



Customer DELTA TECH GmbH
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Document title:
Catalogues(Datasheet)

Scope of supply Pressure Gauge,Thermowell, Temperature Transmitter & Process Transmitter
WIKA Document no. S110232513-DASH-0001
WIKA Revision 00

REV	DATE	ISSUE PURPOSE	ORIG	CHKD	APPROVED BY		
					Contractor	Result Code A, C, R, N, F	Next Status
00	24.01.2025	IFR	S. Karbhari	S. Ghule			
A: Approved without Comment; C: Approved with Minor Comment R: Resubmit Incorporating Comment; N: Not Approved F: Not Subject to							

Bourdon tube pressure gauge, stainless steel

For the process industry, safety version

Models 232.30 and 233.30

WIKA data sheet PM 02.04



For further approvals,
see page 6

Applications

- Increased safety requirements for personal protection
- For gaseous and liquid aggressive media that are not highly viscous or crystallising, also in aggressive environments
- Oil and gas industry, chemical and petrochemical industries, power engineering and also water and wastewater technology

Special features

- Safety version with solid baffle wall (Solidfront) designed in compliance with the requirements of EN 837-1 and ASME B40.100
- Excellent load-cycle stability and shock resistance
- With case filling (model 233.30) for applications with high dynamic pressure loads and vibrations
- EMICOGauge version, to avoid fugitive emissions
- QR code on dial links to instrument-specific information



Bourdon tube pressure gauge, model 232.30, NS 100 [4"]

Description

This high-quality Bourdon tube pressure gauge has been designed especially for increased safety requirements within the process industry.

The use of high-quality stainless steel materials and the robust design are geared to applications in the chemical and process engineering industries. Thus the instrument is suitable for liquid and gaseous media, also in aggressive environments.

Scale ranges of 0 ... 0.6 to 0 ... 1,600 bar [0 ... 10 to 0 ... 20,000 psi] ensure the measuring ranges required for a wide variety of applications.

WIKA manufactures and qualifies the pressure gauge in accordance with the standards EN 837-1 and ASME B40.100. This safety version is made up of a non-splintering window, a solid baffle wall between measuring system and dial and a blow-out back. In the event of a failure, the operator is protected at the front side, as media or components can only be ejected via the back of the case.

The QR code on the dial allows instrument-specific information such as the serial number, the order number, certificates and other product data to be retrieved from the internet easily and in the long term.

Specifications

Basic information	
Standard	<ul style="list-style-type: none"> ■ EN 837-1 ■ ASME B40.100 <p>For information on the "Selection, installation, handling and operation of pressure gauges", see Technical information IN 00.05.</p>
Further version	<ul style="list-style-type: none"> ■ Oil- and grease-free for oxygen ■ Per NACE ¹⁾ MR0175 / ISO 15156, use in H₂S-containing environments in oil and gas production ■ With pre-volume deflagration flame arrester ²⁾ for connection to zone 0 (EPL Ga); model 910.21; see data sheet AC 91.02 ■ Monel version; models 262 and 263; see data sheet PM 02.33 ■ EMICOGauge, to avoid fugitive emissions; instrument hook-up with instrumentation valves, see page 11
Nominal size (NS)	<ul style="list-style-type: none"> ■ Ø 63 mm [2 ½"] ■ Ø 100 mm [4"] ■ Ø 160 mm [6"]
Connection location	<ul style="list-style-type: none"> ■ Lower mount (radial) ■ Lower back mount ³⁾
Window	Laminated safety glass (NS 63 [2 ½"]: Polycarbonate)
Case	
Design	<p>Safety level "S3" per EN 837-1</p> <p>With solid baffle wall and blow-out back</p> <p>Scale ranges ≤ 0 ... 16 bar [≤ 0 ... 300 psi] with compensating valve to vent and reseal case</p>
Material	<ul style="list-style-type: none"> ■ Stainless steel 1.4301 (304) ■ Stainless steel 1.4571 (316 Ti)
Ring	Bayonet ring, stainless steel
Mounting	<ul style="list-style-type: none"> ■ Without ■ Panel mounting flange, stainless steel ■ Panel mounting flange, polished stainless steel ■ Surface mounting lugs on the back, stainless steel
Case filling (model 233.30)	<ul style="list-style-type: none"> ■ Without ■ Glycerine ■ Glycerine-water mixture for NS 100 [4"] and 160 [6"] with scale range ≤ 0 ... 2.5 bar [≤ 0 ... 40 psi] or for NS 63 [2 ½"] with scale range ≤ 0 ... 4 bar [≤ 0 ... 60 psi] ■ Silicone oil
Movement	<ul style="list-style-type: none"> ■ Stainless steel ■ everlast® version

1) General information about NACE standards; see data sheet IN 00.21

2) Only for instruments with Ex approval

3) Not available for NS 160 [6"]

Measuring element	
Type of measuring element	Bourdon tube, C-type or helical type
Material	Stainless steel 1.4404 (316L)
Leak tightness	<ul style="list-style-type: none"> ■ Helium tested, leakage rate: < 5 · 10⁻³ mbar l/s ■ Helium tested, leakage rate: < 1 · 10⁻⁶ mbar l/s

Accuracy specifications		
Accuracy class		
NS 63 [2 ½"]	EN 837-1	Class 1.6
	ASME B40.100	±2 % of measuring span (grade A)
NS 100 [4"], 160 [6"]	EN 837-1	Class 1.0
	ASME B40.100	±1 % of measuring span (grade 1A)
Temperature error	On deviation from the reference conditions at the measuring system: ≤ ±0.4 % per 10 °C [≤ ±0.4 % per 18 °F] of full scale value	
Reference conditions		
Ambient temperature	+20 °C [68 °F]	

Scale ranges

bar	
0 ... 0.6 ¹⁾	0 ... 40
0 ... 1	0 ... 60
0 ... 1.6	0 ... 100
0 ... 2.5	0 ... 160
0 ... 4	0 ... 250
0 ... 6	0 ... 400
0 ... 10	0 ... 600
0 ... 16	0 ... 1,000
0 ... 25	0 ... 1,600 ¹⁾

kg/cm²	
0 ... 0.6 ¹⁾	0 ... 40
0 ... 1	0 ... 60
0 ... 1.6	0 ... 100
0 ... 2.5	0 ... 160
0 ... 4	0 ... 250
0 ... 6	0 ... 400
0 ... 10	0 ... 600
0 ... 16	0 ... 1,000
0 ... 25	0 ... 1,600 ¹⁾

kPa	
0 ... 60 ¹⁾	0 ... 4,000
0 ... 100	0 ... 6,000
0 ... 160	0 ... 10,000
0 ... 250	0 ... 16,000
0 ... 400	0 ... 25,000
0 ... 600	0 ... 40,000
0 ... 1,000	0 ... 60,000
0 ... 1,600	0 ... 100,000
0 ... 2,500	0 ... 160,000 ¹⁾

MPa	
0 ... 0.06 ¹⁾	0 ... 4
0 ... 0.1	0 ... 6
0 ... 0.16	0 ... 10
0 ... 0.25	0 ... 16
0 ... 0.4	0 ... 25
0 ... 0.6	0 ... 40
0 ... 1	0 ... 60
0 ... 1.6	0 ... 100
0 ... 2.5	0 ... 160 ¹⁾

psi	
0 ... 10 ¹⁾	0 ... 1,000
0 ... 15	0 ... 1,500
0 ... 30	0 ... 2,000
0 ... 60	0 ... 3,000
0 ... 100	0 ... 4,000
0 ... 160	0 ... 5,000
0 ... 200	0 ... 6,000
0 ... 300	0 ... 7,500
0 ... 400	0 ... 10,000
0 ... 600	0 ... 15,000
0 ... 800	0 ... 20,000 ¹⁾

1) Not available for NS 63 [2 ½"]

Vacuum and +/- scale ranges

bar	
-0.6 ... 0 ¹⁾	-1 ... +5
-1 ... 0	-1 ... +9
-1 ... +0.6	-1 ... +15
-1 ... +1.5	-1 ... +24
-1 ... +3	-

kPa	
-60 ... 0 ¹⁾	-100 ... +500
-100 ... 0	-100 ... +900
-100 ... +60	-100 ... +1,500
-100 ... +150	-100 ... +2,400
-100 ... +300	-

MPa	
-0.06 ... 0 ¹⁾	-0.1 ... +0.5
-0.1 ... 0	-0.1 ... +0.9
-0.1 ... +0.06	-0.1 ... +1.5
-0.1 ... +0.15	-0.1 ... +2.4
-0.1 ... +0.3	-

psi	
-30 inHg ... 0	-30 inHg ... +100
-30 inHg ... +15	-30 inHg ... +160
-30 inHg ... +30	-30 inHg ... +200
-30 inHg ... +60	-30 inHg ... +300

1) Not available for NS 63 [2 ½"]

Further details on: scale ranges	
Unit	<ul style="list-style-type: none"> ■ bar ■ psi ■ kg/cm² ■ kPa ■ MPa
Increased overload safety	<ul style="list-style-type: none"> ■ Without ■ 2-fold ■ 3-fold ■ 4-fold ■ 5-fold <p>The possibility of selection depends on scale range and nominal size</p>
Vacuum resistance	<ul style="list-style-type: none"> ■ Without ■ Vacuum-resistant to -1 bar
Dial	
Scale colour	Black
Material	Aluminium
Customer-specific version	<ul style="list-style-type: none"> ■ Without ■ With temperature scale for refrigerant, e.g. for NH3: R 717 <p>Other scales or customer-specific dials, e.g. with red mark, circular arcs or circular sectors, on request</p>
Pointer	
Instrument pointer	Aluminium, black
Mark pointer/drag pointer	<ul style="list-style-type: none"> ■ Without ■ Red mark pointer on dial, fixed ■ Red mark pointer on window, adjustable ■ Mark pointer on bayonet ring, adjustable ■ Red drag pointer on window, adjustable
Pointer stop pin	<ul style="list-style-type: none"> ■ Without ■ At zero point (only for NS 63 [2 ½"]) ■ At 6 o'clock (only for NS 100 [4"], 160 [6"])



→ Other scale ranges on request

Process connection	
Standard	<ul style="list-style-type: none"> ■ EN 837-1 ■ ISO 7 ■ ANSI/B1.20.1
Size	
EN 837-1	<ul style="list-style-type: none"> ■ G 1/8 B, male thread ■ G 1/4 B, male thread ■ G 1/2 B, male thread ■ M12 x 1.5, male thread ■ M20 x 1.5, male thread
ISO 7	<ul style="list-style-type: none"> ■ R 1/4, male thread ■ R 1/2, male thread
ANSI/B1.20.1	<ul style="list-style-type: none"> ■ 1/4 NPT, male thread ■ 1/2 NPT, male thread
Restrictor	<ul style="list-style-type: none"> ■ Without ■ Ø 0.6 mm [0.024"], stainless steel ■ Ø 0.3 mm [0.012"], stainless steel
Material (wetted)	
Process connection	Stainless steel 1.4404 (316L)
Bourdon tube	Stainless steel 1.4404 (316L)








→ Other process connections on request

Operating conditions		
Medium temperature		
Unfilled instruments	-40 ... +200 °C [-40 ... +392 °F]	
Instruments with glycerine filling	-20 ... +100 °C [-4 ... +212 °F]	
Instruments with silicone oil filling	-40 ... +100 °C [-40 ... +212 °F]	
Ambient temperature		
Unfilled instruments or with silicone oil filling	-40 ... +60 °C [-40 ... +140 °F]	
Instruments with glycerine filling	-20 ... +60 °C [-4 ... +140 °F]	
Pressure limitation		
NS 63 [2 ½"]	Steady	3/4 x full scale value
	Fluctuating	2/3 x full scale value
	Short time	Full scale value
NS 100 [4"], 160 [6"]	Steady	Full scale value
	Fluctuating	0.9 x full scale value
	Short time	1.3 x full scale value
Ingress protection per IEC/EN 60529	■ IP65 ■ IP66 ■ IP54 (for lower back mount)	

Approvals

Logo	Description	Country
	EU declaration of conformity Pressure equipment directive PS > 200 bar, module A, pressure accessory	European Union
	UKCA Pressure equipment (safety) regulations	United Kingdom
-	CRN Safety (e.g. electr. safety, overpressure, ...) For scale ranges ≤ 1,000 bar	Canada

Optional approvals

Logo	Description	Country
 	EU declaration of conformity ATEX directive Hazardous areas - Ex h Gas II 2G Ex h IIC T6 ... T1 Gb X Dust II 2D Ex h IIC T85°C ... T450°C Db X	European Union
	UKCA Equipment and protective systems intended for use in potentially explosive atmospheres regulations	United Kingdom
	EAC Hazardous areas	Eurasian Economic Community
	PAC Kazakhstan Metrology, measurement technology	Kazakhstan
-	MChS Permission for commissioning	Kazakhstan
-	PAC Ukraine Metrology, measurement technology	Ukraine
	PAC Uzbekistan Metrology, measurement technology	Uzbekistan
-	CPA Metrology, measurement technology	China
	DNV GL Ships, shipbuilding (e.g. offshore)	International
-	KBA¹⁾ Automotive Hydrogen-powered motor vehicles - (EC) no. 79/2009 and (EU) no. 406/2010 Components for motor vehicles using natural gas (CNG/LNG) – UN no. R 110	International

1) Not available for all versions

Manufacturer's declaration

Logo	Description
-	Pressure equipment directive (PED) for maximum allowable pressure PS ≤ 200 bar
-	Suitability of wetted materials for drinking water in accordance with the European 4MS initiative
-	Suitability of wetted materials for hydrogen
-	Emission protection in accordance with TA-Luft (VDI 2440) ¹⁾

1) only for EMICOgauge, see page 10

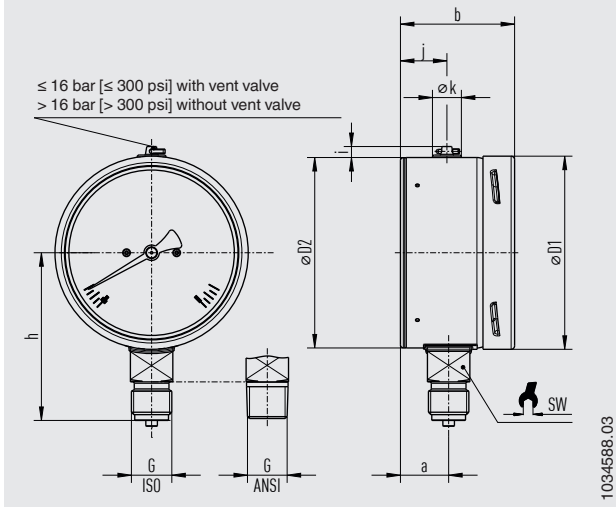
Certificates (option)

Certificates	
Certificates	<ul style="list-style-type: none">■ 2.2 test report per EN 10204 (e.g. state-of-the-art manufacturing, indication accuracy)■ 3.1 inspection certificate per EN 10204 (e.g. material proof for wetted metal parts, indication accuracy)■ PCA calibration certificate, traceable and accredited in accordance with ISO/IEC 17025■ Calibration certificate by a national accreditation body, traceable and accredited in accordance with ISO/IEC 17025 on request
Recommended calibration interval	1 year (dependent on conditions of use)

→ For approvals and certificates, see website

Dimensions in mm [in]

Lower mount (radial)



NS	Weight	
	Model 232.30	Model 233.30
63 [2 ½"]	approx. 0.20 kg [0.44 lb]	approx. 0.26 kg [0.57 lb]
100 [4"]	approx. 0.65 kg [1.43 lb]	approx. 1.08 kg [2.38 lb]
160 [6"]	approx. 1.30 kg [2.87 lb]	approx. 2.34 kg [4.94 lb]

Process connection with thread per EN 837-1

NS	G	Dimensions in mm [in]								
		h ±1 [0.04]	a	b	D1	D2	i	y	k	SW
63 [2 ½"]	G ¼ B	54 [2.13]	17.5 [0.69]	42 [1.65]	63 [2.48]	62 [2.44]	6 [0.24]	18 [0.71]	15 [0.59]	14 [0.55]
	G ⅝ B	51 [2.01]								
	M12 x 1.5	54 [2.13]								
100 [4"]	G ¼ B	87 [3.43]	25 [0.98]	59.5 [2.34]	100 [3.94]	100 [3.94]	6 [0.24]	24 [0.94]	15 [0.59]	22 [0.87]
	G ½ B	87 [3.43]								
	M12 x 1.5	80 [3.15]								
	M20 x 1.5	87 [3.43]								
160 [6"]	G ¼ B	111 [4.37]	27 [1.06] ¹⁾	65 [2.56] ²⁾	159 [6.26]	159 [6.26]	6 [0.24]	18.5 [0.73]	15 [0.59]	22 [0.87]
	G ½ B	118 [4.65]								
	M12 x 1.5	111 [4.37]								
	M20 x 1.5	118 [4.65]								

Process connection with thread per ISO 7

NS	G	Dimensions in mm [in]								
		h ±1 [0.04]	a	b	D1	D2	i	y	k	SW
63 [2 ½"]	R ¼	54 [2.13]	17.5 [0.69]	42 [1.65]	63 [2.48]	62 [2.44]	6 [0.24]	18 [0.71]	15 [0.59]	14 [0.55]
100 [4"]	R ¼	80 [3.15]	25 [0.98]	59.5 [2.34]	100 [3.94]	100 [3.94]	6 [0.24]	24 [0.94]	15 [0.59]	22 [0.87]
	R ½	86 [3.39]								
160 [6"]	R ¼	111 [4.37]	27 [1.06] ¹⁾	65 [2.56] ²⁾	159 [6.26]	159 [6.26]	6 [0.24]	18.5 [0.73]	15 [0.59]	22 [0.87]
	R ½	117 [4.61]								

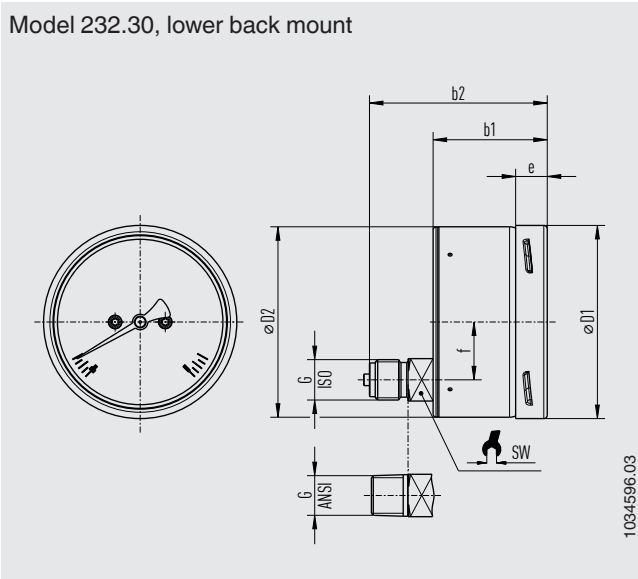
Process connection with thread per ANSI/B1.20.1

NS	G	Dimensions in mm [in]								
		h ±1 [0.04]	a	b	D1	D2	i	y	k	SW
63 [2 ½"]	¼ NPT	54 [2.13]	17.5 [0.69]	42 [1.65]	63 [2.48]	62 [2.44]	6 [0.24]	18 [0.71]	15 [0.59]	14 [0.55]
	⅝ NPT	51 [2.01]								
100 [4"]	¼ NPT	80 [3.15]	25 [0.98]	59.5 [2.34]	100 [3.94]	100 [3.94]	6 [0.24]	24 [0.94]	15 [0.59]	22 [0.87]
	½ NPT	86 [3.39]								
160 [6"]	¼ NPT	111 [4.37]	27 [1.06] ¹⁾	65 [2.56] ²⁾	159 [6.26]	159 [6.26]	6 [0.24]	18.5 [0.73]	15 [0.59]	22 [0.87]
	½ NPT	117 [4.61]								

1) With scale range ≥ 0 ... 100 bar [1,500 psi] a = 41.5 [1.63]

2) With scale range ≥ 0 ... 100 bar [1,500 psi] b = 79 [3.11]

Model 232.30, lower back mount



NS	Weight
63 [2 ½"]	approx. 0.20 kg [0.44 lbs]
100 [4"]	approx. 0.65 kg [1.43 lbs]

Process connection with thread per EN 837-1

NS	G	Dimensions in mm [in]						
		b1	b2	D1	D2	e	f	SW
63 [2 ½"]	G ¼ B	42 [1.65]	61 [2.4]	63 [2.48]	62 [2.44]	14.5 [0.57]	18.5 [0.73]	14 [0.55]
	G ⅝ B							
	M12 x 1.5							
100 [4"]	G ¼ B	59.5 [2.34]	93 [3.66]	101 [3.98]	100 [3.94]	17 [0.67]	30 [1.18]	22 [0.87]
	G ½ B							
	M12 x 1.5							
	M20 x 1.5							

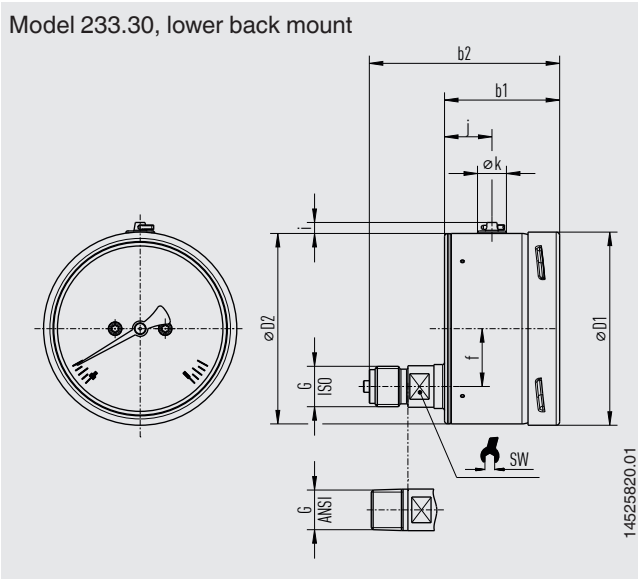
Process connection with thread per ISO 7

NS	G	Dimensions in mm [in]						
		b1	b2	D1	D2	e	f	SW
63 [2 ½"]	R ¼	42 [1.65]	61 [2.4]	63 [2.48]	62 [2.44]	14.5 [0.57]	18.5 [0.73]	14 [0.55]
100 [4"]	R ¼	59.5 [2.34]	93 [3.66]	101 [3.98]	100 [3.94]	17 [0.67]	30 [1.18]	22 [0.87]
	R ½							

Process connection with thread per ANSI/B1.20.1

NS	G	Dimensions in mm [in]						
		b1	b2	D1	D2	e	f	SW
63 [2 ½"]	¼ NPT	42 [1.65]	61 [2.4]	63 [2.48]	62 [2.44]	14.5 [0.57]	18.5 [0.73]	14 [0.55]
	⅝ NPT							
100 [4"]	¼ NPT	59.5 [2.34]	93 [3.66]	101 [3.98]	100 [3.94]	17 [0.67]	30 [1.18]	22 [0.87]
	½ NPT							

Model 233.30, lower back mount



NS	Weight
63 [2 ½"]	approx. 0.28 kg [0.62 lbs]
100 [4"]	approx. 1.08 kg [2.38 lbs]

Process connection with thread per EN 837-1

NS	G	Dimensions in mm [in]								
		b1	b2	D1	D2	f	i	y	k	SW
63 [2 ½"]	G ¼ B	42 [1.65]	68 [2.68]	63 [2.48]	62 [2.44]	18.5 [0.73]	6 [0.24]	18 [0.71]	15 [0.59]	14 [0.55]
	G ⅝ B									
	M12 x 1.5									
100 [4"]	G ¼ B	59.5 [2.34]	100 [3.94]	101 [3.98]	100 [3.94]	30 [1.18]	6 [0.24]	24 [0.94]	15 [0.59]	22 [0.87]
	G ½ B									
	M12 x 1.5									
	M20 x 1.5									

Process connection with thread per ISO 7

NS	G	Dimensions in mm [in]								
		b1	b2	D1	D2	f	i	y	k	SW
63 [2 ½"]	R ¼	42 [1.65]	68 [2.68]	63 [2.48]	62 [2.44]	18.5 [0.73]	6 [0.24]	18 [0.71]	15 [0.59]	14 [0.55]
100 [4"]	R ¼	59.5 [2.34]	100 [3.94]	101 [3.98]	100 [3.94]	30 [1.18]	6 [0.24]	24 [0.94]	15 [0.59]	22 [0.87]
	R ½									

Process connection with thread per ANSI/B1.20.1

NS	G	Dimensions in mm [in]								
		b1	b2	D1	D2	f	i	y	k	SW
63 [2 ½"]	¼ NPT	42 [1.65]	68 [2.68]	63 [2.48]	62 [2.44]	18.5 [0.73]	6 [0.24]	18 [0.71]	15 [0.59]	14 [0.55]
	⅝ NPT									
100 [4"]	¼ NPT	59.5 [2.34]	100 [3.94]	101 [3.98]	100 [3.94]	30 [1.18]	6 [0.24]	24 [0.94]	15 [0.59]	22 [0.87]
	½ NPT									

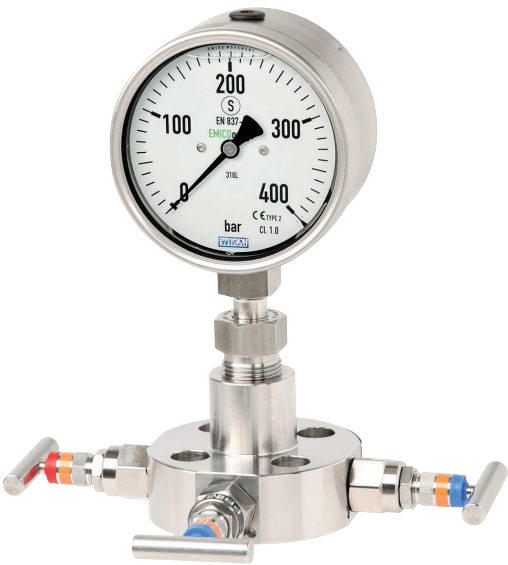
EMICOGauge

Instrument hook-up with instrumentation valves

The EMICOGauge instrument hook-up, consisting of pressure gauge and instrumentation valve, minimises the number of leakage points and thus reduces the risk of media escaping into the environment. In order to guarantee the system's leak tightness, an additional leak test is carried out in advance, for each individual component.

During mounting, the 360° swivel adapter connection of the EMICOGauge enables quick alignment of the pressure gauge with simultaneous pressure sealing. With this design, maintenance and dismounting of the pressure gauge and valve are also easy. WIKA can guarantee the leak tightness of the assembly for up to 20 mounting and dismounting operations.

The possible combinations of pressure gauges and the attachable valve models IV1x, IV2x and IVM are very large. Since special pressure connections are often required for specific applications, a large number of variants have been defined for the EMICOGauge in order to avoid adapters, which would otherwise be needed, with their 2 additional sealing points.



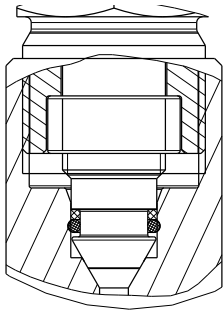
EMICOGauge consisting of model 232.30, NS 100 [4"] and mounted instrumentation valve

Advantages

- Significantly reduced risk of fugitive emissions, since the version for "fugitive emissions" complies with TA-Luft (VDI 2440)
- Fully tested and ready-to-install solution of an instrument-valve assembly
- Reduction of leakage paths in pressurised systems
- 360° swivel connection (swivel adapter) enables easy replacement and positioning of pressure gauges
- For various applications in chemical and petrochemical plants such as gas processing and production

Special pressure sealing

The redundant sealing from metal/metal seat and an additional O-ring sealing with support ring ensures the required leak tightness of the measuring assembly in addition to a long service life.



Specifications

Basic information for pressure gauges	
Nominal size (NS)	Ø 100 mm [4"]
Scale range	Between 0 ... 0.6 bar and 0 ... 420 bar
	As well as corresponding measuring spans for other units and +/- scale ranges
Connection location	Lower mount (radial)

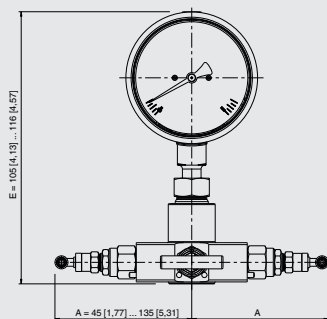
Assembly	
Mounting type	EMICOGauge connection: 360° swivel connection (swivel adapter) with special pressure sealing Spare part: 5 x sealing set consisting of O-ring and support ring; article no. 14525042
Instrumentation valve	<ul style="list-style-type: none">■ For instrument version of IVM → See data sheet AC 09.17■ Model IV10, IV11 or IV20 → See data sheets AC 09.22 and AC 09.19

Process connection	
Standard	
Model IVM	<ul style="list-style-type: none"> ■ In line with ASME B16.5, RF or RJ ■ In line with EN 1092-1, form B1 or B2
Model IV10, IV11 or IV20	<ul style="list-style-type: none"> ■ ANSI/B1.20.1 ■ EN 837-1
Size	
In line with ASME B16.5, RF or RJ	Flange ½" ... 2" / class 150 ... class 2500
In line with EN 1092-1, form B1 or B2	Flange DN 15 ... DN 25 / PN 16 ... PN 100
ANSI/B1.20.1	½ NPT, male thread or ½ NPT, female thread
EN 837-1	G ½ B male
Material (wetted)	
Process connection	Stainless steel 1.4404 (316L)
Sealing	O-ring: FKM; backup sealing ring: PEEK

Operating conditions	
Medium temperature	
With unfilled pressure gauge	-20 ... +150 °C [-4 ... +302 °F]
With filled pressure gauge	-20 ... +100 °C [-4 ... +212 °F]
Ambient temperature	-20 ... +60 °C [-4 ... +140 °F]
Leak tightness of the overall system	Fulfills the fugitive emission requirements per TA Luft (VDI 2440), helium tested, leakage rate: $< 1 \cdot 10^{-4}$ mbar l/s

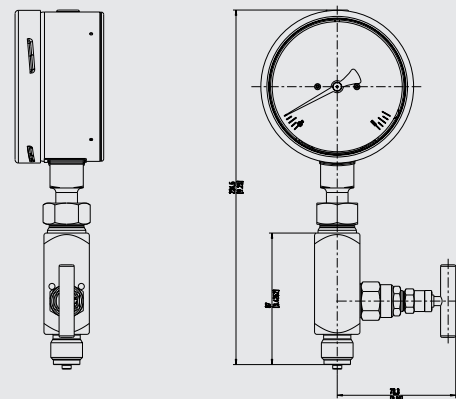
Examples of EMICOGauge, model 232.30, NS 100 [4"] and mounted instrumentation valve

With valve model IVM



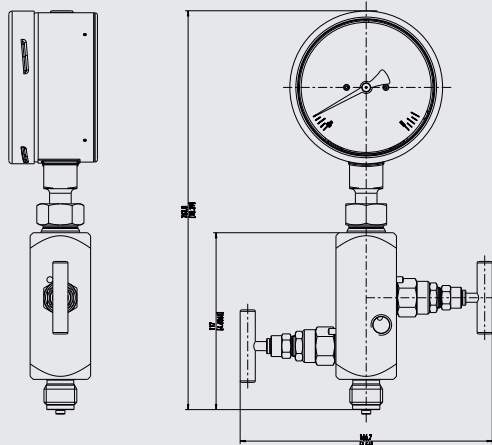
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With valve model IV10



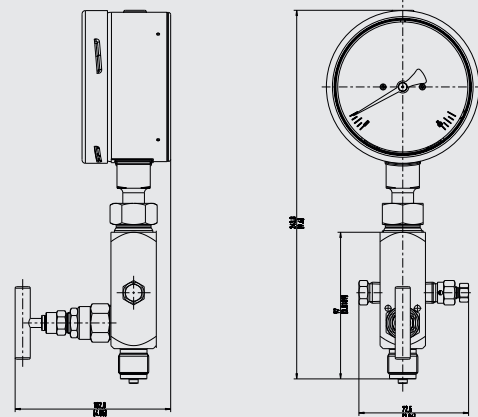
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With valve model IV20







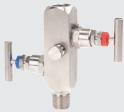



14521735.01

With valve model IV11



14522516.01

Accessories and spare parts for models 232.30 and 233.30

Model	Description	
	910.17	Seals → See data sheet AC 09.08
	910.15	Syphons → See data sheet AC 09.06
	910.13	Overpressure protector → See data sheet AC 09.04
	IV10, IV11	Needle valve and multiport valve → See data sheet AC 09.22
	IV20, IV21	Block-and-bleed valve → See data sheet AC 09.19
	IVM	Monoflange, process and instrument version → See data sheet AC 09.17
	BV	Ball valve, process and instrument version → See data sheet AC 09.28
	IBF2, IBF3	Monoblock with flange connection → See data sheet AC 09.25

Ordering information

Model / Nominal size / Scale range / Process connection / Connection location / Options

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In case of a different interpretation of the translated and the English data sheet, the English wording shall prevail.



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Process resistance thermometer

For additional thermowell or basic module

Models TR12-B, TR12-M

WIKA data sheet TE 60.17



for further approvals
see page 2

Applications

- Chemical industry
- Petrochemical industry
- Offshore
- Plant and vessel construction

Special features

- Sensor ranges from -196 ... +600 °C [-320 ... +1,112 °F]
- For many variants of temperature transmitters including field transmitter
- For mounting in all standard thermowell designs
- Spring-loaded measuring insert (replaceable)
- Explosion-protected versions (option)

Description

Resistance thermometers in this series can be combined with a large number of thermowell designs. The replaceable, centrally spring-loaded measuring insert and its extended spring travel enable combination with the widest range of connection head designs.

A wide variety of possible combinations of sensor, connection head, insertion length, neck length, connection to thermowell etc. are available for the thermometers; suitable for any thermowell dimension and any application.

Operation without thermowell is only recommended in certain applications.



Fig. left: Process resistance thermometer model TR12-B
Fig. right: Basic module model TR12-M

Explosion protection (option)






The TR12-M is a basic module, which may only be operated as an extension to the complete instrument TR12-B in hazardous areas.









The permissible power, P_{\max} , as well as the permissible ambient temperature, for the respective category can be seen on the certificate for hazardous areas or in the operating instructions.


Transmitters have own certificates for hazardous areas.

The permissible ambient temperature ranges of the built-in transmitters can be taken from the corresponding transmitter operating instructions and approvals.

Approvals (explosion protection, further approvals)

Logo	Description	Country
 	EU declaration of conformity <ul style="list-style-type: none"> ■ EMC directive ¹⁾ EN 61326 emission (group 1, class B) and interference immunity (industrial application) ■ RoHS directive ■ ATEX directive (option) Hazardous areas <ul style="list-style-type: none"> - Ex i Zone 0 gas II 1G Ex ia IIC T1 ... T6 Ga Zone 1 mounting to zone 0 gas II 1/2G Ex ia IIC T1 ... T6 Ga/Gb Zone 1 gas II 2G Ex ia IIC T1 ... T6 Gb - Ex d Zone 1 mounting to zone 0 gas II 1/2G Ex db IIC T1 ... T6 Ga/Gb Zone 1 gas II 2G Ex db IIC T1 ... T6 Gb 	European Union
	IECEx - in conjunction with ATEX (option) Hazardous areas <ul style="list-style-type: none"> - Ex i Zone 0 gas Ex ia IIC T1 ... T6 Ga Zone 1 mounting to zone 0 gas Ex ia IIC T1 ... T6 Ga/Gb Zone 1 gas Ex ia IIC T1 ... T6 Gb - Ex d Zone 1 mounting to zone 0 gas Ex db IIC T1 ... T6 Ga/Gb Zone 1 gas Ex db IIC T1 ... T6 Gb 	International
	FM (option) Hazardous areas <ul style="list-style-type: none"> - Ex d (XP) Division 1 gas Class I, division 1, group B, C, D, T6 type 4/4X Division 1 dust Class II or III, division 1, group E, F, G type 4/4X - Ex n (NI) Division 2 gas Class I, division 2, group B, C, D, T6 type 4/4X 	USA
	CSA (option) <ul style="list-style-type: none"> ■ Safety (e.g. electr. safety, overpressure, ...) ■ Hazardous areas <ul style="list-style-type: none"> - Ex d (XP) Division 1 gas Class I, division 1, group B, C, D, T6 type 4/4X Division 1 dust Class II or III, division 1, group E, F, G type 4/4X - Ex d (FP - CAN) Zone 1 gas Ex d IIC Gb T6/T5/T4 Zone 1 gas Ex d IIB + H2 Gb T6/T5/T4 - Ex d (FP - USA) Zone 1 gas Class I zone 1, AEx d IIC Gb T6/T5/T4 Zone 1 gas Class I zone 1, AEx d IIB + H2 Gb T6/T5/T4 - Ex n (NI) Division 2 gas Class I, division 2, group B, C, D type 4/4X 	USA and Canada

Logo	Description	Country
	EAC (option) Hazardous areas - Ex i Zone 0 gas 0Ex ia IIC T6 ... T1 Ga X Zone 1 gas 1Ex ia IIC T6 ... T1 Ga X Zone 20 dust ²⁾ Ex ia IIIC T80...T440 °C Da X Zone 21 dust ²⁾ Ex ia IIIC T80...T440 °C Db X - Ex n Zone 2 gas Ex nA IIC T6...T1 Gc X - Ex t Zone 1 gas Ex tb IIIC Db U Zone 1 dust ²⁾ Ex tb IIIC T85°C Db X - Ex d Zone 1 gas 1 Ex d IIC Gb U Zone 1 gas ²⁾ 1Ex d IIC T6...T4 Gb X Zone 21 dust Ex tb IIIC Db U	Eurasian Economic Community
	Ex Ukraine (option) Hazardous areas - Ex i Zone 0 gas ²⁾ II 1G Ex ia IIC T1 ...T6 Ga Zone 1 mounting to zone 0 gas ²⁾ II 1/2G Ex ia IIC T1 ...T6 Ga/Gb Zone 1 gas ²⁾ II 2G Ex ia IIC T1 ...T6 Gb Zone 20 dust ²⁾ II 1D Ex ia IIIC T125 ... T65 °C Da Zone 21 mounting to zone 20 dust ²⁾ II 1/2D Ex ia IIIC T125 ... T65 °C Da/Db Zone 21 dust ²⁾ II 2D Ex ia IIIC T125 ... T65 °C Db - Ex d Zone 1 gas II 2 G Ex db IIC T6...T4 Gb Zone 1 mounting to zone 0 gas II 1/2 G Ex db IIC T6...T4 Ga/Gb Zone 1 gas II 2D Ex tb IIIC T85°C Db	Ukraine
	INMETRO (option) Hazardous areas - Ex i Zone 0 gas Ex ia IIC T3 ... T6 Ga Zone 1 mounting to zone 0 gas Ex ia IIC T3 ... T6 Ga/Gb Zone 20 dust ²⁾ Ex ia IIIC T125 ... T65 °C Da Zone 21 mounting to zone 20 dust ²⁾ Ex ia IIIC T125 ... T65 °C Da/Db - Ex d Zone 1 mounting to zone 0 gas Ex db IIC T1 ... T6 Ga/Gb	Brazil
	CCC (option) Hazardous areas - Ex i Zone 0 gas Ex ia IIC T1 ~ T6 Ga Zone 1 mounting to zone 0 gas Ex ia IIC T1 ~ T6 Ga/Gb Zone 1 gas Ex ia IIC T1 ~ T6 Gb Zone 2 gas Ex ic IIC T1~T6 Gc Zone 20 dust Ex iaD 20 T65/T95/T125 Zone 21 dust Ex iaD 21 T65/T95/T125 Zone 21 mounting to zone 20 dust Ex iaD 20/21 T65/T95/T125 - Ex d Zone 1 gas Ex d IIC T1~T6 Gb Zone 1 mounting to zone 0 Ex d IIC T1~T6 Ga/Gb	China
	KCs - KOSHA (option) Hazardous areas - Ex i Zone 0 gas Ex ia IIC T4 ... T6 Zone 1 gas Ex ib IIC T4 ... T6	South Korea
-	PESO (option) Hazardous areas - Ex i Zone 0 gas Ex ia IIC T1 ... T6 Ga Zone 1 mounting to zone 0 gas Ex ia IIC T1...T6 Ga/Gb Zone 1 gas Ex ia IIC T1...T6 Gb - Ex d Zone 1 mounting to zone 0 gas Ex db IIC T1...T6 Ga/Gb Zone 1 gas Ex db IIC T1...T6 Gb	India
	GOST (option) Metrology, measurement technology	Russia
	KazInMetr (option) Metrology, measurement technology	Kazakhstan
-	MTSCHS (option) Permission for commissioning	Kazakhstan
	BelGIM (option) Metrology, measurement technology	Belarus

Logo	Description	Country
	UkrSEPRO (option) Metrology, measurement technology	Ukraine
	Uzstandard (option) Metrology, measurement technology	Uzbekistan

1) Only for built-in transmitter
2) Only for model TR12-B

Instruments marked with “ia” may also be used in areas only requiring instruments marked with “ib” or “ic”.
If an instrument with “ia” marking has been used in an area with requirements in accordance with “ib” or “ic”, it can no longer be operated in areas with requirements in accordance with “ia” afterwards.

Manufacturer's information and certificates

Logo	Description
	SIL 2 Functional safety

Approvals and certificates, see website

Specifications

Output signal Pt100			
Temperature range	Measuring range -200 ... +600 °C		
Measuring element (measuring current: 0.1 ... 1.0 mA)	Pt100 measuring resistor		
Connection method	1 x 2-wire 1 x 3-wire 1 x 4-wire 2 x 2-wire 2 x 3-wire 2 x 4-wire		
Tolerance value of the measuring element ¹⁾ per EN 60751		Wire-wound	Thin film
	Class B	-196 ... +600 °C	-50 ... +500 °C
	Class A	-100 ... +450 °C	-30 ... +300 °C
	Class AA	-50 ... +250 °C	0 ... 150 °C

Output signal 4 ... 20 mA, HART® protocol			
Transmitter (selectable versions)	Model T15	Model T32	Models TIF50, TIF52
Data sheet	TE 15.01	TE 32.04	TE 62.01
Output			
4 ... 20 mA	x	x	x
HART® protocol	-	x	x
Connection method			
1 x 2-wire, 3-wire or 4-wire	x	x	x
Measuring current	< 0.2 mA	< 0.3 mA	< 0.3 mA
Explosion protection	Optional	Optional	Standard

Measuring insert (replaceable)	
Material	Stainless steel 1.4571, 316L
Diameter	<ul style="list-style-type: none"> ■ 3 mm ²⁾ ■ 6 mm ■ 8 mm (with sleeve) ■ 1/8 in [3.17 mm] ²⁾ ■ 1/4 in [6.35 mm] ■ 3/8 in [9.53 mm]
Spring travel	approx. 20 mm
Response time (in water, per EN 60751)	t ₅₀ < 10 s t ₉₀ < 20 s (measuring insert diameter 6 mm: The thermowell required for operation increases the response time dependent upon the actual parameters for the thermowell and the process.)

Neck tube		
Material	Stainless steel 1.4571, 316, 316L	
Connection thread to the thermowell	■ G 1/2 B	■ M14 x 1.5
	■ G 3/4 B	■ M18 x 1.5
	■ 1/2 NPT	■ M20 x 1.5
	■ 3/4 NPT	■ M27 x 2
Connection thread to the head	■ M20 x 1.5 with counter nut	
	■ 1/2 NPT	
Neck length	■ min. 150 mm, standard neck length	
	■ 200 mm	
	■ 250 mm	
	other neck lengths on request	

Use resistance thermometers with shielded cable, and, if the lines are longer than 30 m or leave the building, ground the shield on at least one end of the lead. For a correct determination of the overall measuring deviation, both sensor and transmitter measuring deviations have to be considered.

1) For detailed specifications for Pt100 sensors, see Technical information IN 00.17 at www.wika.com.

2) Not for 2 x 4-wire connection method

Ambient conditions	
Ambient and storage temperature	-60 ³⁾ / -40 ... +80 °C
Ingress protection	IP66 per IEC/EN 60529 The specified ingress protection only applies for TR12-B with corresponding thermowell, connection head, cable gland and appropriate cable dimensions.
Vibration resistance	6 g peak-to-peak, wire-wound measuring resistor or thin film (standard) 20 g peak-to-peak, thin-film measuring resistor (option) 50 g peak-to-peak, thin-film measuring resistor (option) ⁴⁾

3) Special version on request (only available with selected approvals), other ambient and storage temperature on request

4) For measuring insert diameter < 8 mm

Measuring insert

The replaceable measuring insert is made of a vibration-resistant, sheathed measuring cable (MI cable). The measuring insert diameter should be approx. 1 mm smaller than the bore diameter of the thermowell. Gaps of more than 0.5 mm between thermowell and the measuring insert will have a negative effect on the heat transfer, and they will result in unfavourable response behaviour of the thermometer.

When fitting the measuring insert into a thermowell, it is very important to determine the correct insertion length (= thermowell length for bottom thicknesses of ≤ 5.5 mm). In order to ensure that the measuring insert is firmly pressed down onto the bottom of the thermowell, the insert must be spring-loaded (spring travel: 0 ... 20 mm).

Calculation of the measuring insert length in the event of replacement

Thread to connection head	Measuring insert length l_5
1/2 NPT	NL + 12 mm
M20 x 1.5	NL + 18 mm

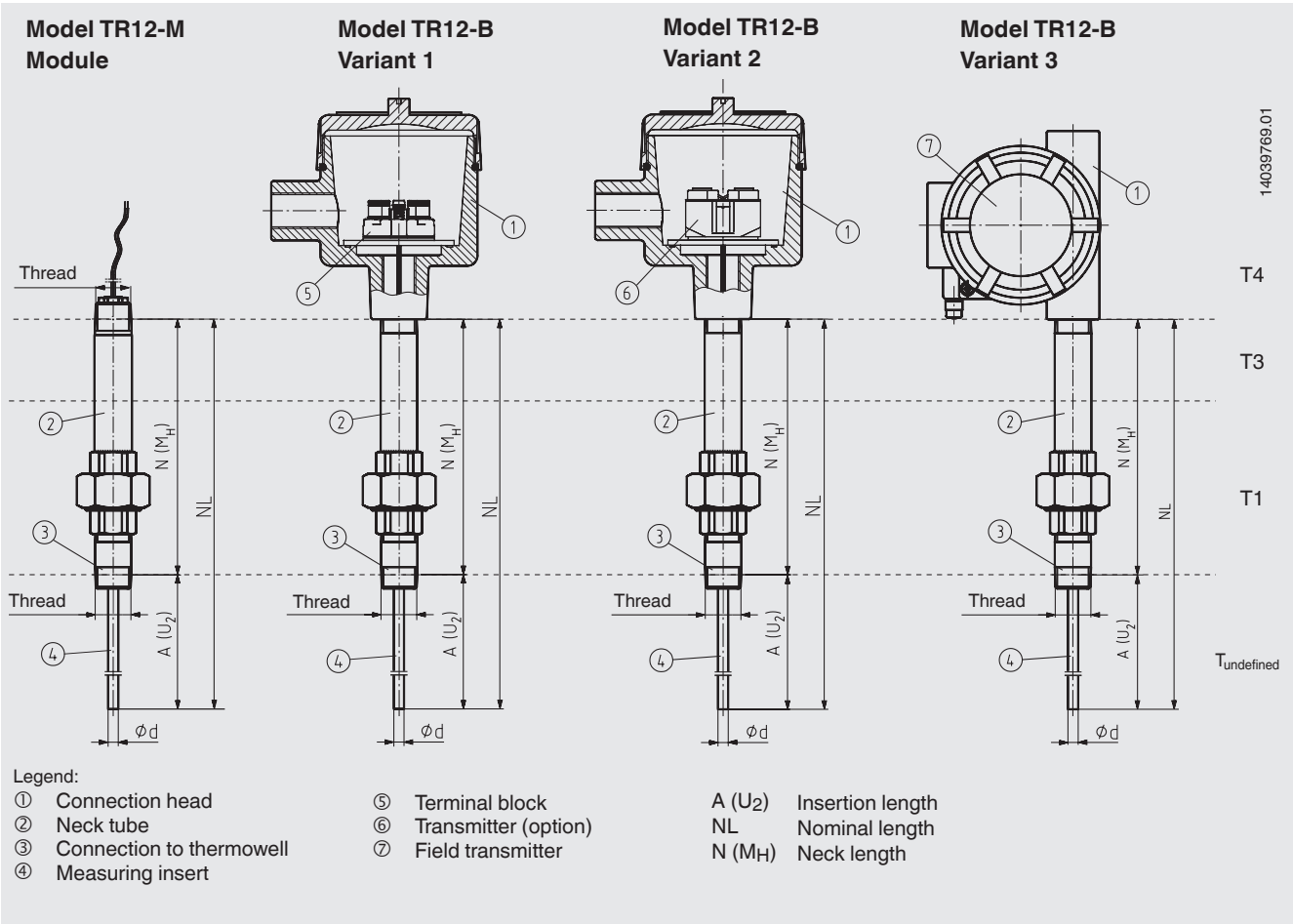
NL = Nominal length of the TR12-B or TR12-M

Neck tube

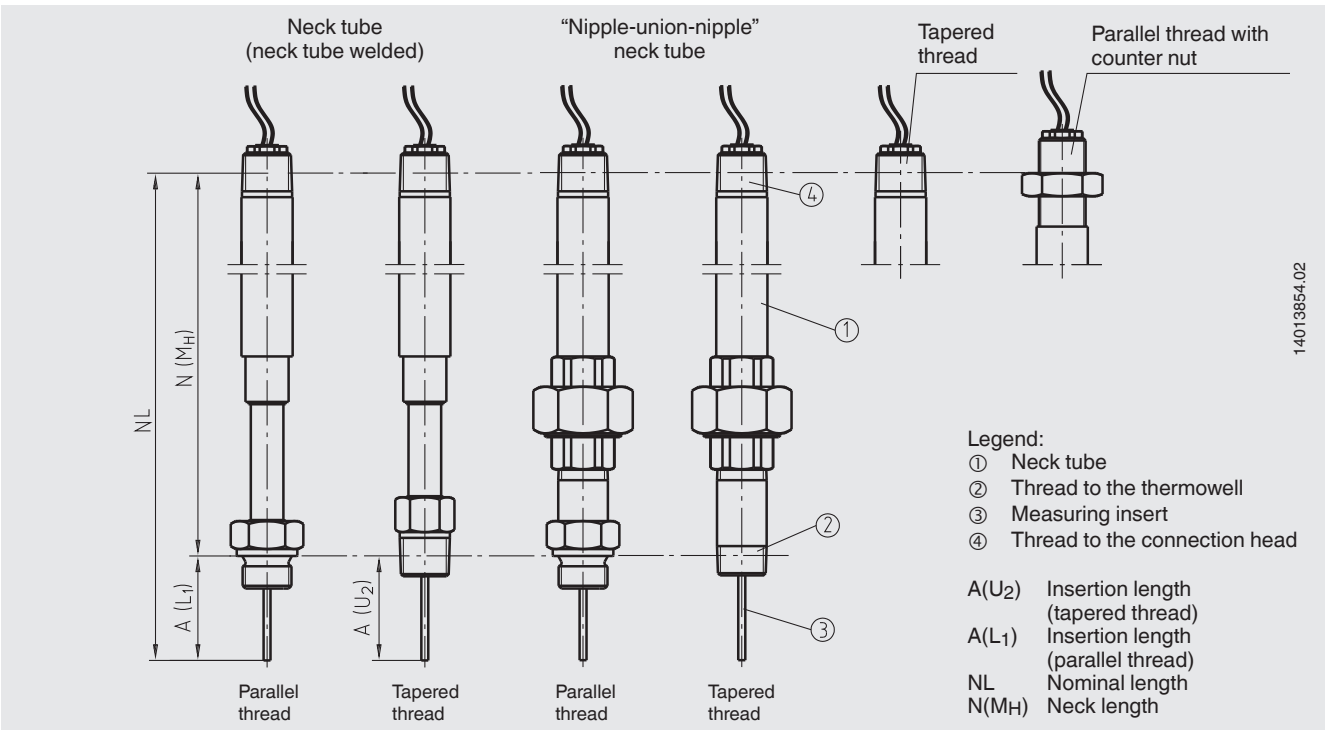
The neck tube is screwed into the connection head or the case. The neck length depends on the intended use. Usually an isolation is bridged by the neck tube. Also, in many cases, the neck tube serves as a cooling extension between the connection head and the medium, in order to protect any possible built-in transmitter from high medium temperatures.

In the Ex d version the flameproof joint is integrated in the neck tube.








Components model TR12



Neck tube versions


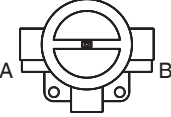
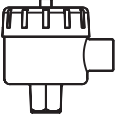



Thermowell selection

						
Data sheets: TW 95.10 TW 95.11 TW 95.12	Data sheet: TW 95.15	Data sheet: TW 95.20	Data sheet: TW 95.25	Data sheet: TW 95.31	Data sheet: TW 95.50	Data sheet: TW 95.55

Special thermowells on request

Connection head

			
1/4000	5/6000	7/8000	other connection housings

Model	Material	Cable outlet	Ingress protection	Explosion protection	Cap	Surface
1/4000 F	Aluminium	½ NPT, ¾ NPT, M20 x 1.5	IP66 ¹⁾	Without, Ex i, Ex d	Screw-on lid	Blue, lacquered ²⁾
1/4000 S	Stainless steel	½ NPT, ¾ NPT, M20 x 1.5	IP66 ¹⁾	Without, Ex i, Ex d	Screw-on lid	Blank
5/6000	Aluminium	2 x ½ NPT, 2 x ¾ NPT, 2 x M20 x 1.5	IP66 ¹⁾	Without, Ex i, Ex d	Screw-on lid	Blue, lacquered ²⁾
7/8000 W	Aluminium	½ NPT, ¾ NPT, M20 x 1.5	IP66 ¹⁾	Without, Ex i, Ex d	Screw-on lid	Blue, lacquered ²⁾
7/8000 S	Stainless steel	½ NPT, ¾ NPT, M20 x 1.5	IP66 ¹⁾	Without, Ex i, Ex d	Screw-on lid	Blank

1) The specified ingress protection only applies for TR12-B with corresponding cable gland, appropriate cable dimensions and mounted thermowell.
2) RAL 5022

Field temperature transmitter with digital display (option)

Field temperature transmitters models TIF50, TIF52
As an alternative to the standard connection head the thermometer can be fitted with an optional model TIF50 or TIF52 field temperature transmitter.
The field temperature transmitter comprises a 4 ... 20 mA/ HART® protocol output and is equipped with an LCD indication module.

Model TIF50: HART® slave
Model TIF52: HART® master



Field temperature transmitters models TIF50, TIF52

Transmitter (option)

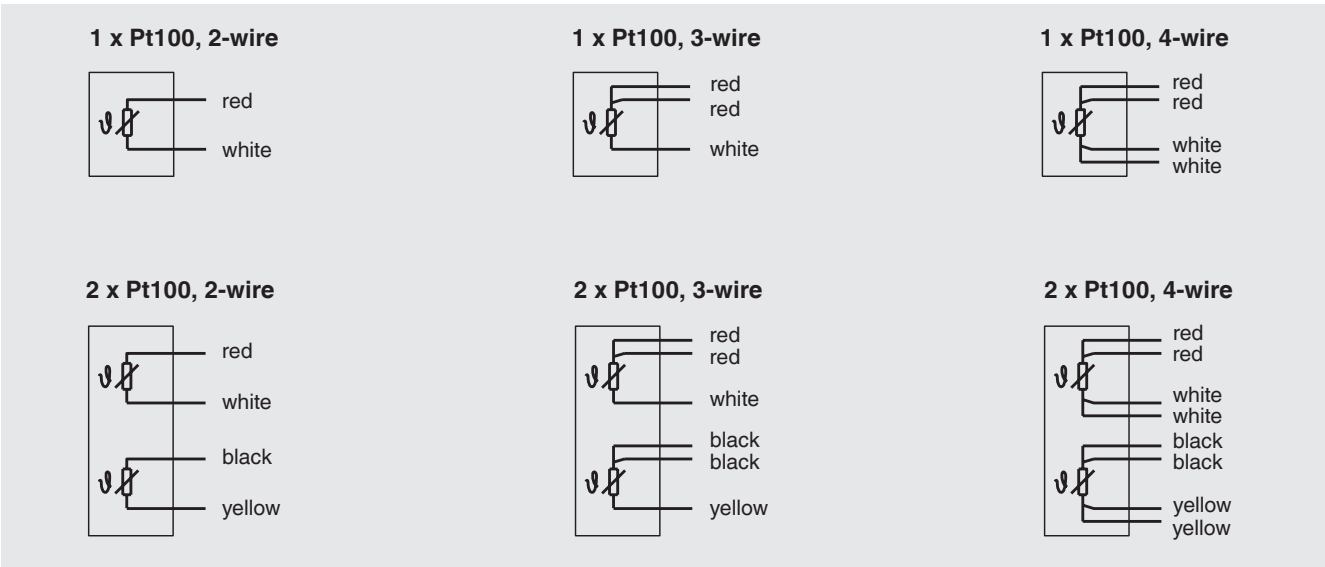
As an option, WIKA transmitters can be installed in the TR12-B connection head.

Model	Description	Explosion protection	Data sheet
T15	Digital transmitter, PC configurable	Optional	TE 15.01
T32	Digital transmitter, HART® protocol	Optional	TE 32.04
TIF50	Digital field temperature transmitter, HART® protocol (slave)	Optional	TE 62.01
TIF52	Digital field temperature transmitter, HART® protocol (master)	Optional	TE 62.01

Other transmitters on request

Electrical connection

(Colour code per IEC 60751)



For the electrical connections of built-in temperature transmitters see the corresponding data sheets or operating instructions.

Functional safety (option)

In safety-critical applications, the entire measuring chain must be taken into consideration in terms of the safety parameters. The SIL classification allows the assessment of the risk reduction reached by the safety installations.

Selected TR12 process resistance thermometers in combination with an appropriate temperature transmitter (e.g. model T32.1S) are suitable as sensors for safety functions up to SIL 2.

Matched thermowells allow easy dismounting of the measuring insert for calibration. The optimally matched measuring point consists of a thermowell, a TR12 thermometer and a T32.1S transmitter developed in accordance with IEC 61508. Thus, the measuring point provides maximum reliability and a long service life.

Certificates (option)

Certification type	Measurement accuracy	Material certificate
2.2 test report	x	x
3.1 inspection certificate	x	x
DKD/DAkkS calibration certificate	x	-

The different certifications can be combined with each other.

For calibration, the measuring insert is removed from the thermometer. The minimum length (metal part of the probe) for carrying out a measurement accuracy test 3.1 or DKD/DAkkS is 100 mm.

Calibration of shorter minimum lengths on request.

Ordering information

Model / Explosion protection / Ignition protection type / Sensor / Sensor specifications / Thermometer range of use / Connection housing / Thread size at cable outlet / Transmitter / Neck tube version / Connection to case, connection head / Connection to thermowell / Neck tube length N(MH) / Insertion length A / Measuring insert / Options

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We reserve the right to make modifications to the specifications and materials.



Digital temperature transmitter With HART® protocol, head and rail-mounted version Model T38

WIKA data sheet TE 38.01


Approvals, see
page 13


Configurator


Standard
articles


Applications

- Process industry
- Machine building and plant construction

Special features

- TÜV certified SIL version per IEC 61508 (option)
- Operation in safety applications to SIL 2/SIL 3
- Configurable with almost all configuration tools
- Universal for the connection of 1 or 2 sensors: Resistance thermometer (up to 2 x 3-wire), Thermocouple, Voltage sensor, Potentiometer, Reed chains and others
- Signalling in accordance with NAMUR NE43, sensor monitoring in accordance with NE89, EMC in accordance with NE21, self-monitoring and diagnostics of field instruments in accordance with NE107

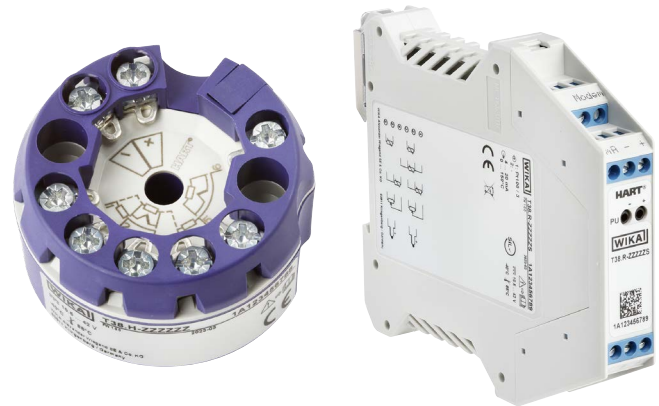


Fig. left: head-mounted version, model T38.H
Fig. right: rail-mounted version, model T38.R

Description

These temperature transmitters are designed for universal use in the process industry. They offer high accuracy through sensor-transmitter matching, highest reliability and excellent protection against electromagnetic influences. Via HART® protocol, the T38 temperature transmitters are configurable (interoperable) with a variety of open configuration tools. In addition, the T38 temperature transmitters, via the WIKAsoft-TT configuration software with model PU-548 programming unit, can be parameterised very easily, quickly and with a clear overview.

Besides the selection of the sensor type and the measuring range, the software enables the error signalling operation, damping, several measuring location descriptions and process adjustment to be stored.

The T38 transmitters offer a wide range of sensor connection combinations.

Through the configuration of a sensor with redundancy (dual sensor), on a sensor failure it will automatically change over to the working sensor. Furthermore, there is the possibility to activate sensor drift detection. With the WIKA True Drift Detection, sensors can be monitored continuously, and erroneous measuring locations can be identified immediately.

Additionally, the T38 transmitters also have numerous sophisticated supervisory functionalities. In addition, extended diagnostic functions in accordance with NE107 are integrated and extensive cyclical self-monitoring functions are carried out, which contribute to the high level of system security.

Specifications

Measuring element				
	Sensor type	Max. configurable measuring range	Standard	Min. measuring span (MS) ¹⁾
Resistance sensor	Pt100	-200 ... +850 °C [-328 ... +1,562 °F]	IEC 60751	10 K
	Pt1000	-200 ... +850 °C [-328 ... +1,562 °F]	IEC 60751	
	CvD	-200 ... +850 °C [-328 ... +1,562 °F]	n. a.	
	Pt1000 Cryogenic design ²⁾	-260 ... +200 °C [-436 ... +392 °F]	Internal + IEC 60751	
	JPt100	-200 ... +500 °C [-328 ... +932 °F]	JIS C1606:1989	
	JPt1000	-200 ... +500 °C [-328 ... +932 °F]	JIS C1606:1989	
	Ni100	-60 ... +250 °C [-76 ... +482 °F]	DIN 43760:1987	
	Resistance sensor ²⁾	0 ... 4,100 Ω	n.a.	20 Ω
Potentiometer ³⁾	Potentiometer ²⁾	0 ... 100 %	n.a.	10 %
FLR sensor ³⁾	Reed chains	0 ... 100 %	n.a.	10 %
Thermocouple type	J	-210 ... +1,200 °C [-346 ... +2,192 °F]	IEC 60584-1	50 K
	K	-270 ... +1,300 °C [-454 ... +2,372 °F]	IEC 60584-1	
	L (DIN)	-200 ... +900 °C [-328 ... +1,652 °F]	DIN 43710:1985	
	L (GOST)	-200 ... +800 °C [-328 ... +1,472 °F]	GOST R 8.585 - 2001	
	E	-200 ... +1,000 °C [-328 ... +1,832 °F]	IEC 60584-1	
	E (CRYO)	-270 ... +250 °C [-454 ... +482 °F]		
	N	-270 ... +1,300 °C [-454 ... +2,372 °F]	IEC 60584-1	
	T	-270 ... +400 °C [-454 ... +752 °F]	IEC 60584-1	
	U	-200 ... +600 °C [-328 ... +1,112 °F]	DIN 43710:1985	
	R	-50 ... +1,768 °C [-58 ... +3,214 °F]	IEC 60584-1	150 K
	S	-50 ... +1,768 °C [-58 ... +3,214 °F]	IEC 60584-1	
	B	-50 ... +1,820 °C [-58 ... +3,308 °F]	IEC 60584-1	200 K
	C	-50 ... +2,315 °C [-58 ... +4,199 °F]	IEC 60584-1	150 K
	A	-50 ... +2,500 °C [-58 ... +4,532 °F]	IEC 60584-1	
Voltage sensor	mV sensor ²⁾	-500 ... +1,000 mV	-	10 mV

1) The transmitter can be configured below these limit values, but this is not recommended due to loss of accuracy.

2) This operating mode is not allowed for the SIL option.

3) R_{total}: 1 ... 35 kΩ

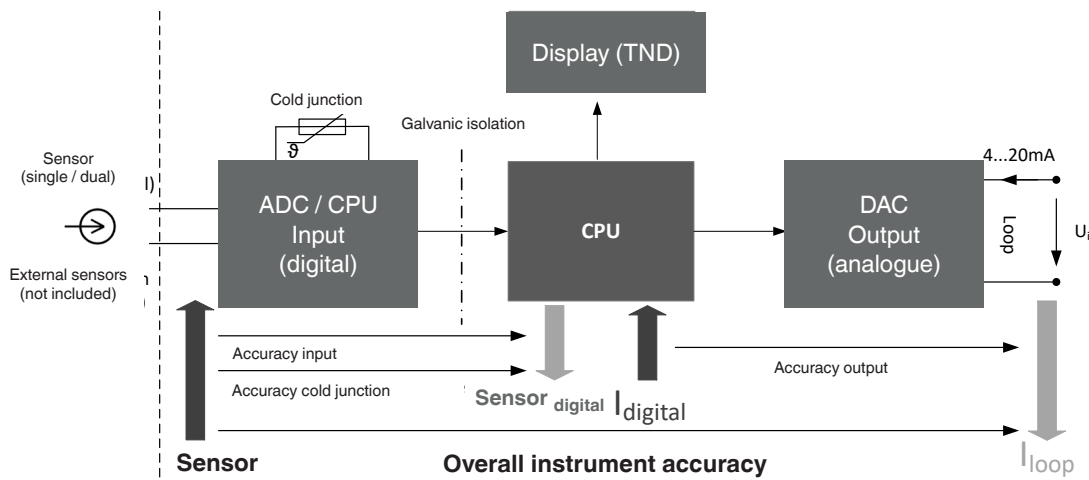
Further details on: Measuring element	
Measuring current during measurement	Max. 0.33 mA (Pt100)
Connection methods	
Resistance thermometer (RTD)	<ul style="list-style-type: none"> ■ 1 sensor in 2-/3-/4-wire connection ■ 2 sensors in 2-/3-wire connection → For further information, see "Assignment of connection terminals"
Thermocouple (TC), FLR, potentiometer, voltage sensor	<ul style="list-style-type: none"> ■ 1 sensor ■ 2 sensors → For further information, see "Assignment of connection terminals"
Resistance sensor	<ul style="list-style-type: none"> ■ 1 sensor in 2-/3-/4-wire connection ■ 2 sensors in 2-/3-wire connection
Resistance thermometer (RTD) and thermocouple (TC)	<ul style="list-style-type: none"> ■ Sensor 1 in 4-wire connection ■ Sensor 2 thermocouple
Thermocouple (TC) and resistance thermometer (RTD)	<ul style="list-style-type: none"> ■ Sensor 1 thermocouple ■ Sensor 2 in 2-/3-wire connection
Cold junction compensation, configurable	<ul style="list-style-type: none"> ■ Internal compensation ■ External with Pt100 ■ Fixed valued with fixed temperature specification ■ Disabled

Versioning per NAMUR NE53

Version	T38.x HART® instrument version	Corresponding DD (Device Description)
1.0.1	1	Dev v1, DDv1

Overall instrument accuracy

The product-specific accuracy specifications refer to the overall instrument. To determine the total error, all possible types of error must be considered - these are summarised in the following table.



Accuracy specifications				
Input and output in accordance with IEC 62828				
Input sensor type	Mean temperature coefficient for each 10 K change in ambient temperature in the range -40 ... +85 °C [-40 ... +185 °F]	Measuring deviation at reference conditions ¹⁾ in accordance with EN IEC 62828, NE 145	Influence of lead resistance	Long-term stability after 1 year at reference conditions ¹⁾
Pt100 / Pt1000 ²⁾ / JPt100 / JPt1000 / Ni100	$\pm(0.06 \text{ K} + 0.015 \% \text{ MV})$	-200 °C [-328 °F] $\leq \text{MV} \leq +200 \text{ °C}$ [+392 °F]: $\pm 0.10 \text{ K}$ MV > +200 °C [+392 °F]: $\pm(0.1 \text{ K} + 0.01 \% \text{ IMV} \cdot 200 \text{ K})$	4-wire: no effect (0 ... 50 Ω per wire) 3-wire: $\pm 0.02 \text{ Ω} / 10 \text{ Ω}$ (0 ... 50 Ω per wire) 2-wire: resistance of the supply lines ³⁾	$\pm 60 \text{ mΩ}$ or 0.05 % of MV, greater value applies
Pt1000 cryogenic design		-260 ... -200 $\pm(0.1 \text{ K} + 0.6 \% \text{ IMV} \cdot 200 \text{ K})$ -200 ... +200 $\pm 0.1 \text{ K}$		
Resistance sensor	$\pm(0.01 \text{ Ω} + 0.01 \% \text{ MV})$	4-wire: 0 °C $\leq \text{MV} \leq +250 \text{ °C}$ [482 °F]: $\pm 0.05 \text{ Ω}$ MV > +250 °C [482 °F]: $\pm(\text{MV} \cdot 0.02 \%) \text{ Ω}$ 3-wire: 0 °C $\leq \text{MV} \leq +250 \text{ °C}$ [482 °F]: $\pm 0.05 \text{ Ω}$ MV > +250 °C [482 °F]: $\pm(\text{MV} \cdot 0.02 \%) \text{ Ω}$		
Potentiometer	$\pm(0.1 \% \text{ MV})$	$R_{\text{part}}/R_{\text{total}}$ is max. $\pm 0.5 \%$	-	-
FLR sensor	$\pm(0.1 \% \text{ MV})$	$R_{\text{part}}/R_{\text{total}}$ is max. $\pm 0.2 \%$ ⁴⁾	-	$\pm(0.1 \% \text{ MV})$
Thermocouples				
Type J (Fe-CuNi)	MV > -150 °C [-238 °F]: $\pm(0.07 \text{ K} + 0.02 \% \text{ IMV})$	-150 °C [-238 °F] < MV < 0 °C [+32 °F]: $\pm(0.3 \text{ K} + 0.2 \% \text{ IMV})$ MV > 0 °C [+32 °F]: $\pm(0.3 \text{ K} + 0.03 \% \text{ MV})$	6 μV / 1,000 Ω	$\pm 20 \text{ μV}$ or 0.05 % of MV, greater value applies

Accuracy specifications				
Input and output in accordance with IEC 62828				
Input sensor type	Mean temperature coefficient for each 10 K change in ambient temperature in the range -40 ... +85 °C [-40 ... +185 °F]	Measuring deviation at reference conditions ¹⁾ in accordance with EN IEC 62828, NE 145	Influence of lead resistance	Long-term stability after 1 year at reference conditions ¹⁾
Type K (NiCr-Ni)	MV > -150 °C [-238 °F]: ±(0.1 K + 0.02 % IMV)	-150 °C [-238 °F] < MV < 0 °C [+32 °F]: ±(0.4 K + 0.2 % IMV) MV > 0 °C [+32 °F]: ±(0.4 K + 0.04 % MV)	6 µV / 1,000 Ω	±20 µV or 0.05 % of MV, greater value applies
Type L (DIN / Fe-CuNi)	MV > 0 °C [+32 °F]: ±(0.07 K + 0.015 % MV)	MV > 0 °C [+32 °F]: ±(0.3 K + 0.03 % MV)	6 µV / 1,000 Ω	±20 µV or 0.05 % of MV, greater value applies
Type L (GOST / Fe-Cu-Ni)	MV > -150 °C [-238 °F]: ±(0.1 K + 0.015 % IMV)	-150 °C [-238 °F] < MV < 0 °C [+32 °F]: ±(0.3 K + 0.2 % IMV) MV > 0 °C [+32 °F]: ±(0.3 K + 0.03 % MV)	6 µV / 1,000 Ω	±20 µV or 0.05 % of MV, greater value applies
Type E (NiCr-Cu)	MV > -150 °C [-238 °F]: ±(0.1 K + 0.015 % IMV)	-150 °C [-238 °F] < MV < 0 °C [+32 °F]: ±(0.3 K + 0.2 % IMV) MV > 0 °C [+32 °F]: ±(0.3 K + 0.03 % MV)	6 µV / 1,000 Ω	±20 µV or 0.05 % of MV, greater value applies
Type N (NiCrSi-NiSi)	-150 °C [-238 °F] < MV < 0 °C [+32 °F]: ±(0.1 K + 0.05 % IMV) MV > 0 °C [+32 °F]: ±(0.1 K + 0.02 % MV)	-150 °C [-238 °F] < MV < 0 °C [+32 °F]: ±(0.5 K + 0.2 % IMV) MV > 0 °C [+32 °F]: ±(0.5 K + 0.03 % MV)	6 µV / 1,000 Ω	±20 µV or 0.05 % of MV, greater value applies
Type T (Cu-CuNi)	-150 °C [-238 °F] < MV < 0 °C [+32 °F]: ±(0.07 K + 0.04 % MV) MV > 0 °C [32 °F]: ±(0.07 K + 0.01 % MV)	-150 °C [-238 °F] < MV < 0 °C [+32 °F]: ±(0.4 K + 0.2 % IMV) MV > 0 °C [+32 °F]: ±(0.4 K + 0.01 % MV)	6 µV / 1,000 Ω	±20 µV or 0.05 % of MV, greater value applies
Type U (Cu-CuNi)	MV > 0 °C [32 °F]: ±(0.07 K + 0.01 % MV)	MV > 0 °C [32 °F]: ±(0.4 K + 0.01 % MV)	6 µV / 1,000 Ω	±20 µV or 0.05 % of MV, greater value applies
Type R (PtRh-Pt)	MV > 50 °C [122 °F]: ±(0.3 K + 0.01 % IMV - 400 KI)	50 °C [122 °F] < MV < 400 °C [752 °F]: ±(1.45 K + 0.12 % IMV - 400 KI) MV > 400 °C [752 °F]: ±(1.45 K + 0.005 % IMV - 400 KI)	6 µV / 1,000 Ω	±20 µV or 0.05 % of MV, greater value applies
Type S (PtRh-Pt)	MV > 50 °C [122 °F]: ±(0.3 K + 0.015 % IMV - 400 KI)	50 °C [122 °F] < MV < 400 °C [752 °F]: ±(1.45 K + 0.12 % IMV - 400 KI) MV > 400 °C [752 °F]: ±(1.45 K + 0.01 % IMV - 400 KI)	6 µV / 1,000 Ω	±20 µV or 0.05 % of MV, greater value applies
Type B (PtRh-Pt)	450 °C [842 °F] < MV < 1,000 °C [1,832 °F]: ±(0.4 K + 0.02 % IMV - 1,000 KI) MV > 1,000 °C: ±(0.4 K + 0.005 % (MV - 1,000 K))	450 °C [842 °F] < MV < 1,000 °C [1,832 °F]: ±(1.7 K + 0.2 % IMV - 1,000 KI) MV > 1,000 °C: ±1.7 K	6 µV / 1,000 Ω	±20 µV or 0.05 % of MV, greater value applies
Type C (W5Re-W26Re)	0 °C [32 °F] < MV < 400 °C [752 °F]: ±0.25 K MV > 400 °C [752 °F]: ±(0.25 K + 0.05 % (MV - 400 K))	0 °C [32 °F] < MV < 400 °C [752 °F]: ±(0.85 K + 0.04 % IMV - 400 KI) MV > 400 °C [752 °F]: ±(0.85 K + 0.1 % IMV - 400 KI)	6 µV / 1,000 Ω	±20 µV or 0.05 % of MV, greater value applies

Accuracy specifications				
Input and output in accordance with IEC 62828				
Input sensor type	Mean temperature coefficient for each 10 K change in ambient temperature in the range -40 ... +85 °C [-40 ... +185 °F]	Measuring deviation at reference conditions ¹⁾ in accordance with EN IEC 62828, NE 145	Influence of lead resistance	Long-term stability after 1 year at reference conditions ¹⁾
Type A (W5Re-W20Re)	0 °C [32 °F] < MV < 400 °C [752 °F]: ± 0.25 K MV > 400 °C [752 °F] ±(0.25 K + 0.05 % (MV - 400 K))	0 °C [32 °F] < MV < 400 °C [752 °F] ±(0.85 K + 0.04 % IMV - 400 KI) MV > 400 °C [752 °F] ±(0.85 K + 0.1 % IMV - 400 KI)	6 µV / 1,000 Ω	±20 µV or 0.05 % of MV, greater value applies
mV sensor	±(2 µV + 0.02 % IMVI)	±(10 µV + 0.03 % IMVI)	6 µV / 1,000 Ω	±20 µV or 0.05 % of MV, greater value applies
Cold junction (only with TC)	±0.1 K	±0.8 K	-	±0.2 K
Output	±0.03 % of measuring span ⁵⁾	±0.03 % of measuring span	-	±0.05 % of span

1) Reference conditions: Temperature: 23 °C [73 °F] ±3 K, relative humidity: 50 - 70 %, ambient pressure: 86 - 106 kPa

2) Dual sensor only up to 450 °C [842 °F] within specification.

3) The specified resistance value of the sensor wire can be subtracted from the calculated sensor resistance. Dual sensor: configurable for each sensor separately.

4) For dual sensors, the doubled value can be taken.

5) Only for the range -40 ... +85 °C [-40 ... +185 °F], furthermore, the temperature coefficient error doubles to ±0.06 % of the measuring span.

Measuring span = configured end of measuring range - configured start of measuring range

Example calculation

Pt100 / 4-wire / Measuring range 0 ... 150 °C / Ambient temperature 33 °C	
Input Pt100, MV < 200 °C	±0.100 K
Output ±(0.03 % of 150 K)	±0.045 K
TC _{input} ±(0.06 K + 0.015 % of 150 K)	±0.083 K
TC _{output} ±(0.03 % of 150 K)	±0.045 K
Measuring deviation (typical) $\sqrt{\text{input}^2 + \text{output}^2 + \text{TC}_{\text{input}}^2 + \text{TC}_{\text{output}}^2}$	±0.145 K
Measuring deviation (maximum) (input + output + TC _{input} + TC _{output})	±0.273 K

Thermocouple type K / measuring range 0 ... 400 °C / internal compensation (cold junction) / ambient temperature 23 °C	
Input type K, 0 °C < MV < 1,300 °C ±(0.4 K + 0.04 % of 400 K)	±0.56 K
Cold junction ±0.8 K	±0.80 K
Output ±(0.03 % of 400 K)	±0.12 K
Measuring deviation (typical) $\sqrt{\text{input}^2 + \text{cold junction}^2 + \text{output}^2}$	±0.98 K
Measuring deviation (maximum) (input + cold junction + output)	±1.48 K

Output signal		
Analogue output (configurable)	■ 4 ... 20 mA, 2-wire ■ 20 ... 4 mA, 2-wire	
Temperature linearity	For RTD	Linear to temperature per IEC 60751, JIS C1606, DIN 43760
	For TC	Linear to temperature per IEC 60584, DIN 43710, GOST R 8.585 - 2001
Load R _A	The permissible load depends on the loop supply voltage.	
With HART®	R _A ≤ (U _B - 10.5 V) / 0.022 A with R _A in Ω and U _B in V	
Output limits (configurable)		
In accordance with NAMUR NE43	Lower limit	3.8 mA
	Upper limit	20.5 mA
Customer-specifically adjustable	Lower limit	3.8 ... 4.0 mA
	Upper limit	20.0 ... 20.5 mA
Simulation	In simulation mode, independent from input signal, simulation value configurable from 3.5 ... 22.0 mA	
Current value for signalling		
In accordance with NAMUR NE43	Downscale	< 3.6 mA (3.5 mA) ¹⁾
	Upscale	> 20.5 mA (21.5 mA) ¹⁾
Setting range	Downscale	3.5 ... 3.6 mA
	Upscale	21.0 ... 22.0 mA
PV, primary value (digital HART® measured value)	Signalling on sensor and hardware error through default value [±9,999]	
Damping (configurable)	Configuration of 1 ... 60 s (0 = disabled) ¹⁾	
Factory configuration		
Sensor	Pt100	
Connection method	3-wire connection	
Measuring range	0 ... 150 °C [32 ... 302 °F]	
Damping	Disabled	
Error signalling	Downscale	
Output limits	Lower limit	3.8 mA
	Upper limit	20.5 mA
Communication		
Communication protocol	HART® protocol rev. 7.6	
	→ For further information, see page 3	
Integration software	HART® instrument driver and integration software	
	→ Free download from www.wika.com	
WIKA configuration software	WIKAsoft-TT	
	→ Free download from www.wika.com	
Configuration		
User linearisation	Store customer-specific sensor characteristics in the transmitter using software (other sensor types can be used in this way) Number of data points: min. 2 / max. 30	

Output signal		
Sensor functionality dual sensor	Sensor 1, sensor 2 redundant	The 4 ... 20 mA output signal delivers the process value of sensor 1. If sensor 1 fails, the process value of sensor 2 is output (sensor 2 is redundant).
	Sensor 1 redundant, sensor 2	The 4 ... 20 mA output signal delivers the process value of sensor 2. If sensor 2 fails, the process value of sensor 1 is output (sensor 1 is redundant).
	Sensor 1, sensor 2 digital	The 4 ... 20 mA output signal always delivers the process value of sensor 1. If sensor 1 fails, the transmitter switches to error signalling. Process values from sensor 2 can be queried via HART®.
	Mean value	The 4 ... 20 mA output signal delivers the mean value of the two values from sensor 1 and sensor 2. If one sensor fails, the process value of the error-free sensor is output.
	Minimum value	The 4 ... 20 mA output signal delivers the minimum value of the two values from sensor 1 and sensor 2. If one sensor fails, the process value of the error-free sensor is output.
	Maximum value	The 4 ... 20 mA output signal delivers the maximum value of the two values from sensor 1 and sensor 2. If one sensor fails, the process value of the error-free sensor is output.
	Difference ²⁾	The 4 ... 20 mA output signal delivers the difference between sensor 1 and sensor 2. If one sensor fails, an error signalling will be activated.
Monitoring functions		
Test current for sensor monitoring (TC)	Nom. 50 µA during test cycle, otherwise 0 µA	
Test current for sensor monitoring (RTD)	Measuring current (sensor-dependent)	
Monitoring NAMUR NE89 (monitoring of supply line resistance)	Resistance thermometer (3- and 4-wire)	Max. 50 Ω each wire
	3-wire	Monitoring of the resistance difference between lines 2 & 3 and lines 5 & 6. An error will be signalled if there is a difference of > 0.5 Ω. ³⁾
	Thermocouple	R _{Lmax} > 10 kΩ
Sensor break monitoring	Configurable via software Default: downscale	
Sensor short-circuit monitoring resistance sensor	Configurable via software Default: downscale	
Self-monitoring	Active permanently, e.g. RAM/ROM test, logical program operating checks and validity check	
Measuring range monitoring	Monitoring of the set measuring range for upper/lower deviations Standard: deactivated	
Measuring range monitoring	Monitoring of the set measuring range for upper/lower deviations Standard: Deactivated	

Output signal		
Monitoring functionality when 2 sensors have been connected (dual sensor)	Redundancy	In the case of a sensor error (sensor break, lead resistance too high or outside the measuring range of the sensor) of one of the two sensors, the process value will be only based on the error-free sensor. Once the error is rectified, the process value will again be based on the two sensors, or on sensor 1.
	Ageing control (sensor drift monitoring)	A status message via HART® occurs when the magnitude of the temperature difference between sensor 1 and sensor 2 exceeds a user-selectable value. This monitoring only generates a signal if two valid sensor values can be determined and the temperature difference is higher than the selected limit value. (Cannot be selected for the “Difference” sensor functionality, since the output signal already indicates the difference value).
	WIKA True Drift Detection	WIKA True Drift Detection technology is a specific sensor combination for the continuous monitoring of a resistance sensor. As soon as a drift is detected, this error will be signalled by the temperature transmitter via a HART® flag as a diagnostic status. A faulty measuring location is thus identified immediately and before the next recalibration. → For technical details, see special documentation SP 05.26
Voltage supply		
Auxiliary power U _B	DC 10.5 ... 42 V ⁴⁾ Attention: Restricted auxiliary power ranges for explosion-protected versions (see “Safety-related characteristic values”) and extended SIL version.	
	Load R _A ≤ (U _B - 10.5 V) / 0.022 A with R _A in Ω and U _B in V (without HART®)	
Time response		
Rise time t _{g0}	< 0.8 s ⁵⁾	
Warm-up time ⁶⁾	After approx. 5 minutes the instrument will function to the specifications (accuracies) given in the data sheet	
Switch-on time (time to get the first measured value)	Max. 15 s	
Typical measuring rate ⁷⁾	Measured value update	<div><div></div> Single sensor > 6/s</div> <div><div></div> Dual sensor > 3/s</div>

1) Values in brackets are the default values

2) This operating mode is not allowed for the SIL option.

3) Only with SIL version

4) Auxiliary power input protected against reverse polarity. On switching on (24 V (load = 500 Ω)), an increase in the auxiliary power of at least 4 V/s is needed; otherwise the temperature transmitter will remain in a safe state at 3.5 mA.

5) < 1.0 s with FLR sensor

6) When using thermocouples, the warm-up time can take up to 30 minutes (cold junction compensation).

7) For the FLR sensor, half values can be assumed.

Electrical connections

Wire cross-section

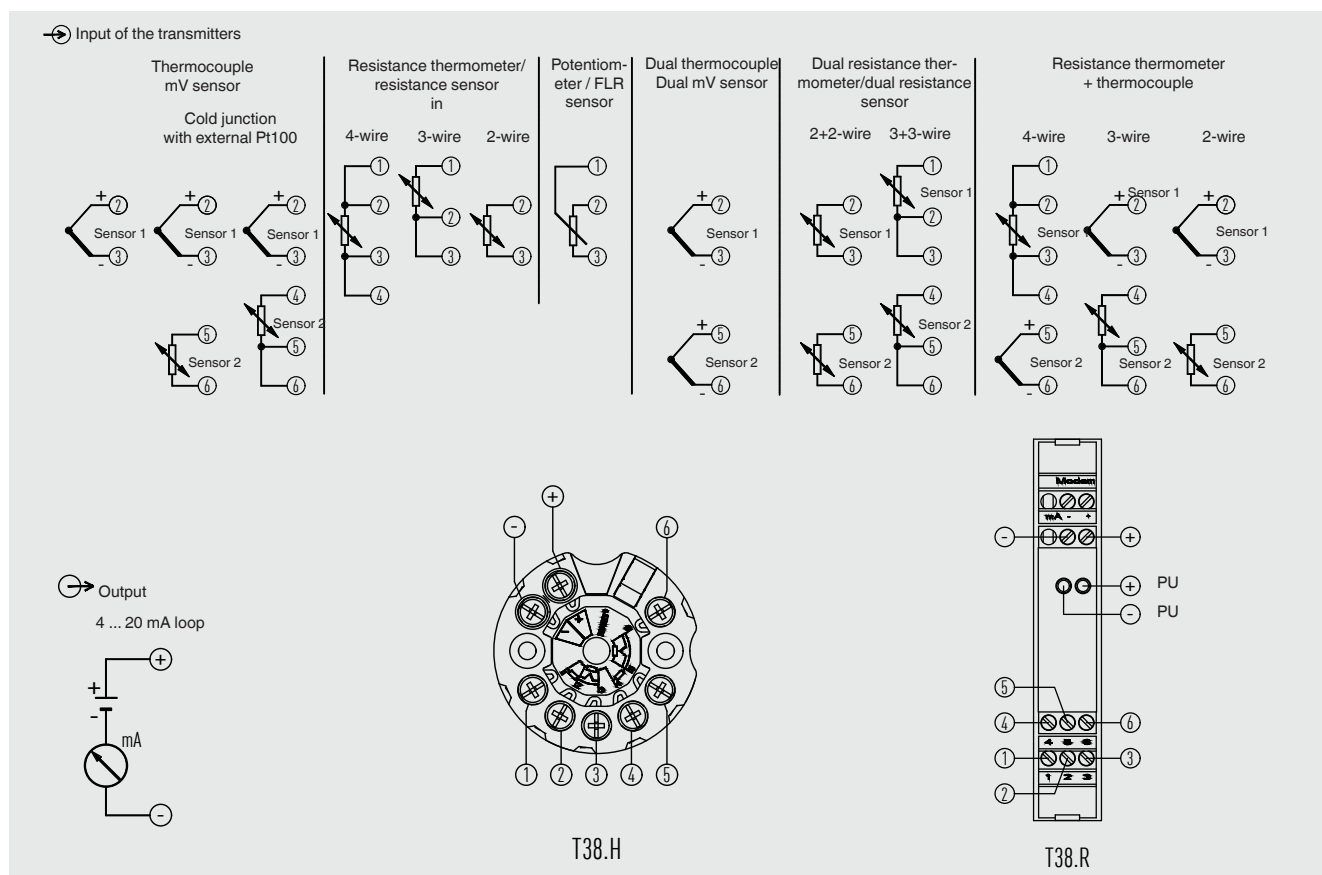
T38.H head-mounted version	Solid wire	0.2 ... 2.5 mm ² (24 ... 14 AWG)
	Stranded wire with end splice	0.14 ... 1.5 mm ² (26 ... 16 AWG)
T38.R rail-mounted version	Solid wire	0.2 ... 2.5 mm ² (24 ... 14 AWG)
	Stranded wire with end splice	0.14 ... 2.5 mm ² (26 ... 14 AWG)

Lead resistance ¹⁾

Resistance sensor	Max. 50 Ω each wire, 3-/4-wire connection
Thermocouple	Max. 10 kΩ
Insulation voltage (input to analogue output)	AC 1,500 V, (50 Hz / 60 Hz); 60 s

1) Monitoring of the lead resistance can be switched off (does not apply to SIL). If exceeded, the specified accuracy specifications no longer apply.

Assignment of connection terminals



Version with display TND

Operation/display:
The display shows a current measured value and additional information about which value it is (PV, S1-S2, etc.). The selection of the displayed value can be made via the configuration tool.

Should the transmitter detect an error in the measuring chain, this will be shown on the display with the channel number and the error code.

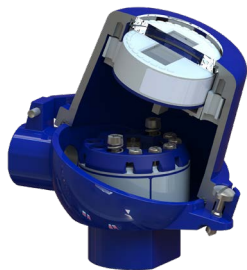
T38 with clip-on display (TND)



PIH-W with T38 and TND



BSZ-H with T38 and TND



When installing a head-mounted transmitter with a display in a case, it must be ensured that a case with a window in the cover is used. The WIKA PIH-W case, specifically developed for this application, is available for the combination of a T38 with a TND clip-on display (see figure “PIH-W with T38 and TND” and accessories). Alternatively, the TND can be installed in the cover of the BSZ-H connection head, see figure “BSZ-H with T38”

Adjustment of sensors

One method to improve the accuracy of the temperature measurement can be carried out by using Callendar–Van Dusen coefficients (platinum resistance thermometer).
The Callendar–Van Dusen equation is described as:
 $R_t = R_0[1 + AT + BT^2 + C(T - 100)T^3]$

For best accuracy of the system, a platinum resistance thermometer (RTD) should be individually calibrated to generate the A, B, C coefficients.

→ For further information, see technical information IN 00.29

Materials	
Non-wetted parts	
T38.H head-mounted version	Plastic, PBT, glass-fibre reinforced
T38.R rail-mounted version	Plastic

Operating conditions	
Ambient temperature	
Standard	-40 ... +85 °C [-40 ... +185 °F]
Extended for high ambient temperatures ¹⁾	-40 ... +105 °C [-40 ... +221 °F]
Extended for low ambient temperatures ¹⁾	-50 ... +85 °C [-58 ... +185 °F]
Advanced for SIL ²⁾	-40 ... +95 °C [-40 ... +203 °F]
Storage temperature	-40 ... +85 °C [-40 ... +185 °F]
Operating Temperature TND	-30 ... +65 °C [-22 ... +149 °F]
Maximum allowable humidity	
T38.H head-mounted version IEC 60068-2-38:2022	Test of max. temperature variation 65 °C [149 °F] and -10 °C [14 °F], 95 % r. h.
T38.R rail-mounted version IEC 60068-2-30:1999	Test of max. temperature 25 °C [77 °F] and 55 °C [131 °F], 80 % r. h.
Climate class per IEC 60654-1: 1993 ³⁾	Cx (-40 ... +85 °C [-40 ... +185 °F], 5 ... 95 % r. h.)
Salt mist per IEC 60068-2-52: 2017	Severity grade 1
Vibration resistance per IEC 60068-2-6:2008	Test Fc: 10 ... 2,000 Hz, 10g, amplitude 0.75 mm [0.03 in]
Shock resistance per IEC 60068-2-27: 2008	Acceleration / shock width
T38.H head-mounted version	100g / 6 ms
T38.R rail-mounted version	15g / 11 ms
Free fall in line with IEC 60721-3-2:2018	1.5 m [4.9 ft]
Ingress protection of the complete instrument (per IEC 60529)	
T38.H head-mounted version	IP00 (electronics completely potted)
T38.R rail-mounted version	IP20
Electromagnetic compatibility (EMC) in accordance with EN 55011:2022, EN IEC 61326, NAMUR NE21:2017	Emission (group 1, class B) and immunity (industrial application) [HF field, HF line, ESD, burst and surge]

1) Special version, not for rail-mounted version, not for SIL version










2) Special version, not for rail-mounted version

3) Not for rail-mounted version



Approvals

Logo	Description	Region
	EU declaration of conformity	European Union
	EMC directive	
	EN 61326 emission (group 1, class B) and immunity (industrial environments)	
	RoHS directive	

Optional approvals

Logo	Description	Region
	EU declaration of conformity	European Union
	ATEX directive	
	Hazardous areas	
	IECEx Hazardous areas	International
	CSA	USA and Canada
	Hazardous areas	
	EAC Ex	Eurasian Economic Community
	EMC directive	
	Hazardous areas	
	Ex Ukraine	Ukraine
	Hazardous areas	
	INMETRO	Brazil
	Metrology, measurement technology	
	Hazardous areas	
	KCs Hazardous areas	Korea
-	PESO Hazardous areas	India
	NEPSI Hazardous areas	China
-	ECAS	United Arab Emirates
	Hazardous areas	
	PAC Kasachstan Metrology, measurement technology	Kasachstan

Manufacturer's information and certificates

Logo	Description
	SIL 2 Functional safety
-	China RoHS directive
	NAMUR
	■ EMC per NAMUR NE21
	■ Signalling per NAMUR NE43
	■ Sensor break monitoring per NAMUR NE89
	■ Self-monitoring and diagnostics of field instruments in accordance with NAMUR NE107
	■ Uniform representation of the measuring deviation of field instruments in accordance with NAMUR NE145
	■ Field instruments for standard applications in accordance with NAMUR NE131

Certificates (option)

Certificates	
Certificates	<ul style="list-style-type: none"> ■ 2.2 test report ■ 3.1 inspection certificate
Calibration	DAkkS calibration certificate

→ For approvals and certificates, see website

Safety-related characteristic values (Ex)

ATEX approval, IECEx

	Model T38.*-AI** Gas hazardous applica- tion	Model T38.*-AC** Gas hazardous applica- tion	Model T38.*-AI** Dust hazardous applica- tion
Ex marking			
Head-mounted version	II 1G Ex ia IIC T6...T4 Ga	II 3G Ex ic IIC T6...T4 Gc	II 1D Ex ia IIIC T135° Da
Rail-mounted version	II 2(1)G Ex ia [ia Ga] IIIC T6...T4 Gb	II 3G Ex ic IIC T6...T4 Gc	II 2(1)D Ex ia [ia Da] IIIC T135 °C Db
Connection values / Intrinsically safe supply and signal circuit (4 ... 20 mA current loop)			
Terminals	+ / -	+ / -	+ / -
Auxiliary power U_B ¹⁾	DC 10.5 ... 30 V	DC 10.5 ... 30 V	DC 10,5 ... 30 V
Maximum voltage U_i	DC 30 V	DC 30 V	DC 30 V
Maximum current I_i	130 mA	130 mA	130 mA
Maximum power P_i	800/600 mW	800/600 mW	750 / 650 / 550 mW
Effective internal capacitance C_i	1.7 nF	1.7 nF	1.7 nF
Effective internal inductance L_i	Negligible	Negligible	Negligible

1) Auxiliary power input protected against reverse polarity. When switching on (24 V (load = 500 Ω)), an increase of the auxiliary power of at least 4 V/s is required, otherwise the temperature transmitter remains in the safe state at 3.5 mA.

Further specifications on: Safety-related characteristic values (Ex)		
	Model T38.*-AE** Ex ia IIC/IIB/IIA Ex ia IIIC	Model T38.x-AC Ex ic IIC/IIB/IIA
Connection values of sensor circuit		
Terminals	1 - 6	1 - 6
Maximum voltage U_0	DC 6.32 V	DC 6.32 V
Maximum current I_0	25 mA	25 mA
Maximum power P_0	39 mW	39 mW
Maximum external capacitance C_0	24 µF	325 µF
Maximum external inductance L_0	50 mH	120 mH
Maximum inductance/resistance ratio L_0/R_0	0.8 mH/Ω	1.55 mH/Ω
Characteristic curve	Linear	

	Model T38.*-AE**
	Gas hazardous application
Ex marking	II 3G Ex ec IIC T6 ... T4 Gc
Connection values / Intrinsically safe supply and signal circuit (4 ... 20 mA current loop)	
Terminals	+ / -
Voltage U_n	DC 40 V
Current I_n	22.5 mA

	Model T38.*-AE**
	Connection values of sensor circuit
Terminals	1-6
Voltage U_n	DC 3 V
Current I_n	0.66 mA
Power P_n	2 mW

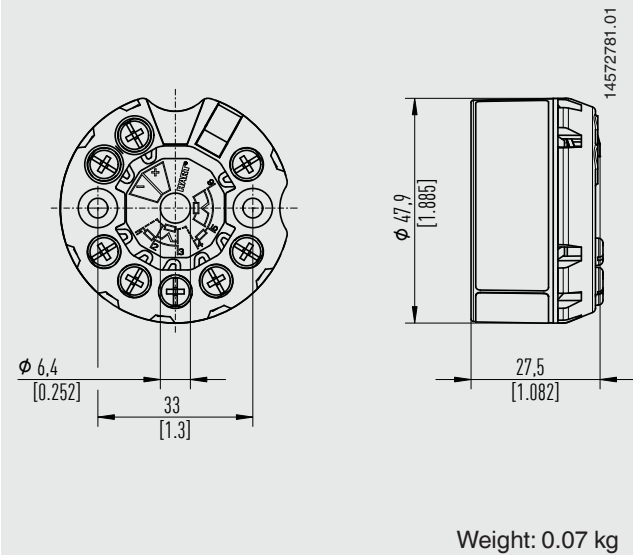
Application	Ambient temperature range	Temperature class	Power P_i
Group II Gas	-50 ... +105 °C [-58 ... 221 °F]	T4	600 mW
	-50 ... +85 °C [-58 ... 185 °F]	T4	800 mW
	-50 ... +75 °C [-58 ... 167 °F]	T5	800 mW
	-50 ... +60 °C [-58 ... 140 °F]	T6	600 mW
	-50 ... +50 °C [-58 ... 122 °F]	T6	800 mW
Group III Dust	-50 ... +40 °C [-58 ... 104 °F]	T135 °C	750 mW
	-50 ... +70 °C [-58 ... 158 °F]	T135 °C	650 mW
	-50 ... +100 °C [-58 ... 212 °F]	T135 °C	550 mW

CSA approval

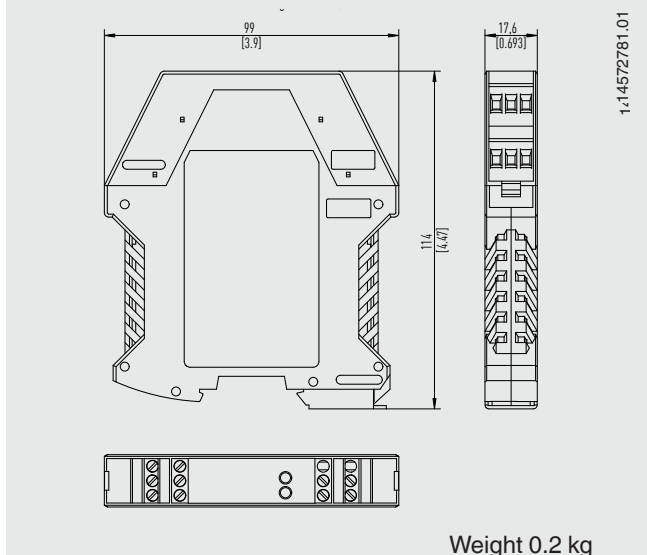
Safety-related characteristic values (Ex)	Model T38.*-CI** Gas hazardous application	Model T38.*-CC** Gas hazardous application	Model T38.*-CI** Dust hazardous application
Ex marking			
Head-mounted version	CL I DIV GP A B C D T6 ... T4 CL I Zone 0 AEx/Ex ia IIC T6...T4 Ga	CL I DIV 2 GP A B C D T6...T4 CL I Zone 2 AEx/Ex ic IIC T6...T4 Gc	CL II Zone 20 AEx/Ex ia IIC T135°C Da
Rail-mounted version	CL I DIV 1 GP A B C D T6...T4 CL I Zone 1 AEx/Ex ia IIC T6...T4 Gb	CL I DIV 2 GP A B C D T6...T4 CL I Zone 2 AEx/Ex ic IIC T6...T4 Gc	CL II Zone 21 AEx/Ex ia IIC T6...T4 Db

Dimensions in mm [in]

Head-mounted version



Rail-mounted version



Communication

HART® protocol rev. 7.6

Interoperability (i.e. compatibility between components from different manufacturers) is a strict requirement of HART® instruments. The T38 transmitter is compatible with almost every open software and hardware tool; including:

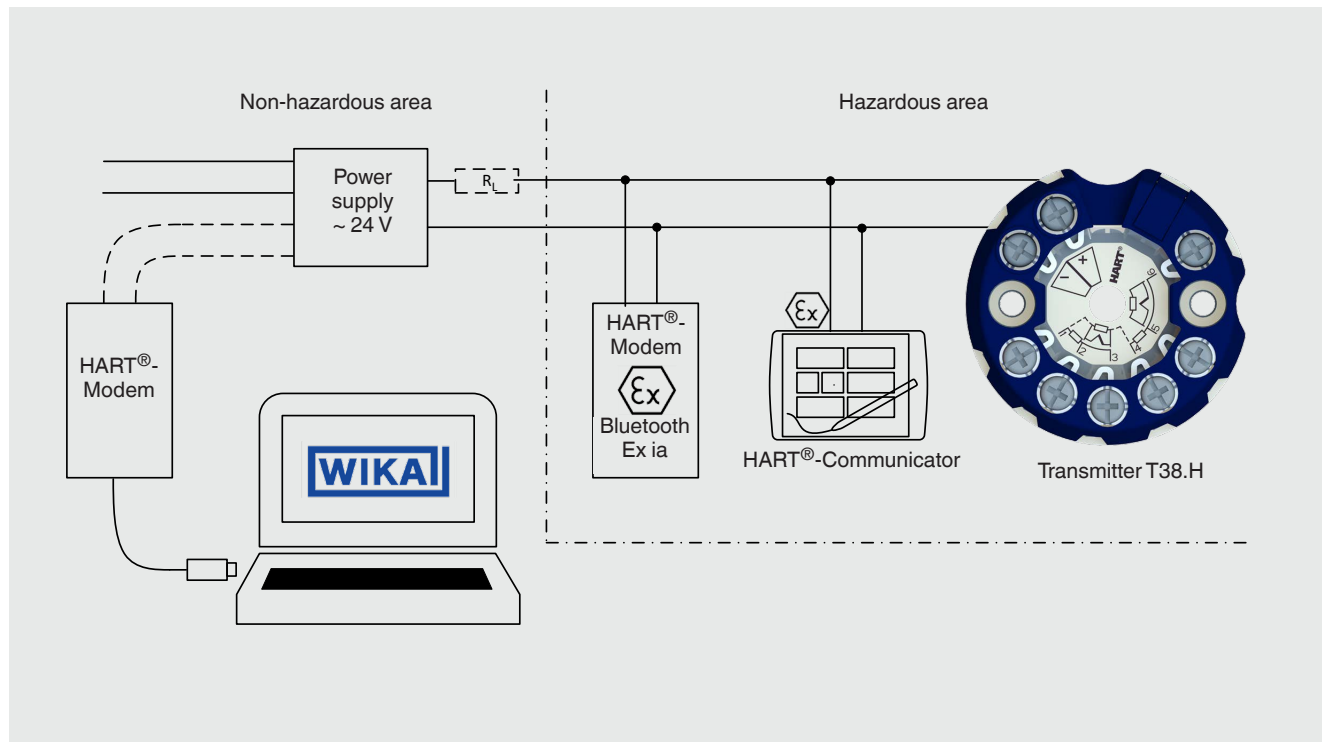
1. User-friendly WIKAsoft-TT WIKA configuration software, free-of-charge download from www.wika.com
2. HART® communicator (e.g. AMS Trex):
T38 device description (device object file) is integrated
3. Asset management systems
 - 3.1 Complete, EDDL/FDI-compliant Device Description (DD) with FDI device package: e.g. for Emerson AMS, Simatic PDM
 - 3.2 Device Type Manager (DTM): e.g. for PACTware, FieldMate

Attention:

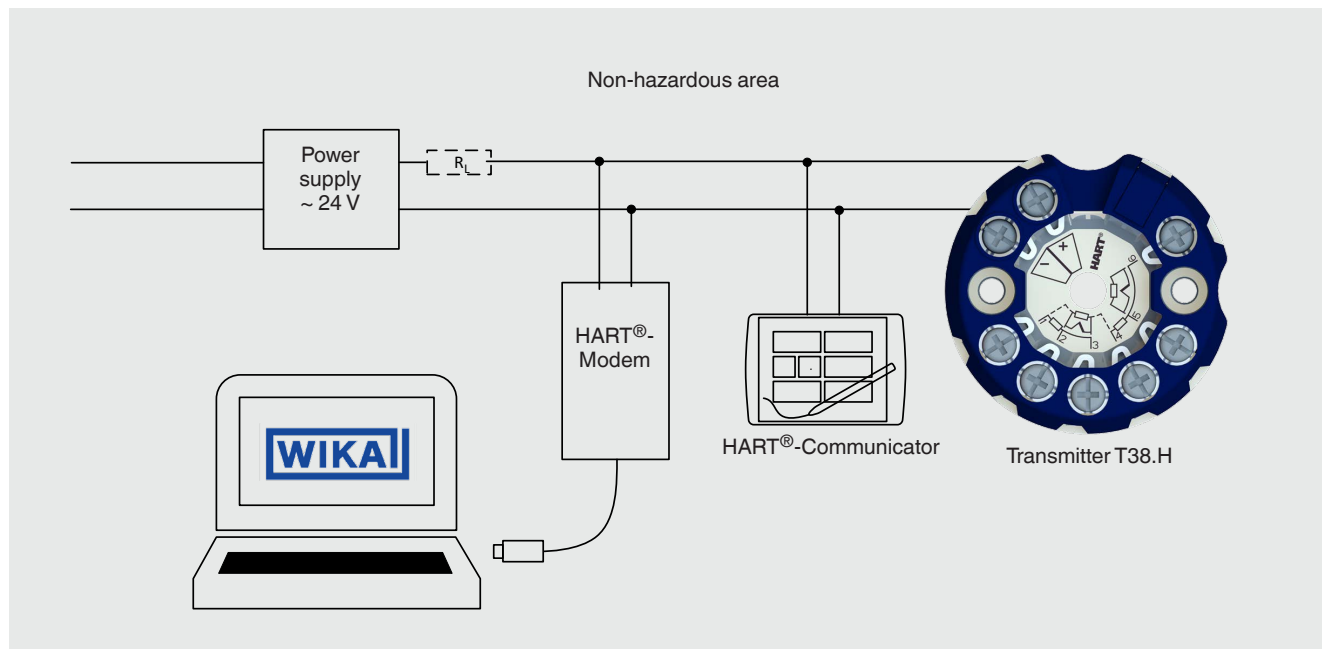
For direct communication via the serial interface of a PC/notebook, a HART® modem is needed (see "Accessories"). As a general rule, parameters which are defined in the scope of the universal HART® commands can, in principle, be edited with all HART® configuration tools.

Configuration

Typical connection in hazardous area



Typical connection in non-hazardous area



R_L = Load resistance for HART® communication
 R_L min. 230 Ω , max. 1,431 Ω

Example calculation

$$R_{MAX} @ 24V = (24V - 10,5 V) / 22 \text{ mA} = 613 \Omega$$

$$R_{MAX} @ 42V = (42V - 10,5 V) / 22 \text{ mA} = 1431 \Omega$$

$$U_{B_MIN} @ 230 \Omega = (230 \Omega * 22 \text{ mA}) + 10,5 V = 15,6 V$$

If R_L is < 230 Ω in the respective circuit, R_L must be increased to at least 230 Ω by connecting external resistors.

Connecting the PU-548 programming unit



Attention:

For direct communication via the serial interface of a PC/notebook, a model PU-548 programming unit is needed (see “Accessories” on page 19).

Configuration software WIKAsoft-TT

W WikaSoft-TT
— □ ×

:: Digital temperature transmitter ::
WIKA

File Instrument ?
:: Configuration ::

COM port
COM6 ▼

Configuration

Diagnostics

Load instrument data

Load configuration

Reset to Factory Defaults

Instrument data HART Data

Transmitter model code
T38.H-ZZZZZZ

Serial number
1A02YFWM43

Firmware
V 1.0.1

Maximum instrument temperature
24.68 °C

Permissible ambient temperature
-40 ... 85 °C

Manufacturing Date
11/7/2023

Hours of operation
0

TAG Long	Description	User message	TAG no.
Long Tags	???????????????	?????????????????????????????????	SHORTAG

Input	Error signaling (NAMUR)	Process adaption
Sensor type	All errors uniform	Type of adaption
Type C ▼	Downscale (3.5 mA) ▼	no adaption ▼

Measuring range
 ... °C ▼

Damping
 Seconds

Configuration protocol





Write to instrument

Accessories


WIKA configuration software: Free download from www.wika.com

Model		Description	Order number
	DIH50, DIH52 with field case	DIH50 display module without separate auxiliary power supply, automatically rescales on a change in measuring range and units via monitoring of the HART® communication, 5-digit LC display, 20-segment bar graph display, display rotatable in 10° steps, with II 1G EEx ia IIC explosion protection Material: Aluminium / stainless steel Dimensions: 150 x 127 x 138 mm → For further information, see data sheet AC 80.10	On request
	PIH-X Connection head	Modular connection heads, can be combined with T38 transmitter as a complete instrument; Available with window → installation of the TND possible Impressive stability in accordance with C5-M (without mounting parts) With explosion protection Material: Aluminium → For further specifications, see data sheet AC 80.30	On request
	TND – Temperature Numerical Display	Indication module TND, 5-digit LC display	33025404
	BSZ-H	Connection head, can be combined with T38 transmitter Available with window → installation of the TND possible With explosion protection Material: Aluminium	On request
	Programming unit model PU-548	Programming unit for USB interface for use with the WIKAsoft-TT configuration software Easy to use LED status indication Compact design No further voltage supply needed, neither for the programming unit nor for the transmitter Incl. 1 model magWIK magnetic quick connector	14231581
	Adapter	Suitable for TS 35 per DIN EN 60715 (DIN EN 50022) or TS 32 per DIN EN 50035 Material: Plastic / stainless steel Dimensions: 60 x 20 x 41.6 mm	On request
	Adapter	Suitable for TS 35 per DIN EN 60715 (DIN EN 50022) Material: Steel, tin-plated Dimensions: 49 x 8 x 14 mm	On request
	Magnetic quick connector, model magWIK	Replacement for crocodile clips and HART® terminals Fast, safe and tight electrical connection For all configuration and calibration processes	14026893


HART® modem

Model	Description		Order number
Programming unit, model PU-H			
	VIATOR® HART® USB	HART® modem for USB interface	11025166
	VIATOR® HART® USB PowerXpress™	HART® modem for USB interface	14133234
	VIATOR® HART® RS-232	HART® modem for RS-232 interface	7957522
	VIATOR® HART® Bluetooth® Ex	HART® modem for Bluetooth interface, Ex	11364254

Configurator



Standard articles



Ordering information

Model / Explosion protection / SIL specifications / Configuration / Permissible ambient temperature / Certificates / Options

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The specifications given in this document represent the state of engineering at the time of publishing.
We reserve the right to make modifications to the specifications and materials.

Digital temperature transmitter

With HART® protocol, head and rail-mounted version

Models T32.1S, T32.3S

WIKAI data sheet TE 32.04



For further approvals
see page 8



Applications

- Process industry
- Machine building and plant construction

Special features

- TÜV certified SIL version for protection systems developed per IEC 61508 (option)
- Operation in safety applications to SIL 2 (single instrument) and SIL 3 (redundant configuration)
- Configurable with almost all soft- and hardware tools
- Universal for the connection of 1 or 2 sensors
 - Resistance thermometer, resistance sensor
 - Thermocouple, mV sensor
 - Potentiometer
- Signalling per NAMUR NE43, sensor break monitoring per NE89, EMC per NE21

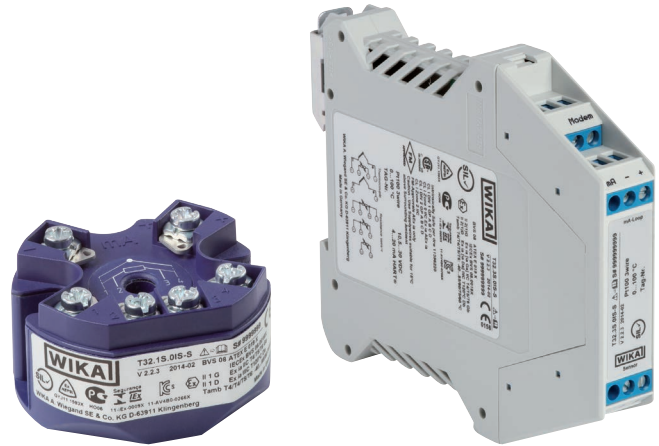


Fig. left: head-mounted version, model T32.1S
Fig. right: rail-mounted version, model T32.3S

Description

These temperature transmitters are designed for universal use in the process industry. They offer high accuracy, galvanic isolation and excellent protection against electromagnetic influences (EMI). Via HART® protocol, the T32 temperature transmitters are configurable (interoperable) with a variety of open configuration tools. In addition to the different sensor types, e.g. sensors in accordance with DIN EN 60751, JIS C1606, DIN 43760, IEC 60584 or DIN 43710, customer-specific sensor characteristics can also be defined, through the input of value pairs (user-defined linearisation).

Through the configuration of a sensor with redundancy (dual sensor), on a sensor failure it will automatically change over to the working sensor. Furthermore, there is the possibility to activate sensor drift detection. With this, an error signalling occurs when the magnitude of the temperature difference between sensor 1 and sensor 2 exceeds a user-selectable value.

The T32 transmitter also has additional sophisticated supervisory functionality such as monitoring of the sensor lead resistance and sensor break monitoring in accordance with NAMUR NE89 as well as monitoring of the measuring range. Moreover, these transmitters have comprehensive cyclic self-monitoring functionality.

The dimensions of the head-mounted transmitter match the form B DIN connection heads with extended mounting space, e.g. WIKAI model BSS.

The transmitters in rail mounting cases are suitable for all standard rails in accordance with IEC 60715. The transmitters are delivered with a basic configuration or configured according to customer specifications.

Specifications

Measuring element				
	Sensor type	Max. configurable measuring range	Standard	Min. measuring span (MS) ¹⁾
Resistance sensor	Pt100	-200 ... +850 °C [-328 ... +1,562 °F]	IEC 60751	10 K
	Pt (x) ²⁾ 10 ... 1000	-200 ... +850 °C [-328 ... +1,562 °F]	IEC 60751	
	JPt100	-200 ... +500 °C [-328 ... +932 °F]	JIS C1606:1989	
	Ni100	-60 ... +250 °C [-76 ... +482 °F]	DIN 43760:1987	
	Resistance sensor ³⁾	0 ... 8,370 Ω	n.a.	4 Ω
Potentiometer ⁴⁾	Potentiometer ³⁾	0 ... 100 %	n.a.	10 %
Thermocouple type	J	-210 ... +1,200 °C [-346 ... +2,192 °F]	IEC 60584-1	50 K
	K	-270 ... +1,300 °C [-454 ... +2,372 °F]	IEC 60584-1	
	L (DIN)	-200 ... +900 °C [-328 ... +1,652 °F]	DIN 43710:1985	
	E	-270 ... +1,000 °C [-454 ... +1,832 °F]	IEC 60584-1	
	N	-270 ... +1,300 °C [-454 ... +2,372 °F]	IEC 60584-1	
	T	-270 ... +400 °C [-454 ... +752 °F]	IEC 60584-1	
	U	-200 ... +600 °C [-328 ... +1,112 °F]	DIN 43710:1985	
	R	-50 ... +1,768 °C [-58 ... +3,214 °F]	IEC 60584-1	150 K
	S	-50 ... +1,768 °C [-58 ... +3,214 °F]	IEC 60584-1	
	B	0 ... 1,820 °C [32 ... 3,308 °F]	IEC 60584-1	200 K
Voltage sensor	mV sensor ³⁾	-500 ... +1,800 mV	-	4 mV

1) The transmitter can be configured below these limit values, but this is not recommended due to loss of accuracy.

2) x configurable between 10 ... 1,000

3) This operating mode is not allowed for the SIL option.

4) R_{total}: 10 ... 100 kΩ

Further information on: Measuring element	
Measuring current during measurement	Max. 0.3 mA (Pt100)
Connection methods	
Resistance thermometer (RTD)	1 sensor in 2-/4-/3-wire connection or 2 sensors in 2-wire connection → for further information, see "Designation of connection terminals"
Thermocouples (TC)	1 sensor or 2 sensors → for further information, see "Designation of connection terminals"
Max. lead resistance	
Resistance thermometer (RTD)	50 Ω each wire, 3-/4-wire
Thermocouples (TC)	5 kΩ each wire
Cold junction compensation, configurable	Internal compensation or external with Pt100, with thermostat or switched off

Accuracy specifications				
Input + output in accordance with DIN EN 60770				
Input sensor type	Mean temperature coefficient (TC) for each 10 K change in ambient temperature in the range -40 ... +85 °C ¹⁾	Measuring deviation at reference conditions in accordance with DIN EN 60770, NE 145, valid at 23 °C ±3 K	Lead resistance effects	Long-term stability after 1 year
Pt100 ²⁾ / JPt100 / Ni100	±(0.06 K + 0.015 % MV)	-200 °C ≤ MV ≤ 200 °C: ±0.10 K MV > 200 °C: ±(0.1 K + 0.01 % IMV - 200 KI) ³⁾	4-wire: no effect (0 ... 50 Ω per wire)	±60 mΩ or 0.05 % of MV, greater value applies
Resistance sensor ⁵⁾	±(0.01 Ω + 0.01 % MV)	≤ 890 Ω: 0.053 Ω ⁶⁾ or 0.015 % MV ⁷⁾ ≤ 2,140 Ω: 0.128 Ω ⁶⁾ or 0.015 % MV ⁷⁾ ≤ 4,390 Ω: 0.263 Ω ⁶⁾ or 0.015 % MV ⁷⁾ ≤ 8,380 Ω: 0.503 Ω ⁶⁾ or 0.015 % MV ⁷⁾	3-wire: ±0.02 Ω / 10 Ω (0 ... 50 Ω per wire) 2-wire: Resistance of the connection leads ⁴⁾	
Potentiometer ⁵⁾	±(0.1 % MV)	R _{part} /R _{total} is max. ±0.5 %	-	±20 μV or 0.05 % of MV, greater value applies
Thermocouples				
Type J (Fe-CuNi)	MV > -150 °C: ±(0.07 K + 0.02 % IMVI)	-150 °C < MV < 0 °C: ±(0.3 K + 0.2 % IMVI) MV > 0 °C: ±(0.3 K + 0.03 % MV)	6 μV / 1,000 Ω ⁸⁾	±20 μV or 0.05 % of MV, greater value applies
Type K (NiCr-Ni)	-150 °C < MV < 1,300 °C: ±(0.1 K + 0.02 % IMVI)	-150 °C < MV < 0 °C: ±(0.4 K + 0.2 % IMVI) 0 °C < MV < 1,300 °C: ±(0.4 K + 0.04 % MV)	6 μV / 1,000 Ω ⁸⁾	±20 μV or 0.05 % of MV, greater value applies
Type L (Fe-CuNi)	-150 °C < MV < 0 °C: ±(0.07 K + 0.02 % IMVI) MV > 0 °C: ±(0.07 K + 0.015 % MV)	-150 °C < MV < 0 °C: ±(0.3 K + 0.1 % IMVI) MV > 0 °C: ±(0.3 K + 0.03 % MV)	6 μV / 1,000 Ω ⁸⁾	±20 μV or 0.05 % of MV, greater value applies
Type E (NiCr-Cu)	MV > -150 °C: ±(0.1 K + 0.015 % IMVI)	-150 °C < MV < 0 °C: ±(0.3 K + 0.2 % IMVI) MV > 0 °C: ±(0.3 K + 0.03 % MV)	6 μV / 1,000 Ω ⁸⁾	±20 μV or 0.05 % of MV, greater value applies
Type N (NiCrSi-NiSi)	-150 °C < MV < 0 °C: ±(0.1 K + 0.05 % IMVI) MV > 0 °C: ±(0.1 K + 0.02 % MV)	-150 °C < MV < 0 °C: ±(0.5 K + 0.2 % IMVI) MV > 0 °C: ±(0.5 K + 0.03 % MV)	6 μV / 1,000 Ω ⁸⁾	±20 μV or 0.05 % of MV, greater value applies
Type T (Cu-CuNi)	-150 °C < MV < 0 °C: ±(0.07 K + 0.04 % MV) MV > 0 °C: ±(0.07 K + 0.01 % MV)	-150 °C < MV < 0 °C: ±(0.4 K + 0.2 % IMVI) MV > 0 °C: ±(0.4 K + 0.01 % MV)	6 μV / 1,000 Ω ⁸⁾	±20 μV or 0.05 % of MV, greater value applies
Type U (Cu-CuNi)	-150 °C < MV < 0 °C: ±(0.07 K + 0.04 % MV) MV > 0 °C: ±(0.07 K + 0.01 % MV)	-150 °C < MV < 0 °C: ±(0.4 K + 0.2 % IMVI) MV > 0 °C: ±(0.4 K + 0.01 % MV)	6 μV / 1,000 Ω ⁸⁾	±20 μV or 0.05 % of MV, greater value applies
Type R (PtRh-Pt)	50 °C < MV < 1,600 °C: ±(0.3 K + 0.01 % IMV - 400 KI)	50 °C < MV < 400 °C: ±(1.45 K + 0.12 % IMV - 400 KI) 400 °C < MV < 1,600 °C: ±(1.45 K + 0.01 % IMV - 400 KI)	6 μV / 1,000 Ω ⁸⁾	±20 μV or 0.05 % of MV, greater value applies
Type S (PtRh-Pt)	50 °C < MV < 1,600 °C: ±(0.3 K + 0.015 % IMV - 400 KI)	50 °C < MV < 400 °C: ±(1.45 K + 0.12 % IMV - 400 KI) 400 °C < MV < 1,600 °C: ±(1.45 K + 0.01 % IMV - 400 KI)	6 μV / 1,000 Ω ⁸⁾	±20 μV or 0.05 % of MV, greater value applies

Accuracy specifications				
Input + output in accordance with DIN EN 60770				
Input sensor type	Mean temperature coefficient (TC) for each 10 K change in ambient temperature in the range -40 ... +85 °C ¹⁾	Measuring deviation at reference conditions in accordance with DIN EN 60770, NE 145, valid at 23 °C ±3 K	Lead resistance effects	Long-term stability after 1 year
Type B (PtRh-Pt)	450 °C < MV < 1,000 °C: ±(0.4 K + 0.02 % IMV - 1,000 KI) MV > 1,000 °C: ±(0.4 K + 0.005 % (MV - 1,000 K))	450 °C < MV < 1,000 °C: ±(1.7 K + 0.2 % IMV - 1,000 KI) MV > 1,000 °C: ±1.7 K	6 µV / 1,000 Ω ⁸⁾	±20 µV or 0.05 % of MV, greater value applies
mV sensor ⁵⁾	2 µV + 0.02 % IMVI 100 µV + 0.08 % IMVI	≤ 1,160 mV: 10 µV + 0.03 % IMVI > 1,160 mV: 15 µV + 0.07 % IMVI	6 µV / 1,000 Ω ⁸⁾	±20 µV or 0.05 % of MV, greater value applies
Cold junction (only with TC)	±0.1 K	±0.8 K	-	±0.2 K
Output	±0.03 % of measuring span	±0.03 % of measuring span	-	±0.05 % of span

Further information on: Accuracy specifications	
Measuring rate (only for single RTD/TC sensors)	Typical, measured value update approx. 6/s
Influence of supply voltage	Not measurable
Effect of load	Not measurable

MV = measured value (temperature measured values in °C)

Measuring span = configured end of measuring range - configured start of measuring range

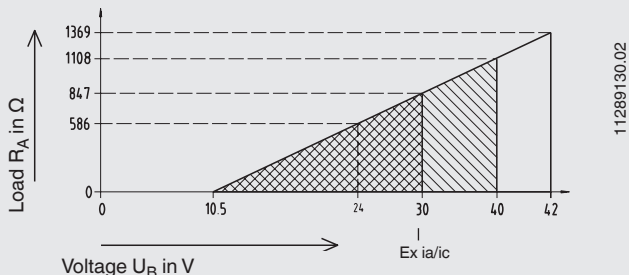
- 1) T32.1S: with the extended ambient temperature (-50 ... -40 °C) the value is doubled
- 2) For sensor Ptx (x = 10 ... 1,000) applies: for x ≥ 100: permissible error, as for Pt100
for x < 100: permissible error, as for Pt100 with a factor (100/x)
- 3) Additional error for resistance thermometers in a 3-wire configuration with zero-balanced cable: 0.05 K
- 4) The specified resistance value of the sensor wire can be subtracted from the calculated sensor resistance.
Dual sensor: Configurable for each sensor separately
- 5) This operating mode is not allowed for SIL option (T32.xS.xxx-S).
- 6) Double value at 3-wire
- 7) Greater value applies
- 8) Within a range of 0 ... 10 kΩ lead resistance

Example calculation

Pt100 / 4-wire / Measuring range 0 ... 150 °C / Ambient temperature 33 °C	
Input Pt100, MV < 200 °C	±0.100 K
Output ±(0.03 % of 150 K)	±0.045 K
TC _{input} ±(0.06 K + 0.015 % of 150 K)	±0.083 K
TC _{output} ±(0.03 % of 150 K)	±0.045 K
Measuring deviation (typical) $\sqrt{\text{input}^2 + \text{output}^2 + \text{TC}_{\text{input}}^2 + \text{TC}_{\text{output}}^2}$	±0.145 K
Measuring deviation (maximum) (input + output + TC _{input} + TC _{output})	±0.273 K

Pt1000 / 3-wire / Measuring range -50 ... +50 °C / Ambient temperature 45 °C	
Input Pt1000, MV < 200 °C	±0.100 K
Output ±(0.03 % of 100 K)	±0.03 K
TC _{input} ±(0.06 K + 0.015 % of 100 K) * 2	±0.15 K
TC _{output} ±(0.03 % of 100 K) * 2	±0.06 K
Measuring deviation (typical) $\sqrt{\text{input}^2 + \text{output}^2 + \text{TC}_{\text{input}}^2 + \text{TC}_{\text{output}}^2}$	±0.19 K
Measuring deviation (maximum) (input + output + TC _{input} + TC _{output})	±0.34 K

Thermocouple type K / measuring range 0 ... 400 °C / internal compensation (cold junction) / ambient temperature 23 °C	
Input type K, 0 °C < MV < 1,300 °C ±(0.4 K + 0.04 % of 400 K)	±0.56 K
Cold junction ±0.8 K	±0.80 K
Output ±(0.03 % of 400 K)	±0.12 K
Measuring deviation (typical) $\sqrt{\text{input}^2 + \text{cold junction}^2 + \text{output}^2}$	±0.98 K
Measuring deviation (maximum) (input + cold junction + output)	±1.48 K

Output signal		
Analogue output (configurable)	■ 4 ... 20 mA, 2-wire ■ 20 ... 4 mA, 2-wire	
	Temperature linearity	For RTD Linear to temperature per IEC 60751, JIS C1606, DIN 43760 For TC Linear to temperature per IEC 60584, DIN 43710
Load R _A	The permissible load depends on the loop supply voltage.	
With HART®	R _A ≤ (U _B - 11.5 V) / 0.023 A with R _A in Ω and U _B in V	
Without HART®	R _A ≤ (U _B - 10.5 V) / 0.023 A with R _A in Ω and U _B in V	
Load diagram (without HART®)		
Output limits (configurable)		
In accordance with NAMUR NE43	Lower limit	3.8 mA
	Upper limit	20.5 mA
Customer-specifically adjustable	Lower limit	3.6 ... 4.0 mA
	Upper limit	20.0 ... 21.5 mA
Option SIL (model T32.xS.xxx-S)	Lower limit	3.8 ... 4.0 mA
	Upper limit	20.0 ... 20.5 mA
Simulation	In simulation mode, independent from input signal, simulation value configurable from 3.5 ... 23.0 mA	
Current value for signalling		
In accordance with NAMUR NE43	Downscale	< 3.6 mA (3.5 mA)
	Upscale	> 21.0 mA (21.5 mA)
Setting range	Downscale	3.5 ... 3.6 mA
	Upscale	21.0 ... 22.5 mA
PV, primary value (digital HART® measured value)	Signalling on sensor and hardware error through default value	
Dampening (configurable)	Configurable between 1 ... 60 s (0 = disabled)	
Factory configuration		
Sensor	1 sensor	
Connection method	3-wire connection	
Measuring range	0 ... 150 °C	
Dampening	Disabled	
Output limits	Lower limit	3.8 mA
	Upper limit	20.5 mA
Current value for signalling	Downscale	< 3.6 mA (3.5 mA)
Communication		
Communication protocol	HART® protocol rev. 5 ¹⁾ including burst mode, multidrop → for further information, see page 14	

Output signal		
Configuration software	WIKA_T32	
	→ free download from www.wika.com	
Configuration	→ For connection example, see page 15	
User linearisation	Store customer-specific sensor characteristics in the transmitter using software (other sensor types can be used in this way) Number of data points: min. 2 / max. 30	
Sensor functionality when 2 sensors have been connected (dual sensor)	Transmitter can be configured below these limit values. This is not recommended due to loss of accuracy.	
	Sensor 1, sensor 2 redundant	The 4 ... 20 mA output signal delivers the process value of sensor 1. If sensor 1 fails, the process value of sensor 2 is output (sensor 2 is redundant).
	Mean value	The 4 ... 20 mA output signal delivers the mean value of the two values from sensor 1 and sensor 2. If one sensor fails, the process value of the error-free sensor is output.
	Minimum value	The 4 ... 20 mA output signal delivers the lower of the two values from sensor 1 and sensor 2. If one sensor fails, the process value of the error-free sensor is output.
	Maximum value	The 4 ... 20 mA output signal delivers the higher of the two values from sensor 1 and sensor 2. If one sensor fails, the process value of the error-free sensor is output.
	Difference ²⁾	The 4 ... 20 mA output signal delivers the difference between sensor 1 and sensor 2. If one sensor fails, an error signalling will be activated.
Monitoring functions		
Test current for sensor monitoring ³⁾	Nom. 20 µA during test cycle, otherwise 0 µA	
Monitoring NAMUR NE89 (monitoring of input lead resistance)	Resistance thermometer (Pt100, 4-wire)	$R_{L1} + R_{L4} > 100 \Omega$ with hysteresis 5 Ω $R_{L2} + R_{L3} > 100 \Omega$ with hysteresis 5 Ω
	Thermocouple	$R_{L1} + R_{L4} + R_{\text{thermocouple}} > 10 \text{ k}\Omega$ with hysteresis 100 Ω
	3-wire	Monitoring of the resistance difference between lead 3 and 4; an error will be indicated if there is a difference of > 0.5 Ω between leads 3 and 4
Sensor break monitoring	Always active	
Sensor short circuit monitoring	Active (only for resistance thermometers)	
Self-monitoring	Active permanently, e.g. RAM/ROM test, logical program operating checks and validity check	
Measuring range monitoring	Monitoring of the set measuring range for upper/lower deviations Standard: deactivated	
Monitoring functionality by connection of 2 sensors (dual sensor)	Redundancy	In the case of a sensor error (sensor break, lead resistance too high or outside the measuring range of the sensor) of one of the two sensors, the process value will be only based on the error-free sensor. Once the error is rectified, the process value will again be based on the two sensors, or on sensor 1.
	Ageing control (sensor drift monitoring)	An error signalling on the output is activated if the value of the temperature difference between sensor 1 and sensor 2 is higher than a set value, which can be selected by the user. This monitoring only generates a signal if two valid sensor values can be determined and the temperature difference is higher than the selected limit value. (Cannot be selected for the "Difference" sensor function, since the output signal already indicates the difference value).
Voltage supply		
Supply voltage U_B	DC 10.5 ... 42 V ⁴⁾ Attention: Restricted auxiliary power ranges for explosion-protected versions (see "Safety-related characteristic values")	

Output signal

Time response

Rise time t_{90}	Approx. 0.8 s
Switch-on time (time to get the first measured value)	Max. 15 s
Warm-up time	After approx. 5 minutes the instrument will function to the specifications (accuracy) given in the data sheet

1) Optional: Rev. 7

2) This operating mode is not allowed for SIL option (T32.xS.xxx-S).

3) Only for thermocouple

4) Supply voltage input protected against reverse polarity; Load $R_A \leq (U_B - 10.5 \text{ V}) / 0.023 \text{ A}$ with R_A in Ω and U_B in V (without HART®)

On switching on, an increase in the supply voltage of 2 V/s is needed; otherwise the temperature transmitter will remain in a safe condition at 3.5 mA.

Electrical connections

Wire cross-section

T32.1S head-mounted version	Solid wire	0.14 ... 2.5 mm ² (24 ... 14 AWG)
	Strand with end splice	0.14 ... 1.5 mm ² (24 ... 16 AWG)
T32.3S rail-mounted version	Solid wire	0.14 ... 2.5 mm ² (24 ... 14 AWG)
	Strand with end splice	0.14 ... 2.5 mm ² (24 ... 14 AWG)

Lead resistance

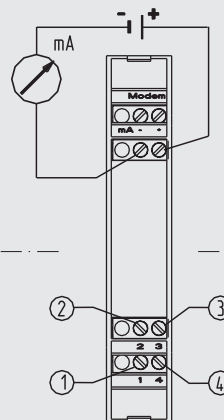
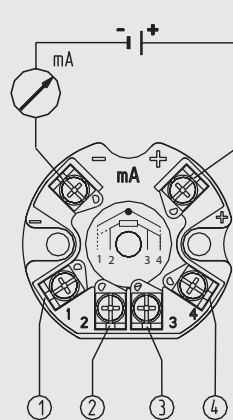
With resistance sensors	50 Ω each wire, 3-/4-wire
With thermocouples	5 k Ω each wire

Insulation voltage (input to analogue output)	AC 1,200 V, (50 Hz/60 Hz); 1 s
---	--------------------------------

Designation of connection terminals

⊕ → Analogue output

4 ... 20 mA loop

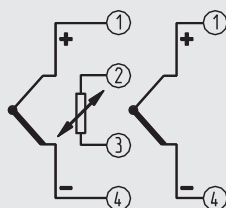


Identical dual sensors are supported for all sensor types, i. e. dual sensor combinations as for example Pt100/ Pt100 or thermocouple type K/type K are possible.
A further rule is that both sensor values have the same unit and the same sensor range.

⊕ → Input resistance sensor/thermocouple

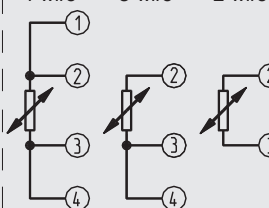
Thermocouple

Cold junction with external Pt100

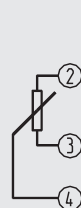


Resistance thermometer/
resistance sensor
in

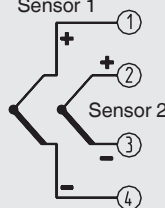
4-wire 3-wire 2-wire



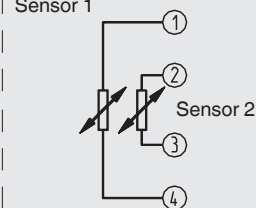
Potentiometer



Dual thermocouple
Dual mV sensor



Dual resistance thermometer/
dual resistance sensor
in
2+2-wire



For the HART® modem, connection terminals are available for the head-mounted case and additional terminals are available for the rail-mounted case.

11234547.0X

Materials	
Non-wetted parts	
T32.1S head-mounted version	Plastic, PBT, glass-fibre reinforced
T32.3S rail-mounted version	Plastic
Operating conditions	
Ambient temperature	-60 ¹⁾ / -50 ²⁾ / -40 ... +85 °C
Storage temperature	-60 ¹⁾ / -50 ²⁾ / -40 ... +85 °C
Relative humidity, condensation	
T32.1S head-mounted version (in accordance with IEC 60068-2-38: 1974)	Test max. temperature variation 65 °C and -10 °C, 93 % ±3 % r. h.
T32.3S rail-mounted version (in accordance with IEC 60068-2-30: 2005)	Test max. temperature 55 °C, 95 % r. h.
Climate class per IEC 654-1: 1993	Cx (-40 ... +85 °C, 5 ... 95 % r. h.)
Salt fog per IEC 60068-2-52	Severity level 1
Vibration resistance per IEC 60068-2-6:2007	Test Fc: 10 ... 2,000 Hz; 10 g, amplitude 0.75 mm
Shock resistance per IEC 68-2-27: 1987	Test Ea: Acceleration type I 30 g and type II 100 g
Free-fall test following IEC 60721-3-2: 1997	Drop height 1,500 mm
Ingress protection of the entire instrument (in accordance with IEC/EN 60529)	
T32.1S head-mounted version	IP00 (electronics completely potted)
T32.3S rail-mounted version	IP20
Service life	Max. service life of 20 years (in line with ISO 13849-1)

1) Special version on request (only available with specific approvals), not for rail-mounted version T32.3S, not for SIL version

2) Special version, not for rail-mounted version T32.3S






Approvals






Approvals included in the scope of delivery

Logo	Description	Country
	EU declaration of conformity	European Union
	EMC directive ¹⁾	
	EN 61326 emission (group 1, class B) and immunity (industrial application)	
	RoHS directive	



1) During interference take into account an increased measuring deviation of up to 1 %.

Optional approvals

Logo	Description	Country
	EU declaration of conformity ATEX directive Hazardous areas	European Union
	IECEx Hazardous areas	International
	FM Hazardous areas	USA
	CSA Hazardous areas	Canada
	EAC	Eurasian Economic Community
	EMC directive	
	Hazardous areas	
-	MTSCHS Permission for commissioning	Kazakhstan

Logo	Description	Country
	UkrSEPRO Metrology, measurement technology	Ukraine
	Uzstandard Metrology, measurement technology	Uzbekistan
	INMETRO Hazardous areas	Brazil
	NEPSI Hazardous areas	China
	KCs - KOSHA Hazardous areas	South Korea

Manufacturer's information and certificates

Logo	Description
	SIL 2 (option) Functional safety
-	China RoHS directive
	NAMUR <ul style="list-style-type: none"> ■ EMC per NAMUR NE21 ■ Signalling per NAMUR NE43 ■ Sensor break monitoring per NAMUR NE89

Certificates (option)

Certificates	
Certificates	<ul style="list-style-type: none"> ■ 2.2 test report ■ 3.1 inspection certificate
Calibration	DAkkS calibration certificate

Approvals and certificates, see website

Safety-relevant characteristic values (explosion-protected version)

T32.1S.0IS, T32.3S.0IS

ATEX approval, IEC

Safety-related characteristic values (Ex)		
Ex marking	BVS 08 ATEX E 019 X BVS 08.0018X (IECEx certificate)	
T32.1S head-mounted version	Zones 0, 1	II 1G Ex ia IIC T4/T5/T6 Ga
	Zones 20, 21	II 1D Ex ia IIIC T135 °C Da
T32.3S rail-mounted version	Zones 0, 1	II 2(1)G Ex ia [ia Ga] IIC T4/T5/T6 Gb
	Zones 20, 21	II 2(1)D Ex ia [ia Da] IIIC T135 °C Db
Connection values / Intrinsically safe supply and signal circuit (4 ... 20 mA current loop)		
Terminals	+ / -	
Supply voltage U _B ¹⁾	DC 10.5 ... 30 V	
Maximum voltage U _i	DC 30 V	
Maximum current I _i	130 mA	
Maximum power P _i (gas)	800 mW	
Maximum power P _i (dust)	750/650/550 mW	
Effective internal capacitance C _i	7.8 nF	
Effective internal inductance L _i	Negligible	
Sensor circuit connection values		
Terminals	1 - 4	
Maximum voltage U ₀	DC 6.5 V	
Maximum current I ₀	9.3 mA	
Maximum power P ₀	15.2 mW	
Effective internal capacitance C _i	208 nF	
Effective internal inductance L _i	Negligible	
Maximum external capacitance C ₀	Gas, category 1 and 2, group IIC	24 µF ²⁾
	Gas, category 1 and 2, group IIA	1,000 µF ²⁾
	Category 1 and 2, gas IIB, dust IIIC	570 µF ²⁾
Maximum external inductance L ₀	Gas, category 1 and 2, group IIC	365 mH
	Gas, category 1 and 2, group IIA	3,288 mH
	Category 1 and 2, gas IIB, dust IIIC	1,644 mH
Maximum inductance/resistance ratio L ₀ /R ₀	Gas, category 1 and 2, group IIC	1.44 mH/Ω
	Gas, category 1 and 2, group IIA	11.5 µH/Ω
	Category 1 and 2, gas IIB, dust IIIC	5.75 mH/Ω
Characteristic curve	Linear	

Application	Ambient temperature range	Temperature class	Power P_i
Group II Gas, category 1 and 2	-50 ³⁾ / -40 ... +85 °C	T4	800 mW
	-50 ³⁾ / -40 ... +75 °C	T5	800 mW
	-50 ³⁾ / -40 ... +60 °C	T6	800 mW
Group IIIC Dust, category 1 + 2	-50 ³⁾ / -40 ... +40 °C	N / A	750 mW
	-50 ³⁾ / -40 ... +70 °C	N / A	650 mW
	-50 ³⁾ / -40 ... +85 °C	N / A	550 mW

1) Supply voltage input protected against reverse polarity; Load $R_A \leq (U_B - 10.5 \text{ V}) / 0.023 \text{ A}$ with R_A in Ω and U_B in V (without HART®)

On switching on, an increase in the supply voltage of 2 V/s is needed; otherwise the temperature transmitter will remain in a safe condition at 3.5 mA.

2) C_i already considered

3) Special version, not for rail-mounted version T32.3S

Safety-related characteristic values (Ex)	CSA	FM
Ex marking	70038032	3034620 / FM17US0333X
Intrinsically safe installation (in accordance with drawing 11396220)	Class I, zone 0, Ex ia IIC Class I, zone 0, AEx ia IIC	Class I, zone 0, AEx ia IIC Class I, division 1, group A, B, C, D (only FM approval AEx ia)
Non-sparking field terminal (in accordance with drawing 11396220)	Class I, division 2, group A, B, C, D	Class I, division 2, group A, B, C, D Class I, division 2, IIC
Connection values / Intrinsically safe supply and signal circuit (4 ... 20 mA current loop)		
Terminals	+ / -	+ / -
Supply voltage U_B ¹⁾	DC 10.5 ... 30 V	DC 10.5 ... 30 V
Maximum voltage U_i	DC 30 V	DC 30 V
Maximum current I_i	130 mA	130 mA
Maximum power P_i (gas)	800 mW	800 mW
Maximum power P_i (dust)	750/650/550 mW	-
Effective internal capacitance C_i	7.8 nF	7.8 nF
Effective internal inductance L_i	100 μ H	100 μ H
Sensor circuit connection values		
Terminals	-	1 - 4
Maximum voltage V_{oc}	-	6.5 V
Maximum current I_{sc}	-	9.3 mA
Maximum power P_{max}	-	15.2 mW
Maximum external capacitance C_a	-	24 μ F
Maximum external inductance L_a	-	365 μ H

Application	Ambient temperature range		Temperature class	Power P_i
	CSA	FM		
Class I	-50 ²⁾ / -40 ... +85 °C	-50 ²⁾ / -40 ... +85 °C	T4	800 mW
	-50 ²⁾ / -40 ... +75 °C	-50 ²⁾ / -40 ... +75 °C	T5	800 mW
	-50 ²⁾ / -40 ... +60 °C	-50 ²⁾ / -40 ... +60 °C	T6	800 mW
Class IIIC	-50 ²⁾ / -40 ... +40 °C	-	-	750 mW
	-50 ²⁾ / -40 ... +75 °C	-	-	650 mW
	-50 ²⁾ / -40 ... +100 °C	-	-	550 mW

1) Supply voltage input protected against reverse polarity; Load $R_A \leq (U_B - 10.5 \text{ V}) / 0.023 \text{ A}$ with R_A in Ω and U_B in V (without HART®)

On switching on, an increase in the supply voltage of 2 V/s is needed; otherwise the temperature transmitter will remain in a safe condition at 3.5 mA.

2) Special version, not for rail-mounted version T32.3S

Safety-related characteristic values (Ex)		
Ex marking	RU C-DE.ГБ08.B.02485, intrinsically safe equipment	
	0 Ex ia IIC T4/T5/T6	
	1 Ex ib IIC T4/T5/T6	
	2 Ex ic IIC T4/T5/T6	
	DIP A20 Ta 120 °C	
	DIP A21 Ta 120 °C	
Connection values / Intrinsically safe supply and signal circuit (4 ... 20 mA current loop)		
Terminals	+ / -	
Supply voltage U _B ¹⁾	DC 10.5 ... 30 V	
Maximum voltage V _{max}	DC 30 V	
Maximum current I _{max}	130 mA	
Maximum power P _i	800 mW	
Effective internal capacitance C _i	7.8 nF	
Effective internal inductance L _i	100 µH	
Sensor circuit connection values		
Terminals	1 - 4	
Maximum voltage V _{oc}	6.5 V	
Maximum current I _{sc}	9.3 mA	
Maximum power P _{max}	15.2 mW	
Maximum external capacitance C _a	IIC	24 µF
	IIB	570 µF
Maximum external inductance L _a	IIC	365 µH
	IIB	1,644 µH

Application	Ambient temperature range	Temperature class
Class IIC	-60 ²⁾ / -50 ³⁾ / -40 ... +85 °C	T4
Class IIB	-60 ²⁾ / -50 ³⁾ / -40 ... +75 °C	T5
	-60 ²⁾ / -50 ³⁾ / -40 ... +60 °C	T6

1) Supply voltage input protected against reverse polarity; Load $R_A \leq (U_B - 10.5 \text{ V}) / 0.023 \text{ A}$ with R_A in Ω and U_B in V (without HART®)

On switching on, an increase in the supply voltage of 2 V/s is needed; otherwise the temperature transmitter will remain in a safe condition at 3.5 mA.

2) Special version on request (only available with specific approvals), not for rail-mounted version T32.3S, not for SIL version

3) Special version, not for rail-mounted version T32.3S

T32.1S.0IC, T32.3S.0IC

ATEX approval, IEC

Safety-related characteristic values (Ex)		
Ex marking	II 3G Ex ic IIC T4/T5/T6 Gc	
Connection values / Intrinsically safe supply and signal circuit (4 ... 20 mA current loop)		
Terminals	+ / -	
Supply voltage U _B ¹⁾	DC 10.5 ... 30 V	
Maximum voltage U _i	DC 30 V	
Maximum current I _i	130 mA	
Maximum power P _i	800 mW	
Effective internal capacitance C _i	7.8 nF	
Effective internal inductance L _i	Negligible	
Sensor circuit connection values		
Terminals	1 - 4	
Maximum voltage U ₀	DC 6.5 V	
Maximum current I ₀	9.3 mA	
Maximum power P ₀	15.2 mW	
Effective internal capacitance C _i	208 nF	
Effective internal inductance L _i	Negligible	
Maximum external capacitance C ₀	Gas IIC	≤ 325 μF ³⁾
	Gas IIA	≤ 1,000 μF ³⁾
	Gas IIB, dust IIIC	≤ 570 μF ³⁾
Maximum external inductance L ₀	Gas IIC	≤ 821 mH
	Gas IIA	≤ 7,399 mH
	Gas IIB, dust IIIC	≤ 3,699 mH
Maximum inductance/resistance ratio L ₀ /R ₀	Gas IIC	≤ 3.23 mH/Ω
	Gas IIA	≤ 25.8 mH/Ω
	Gas IIB, dust IIIC	≤ 12.9 mH/Ω
Characteristic curve	Linear	

Application	Ambient temperature range	Temperature class	Power P_i
Group II Gas, category 1 and 2	-50 ²⁾ / -40 ... +85 °C	T4	800 mW
	-50 ²⁾ / -40 ... +75 °C	T5	800 mW
	-50 ²⁾ / -40 ... +60 °C	T6	800 mW

1) Supply voltage input protected against reverse polarity; Load $R_A \leq (U_B - 10.5 \text{ V}) / 0.023 \text{ A}$ with R_A in Ω and U_B in V (without HART®)

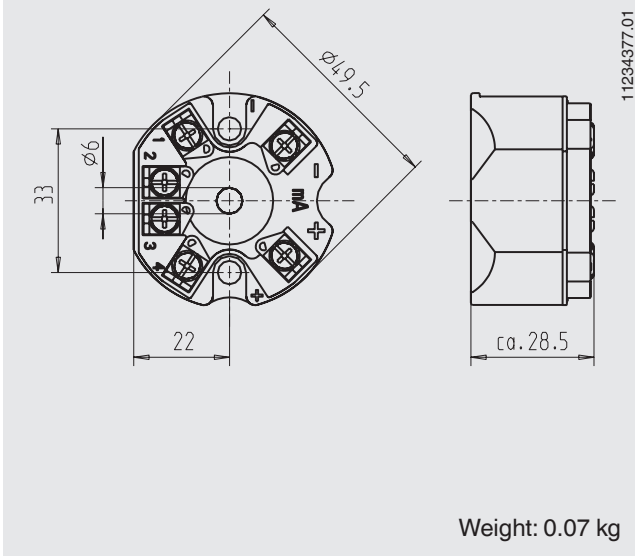
On switching on, an increase in the supply voltage of 2 V/s is needed; otherwise the temperature transmitter will remain in a safe condition at 3.5 mA.

2) Special version, not for rail-mounted version T32.3S

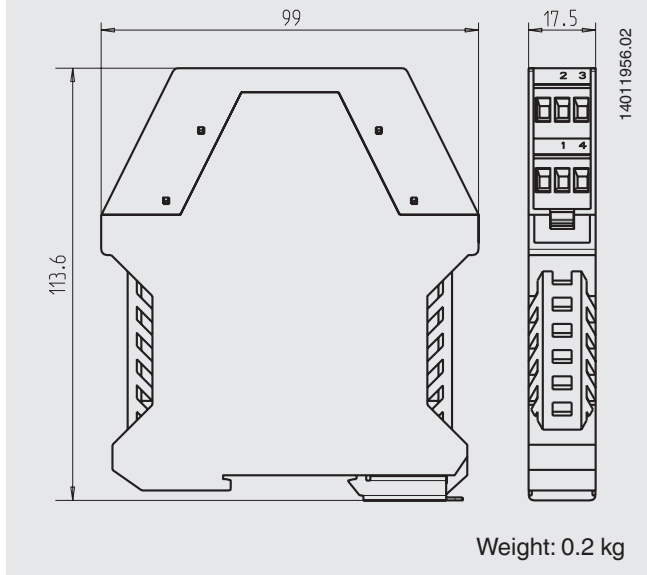
3) Ci already considered

Dimensions in mm

Head-mounted version



Rail-mounted version



Communication

HART® protocol rev. 5 ¹⁾ including burst mode, multidrop

Interoperability (i.e. compatibility between components from different manufacturers) is a strict requirement of HART® instruments. The T32 transmitter is compatible with almost every open software and hardware tool; including:

1. User-friendly WIKA configuration software, free-of-charge download from www.wika.com
2. HART® communicator FC375, FC475, MFC4150, MFC5150, Trex:
 - T32 device description (device object file) is integrated and upgradable with old versions
3. Asset management systems
 - 3.1 AMS: T32_DD completely integrated and upgradable with old versions
 - 3.2 Simatic PDM: T32_EDD completely integrated from version 5.1, upgradable with version 5.0.2
 - 3.3 Smart Vision: DTM upgradable per FDT 1.2 standard from SV version 4
 - 3.4 PACTware: DTM completely integrated and upgradable as well as all supporting applications with FDT 1.2 interface
 - 3.5 Field Mate: DTM upgradable

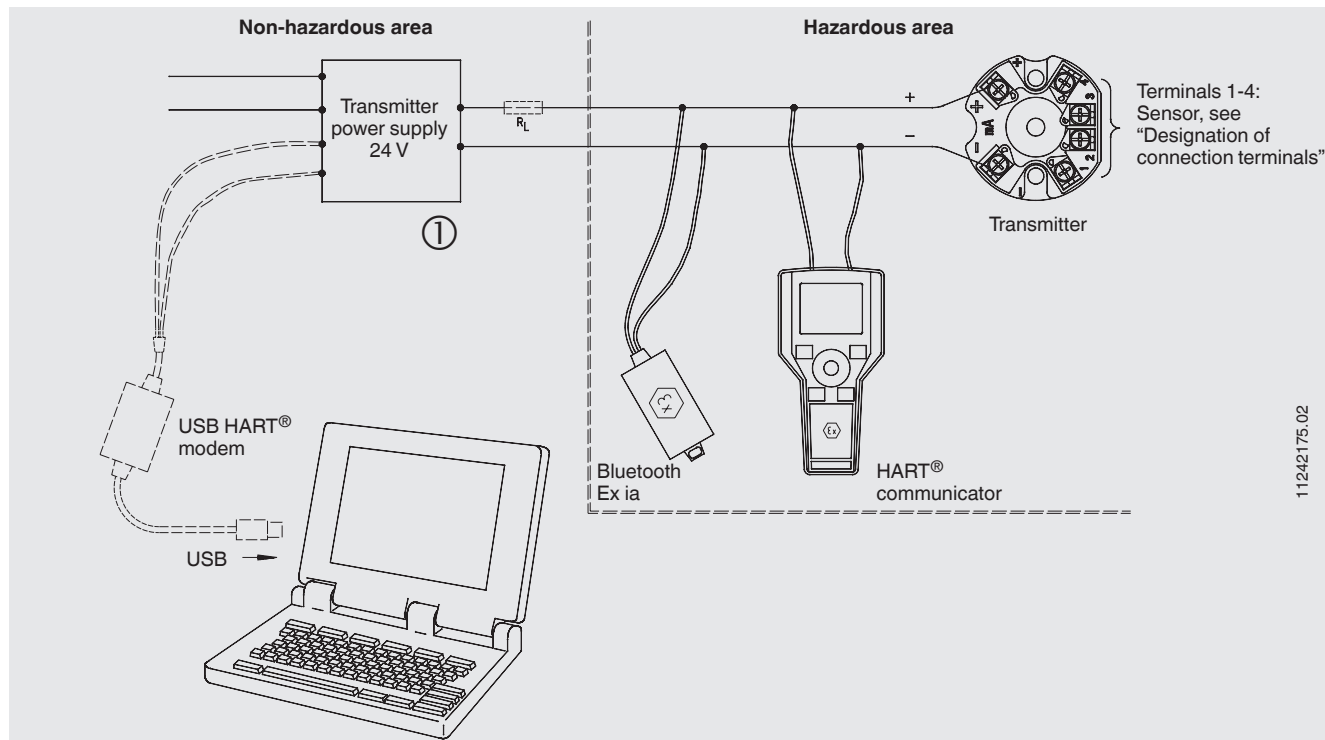
Attention:

For direct communication via the serial interface of a PC/notebook, a HART® modem is needed (see "Accessories"). As a general rule, parameters which are defined in the scope of the universal HART® commands (e.g. the measuring range) can, in principle, be edited with all HART® configuration tools.

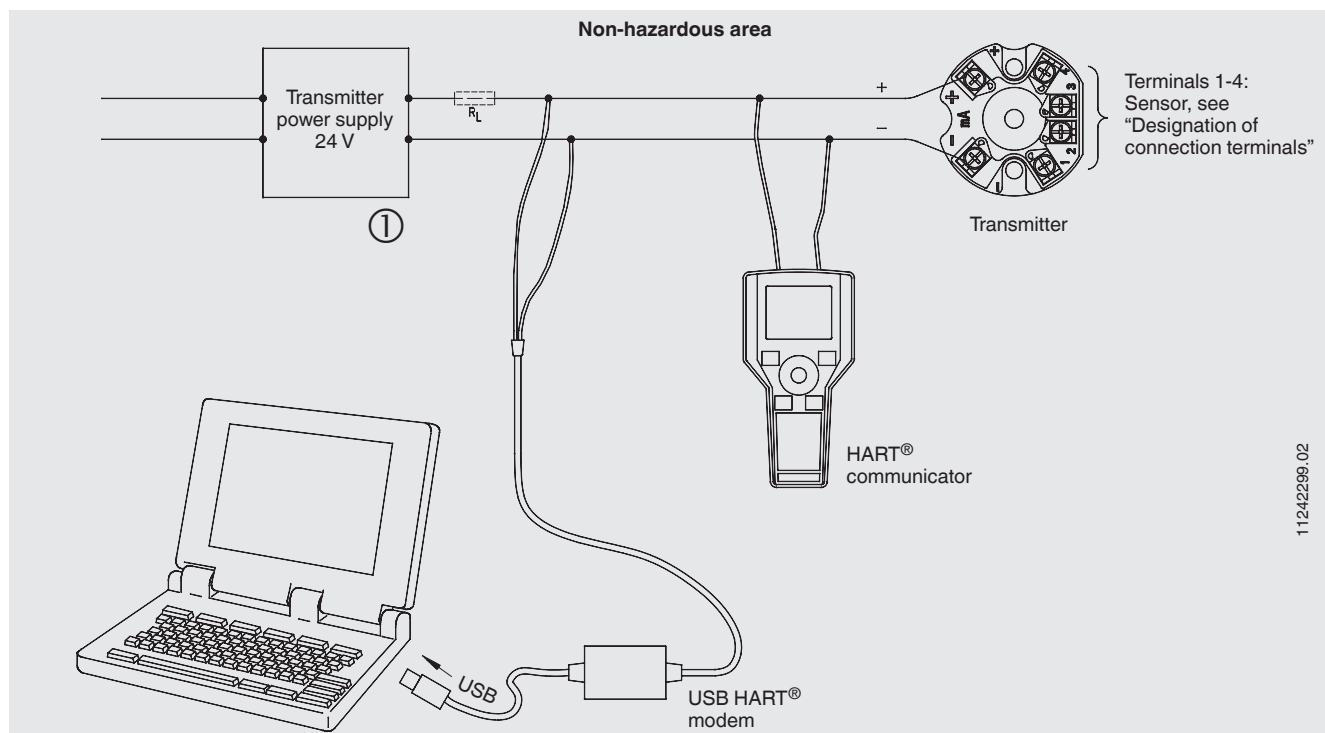
1) Optional: Rev. 7

Configuration

Typical connection in hazardous area



Typical connection in non-hazardous area







- ① RL = Load resistance for HART® communication
RL min. 250 Ω, max. 1,100 Ω

If RL is < 250 Ω in the respective electric circuit, RL must be increased to at least 250 Ω by connecting external resistors.





In the event of a fault, at very high ambient temperatures, with downscale error signaling and with unfavourable loads, communication may occasionally be impaired.

Accessories

DIH50-F with field case, adapter

Model	Description	Order number
	DIH50, DIH52 with field case DIH50 indication module without separate auxiliary supply voltage, automatically rescales on a change in measuring range and units via supervision of the HART® communication, 5-digit LC display, 20-segment bar graph display, display rotatable in 10° steps, with II 1G Ex ia IIC explosion protection; see data sheet AC 80.10 Material: Aluminium / stainless steel Dimensions: 150 x 127 x 138 mm	On request
	Adapter Suitable for TS 35 per DIN EN 60715 (DIN EN 50022) or TS 32 per DIN EN 50035 Material: Plastic / stainless steel Dimensions: 60 x 20 x 41.6 mm	3593789
	Adapter Suitable for TS 35 per DIN EN 60715 (DIN EN 50022) Material: Steel, tin-plated Dimensions: 49 x 8 x 14 mm	3619851
	Magnetic quick connector, model magWIK Replacement for crocodile clips and HART® terminals Fast, safe and tight electrical connection For all configuration and calibration processes	14026893

HART® modem

Model	Description	Order number
Programming unit, model PU-H		
	VIATOR® HART® USB HART® modem for USB interface	11025166
	VIATOR® HART® USB PowerXpress™ HART® modem for USB interface	14133234
	VIATOR® HART® RS-232 HART® modem for RS-232 interface	7957522
	VIATOR® HART® Bluetooth® Ex HART® modem for Bluetooth interface, Ex	11364254

Ordering information

Model / Explosion protection / SIL specifications / Configuration / Permissible ambient temperature / Certificates / Options

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We reserve the right to make modifications to the specifications and materials.
In case of a different interpretation of the translated and the English data sheet, the English wording shall prevail.



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Process transmitter With welded metal measuring cell Models IPT-20, IPT-21

WIKA data sheet PE 86.06



for further approvals
see page 11



Applications

- Chemical and petrochemical industries
- Process engineering
- Pharmaceutical industry
- Food and beverage industry
- Hazardous areas

Special features

- Ex protection per ATEX and IECEx
- For applications to SIL 2 (SIL 3)
- Welded metal measuring cell
- Seven different case variants
- Configuration via EDD and DTM (Device Type Manager) in accordance with the FDT (Field Device Tool) concept, e.g. PACTware



Fig. left: Model IPT-20, with pressure port
Fig. right: Model IPT-21, with flush diaphragm

Description

With its 4 ... 20 mA, 4 ... 20 mA HART®, PROFIBUS® PA or FOUNDATION Fieldbus™ output signals, combined with either intrinsic safety or flameproof enclosure ignition protection type (in accordance with ATEX and IECEx), the model IPT-2x is ideally suited to applications with the highest demands on the measurement technology.

Versatile in application

As a result of the available measuring ranges of 0 ... 0.1 bar to 0 ... 4,000 bar [0 ... 0.15 to 0 ... 60,000 psi] and a freely-selectable turndown, the instrument can be used in almost any application. The large number of process connections and the extensive possibilities offered by the metal measuring cell enables use in all industries.

There are seven different case variants available, and thus it is possible to select a variant suited to every operating environment.

The case itself can be rotated through 330° and is available in plastic, aluminium and stainless steel.

An electropolished stainless steel case (316L) is available to meet the high demands of the food and pharmaceutical industries.

Easy configuration and operation

Service and configuration at the instrument is carried out using the optional display and operating module, which can be fitted in four positions. The operating menu has a simple and self-explanatory structure and has nine selectable languages as standard. Alternatively, the operating parameters can be set using the PACTware™ free and non-proprietary configuration software. An instrument-specific DTM enables easy integration into corresponding process control systems.

Specifications

Instrument versions and measuring cells

Version	Measuring cell
Standard version	Metal measuring cell with piezoresistive sensor or thin-film sensor (depending on measuring range)
Version with cooling element (extended medium temperature range)	Metal measuring cell with piezoresistive sensor or thin-film sensor (depending on measuring range)
High-temperature version	Ceramic/metal measuring cell (→ for medium temperatures up to 200 °C [392 °F], see operating conditions)

Measuring ranges

Gauge pressure				
bar	0 ... 0.1 ²⁾	0 ... 0.4	0 ... 1	0 ... 2.5
	0 ... 5	0 ... 10	0 ... 25	0 ... 40
	0 ... 100	0 ... 250	0 ... 600	0 ... 1,000 ¹⁾
	0 ... 1,600 ¹⁾	0 ... 2,500 ¹⁾	0 ... 4,000 ¹⁾	
psi	0 ... 1.5 ²⁾	0 ... 5	0 ... 15	0 ... 30
	0 ... 75	0 ... 150	0 ... 300	0 ... 500
	0 ... 1,450	0 ... 3,000	0 ... 9,000	0 ... 15,000 ¹⁾
	0 ... 30,000 ¹⁾	0 ... 50,000 ¹⁾	0 ... 60,000 ¹⁾	

Absolute pressure				
bar	0 ... 0.1 ²⁾	0 ... 0.4 ²⁾	0 ... 1	0 ... 2.5
	0 ... 5	0 ... 10	0 ... 25	0 ... 40
psi	0 ... 1.5	0 ... 5	0 ... 15	0 ... 30
	0 ... 150	0 ... 300	0 ... 500	

Vacuum and +/- measuring range				
bar	-0.05 ... +0.05 ²⁾	-0.2 ... +0.2	-0.5 ... +0.5	-1 ... 0
	-1 ... +1.5	-1 ... +5	-1 ... +10	-1 ... +25
	-1 ... 40			
psi	-0.7 ... +0.7	-3 ... +3	-7 ... +7	-14.5 ... 0
	-14.5 ... +20	-14.5 ... +75	-14.5 ... +150	-14.5 ... +300
	-14.5 ... +500			

1) Only for model IPT-20

2) Only for high-temperature version

Other measuring ranges can be set via turndown (scaling).

Maximum setting range of the pressure value: -20 ... +120 %

For example, a 0 ... 10 bar [0 ... 150 psi] instrument can also be used from -1 ... +10 bar [-14.5 ... +150 psi].

Values of less than 0 bar abs. [0 psia] cannot be set or measured.

Vacuum/overload safety	
Vacuum safety	Yes (not for oxygen applications)
Overload safety (standard version, version with cooling element)	
Measuring range ≤ 40 bar [500 psi]	3 times
Measuring range 40 ... 1,000 bar [500 ... 15,000 psi]	2 times

Vacuum/overload safety	
Measuring range 1,600 bar [30,000 psi]	1.5 times
Measuring range 2,500 bar [50,000 psi]	1.4 times
Measuring range 4,000 bar [60,000 psi]	1.25 times
Overload safety (high-temperature version)	
Measuring range 0.1 bar [1.5 psi]	15 bar [220 psi]
Measuring range 0.4 bar [5 psi]	30 bar [430 psi]
Measuring range 1.0 bar [15 psi]	35 bar [510 psi]
Measuring ranges from 2.5 ... 25 bar [30 ... 300 psi]	50 bar [720 psi]

Output signals

Output signals	
Signal types	<ul style="list-style-type: none"> ■ 4 ... 20 mA ■ 4 ... 20 mA with a superimposed HART® communication signal (option: SIL qualification) ■ HART® specification: 7.3 ■ FOUNDATION™ Fieldbus ■ PROFIBUS® PA ■ Slave electronics for electrical differential pressure (option: SIL qualification)
Load in Ω	$(U_B - U_{Bmin}) / 0.022 \text{ A}$ U_B = Applied supply voltage (→ see table "Supply voltage") U_{Bmin} = Minimum supply voltage (→ see table "Supply voltage")
Dampening	0 ... 999 s, adjustable After the set dampening time the instrument outputs 63 % of the applied pressure as output signal. Example: A pressure impulse increases from 0 to 10 bar with a dampening of 2 seconds. After the 2 seconds a pressure of 6.3 bar is displayed.
Step response time	< 80 ms (= dead time < 25 ms + rise time 10 ... 90 % < 55 ms)

Accuracy specifications

Accuracy specifications		
Accuracy at reference conditions ¹⁾		
Measuring range ≤ 1,000 bar [15,000 psi]	0.1 % of span (options: 0.075 % / 0.2 %)	
Measuring range > 1,000 bar [15,000 psi]	0.5 % of span	
Adjustability		
Zero point	-20 ... +95 % (downwards, the adjustability is always limited by the minimum pressure of 0 bar abs.)	
Span	Measuring range ≤ 1,000 bar [15,000 psi]	-120 ... +120 % with a difference between zero point and span of max. 120 % of the nominal measuring range
	Measuring range > 1,000 bar [15,000 psi]	(0 bar abs.) ... +105 % (downwards, the adjustability is always limited by the minimum pressure of 0 bar abs.)
Turndown	Unlimited	
	Measuring range ≤ 1,000 bar [15,000 psi]	Maximum recommended turndown 20:1
	Measuring range > 1,000 bar [15,000 psi]	Maximum recommended turndown 2:1
	SIL applications	Max. turndown 10:1
Non-linearity per BFSL (per IEC 61298-2)		
Measuring range ≤ 1,000 bar [15,000 psi]	≤ 0.05 % of span	
Measuring range > 1,000 bar [15,000 psi]	≤ 0.25 % of span	

Accuracy specifications		
Non-repeatability (per IEC 61298-2)		
Measuring range ≤ 1,000 bar [15,000 psi]	≤ 0.1 % of span	
Measuring range > 1,000 bar [15,000 psi]	≤ 0.5 % of span	
Behaviour with turndown		
1:1 ... 5:1 with measuring range 0.1 ... 1,000 bar [1.5 ... 15,000 psi]	No change in accuracy	
> 5:1 with measuring range 0.1 ...1,000 bar [1.5 ... 15,000 psi]	(basic accuracy / 5) x turndown	
1:1 ... 2:1 with measuring range > 1,000 bar [15,000 psi]	< 0.5 % x turndown	
Long-term stability at reference conditions (standard version, version with cooling element)		
Measuring range < 1 bar [15 psi]	≤ (0.35 % x turndown) / year	
Measuring range = 1 bar [15 psi]	≤ (0.15 % x turndown) / year	
Measuring range > 1 bar [15 psi]	≤ (0.10 % x turndown) / year	
Measuring range > 1,000 bar [15,000 psi]	≤ (0.50 % x turndown) / year	
Long-term stability at reference conditions (high-temperature version)	≤ (0.05 % x turndown) / year	
Thermal change, zero point and span (reference temperature 20 °C [68 °F])		
In compensated range 10 ... 70 °C [50 ... 158 °F]	Measuring range ≤ 1,000 bar [15,000 psi]	< 0.075 % / 10 K (max. 0.15 %)
	Measuring range > 1,000 bar [15,000 psi]	No compensated range
Outside compensated range	Measuring range ≤ 1,000 bar [15,000 psi]	< 0.15 % + 0.075 % / 10 K
	Measuring range > 1,000 bar [15,000 psi]	< 0.5 % + 0.2 % / 10 K
Thermal change of the current output (reference temperature 20 °C [68 °F])	< 0.05 % / 10 K (max. 0.15 %) for 4 ... 20 mA output at -40 ... +80 °C [-40 ... +176 °F]	
Deviations through strong electromagnetic fields within the scope of EN 61326-1	< ±150 µA	

1) Including non-linearity, hysteresis, zero offset and end value deviation (corresponds to measured error per IEC 61298-2). Calibrated in vertical mounting position with process connection facing downwards.

For use in hydrogen applications, observe the Technical information IN 00.40 at www.wika.com regarding long-term stability.

Reference conditions (per IEC 61298-1)

Reference conditions (per IEC 61298-1)	
Temperature	18 ... 30 °C [64 ... 86 °F]
Atmospheric pressure	860 ... 1,060 mbar [86 ... 106 kPa, 12.5 ... 15.4 psig]
Air humidity	45 ... 75 % r. h.
Characteristic curve determination	Terminal method per IEC 61298-2
Curve characteristics	Linear
Reference mounting position	Vertical, diaphragm points downward

Voltage supply

Supply voltage (non-Ex and Ex d)

Signal type	Backlighting	
	Inactive	Active
4 ... 20 mA	DC 9.6 ... 35 V	DC 16 ... 35 V
4 ... 20 mA with a superimposed HART® communication signal	DC 9.6 ... 35 V	DC 16 ... 35 V
FOUNDATION™ Fieldbus	DC 9 ... 32 V	DC 13.5 ... 32 V
PROFIBUS® PA	DC 9 ... 32 V	DC 13.5 ... 32 V

Supply voltage (Ex ia)

Signal type	Backlighting	
	Inactive	Active
4 ... 20 mA	DC 9.6 ... 30 V	DC 16 ... 30 V
4 ... 20 mA with a superimposed HART® communication signal	DC 9.6 ... 30 V	DC 16 ... 30 V
FOUNDATION™ Fieldbus	DC 9 ... 24 V (DC 9 ... 17.5 V Fisco)	DC 13.5 ... 24 V (DC 13.5 ... 17.5 V Fisco)
PROFIBUS® PA	DC 9 ... 24 V (DC 9 ... 17.5 V Fisco)	DC 13.5 ... 24 V (DC 13.5 ... 17.5 V Fisco)

Process connections

Standard process connections for model IPT-20	
EN 837	<ul style="list-style-type: none"> ■ G ½ B ■ M20 x 1.5 ■ G ¼ B female, G ½ B male (for high-temperature version with metal/ceramic measuring cell)
ANSI / ASME B1.20.1	<ul style="list-style-type: none"> ■ ½ NPT ■ ½ NPT female ■ ¼ NPT female, ½ NPT male

Standard high-pressure connections for model IPT-20 from 1,600 bar [30,000 psi]	
-	<ul style="list-style-type: none"> ■ M16 x 1.5 female ■ M20 x 1.5 female ■ 9/16-18 UNF female ■ 1 ⅞ -12 UNF female thread

Aseptic process connections for model IPT-21	
Flush	<ul style="list-style-type: none"> ■ G ½ B ■ G 1 B ■ G 1 ½ B ■ G 1 hygienic
ANSI / ASME B1.20.1	½ NPT (for high-temperature version)
-	<ul style="list-style-type: none"> ■ M44 x 1.25 with union nut (for version with cooling element) ■ M44 x 1.25 with union nut (for high-temperature version)
TRI-CLAMP®	<ul style="list-style-type: none"> ■ 1 ½" ■ 2"
VARI LINE®	<ul style="list-style-type: none"> ■ Form F ■ Form N
Grooved union nut DIN 11851	<ul style="list-style-type: none"> ■ DN 25 ■ DN 40 ■ DN 50

Aseptic process connections for model IPT-21		
NEUMO BioControl®	<ul style="list-style-type: none"> ■ Size 50 ■ Size 65 	
Clamp connection per DIN 11864-3	<ul style="list-style-type: none"> ■ DN 40 ■ DN 50 	

BioControl® is a registered trademark of NEUMO.

Pressure transmission medium		
Standard version and extended medium temperature range		
Model IPT-20	Measuring range ≤ 40 bar [500 psi]	Synthetic oil, halocarbon oil
	Measuring range > 40 bar [500 psi]	Dry measuring cell
Model IPT-21	Synthetic oil, halocarbon oil	
High-temperature version		
Models IPT-20 and IPT-21	Medicinal white mineral oil	

Halocarbon oil, generally with oxygen applications, not with vacuum and absolute pressure < 1 bar abs. The application demands special cleaning processes which ensure oil and grease-free surfaces. Optionally FDA-listed media for the food industry are available. All media are silicone-free.

Diaphragm seal

By using diaphragm seals, it is possible to adapt the process transmitter to even the most difficult of conditions in the process industry. Thus, the transmitter can be used at extreme temperatures, and with aggressive, corrosive, heterogeneous, abrasive, highly viscous or toxic media. As a result of the wide variety of aseptic connections (such as clamp, threaded pipe or DIN 11864 aseptic connections) measuring assemblies meet the high demands of sterile process engineering.



Materials

Materials			
Wetted parts			
Standard version, version with cooling element	Model IPT-20	Measuring ranges ≤ 40 bar [500 psi]: Stainless steel 316L/1.4404	
		Measuring ranges > 40 bar [500 psi]: Stainless steel 316L/1.4404 + Elgiloy 2.4711	
		Measuring ranges >1,000 bar [15,000 psi]: Stainless steel XM-13/1.4534	
	Model IPT-21	Standard	Stainless steel 316L/1.4404
		Option	Hastelloy C276/2.4819
		Option	Gold-plated 20 μ
		Option	Gold/rhodium-plated 5 μ/1 μ
High-temperature version	Model IPT-20, IPT-21	Stainless steel 316L / Hastelloy HC276	
O-ring (only for model IPT-21)	NBR, FKM, EPDM, FFKM, FEPM		

316L stainless steel, corresponds to 1.4404 or 1.4435
316Ti stainless steel, corresponds to 1.4571

Case	Material
Single chamber case, plastic	PBT, polyester
Single chamber case, aluminium	Die-casting AlSi10Mg, powder-coated on PE basis
Single chamber case, cast stainless steel	Stainless steel 316L
Single chamber case, electropolished stainless steel, deep-drawn	Stainless steel 316L
Double chamber case, plastic	PBT, polyester

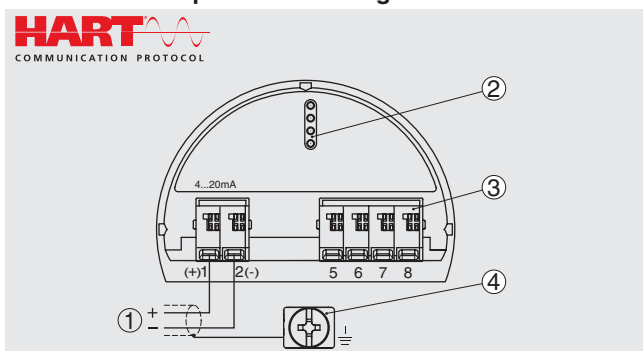
Case	Material
Double chamber case, aluminium	Die-casting AlSi10Mg, powder-coated on PE basis
Double chamber case, cast stainless steel	Stainless steel 316L

Electrical connection

Electrical connection		
Spring-loaded terminals		Wire cross-section: Wire or strand: 0.2 ... 2.5 mm ² (AWG 24 ... 14) Strand with end splice: 0.2 ... 1.5 mm ² (AWG 24 ... 16)
Cable glands M20 x 1.5		
Plastic, PA	Sealing	NBR
	Cable diameter	■ 5 ... 9 mm [0.2 ... 0.35 in] ■ 6 ... 12 mm [0.24 ... 0.47 in] ■ 10 ... 14 mm [0.39 ... 0.55 in]
Brass, nickel-plated	Sealing	NBR
	Cable diameter	9 ... 13 mm [0.35 ... 0.51 in] (for armoured cable)
Stainless steel	Sealing	NBR
	Cable diameter	7 ... 12 mm [0.28 ... 0.47 in]
Cable glands ½ NPT		
Sealed with blind plug		
Plastic, PA	Cable diameter	5 ... 9 mm [0.2 ... 0.35 in]
Brass, nickel-plated	Cable diameter	6 ... 12 mm [0.24 ... 0.47 in]
Brass, nickel-plated	Cable diameter	9 ... 13 mm [0.35 ... 0.51 in] (for armoured cable)
Angular connector DIN 175301-803A with mating connector		Wire cross-section: max. 1.5 mm ² (AWG 16) Ingress protection: IP65 ¹⁾
Circular connector M12 x 1 (4-pin) without mating connector		Ingress protection: IP65 ¹⁾
Electrical safety		Reverse polarity protection

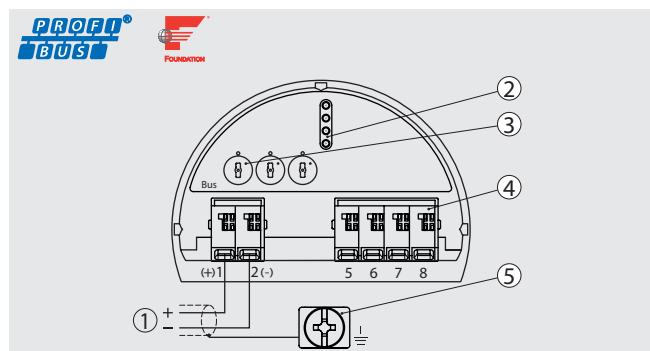
¹⁾ The stated ingress protection only applies when plugged in using mating connectors that have the appropriate ingress protection.

Connection compartment for single chamber case



4 ... 20 mA / HART®

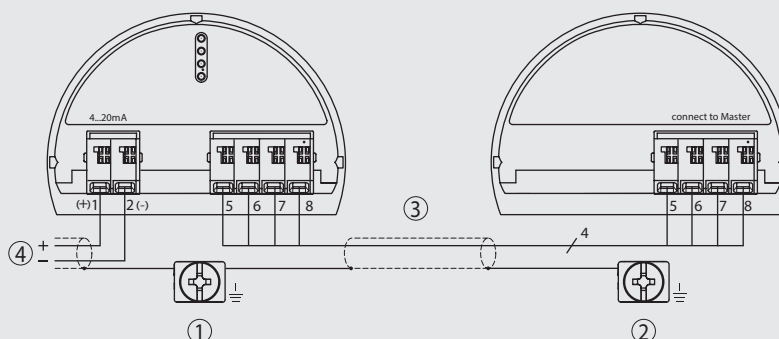
①	Voltage supply / signal output
②	Interface of digital display
③	Connection terminals for external display and operating unit
④	Ground terminal for cable shield



PROFIBUS® PA / FOUNDATION™ Fieldbus

①	Voltage supply / signal output
②	Interface of digital display
③	■ For FOUNDATION™ Fieldbus simulation switch (1 = operation with simulation release) ■ For PROFIBUS® PA: Adjustment of the Profibus settings via 3 switches
④	Connection terminals for external display and operating unit
⑤	Ground terminal for cable shield

Differential pressure measurement, master/slave



Master/slave

①	Master
②	Slave
③	Master/slave connection cable, 4-wire (included in delivery) (standard cable length 5 m, maximum cable length 25 m)
④	Voltage supply / signal output (master) (→ see “Voltage supply”)

Electronic differential pressure measurement with two process transmitters

Two model IPT-2x or CPT-2x process transmitters can be electrically connected into a measuring arrangement in order to be used for electronic differential pressure measurement. The measurement also functions with a combination of both models, though the instruments must both be either absolute pressure or gauge pressure instruments. Another requirement is that one of the instruments is a HART® or BUS-capable instrument that is used as the master and the other is the slave instrument. The instrument must be ordered with this specification in advance.



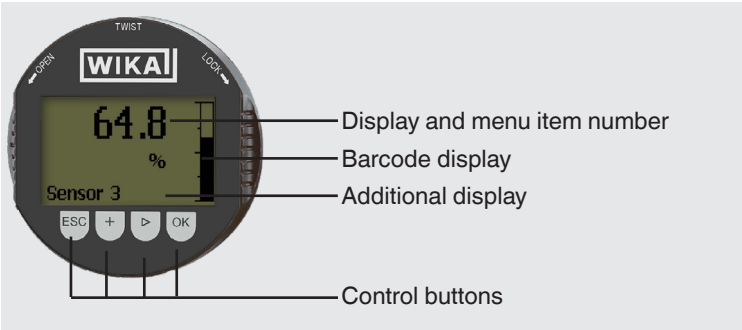
The process transmitters are connected to each other using an internal BUS cable (→ see figure).

The setting as a master-slave arrangement is made in the master instrument. Thus this instrument takes control of both sensors. As an output signal, the process pressure of the master and the slave, and also the differential pressure are determined.

Electronic differential pressure measurement is used in many applications for detecting the level in tanks and other vessels. Compared to measurement via a differential pressure transmitter and two capillary lines, electronic differential pressure measurement involves bridging the distances between the measuring locations with a current cable. Thus the temperature error of the capillary of a diaphragm seal assembly is completely avoided.

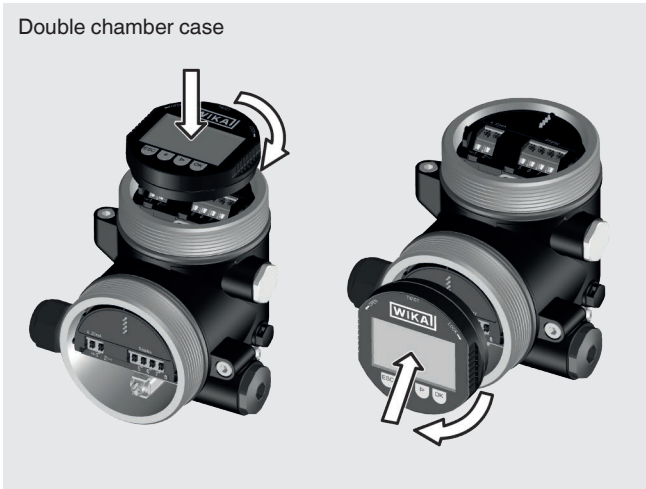
For this measurement procedure, the relation between the static pressure (process pressure) and the differential pressure to be measured is critical. If the static pressure is higher than the differential pressure by a factor of 20, the turndown causes a measurement error that is usually greater than the thermal effect with the same arrangement with capillaries.

Display and operating unit (option)



Specifications				
Backlighting	Yes			
Background	Grey, black digits			
Upgradable	Yes (→ For order numbers, see “Accessories”)			
Menu languages	German English French Spanish	Polish Italian Dutch Japanese	Chinese Russian Portuguese Czech	Turkish
Adjustable units				
Pressure units	<div> <div> ■ bar ■ psi ■ mbar ■ MPa ■ kPa </div> <div> ■ Pa ■ mmH₂O ■ inH₂O ■ mmHg ■ inHg </div> </div>			
Level units	<div> ■ m ■ cm ■ ft ■ in </div>			
Display size	5-digit measured value display, adjustable (option: bar graph display) Max. 5 digits, size 7 x 13 mm [0.28 x 0.51 in]			
Ingress protection per IEC/EN 60529	IP20 (loose) IP40 (built-in without cover)			
Material	Case from ABS, window from polyester film			








Mounting positions



Operating conditions


Operating conditions		
Permissible temperature ranges (standard version, version with cooling element)		
Ambient	<div><div></div>-15 ... +70 °C [5 ... 158 °F] (with digital display)</div> <div><div></div>-40 ... +80 °C [-40 ... 176 °F] (without digital display)</div>	
Medium	<div><div></div>-40 ... +105 °C [-40 ... 221 °F]</div> <div><div></div>-20 ... +150 °C [-4 ... 302 °F] (version with cooling element)</div> <div><div></div>-20 ... +60 °C [-4 ... 140 °F] (for oxygen applications)</div>	
Storage	<div><div></div>-40 ... +80 °C [-40 ... 176 °F] (with digital display)</div> <div><div></div>-60 ... +80 °C [-76 ... +176 °F] (without digital display)</div>	
Restrictions to medium temperature due to sealing material	For oxygen applications max. 60 °C [140 °F]	
FKM	<div><div></div>-20 ... +105 °C (option: -20 ... +150 °C)</div> <div><div></div>-4 ... +221 °F [option: -4 ... +302 °F]</div>	
EPDM	<div><div></div>-20 ... +105 °C (option: -20 ... +150 °C)</div> <div><div></div>-4 ... +221 °F [option: -4 ... +302 °F]</div>	
NBR	-15 ... +105 °C [5 ... 221 °F]	
FFKM	<div><div></div>-15 ... +105 °C (option -15 ... +150 °C)</div> <div><div></div>5 ... 221 °F [option: 5 ... 302 °F]</div>	
FEPM	-5 ... +105 °C [23 ... 221 °F]	
Permissible temperature ranges (high-temperature version)		
Ambient	<div><div></div>-12 ... +70 °C [-4 ... 158 °F] (with digital display)</div> <div><div></div>-12 ... +80 °C [-40 ... 176 °F] (without digital display)</div>	
Medium	<div><div></div>-12 ... +180 °C [-10.4 ... +356 °F]</div> <div><div></div>-12 ... +200 °C [-10.4 ... +392 °F] (with shield sheet)</div>	
Storage	<div><div></div>-40 ... +80 °C [-40 ... 176 °F] (with digital display)</div> <div><div></div>-60 ... +80 °C [-76 ... +176 °F] (without digital display)</div>	
Vibration resistance per EN 60068-2-6 (vibration under resonance)	4 g (5 ... 200 Hz) per GL characteristic curve 2 Double chamber case from stainless steel: 0.75 g per GL characteristic curve 1	
Shock resistance per IEC 60068-2-27	Measuring range ≤ 1,000 bar [15,000 psi]	50 g (2.3 ms) per IEC 60068-2-27
	Measuring range > 1,000 bar [15,000 psi]	20 g (4.6 ms) per IEC 60068-2-27
	Double chamber case from stainless steel with cooling element	20 g
Instrument safety		
Ingress protection per IEC/EN 60529	<div><div></div>IP66/67</div> <div><div></div>IP66/IP68 (0.2 bar) for absolute pressure sensors</div> <div><div></div>Option: IP66/IP68 (1 bar) or IP66/IP68 (25 bar)</div>	
Electrical safety	Overvoltage category III, protection class II	
SIL per IEC 61508:2010	Single-channel operation up to SIL 2 Multi-channel operation (homogeneous, redundant) up to SIL 3	

Approvals

Logo	Description	Country
 	EU declaration of conformity	European Union
	EMC directive	
	Pressure equipment directive	
	RoHS directive	
	ATEX directive Hazardous areas - Ex i Zone 0 gas [II 1G Ex ia IIC T6 ... T1 Ga] Zone 1 gas mounting to zone 0 gas [II 1/2G Ex ia IIC T6 ... T1 Ga/Gb] Zone 1 gas [II 2G Ex ia IIC T6 ... T1 Gb] Zone 20 dust [II 1D Ex ia IIC T135 Da] Zone 21 dust [II 2D Ex ia IIC T135 Db] - Ex d Zone 1 gas mounting to zone 0 gas [II 1/2G Ex db ia IIC T6 ... T1 Ga/Gb] Zone 2 gas [II 2G Ex db ia IIC T6 ... T1 Gb] Zone 21 dust [II 2D Ex db ia IIC T135 Db]	
	IECEx Hazardous areas - Ex i Zone 0 gas [Ex ia IIC T6 ... T1 Ga] Zone 1 gas mounting to zone 0 gas [Ex ia IIC T6 ... T1 Ga/Gb] Zone 1 gas [Ex ia IIC T6 ... T1 Gb] Zone 20 dust [Ex ia IIC T135 Da] Zone 21 dust [Ex ia IIC T135 Db] - Ex d Zone 1 gas mounting to zone 0 gas [Ex db ia IIC T6 ... T1 Ga/Gb] Zone 2 gas [Ex db ia IIC T6 ... T1 Gb] Zone 21 dust [Ex db ia IIC T135 Db]	International
	GOST Metrology, measurement technology	Russia
	UkrSEPRO Metrology, measurement technology	Ukraine
	3-A Food This instrument is 3-A marked, based on a third party verification for conformance to the 3-A standard.	International
	EHEDG Hygienic Equipment Design	European Union

→ Approvals and certificates, see website

Manufacturer's information and certificates

Logo	Description
	SIL 2 (option) ¹⁾ Functional safety ■ Single-channel operation up to SIL 2 ■ Multi-channel operation (homogeneous, redundant) up to SIL 3
-	NAMUR recommendations NE21 - Electrical compatibility of equipment NE43 - Signal level for failure information NE53 - Compatibility of field instruments NE107 - Self-monitoring and diagnostics

¹⁾ Only for output signal 4 ... 20 mA with HART® and with SIL
 Max. turndown for SIL applications 10:1

NAMUR recommendations

NAMUR is the automation technology interest group for the process industry in Germany. The published NAMUR recommendations are considered standards in field instrumentation, and also have the character of international standards.

The instrument fulfils the requirements of the following NAMUR recommendations:

- NE21 - Electromagnetic compatibility of equipment
- NE43 - Signal level for failure information for transmitters
- NE53 - Compatibility of field instruments and display and operating components
- NE107 - Self-monitoring and diagnostics of field instruments

→ For further information, see www.namur.net/en

NACE

NACE is a term for an organisation (National Association of Corrosion Engineers) concerned with the topic of corrosion. The results of this organisation are published as NACE standards and regularly updated.

The instruments and, in particular, the weld seams fulfil:

- NACE MR0103 - Applications in oil refineries
- NACE MR0175 - Oil extraction and processing

FDA compliant filling and sealing

The FDA is the American supervisory authority for the area of "food and drugs", which also controls all goods placed on the market. An important topic is the use of substances that can come into contact with foodstuffs. Stainless steels are generally not critical, but plastics (e.g. sealings) and liquids (e.g. pressure transmission media) for use in food, pharmaceutical and biotechnology applications must be designed in accordance with the requirements of the FDA.

Some of the substances in these instruments are classified as FDA compliant.

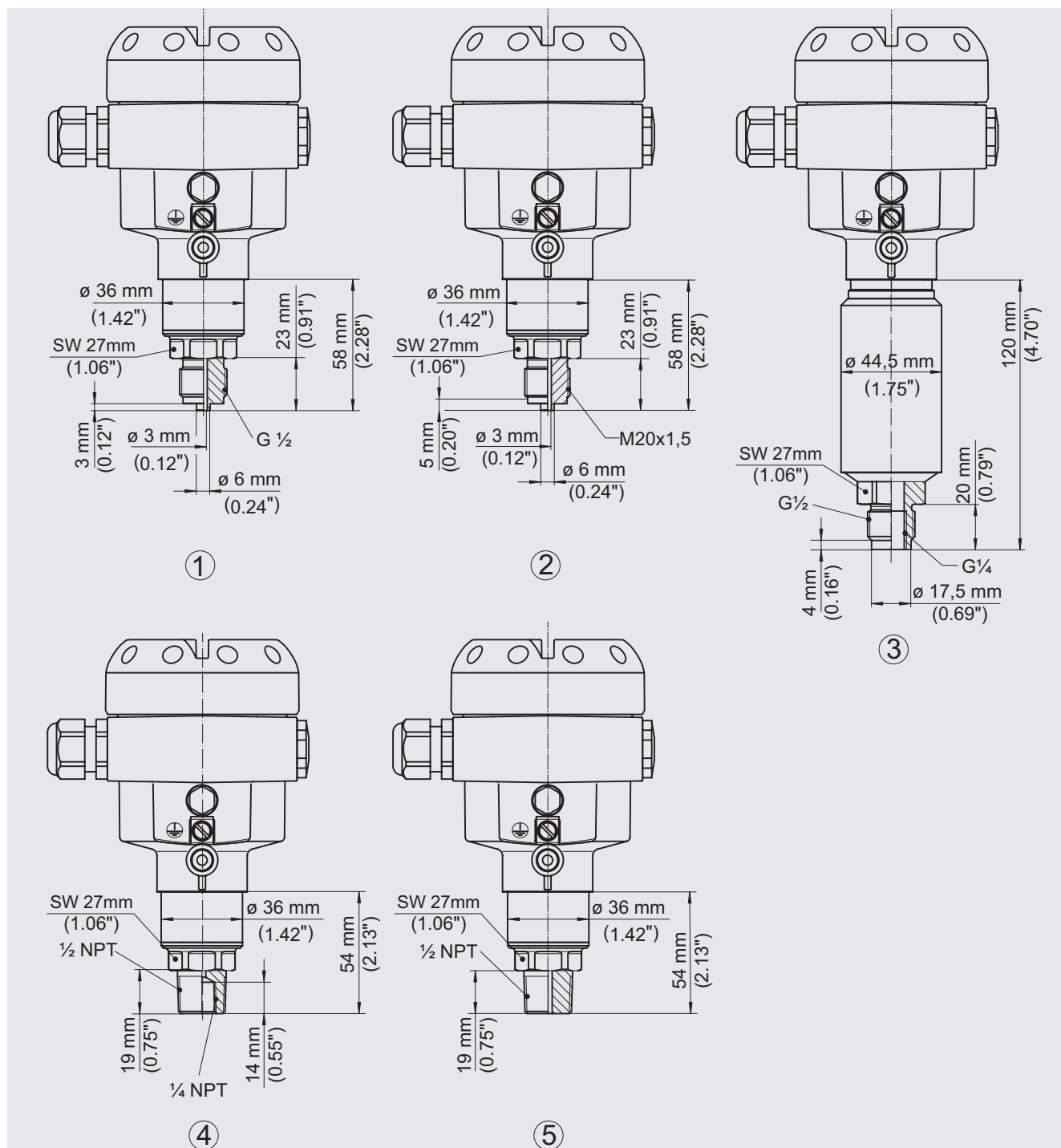
Certificates (option)

- Test certificate for the measurement accuracy included in delivery (5 measuring points in the scaled range)
- 2.2 test report
- 3.1 inspection certificate
- Manufacturer's declaration regarding regulation (EC) 1935/2004
- Manufacturer's declaration regarding regulation (EC) 2023/2006 (GMP)
- DKD/DAkkS calibration per IEC 17025

→ Approvals and certificates, see website

Dimensions in mm [in]

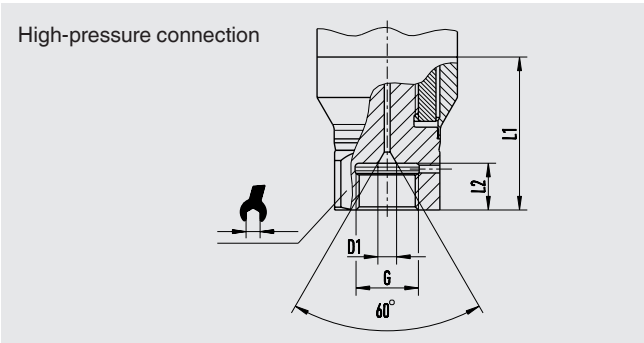
Standard process connections for model IPT-20



Standard process connections for model IPT-20

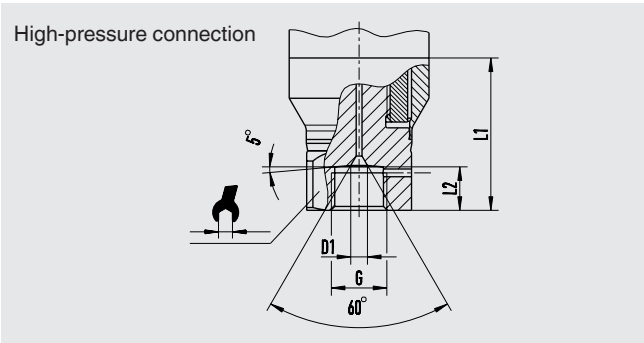
①	EN 837	G ½ B
②	DIN 16288	M20 x 1.5
③	ISO 228	G ¼ B female, G ½ B male (for high-temperature version with metal/ceramic measuring cell)
④	ANSI / ASME B1.20.1	¼ NPT female, ½ NPT
⑤	ANSI / ASME B1.20.1	½ NPT

High-pressure process connections for model IPT-20



G	L1	D1	SW
M16 x 1.5	12 [0.47]	4.8 [0.19]	27 [1.06]
M20 x 1.5	15 [0.59]	4.8 [0.19]	27 [1.06]

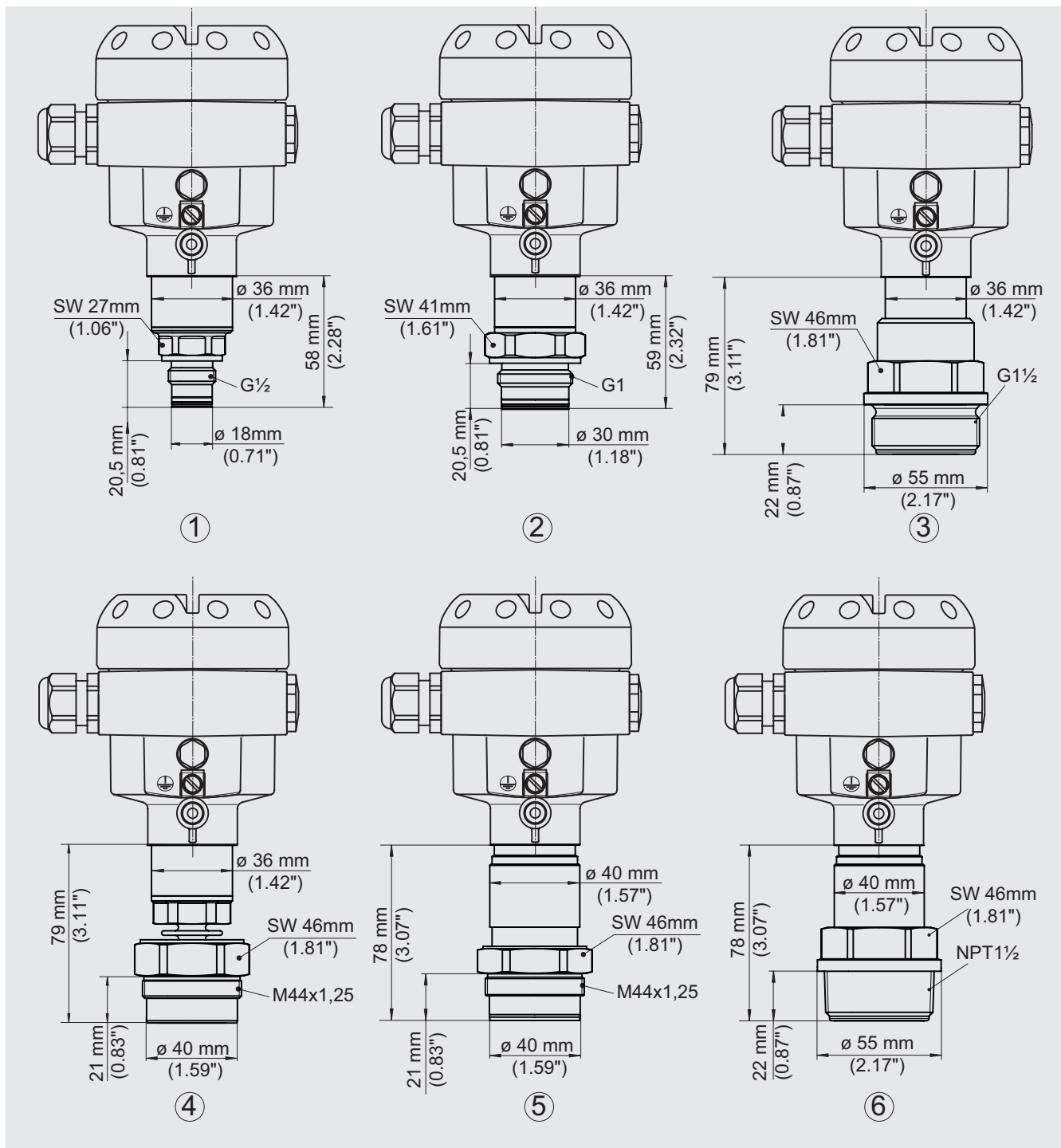
M16 x 1.5 for measuring ranges from 100 bar [1,500 psi] to 4,000 bar [60,000 psi]
M20 x 1.5 for measuring ranges from 1,600 bar [30,000 psi] to 4,000 bar [60,000 psi]



G	L1	D1	SW
9/16-18 UNF female F 250-C	11.2 [0.44]	4.3 [0.17]	27 [1.06]
1 1/8 -12 UNF female F 562-C	19.1 [0.75]	9.7 [0.38]	41 [1.6]

Measuring ranges from 100 bar [1,500 psi] to 4,000 bar [60,000 psi]

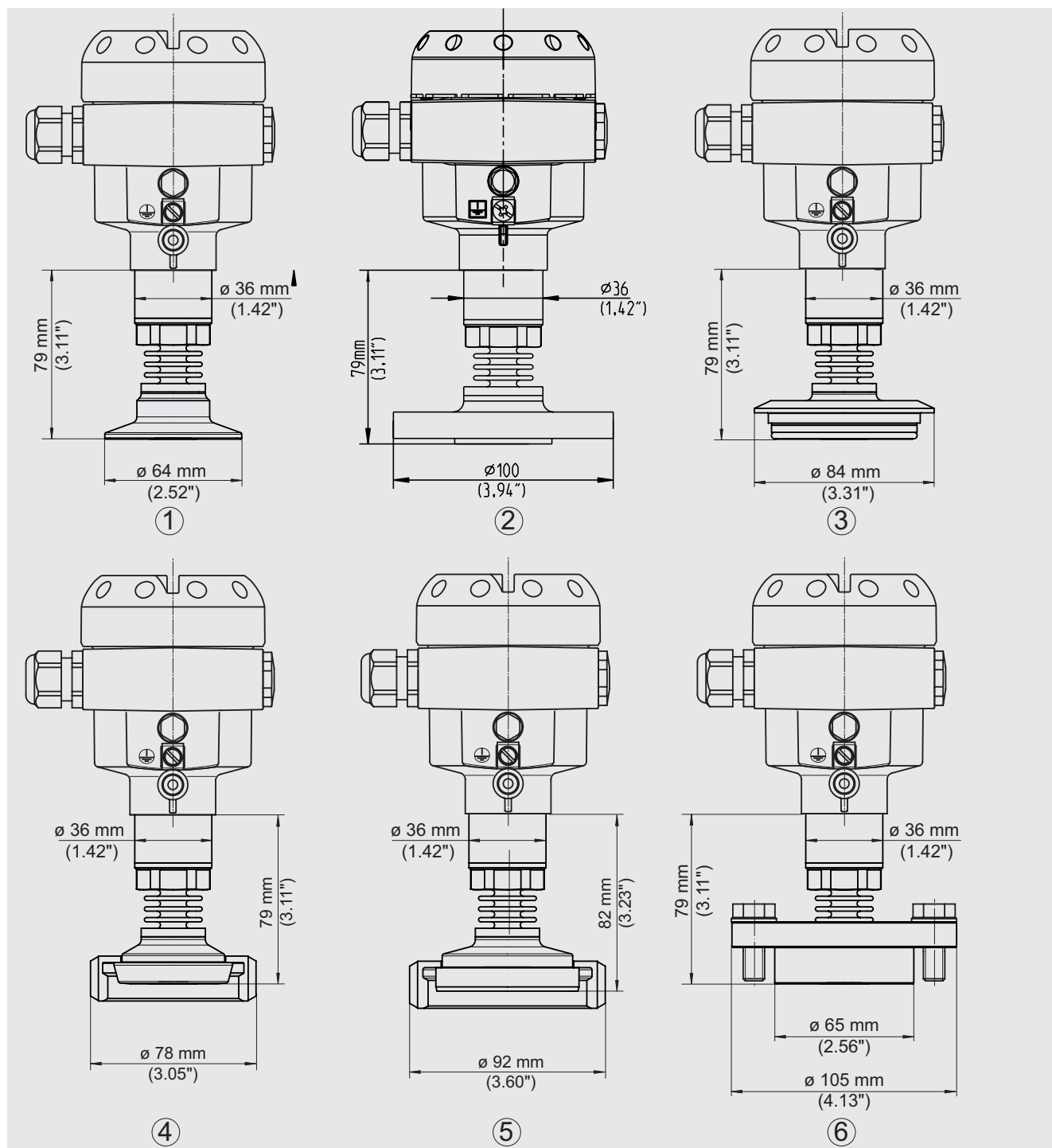
Flush process connections for model IPT-21



Flush process connections for model IPT-21

①	EN 837	G $\frac{1}{2}$ " B flush with O-ring
②	EN 837	G 1" B flush with O-ring
③	EN 837	G 1 $\frac{1}{2}$ " B flush without ring
④	DIN 13	Version with cooling element / Pressure screw: Aluminium
⑤	DIN 13	High-temperature version / Pressure screw: 316L
⑥	ANSI / ASME B1.20.1	1 $\frac{1}{2}$ NPT for high-temperature version

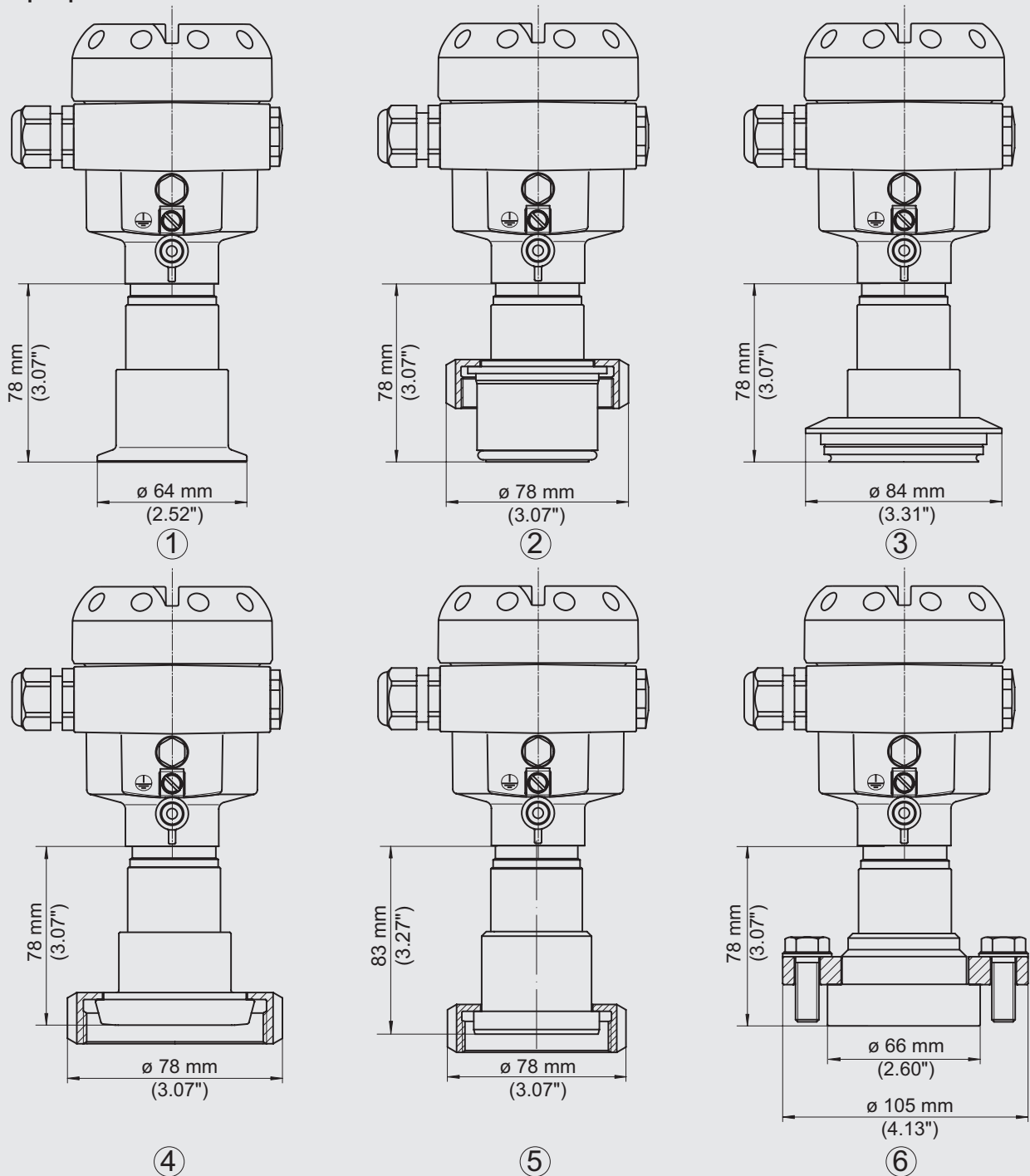
Aseptic process connections for model IPT-21



Aseptic process connections for model IPT-21 (version with cooling element)

①	DIN 32676, ISO 2852	Clamp 2", DN 50, PN 16
②	NEUMO BioConnect®	Flange DN 40, form V
③	VARINLINE®	Form N50-40, diameter 68 mm [2.68 in], PN 25
④	DIN 11851	Liner DN 40, PN 40
⑤	DIN 11864	DN 50 liner, RD 78 x 1/8 grooved union nut, PN 40
⑥	DRD retainer flange	PN 40

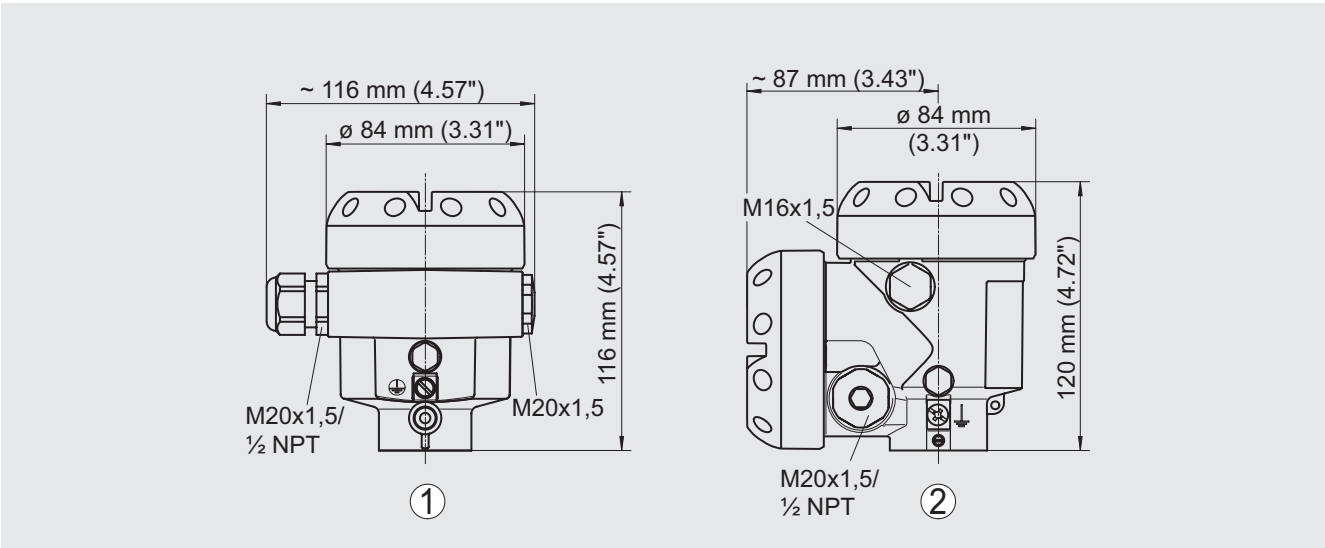
Aseptic process connections for model IPT-21



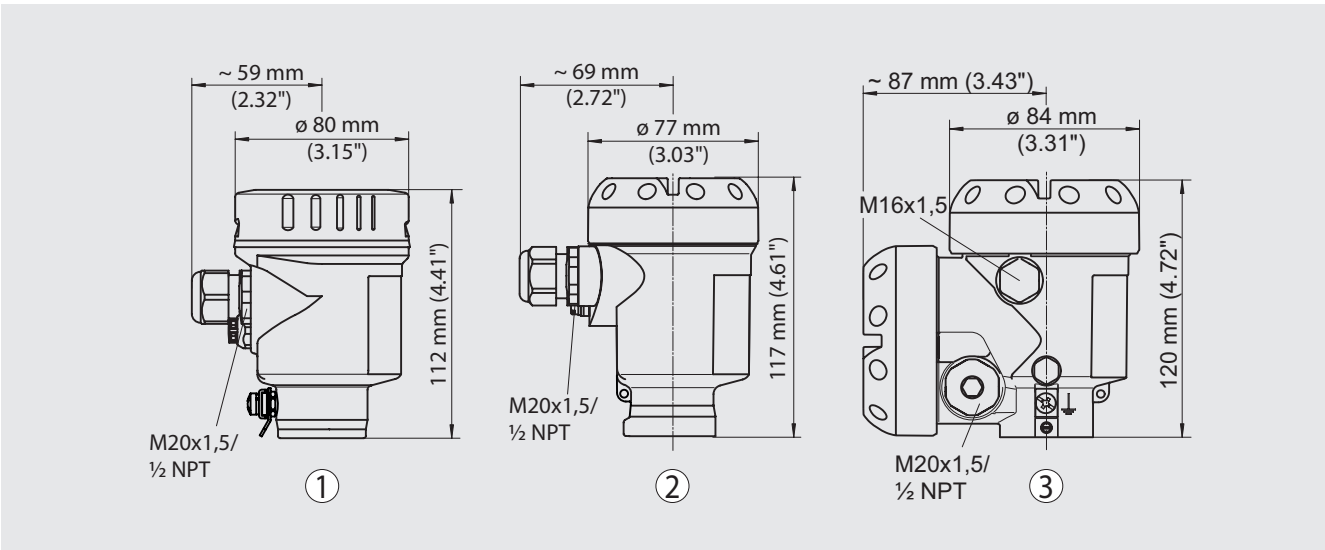
Aseptic process connections for model IPT-21 (high-temperature version)

①	DIN 32676, ISO 2852	Clamp 2", DN 50, PN 16
②	Aseptic connection with grooved union nut	F40, PN 25
③	VARINLINE®	Form N50-40, diameter 68 mm [2.68 in], PN 25
④	DIN 11851	Liner DN 40, PN 40
⑤	DIN 11864	DN 40 liner, RD 65 x 1/6 grooved union nut, PN 40
⑥	DRD retainer flange	PN 40

Case dimensions

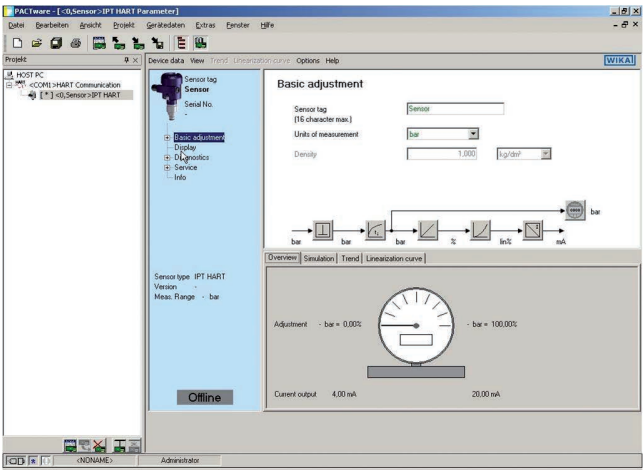


Case (aluminium)	
①	Single chamber case, powder-coated aluminium
②	Double chamber case, powder-coated aluminium

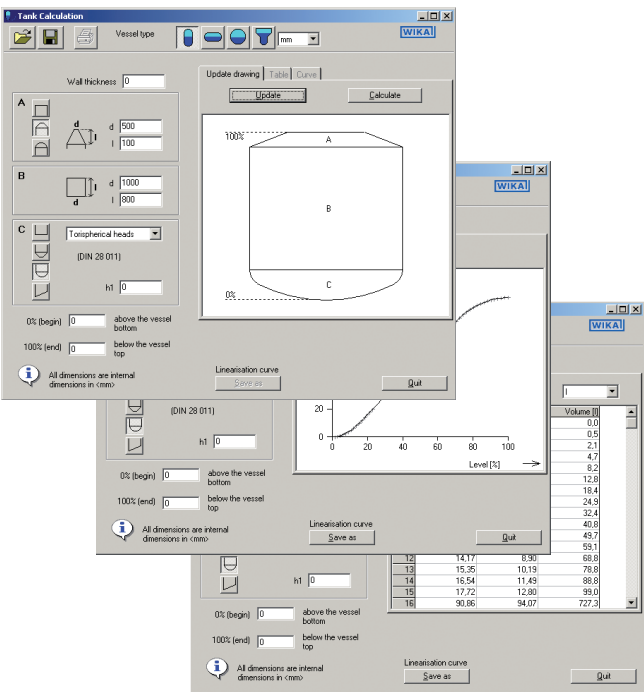


Case	
①	Single chamber case, deep-drawn and electropolished stainless steel, e.g. for hygienic applications
②	Single chamber case, plastic ABS or precision-cast stainless steel
③	Double chamber case, plastic ABS or precision-cast stainless steel

User interface DTM



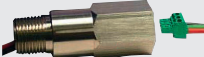

For HART®, PROFIBUS® PA and FF output signals, a DTM is available in accordance with the FDT standard. The DTM provides a self-explanatory and clear user interface for all setup and control processes of the transmitter. For testing purposes, it is also possible to simulate process values and archive the parameter data. Recording of the measured values is available for diagnostic purposes.



Tank volume calculation

The additional tank volume calculation of the DTM function can be used to reproduce any optional tank geometry. The corresponding linearisation table is generated automatically. The linearisation table can be transferred directly to the transmitter.

Accessories

Description	Order number
 <p>Display module, model DIH52-F 5-digit display, 20-segment bar graph, without separate power supply, with additional HART® functionality. Automatic adjustment of measuring range and span. Secondary-master functionality: Setting the measuring range and unit of the connected transmitter using HART® standard commands possible. Optional: Explosion protection per ATEX</p>	On request
 <p>HART® modem for USB interface, specifically designed for use with notebooks (model 010031)</p>	11025166
<p>HART® modem for RS-232 interface (model 010001)</p>	7957522
<p>HART® modem for Bluetooth interface Ex ia IIC (model 010041)</p>	11364254
<p>PowerXpress HART® modem, with optional power supply (model 010031P)</p>	14133234
 <p>Welding socket for process connection G 1/2 flush</p>	1192299
<p>Welding socket for process connection G 1 flush</p>	1192264
<p>Welding socket for process connection G 1/2 flush</p>	2158982
<p>Welding socket for process connection G 1 hygienic flush</p>	2166011
 <p>Instrument mounting bracket for wall or pipe mounting, stainless steel</p>	14309985
 <p>Overvoltage limit for transmitters, 4 ... 20 mA, 1/2 NPT, series connection, Ex i and Ex d</p>	14013656
<p>Overvoltage limit for transmitters, 4 ... 20 mA, M20 x 1.5, series connection, Ex i and Ex d</p>	14002489
<p>Overvoltage limit for transmitters, FF / PROFIBUS, 1/2 NPT, series connection, Ex i and Ex d</p>	14013658
 <p>Model DI-PT-R display and operating module, case cover aluminium with window</p>	14560919
<p>Model DI-PT-R display and operating module, case cover electropolished cast stainless steel with safety window</p>	14561464
<p>Model DI-PT-R display and operating module, case cover plastic with window</p>	14561469
<p>Model DI-PT-R display and operating module, case cover cast stainless steel with window for single chamber case</p>	14561459
<p>Model DI-PT-R display and operating module, case cover cast stainless steel with window for double chamber case</p>	14561471
 <p>Model DI-PT-E external display and operating module, aluminium case</p>	14561461
<p>Model DI-PT-E external display and operating module, cast stainless steel case</p>	14561463
<p>Model DI-PT-E external display and operating module, plastic case</p>	14561475

Ordering information

Model / Approval / Case design / Cable and length / Digital display / Output signal / Electrical connection / Measuring range / Process connection / Sealing / Accuracy / Cleaning / Sensor filling / Certificates / Additional requirements

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Threaded thermowell

Head design: hexagon, milled wrench flats or round with hexagon Model TW15

WIKA data sheet TW 95.15

Applications

- Chemical industry, process technology, equipment manufacturing
- For high chemical stress
- For high process loads

Special features

- International standard
- Possible thermowell designs: tapered, straight or stepped



Threaded thermowell, design TW15-H

Description

Each thermowell/protection tube is an important component of any temperature measuring location. It is used to separate the process from the surrounding area, thus protecting the environment and operating personnel and keeps aggressive media, high pressures and flow rates from the temperature probe itself and thereby enables the thermometer to be exchanged during operation.

Based on the almost limitless application possibilities, there are a large number of variants, such as thermowell designs or materials. The type of process connection and the basic method of manufacture are important design differentiation criteria. A basic differentiation can be made between threaded and weld-in thermowells/protection tubes, and those with flange connections.

Furthermore, one can differentiate between protection tubes and thermowells. Protection tubes are constructed from a tube, that is closed at the tip by a welded solid tip. Thermowells are manufactured from solid bar stock.

The TW15 series of threaded thermowells are suitable for use with numerous electrical and mechanical thermometers from WIKA.

Due to the heavy-duty design, these international design thermowells are the first choice for use in the chemical and petrochemical industries and in plant construction.

Specifications

Basic information	
Thermowell form	<ul style="list-style-type: none"> ■ Tapered ■ Straight ■ Stepped
Version	
Design TW15-H	Hexagon
Design TW15-R	Milled wrench flats
Design TW15-M	Round with hexagon
Material (wetted)	<ul style="list-style-type: none"> ■ Stainless steel 316/316L ■ Stainless steel 304/304L ■ A105 ■ Stainless steel 1.4571 ■ Alloy C4 ■ Alloy C276 ■ Alloy 400 ■ Titanium grade 2 ■ Materials per ASTM specifications
	→ Other materials on request

Process connection	
Type of process connection	<ul style="list-style-type: none"> ■ ½ NPT male thread ■ ¾ NPT male thread ■ 1 NPT male thread
	→ Other threads on request
Connection to thermometer	<ul style="list-style-type: none"> ■ ½ NPT female thread ■ G ½ female thread
	→ Other threads on request
Bore size	<ul style="list-style-type: none"> ■ Ø 6.6 mm [0.26 in] ■ Ø 8.5 mm [0.36 in]
	→ Other bore sizes on request
Insertion length U	To customer specification
Connection length H	To customer specification (min. 45 mm [1.77 in])
Tip thickness	6.4 mm [0.25 in]
	→ Other tip thicknesses on request
Suitable stem length l_1 (dial thermometer)	
Connection design S, 4 or 5	$l_1 = U + H - 10 \text{ mm [0.4 in]}$
Connection design 2	$l_1 = U + H - 30 \text{ mm [1.2 in]}$

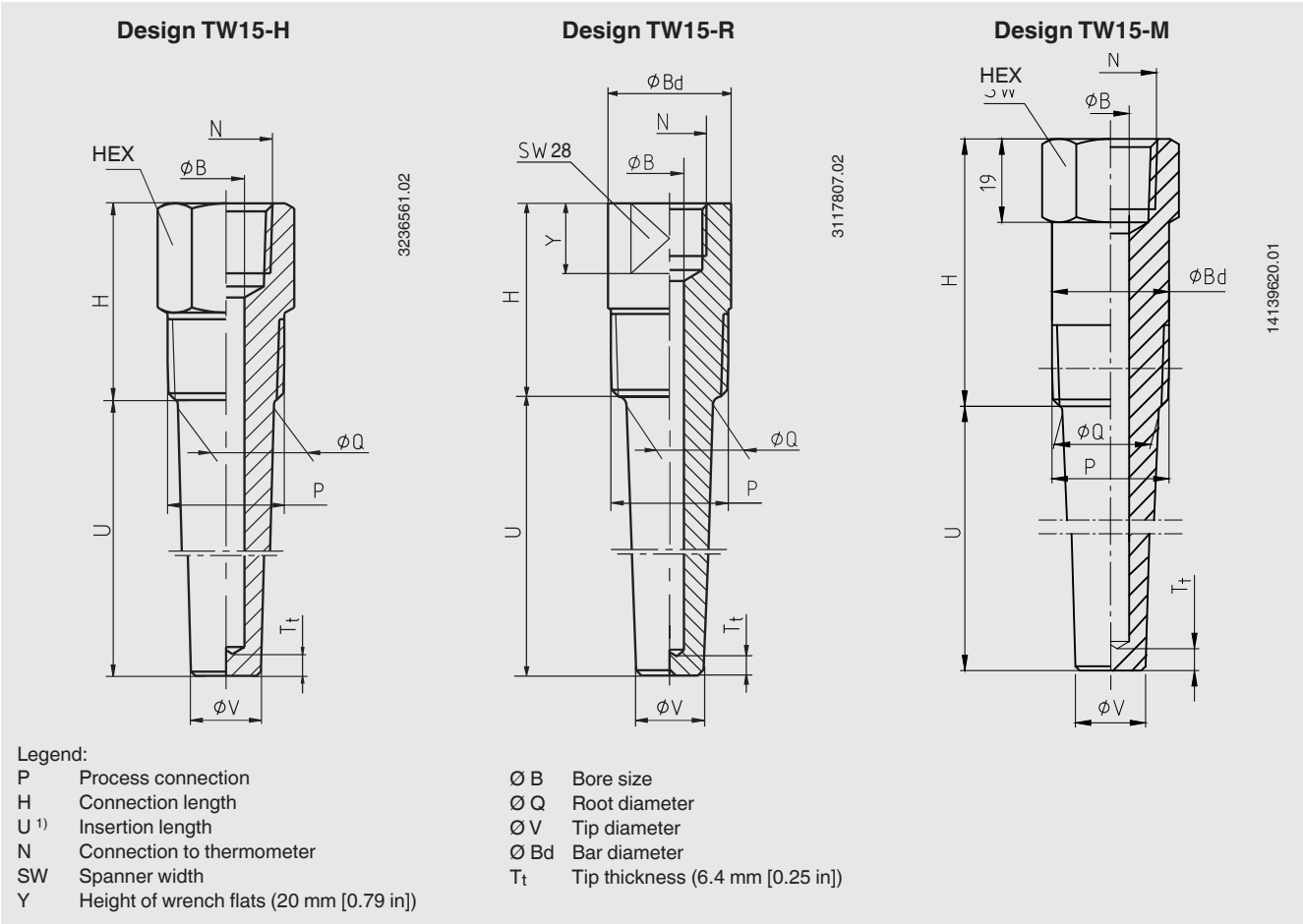
Operating conditions	
Max. process temperature, process pressure	Depending on: <ul style="list-style-type: none"> ■ Thermowell design <ul style="list-style-type: none"> - Dimensions - Material ■ Process conditions <ul style="list-style-type: none"> - Flow rate - Medium density
Wake frequency calculation	For critical applications, is recommended as a WIKA engineering service in accordance with ASME PTC 19.3 TW-2016
	→ For further information see Technical information IN 00.15 "Wake frequency calculation".

Certificates (option)

Certificates	
Certificates	■ 2.2 test report ■ 3.1 inspection certificate

→ Approvals and certificates, see website

Dimensions in mm [in]



1) The insertion length U is also measured with parallel process connection threads below the thread.

Tapered thermowell form

Process connec- tion	Head design				Dimensions in mm [in]					Weight in kg [lbs]	
	Hexagon or round with hexagon		Round with wrench flats								
	Metric	Imperial	Metric	Imperial	N	Ø Q	Ø V	Ø B	H	U = 2 ½ in	U = 7 ½ in
½ NPT	HEX 27	HEX 1.125	Ø 34 mm with SW 28	Ø 1.375 in with SW 1 ⅛ in	■ ½ NPT ■ G ½ ■ M20 x 1,5	16 [0.625]	13 [0.512]	■ 6.6 [0.260] ■ 8.5 [0.355]	45 [1.772]	0.20 [0.441]	0.36 [0.794]
¾ NPT	HEX 27	HEX 1.125			■ ½ NPT ■ G ½ ■ M20 x 1,5	22 [0.866]	16 [0.625]	■ 6.6 [0.260] ■ 8.5 [0.355]	45 [1.772]	0.31 [0.683]	0.56 [1.235]
1 NPT	HEX 36	HEX 1.375			■ ½ NPT ■ G ½ ■ M20 x 1,5	27 [1.063]	19 [0.750]	■ 6.6 [0.260] ■ 8.5 [0.355]	45 [1.772]	0.50 [1.102]	0.84 [1.852]
G ½ B	HEX 27	HEX 1,125	-	-	■ ½ NPT ■ G ½ ■ M20 x 1,5	16 [0.625]	13 [0.512]	■ 6.6 [0.260] ■ 8.5 [0.355]	45 [1.772]	0.20 [0.441]	0.36 [0.794]
G ¾ B	HEX 32	HEX 1,259	-	-	■ ½ NPT ■ G ½ ■ M20 x 1,5	22 [0.866]	16 [0.625]	■ 6.6 [0.260] ■ 8.5 [0.355]	45 [1.772]	0,35 [0.772]	0,6 [1.323]
M20 x 1,5	HEX 27	HEX 1,125	-	-	■ ½ NPT ■ G ½ ■ M20 x 1,5	16 [0.625]	13 [0.512]	■ 6.6 [0.260] ■ 8.5 [0.355]	45 [1.772]	0,20 [0.441]	0,36 [0.794]
M27 x 2	HEX 32	HEX 1,259	-	-	■ ½ NPT ■ G ½ ■ M20 x 1,5	22 [0.866]	16 [0.625]	■ 6.6 [0.260] ■ 8.5 [0.355]	45 [1.772]	0,35 [0.772]	0,6 [1.323]
½ BSPT	HEX 27	HEX 1,125	-	-	■ ½ NPT ■ G ½ ■ M20 x 1,5	16 [0.625]	13 [0.512]	■ 6.6 [0.260] ■ 8.5 [0.355]	45 [1.772]	0,20 [0.441]	0,36 [0.794]
¾ BSPT	HEX 32	HEX 1,259	-	-	■ ½ NPT ■ G ½ ■ M20 x 1,5	22 [0.866]	16 [0.625]	■ 6.6 [0.260] ■ 8.5 [0.355]	45 [1.772]	0,35 [0.772]	0,6 [1.323]
1 BSPW	HEX 36	HEX 1,375	-	-	■ ½ NPT ■ G ½ ■ M20 x 1,5	27 [1.063]	19 [0.750]	■ 6.6 [0.260] ■ 8.5 [0.355]	45 [1.772]	0,50 [1.102]	0,84 [1.852]
½ BSPP	HEX 27	HEX 1,125	-	-	■ ½ NPT ■ G ½ ■ M20 x 1,5	16 [0.625]	13 [0.512]	■ 6.6 [0.260] ■ 8.5 [0.355]	45 [1.772]	0,20 [0.441]	0,36 [0.794]
¾ BSPP	HEX 36	HEX 1,375	-	-	■ ½ NPT ■ G ½ ■ M20 x 1,5	22 [0.866]	16 [0.625]	■ 6.6 [0.260] ■ 8.5 [0.355]	45 [1.772]	0,50 [1.102]	0,84 [1.852]

Ordering information

Model / Thermowell form / Process connection / Connection to thermometer / Insertion length U / Connection length H / Thermowell material / Bar diameter Ø Bd / Bore diameter Ø B / Root diameter Ø Q / Tip diameter Ø V / Assembly with thermometer / Certificates / Options

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