, buckle protection to thermometer case		
<b>Specifics</b>	-			for application without thermowell not dense, only for pressureless medium		clamping ring FPM (Viton®) medium temp. : max. 180 °C
<b>Data sheet</b>	<b>8299.1</b>			<b>8299.2</b>		





**For application in the food-, biotechnics and pharmaceutical industry, rigid mount to stem, up to 400 °C**

					
<b>Stem model:</b>	<b>A20.3</b>	<b>A20.1</b>	<b>A20.11</b>	<b>A20.12</b>	<b>A20.6</b>
<b>Construction type</b>	For thermometers with rigid mount to stem or for capillary line				
<b>Material</b>	316 stainless steel (1.4435)				
<b>Ø-vessel</b>	optionally Ø 10 or 12 mm				Ø 16 mm
<b>Stem length L</b>	30 mm to 200 mm				
<b>Process connection<sup>1)</sup></b>	Conical coupling and groove nut, DIN 11 851	ISO 2852, for tubes acc.to ISO 2037 and BS 4825	Clamp DIN 32 676, Series A, for tubes acc. to DIN 11 850	Tri-Clamp for tubes acc. to BS 4825 and O.D.-Tube, ASME BPE and ISO 1127	Varivent for Varinline®-case
<b>Data sheet</b>	<b>8299.3</b>				

**Contact stems for temperature measurement at outer faces of tanks and pipe barrels up to 300 °C**






		
<b>Stem model:</b>	<b>A1.1</b>	<b>A1.2</b>
<b>Construction type</b>	For thermometers with rigid mount to stem or with max. 5 m capillary line	
<b>Material</b>	316 stainless steel (1.4571)	
<b>Stem length</b>	90 mm	
<b>Stem width</b>	approx. 20 mm	approx. 24 mm
<b>Lay-on surface</b>	plain	convex
<b>Data sheet</b>	<b>8299.4</b>	

				
<b>Thermowell model</b>	SF4	SF4.1	SF4F	SF4.1F
<b>Form (DIN 13 190)</b>	4	–	4F	–
<b>Construction type</b>				
<b>Solid drilled<sup>1)</sup></b>	X	X	X	X
<b>Fabricated</b>				
<b>Material (standard, others upon request)</b>	316 stainless steel (1.4571), 1.7335 (13 CrMo 4-5)		316 stainless steel (1.4571)	
<b>Process connection</b>	for welding		flange	
<b>Connection to stem</b>	female thread	male thread	female thread	male thread
<b>Suitable temperature stem model</b>				
<b>Standard</b>	A4, A4.1, A5, A5.5, A6, B4, B4.1, B5, B6	A3, A3.5, B3	A4, A4.1, A5, A5.5, A6, B4, B4.1, B5, B6	A3, A3.5, B3
<b>Special</b>	A4.2, A4.3, A7, A7.1	A3.2, A2	A4.2, A4.3, A7, A7.1	
<b>Data sheet</b>	<b>8.8110</b>	<b>8.8111</b>	<b>8.8112</b>	<b>8.8113</b>

				
<b>Thermowell model:</b>	SF5	SF6, SF7	SF8	SF9
<b>Form (DIN 13 190)</b>	5	6, 7	8	9
<b>Construction type</b>				
<b>Solid drilled<sup>1)</sup></b>		X		X
<b>Fabricated</b>	X		X	
<b>Material (standard, others upon request)</b>	316 stainless steel (1.4571), 2.0401 (brass)	316 stainless steel (1.4571), 1.7335 (13 CrMo 4-5)	316 stainless steel (1.4571)	316 stainless steel (1.4571), 1.7335 (13 CrMo 4-5)
<b>Process connection</b>	male thread			
<b>Connection to stem</b>	female thread		male thread	
<b>Suitable temperature stem model</b>				
<b>Standard</b>	A4, A4.1, A5, A5.5, A6, B4, B4.1, B5, B6		A3, A3.5, B3	
<b>Special</b>	A4.2, A4.3, A7, A7.1		A3.2, A2	
<b>Data sheet</b>	<b>8.8120</b>	<b>8.8121</b>	<b>8.8130</b>	<b>8.8131</b>

<sup>1)</sup> Thermowell and screw fitting made of solid; flanges are welded to the thermowell




				
<b>Thermowell model:</b>	SK1	SK2	SK3.B	SK4.B
<b>Form (DIN 13 190)</b>	–	–	–	–
<b>Construction type</b>				
<b>Solid drilled<sup>1)</sup></b>		X		X
<b>Fabricated</b>	X		X	
<b>Material (standard, others upon request)</b>	316 stainless steel (1.4571)			
<b>Process connection</b>	male thread			for welding
<b>Connection to stem</b>	clamping ring fitting for plain stems		lateral fixing screw for plain stems	
<b>Suitable temperature stem model</b>				
<b>Standard</b>	A1, A1.5 B1		B1	
<b>Special</b>	–		–	
<b>Data sheet</b>	8.8140	8.8141	8.8150	8.8151

					
<b>Thermowell model:</b>	SL1	SL11	SL12	SL3	SL6
<b>Form (DIN 13 190)</b>		–		–	–
<b>Construction type</b>					
<b>Solid drilled<sup>1)</sup></b>					
<b>Fabricated</b>		X		X	X
<b>Process connection<sup>2)</sup></b>	ISO 2852, for tubes acc. to ISO 2037 and BS 4825	clamp-connection DIN 32 676, Series A, for tubes acc. to DIN 11 850	Tri Clamp for tubes acc. BS 4825 and O.D.-Tube, ASME BPE and ISO 1127	Conical coupling and conical coupling DIN 11 851	Varivent® for Varinline® case
<b>Material (standard, others upon request)</b>	316 stainless steel (1.4435)				
<b>Connection to stem</b>	male thread				
<b>Suitable temperature stem model</b>					
<b>Standard</b>	A3 B3				
<b>Special</b>	A2				
<b>Data sheet</b>	8.8160				

<sup>1)</sup> Thermowell and screw fitting made of solid, turned



<sup>2)</sup> Other process connections, e. g. SL2, Aseptic welding male DIN 11 864-1, Form A upon request

## Machine Glass Thermometers TMa

Upper part model	A	B	C	C	C
Dimension	110 x 30	150 x 36	200 x 36	200 x 36	200 x 36
<b>Stem model</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>4</b>
Male thread <sup>1)</sup>	x	x	x	–	–
Union nut <sup>1)</sup>	–	–	–	x	x (only M24x1.5)
Installation length L1	30 mm and above	63 mm and above	63 mm and above	89 mm and above	155 mm and above
Stem material	brass	brass	brass	St 35, fitting brass	St 35, fitting brass
Stem-Ø (mm)	10	10	10	10	6.5
<b>Construction type</b>					
V straight 	VA2	VB2	VC2	VC3	VC4
H (angle 90°) 	HA2	HB2	HC2	HC3	HC4
S (angle 135°) 	SA2	SB2	SC2	SC3	SC4
<b>Data sheet</b> (tech. inf. sheet)	<b>T08-000-020</b>	<b>T08-000-026</b>	<b>T08-000-027</b>	<b>T08-000-028</b>	<b>T08-000-029</b>

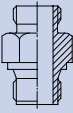
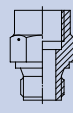

<sup>1)</sup> Available threads see data sheet (technical information sheet)

## Accessories according to DIN 43 772

Neck tube		Welding piece	
<b>Model</b>	HR	<b>Model</b>	S2
<b>Application</b>	e.g. for bridging of insulating material	<b>Application</b>	process connections for thermowells for welding
			
<b>Material</b>	316 stainless steel (1.4571)	<b>Material</b>	316 stainless steel (1.4571)
<b>Data sheet</b>	8.8301	<b>Data sheet</b>	8.8301

## Further Accessories

### Connection screw fitting

Model	AV1	AV2	S1
<b>Application</b>	stem A3/B3	stem A4/B4; A4.1/B4.1	stem A4.1/B4.1 and thermowells for screwing in
			
<b>Material</b>	316 stainl. steel (1.4571)	316 stainl. steel (1.4571)	316 stainl. steel (1.4571)
<b>Data sheet</b>	8.8201	8.8201	8.8201





Available electrical accessories

	Model	Data sheets with details of the electrical additional accessory
Reed switch (only NCS 63)	R 201	T08-000-024
Standard- or magnetic contact	S resp. M	9000 9100
inductive limit switch contact assembly	I	9000 9200
electronic limit switch contact assembly	E	9000 9201
pneumatic limit switch contact assembly	P	9000 9300
e-Gauge®	eG	n.n.

Available thermometers with electrical accessories



Model / Case Filling	Nominal Case Size	Data Sheets	Electrical accessory / Model
TSCh / without case filling TFCh / with case filling	63	n.n.	R 201
TSCh / without case filling TSChOe / with case filling	100 160	8201.90	S*/M, I, E, and P*
TGeICh / without case filling	100, 160	8211.90	S*/M, I, E, and P*
TFCh / without case filling TFChOe / with case filling	100, 160	8221.90	S*/M, I, E, and P*
TFQ / without case filling	96x 96, 144x144	8225.90	S*/M, I, E, and P*
TRCh / without case filling	100, 160	8293.90	S*/M, I, E, and P*
TBiSCh / without case filling TBiGeICh / without case filling	100	n.n.	eG

\* only for unfilled instruments

Accessory

	Model	Data Sheet
Impulse-controlled multifunctional relay für Grenzsinalgeber S und M	MSR	9521
Multifunctional relay for inductive limit switch contact assemblies - not intrinsically safe -	MSR...-I	9531
Output units for inductive limit switch contact assemblies - intrinsically safe -	KFA	9532
Output unit for inductive limit switch contact assembly, safety switching - intrinsically safe -	KHA6-SH- Ex1	T09-000-041
Power supply module - not intrinsically safe -	MSR 000	9981





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