

Differential pressure transmitter Model DPT-20

WIKA data sheet PE 86.22



for further approvals,
see page 8



Applications

- Process engineering
- Chemical industry
- Petrochemical industry
- Food and beverage industry
- Machine building and plant construction

Special features

- High measurement accuracy
- Freely scalable measuring ranges
- Developed in accordance with the SIL 2 requirements
- Seven different case variants
- Configuration via DTM (Device Type Manager) in accordance with the FDT (Field Device Tool) concept (e.g. PACTware™)



Differential pressure transmitter model DPT-20

Description

The model DPT-20, with its 4 ... 20 mA, 4 ... 20 mA HART®, FOUNDATION™ Fieldbus or PROFIBUS® PA output signals, combined with the intrinsic safety or flameproof enclosure ignition protection type, is ideally suited for application in appropriate systems. The development of the transmitter in accordance with the demands of SIL (Safety Integrated Level) IEC 61508 also makes it applicable for plants with special safety requirements.

Versatile in application

The model DTP-20 is suitable for many industrial measuring requirements, such as flow measurement using differential pressure transducers, level measurement in open or closed tanks or filter and pump monitoring. With mounted diaphragm seals, the model DTP-20 is also suitable for harsh process conditions. As a result of the available measuring ranges from -10 ... +10 mbar to -16 ... +16 bar [-0.15 ... +0.15 psi to -240 ... +240 psi] and a static pressure limitation of up to 400 bar [5,800 psi], the instrument can be used in almost any application. The internal digital signal processing, combined

with proven sensors, guarantees high accuracy and the best long-term stability.

There are seven different case versions 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 many selectable languages. 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

Accuracy specifications

Measuring deviation determined using the limit point method IEC 62828/IEC 61298 ¹⁾

Differential pressure	Measuring ranges 10 and 30 mbar [0.15 and 0.45 psi]	<ul style="list-style-type: none"> ■ $TD \leq 5:1 \pm 0.1 \% \text{ of span}$ ■ $TD > 5:1 \pm 0.02 \% \times TD$
	Measuring range 100 and 500 mbar [1.5 and 7.5 psi]	<ul style="list-style-type: none"> ■ $To TD 10:1 \pm 0.065 \% \text{ of span}$ ■ $TD > 10:1 \pm 0.035 \% + 0.01 \% \times TD$
	Measuring range 3 bar [45 psi]	<ul style="list-style-type: none"> ■ $To TD 10:1 \pm 0.065 \% \text{ of span}$ ■ $> TD 10:1 \pm 0.015 \% + 0.005 \% \times TD$
	Measuring range 16 bar [240 psi]	<ul style="list-style-type: none"> ■ $To TD 10:1 \pm 0.065 \% \text{ of span}$ ■ $> TD 10:1 \pm 0.035 \% + 0.01 \% \times TD$
Static pressure	$< \pm 0.1 \%$ (scaling with static pressure is not possible)	

Adjustability, differential pressure

Pressure value of zero point	-120 ... +120 % of the nominal measuring range (with -100 ... +100 mbar [-1.5 ... +1.5 psi] measuring range, 100 mbar [1.5 psi] is the nominal measuring range)
Pressure value of span	Zero point + (-240 ... +240 %)

Adjustability, level

Percentage value	-10 ... +100 %
Pressure value	-120 ... +120 %

Adjustability, flow

Pressure value of zero point	-120 ... +120 %
Pressure value of span	-120 ... +120 %

Influence of mounting position

$< 0.35 \text{ mbar [0.003 psi]}$ per 10° inclination from the vertical

Influence of the medium and ambient temperature

-10 ... +60 °C [14 ... 140 °F]	Measuring range 10 mbar [0.15 psi]	$< \pm 0.15 \% + 0.2 \% \times TD$
	Measuring range 30 mbar [0.45 psi]	$< \pm 0.15 \% + 0.1 \% \times TD$
	Measuring range 100 mbar [1.5 psi]	$< \pm 0.15 \% + 0.15 \% \times TD$
	Measuring range 500 mbar [7.5 psi]	$< \pm 0.15 \% + 0.05 \% \times TD$
	Measuring range 3 bar [45 psi]	$< \pm 0.15 \% + 0.05 \% \times TD$
	Measuring range 16 bar [240 psi]	$< \pm 0.15 \% + 0.15 \% \times TD$
-40 ... -10 °C [-40 ... +14 °F] / 60 ... 85 °C [140 ... 185 °F]	Measuring range 10 mbar [0.15 psi]	$< \pm 0.4 \% + 0.3 \% \times TD$
	Measuring range 30 mbar [0.45 psi]	$< \pm 0.2 \% + 0.15 \% \times TD$
	Measuring range 100 mbar [1.5 psi]	$< \pm 0.15 \% + 0.2 \% \times TD$
	Measuring range 500 mbar [7.5 psi]	$< \pm 0.2 \% + 0.06 \% \times TD$
	Measuring range 3 bar [45 psi]	$< \pm 0.2 \% + 0.06 \% \times TD$
	Measuring range 16 bar [240 psi]	$< \pm 0.15 \% + 0.2 \% \times TD$

Long-term stability

Differential pressure	<ul style="list-style-type: none"> ■ $< 0.065 \% \times TD$ (1 year) ■ $< 0.1 \% \times TD$ (5 years) ■ $< 0.15 \% \times TD$ (10 years)
Static pressure	<ul style="list-style-type: none"> ■ $< \pm 0.065 \%$ (1 year) ■ $< \pm 0.1 \%$ (5 years) ■ $< \pm 0.15 \%$ (10 years)

Thermal change of zero point and output span depending on the static pressure

Measuring ranges 10 and 30 mbar [0.15 and 0.45 psi]	To nominal pressure	40 bar [600 psi]
	Influence on the zero point	$< \pm 0.1 \% \times TD$
	Influence on the span	$< \pm 0.1 \%$
Measuring ranges 100 and 500 mbar [1.5 and 7.5 psi]	To nominal pressure	160 bar [2,400 psi]
	Influence on the zero point	$< \pm 0.1 \% \times TD$
	Influence on the span	$< \pm 0.1 \%$

Accuracy specifications		
Measuring ranges 3 and 16 bar [45 and 240 psi]	To nominal pressure	400 bar [5,800 psi]
	Influence on the zero point	< ±0.25 % x TD
	Influence on the span	< ±0.25 %
Thermal change	Change of the current output with 4 ... 20 mA signals: 0.05 % per 10 K based on 20 °C [68 °F] (maximum 0.15 % at set measuring span) in the ambient temperature range -40 ... +80 °C [-40 ... +176 °F]	
Reference conditions per IEC 61298-1		
Temperature	+18 ... +30 °C [64 ... 86 °F]	
Air 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, i.e. vertical process assembly (connections are on the side)	

1) Includes non-linearity following terminal method, hysteresis and non-repeatability in accordance with IEC 62828.

2) Includes non-linearity, hysteresis, non-repeatability, thermal change of zero point and static pressure influence ($P_{\text{stat}} = 70 \text{ bar}$) in the temperature range -10 ... +60 °C [14 ... 140 °F].

URL = basic measuring range

TD = turndown; turndown = basic measuring range : scaled measuring range

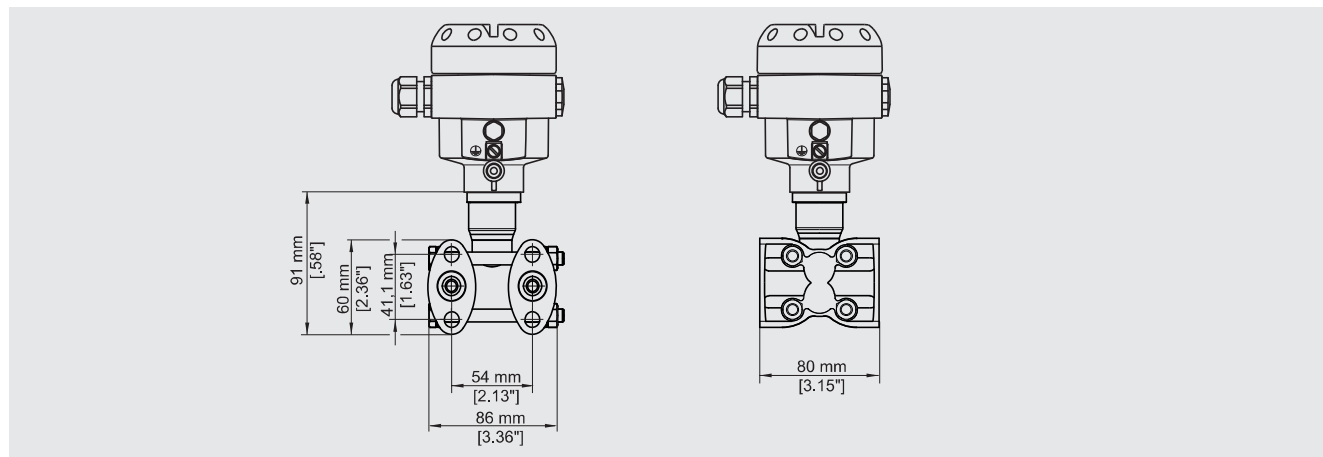
Measuring range						
Measuring range ¹⁾	-10 mbar ... +10 mbar [-0.15 ... +0.15 psi]	-30 mbar ... +30 mbar [-0.45 ... +0.45 psi]	-100 mbar ... +100 mbar [-1.5 ... +1.5 psi]	-500 mbar ... +500 mbar [-7.5 ... +7.5 psi]	-3 bar ... +3 bar [-45 ... +45 psi]	-16 bar ... +16 bar [-240 ... +240 psi]
Maximum operating pressure	40 bar [600 psi]		160 bar [2,400 psi] (option: 400 bar [5,800 psi])			
Lowest static pressure ²⁾	1 mbar abs. [0.015 psi], with application for oxygen the static pressure should not be lower than 10 mbar abs. [0.15 psi]					
Turndown ratio	Maximum permissible turndown is unlimited (max. 20:1 is recommended)					
Overload, on one side	40 bar [600 psi]		160 bar [2,400 psi] (option: 400 bar [5,800 psi])			
Overload, on both sides	60 bar [900 psi]		240 bar [6,300 psi] (option: 630 bar [9,100 psi])			

1) Other measuring ranges can be set via the respective turndown.

2) Valid at reference conditions per IEC 62828.

Process connection

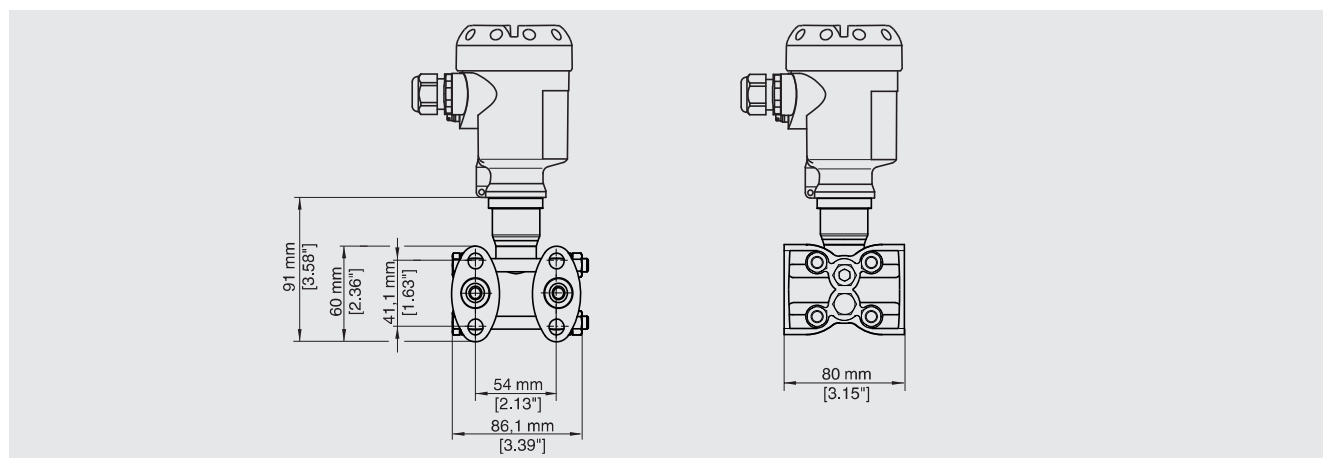
Oval flange, connection 1/4-18 NPT



Connection	Mounting	Material	Equipment
1/4-18 NPT IEC 61518	7/16-20 UNF	AISI 316L (1.4404)	2 vent valves ¹⁾
1/4-18 NPT IEC 61518	7/16-20 UNF	Hastelloy C276 (2.4819)	2 vent valves ¹⁾

1) Material: AISI 316L (1.4404)

Oval flange, connection 1/4-18 NPT



Connection	Mounting	Material	Equipment
1/4-18 NPT IEC 61518	7/16-20 UNF	AISI 316L (1.4404)	2 vent valves, 4 plug screws ¹⁾
1/4-18 NPT IEC 61518	7/16-20 UNF	Hastelloy C276 (2.4819)	2 vent valves, 4 plug screws ¹⁾

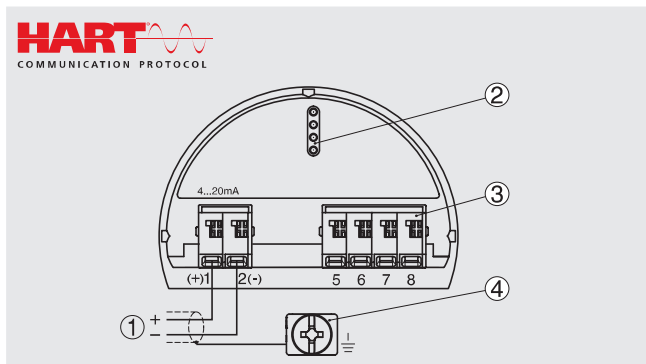
1) Material: AISI 316L (1.4404)

For measuring systems with the diaphragm seal diaphragms mounted either directly or via capillaries, WIKA uses special process connections, that offer higher performance with optimised volume.

Output signal			
Signal type	4 ... 20 mA, 2-wire, (option: 4 ... 20 mA, 2-wire with superimposed communication signal HART®, FOUNDATION™ Fieldbus, PROFIBUS® PA)		
Permissible max. load	$R_A = (U_B - U_{Bmin})/0.023 \text{ A}$		
Dead time	<div><div></div> 160 ms (10 and 30 mbar [0.15 and 0.45 psi])</div> <div><div></div> 130 ms (remaining measuring ranges)</div>		
Time constant (90 %)	<div><div></div> 115 ms (10 and 30 mbar [0.15 and 0.45 psi])</div> <div><div></div> 95 ms (100 mbar [1.5 psi])</div> <div><div></div> 75 ms (500 mbar [7.5 psi])</div> <div><div></div> 60 ms (3 bar [45 psi] and 16 bar [240 psi])</div>		
Damping (63 % of the input variable)	0 ... 999 s, adjustable		
Deviation through interference	Strong, high-frequency fields can influence the current output with 4 ... 20 mA, within the scope of EN 61326-1, by up to ±80 µA.		
Voltage supply			
Supply voltage	4 ... 20 mA	Inactive backlighting	DC 11 ... 35 V
		Active backlighting	DC 16 ... 35 V
	4 ... 20 mA with a superimposed HART® communication signal	Inactive backlighting	DC 11 ... 35 V
		Active backlighting	DC 16 ... 35 V
	PROFIBUS® PA (max. 32 BUS instruments)	Inactive backlighting	DC 9 ... 32 V
		Active backlighting	DC 13.5 ... 32 V
	FOUNDATION™ Fieldbus (max. 32 BUS instruments)	Inactive backlighting	DC 9 ... 32 V
		Active backlighting	DC 13.5 ... 32 V
Electrical safety	Overvoltage category III, protection class II		

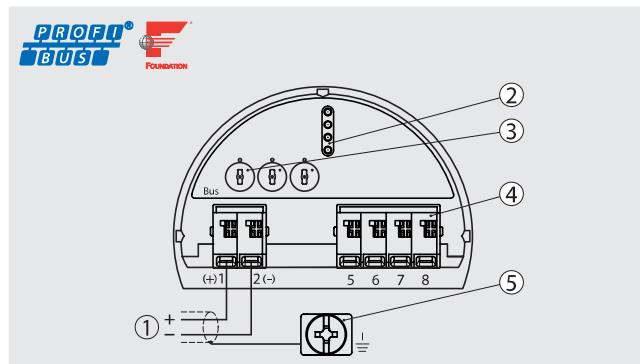
Electrical connection		
Spring-loaded terminals	Wire cross-section	■ Wire or strand: 0.2 ... 2.5 mm ² (AWG 24 ... 14)
		■ Strand with end splice: 0.2 ... 1.5 mm ² (AWG 24 ... 16)
Cable glands M20 x 1.5		
Sealed with blind plug		
Plastic, PA	Sealing	NBR
	Cable diameter	■ 5 ... 9 mm [0.2 ... 0.35 in] ■ 6 ... 12 mm [0.24 ... 0.47 in] ■ 10 ... 14 mm [0.39 ... 0.55 in]
Brass, nickel-plated	Sealing	NBR
	Cable diameter	■ 5 ... 9 mm [0.2 ... 0.35 in] ■ 6 ... 12 mm [0.24 ... 0.47 in]
Stainless steel	Sealing	NBR
	Cable diameter	7 ... 12 mm [0.28 x 0.47 in]
Cable glands ½ NPT		
Sealed with blind plug		
Plastic, PA	Cable diameter	■ 5 ... 9 mm [0.2 x 0.35 in] ■ 6 ... 12 mm [0.24 ... 0.47 in] ■ 10 ... 14 mm [0.39 ... 0.55 in]
Brass, nickel-plated	Cable diameter	■ 5 ... 9 mm [0.2 ... 0.35 in] ■ 6 ... 12 mm [0.24 ... 0.47 in]
Electrical safety	Reverse polarity 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 ¹⁾
④	Ground terminal for cable shield



PROFIBUS® PA / FOUNDATION™ Fieldbus

①	Voltage supply / signal output
②	Interface of digital display
③	<ul style="list-style-type: none"> ■ For PROFIBUS® PA: Adjustment of the Profibus settings via 3 switches ■ For FOUNDATION™ Fieldbus simulation switch (1 = operation with simulation release)
④	Connection terminals for external display and operating unit ¹⁾
⑤	Ground terminal for cable shield

1) Not for output signal 4 ... 20 mA

Material

Material (wetted)

Process connection	316L (1.4404) (option: Hastelloy C276 (2.4819))
Diaphragm	316L (1.4435) (option: Hastelloy C276 (2.4819))
Sealing	FKM (option: EPDM, copper)

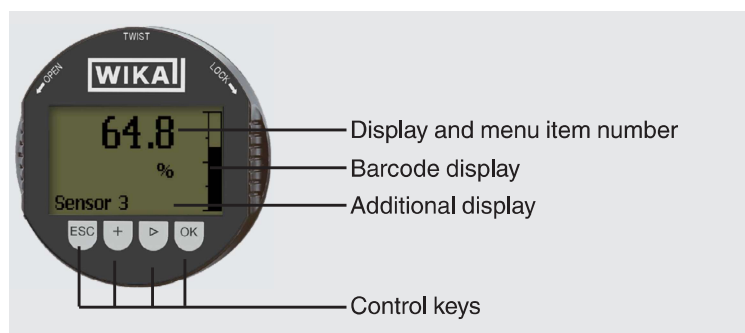
Case material

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

Pressure transmission medium ¹⁾	Silicone oil (halocarbon oil for oxygen applications)
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1) With application for oxygen or when using halocarbon oil, the static pressure should not be lower than 10 mbar abs [0.15 psi].

Display and operating unit (option)



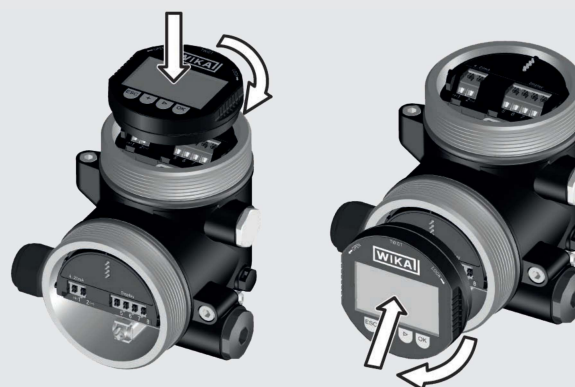
Display and operating unit (option)				
Backlighting	Yes			
Background	Grey, black digits			
Upgradable	Yes (for order numbers, see "Accessories")			
Menu languages	German English French Spanish	Polish Italian Dutch Japanese	Chinese Russian Portuguese Czech	Turkish
Display size	5-digit measured value display, adjustable (option: bar graph display) Max. 5 digits, size 7 x 13 mm [0.28 x 0.51 in]			
Ingress protection (IP code) per IEC 60529	<div> <div>■ IP20 (loose)</div> <div>■ IP40 (built-in without cover)</div> </div>			
Material	Case from ABS, window from polyester film			

Mounting positions

Single chamber case




Double chamber case



Operating conditions		
Permissible temperature ranges		
Ambient	■ -40 ... +80 °C [-40 ... +176 °F] (without display) ■ -20 ... +70 °C [-4 ... +158 °F] (with display)	
Storage and transport	-60 ... +80 °C [-40 ... +176 °F]	
Restrictions to medium temperature due to the sealing material		
FKM	-20 ... +85 °C [-4 ... +185 °F]	
EPDM, copper	-40 ... +85 °C [-40 ... +185 °F]	
FKM, oil- and grease-free	-10 ... +85 °C [14 ... 185 °F]	
For oxygen applications (max. static pressure: 160 bar [2,400 psi])	Copper	-20 ... +60 °C [-4 ... +140 °F]
	EPDM	-10 ... +60 °C [-4 ... +140 °F]
	FKM	-10 ... +60 °C [14 ... 140 °F]
Temperature limits	With differential pressure lines longer than 100 mm: -40 ... +120 ° [-40 ... 248 °F]	
Vibration resistance per IEC 60068-2-6 ¹⁾	4 g (5 ... 200 Hz), vibration under resonance	
Shock resistance per IEC 60068-2-27	50 g for 2.3 ms, mechanical shock	
Ingress protection (IP code) per IEC 60529	IP66/67 (standard case)	
Weight	Approx. 4.2 ... 4.5 kg [9.26 ... 9.92 lbs] depending on the process connection and case variant	


1) Tested in accordance with the directive GL, characteristic curve 2 (not for double chamber cases from stainless steel)

Approvals (option)

Logo	Description	Country
	EU declaration of conformity	European Union
	EMC directive, interference emission (group 1, class B) and immunity per EN 61326-1:2013 (industrial application), EN 61326-2-3:2013 ¹⁾	
	Pressure equipment directive	
	RoHS directive	

1) With electrostatic discharge, a short-term, increased error of up to 1 % of the nominal measuring range can occur. This also applies to NAMUR NE 021.

Manufacturer's information and certificates

Logo	Description
	SIL 2 (option) Functional safety <div> <div></div> 1-channel operation up to SIL 2 </div>
-	NAMUR recommendations NE 021 - Electrical compatibility of equipment NE 043 - Signal level for failure information NE 053 - Compatibility of field instruments

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:

- NE 021 - Electromagnetic compatibility of equipment
- NE 043 - Signal level for failure information for transmitters
- NE 053 - Compatibility of field instruments and display and operating components

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 MR0175 - Oil extraction and processing

Test report

Test certificate for the measurement accuracy included in delivery (5 measuring points in the nominal measuring range)

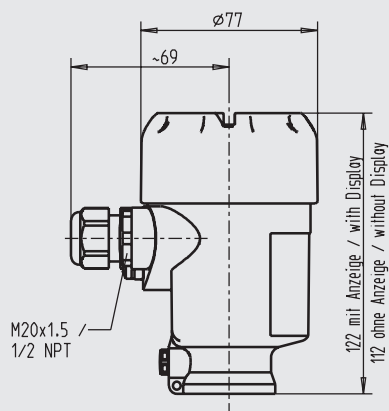
Certificates (option)

Certificates	
Certificates	<ul style="list-style-type: none">■ 2.2 test report per EN 10204 (e.g. state-of-the-art manufacturing, material proof, indication accuracy)■ 3.1 inspection certificate per EN 10204 (e.g. material proof for wetted metal parts, indication accuracy, calibration certificate)
Calibration	DAkkS calibration certificate (traceable and accredited in accordance with ISO/IEC 17025)

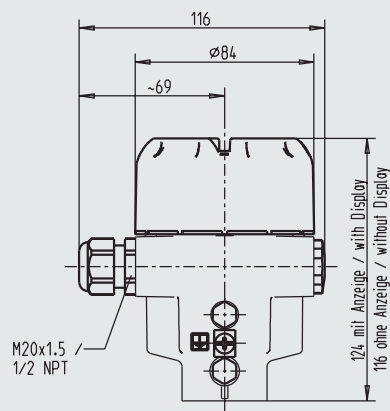
→ For approvals and certificates, see website

Case variants

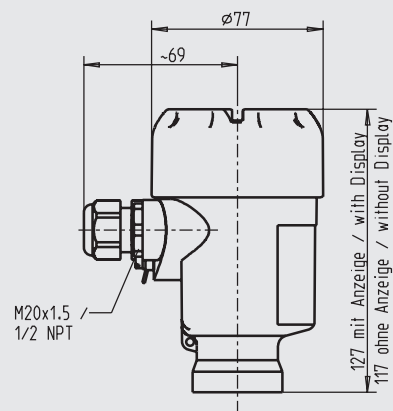
Single chamber case, plastic



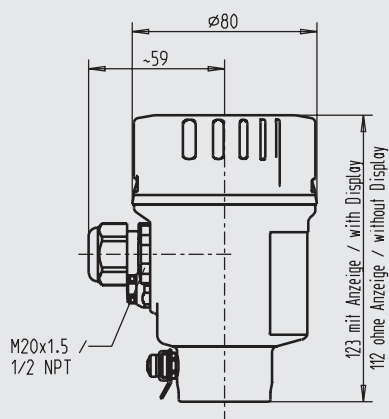
Single chamber case, aluminium



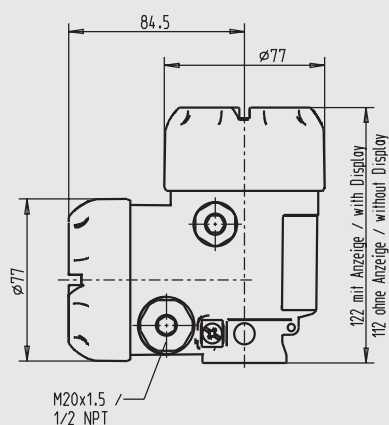
Single chamber case, cast stainless steel



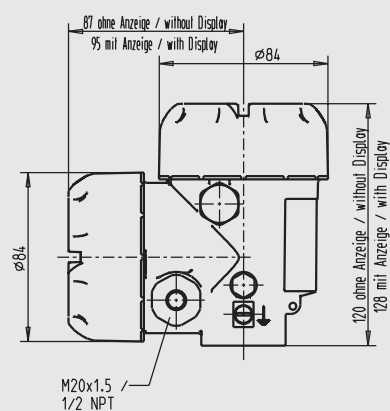
Single chamber case, deep-drawn stainless steel



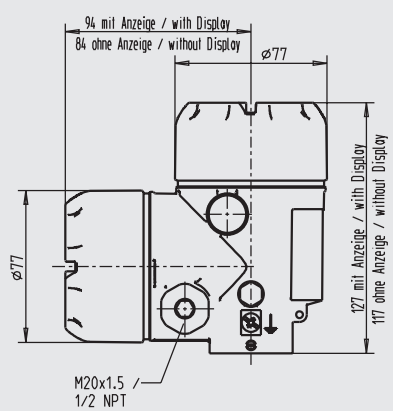
Double chamber case, plastic



Double chamber case, aluminium

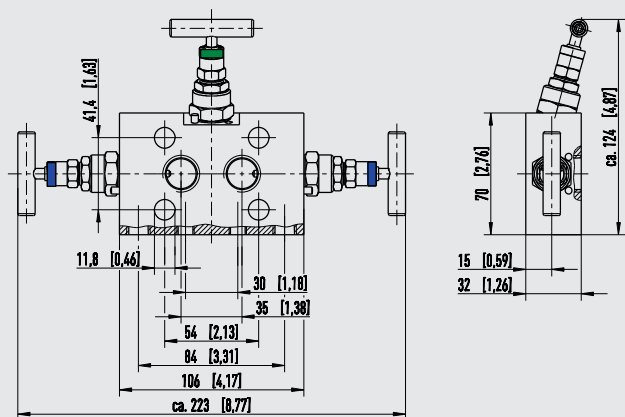


Double chamber case, cast stainless steel



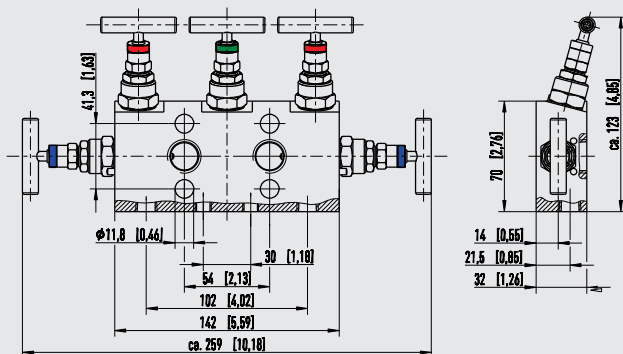
Mounting variants

3-valve manifolds



With upstream pressure compensating valves it is possible to avoid one-sided overpressure loading during both start-up and operation, and also to enable zero point checks during operation. Furthermore, they enable the isolation of the process lines without interference to the running process.

5-valve manifolds



Furthermore, these pressure compensating valves (with integrated shut-off, purge and vent valves) enable the pressure gauge to be vented on one or both sides and the supply line to be purged.

Diaphragm seals



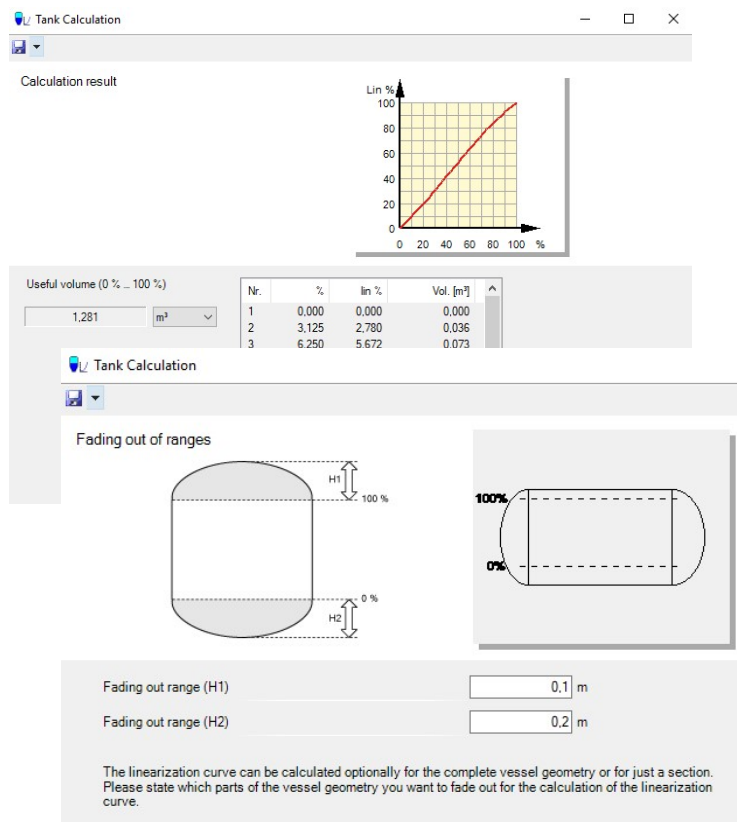
By using diaphragm seals, it is possible to adapt the model DPT-20 differential pressure transmitter to even the most difficult of conditions in the process industry. The transmitters can thus be used at extreme temperatures, and with aggressive, corrosive, heterogeneous, abrasive, highly viscous or 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.

Primary flow elements

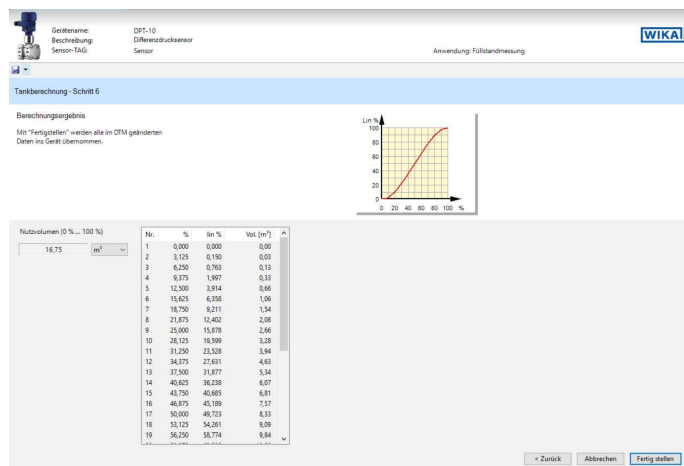


Primary flow elements for flow measurement are available as accessories. Depending on the application, the differential pressure transducers are designed as simple orifice plates, orifice flanges or complete meter runs.

User interface DTM



For HART®, FOUNDATION™ Fieldbus and PROFIBUS® PA 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
	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 possible using HART® standard commands. Optional: Explosion protection per ATEX	On request
	HART® modem for USB interface, specifically designed for use with notebooks (model 010031)	11025166
	HART® modem for RS-232 interface (model 010001)	7957522
	HART® modem for Bluetooth interface Ex ia IIC (model 010041)	11364254
	PowerXpress HART® modem, with optional power supply (model 010031P)	14133234
	3-valve manifold, form A, ½ NPT female (IEC 61518-A) Stainless steel, PN 420, form A, NACE-compliant, 3.1 material certificate	13382498
	3-valve manifold, form A, ¼ NPT female (IEC 61518-A) Stainless steel, PN 420, form A, NACE-compliant, 3.1 material certificate	13382510
	5-valve manifold, form A, ½ NPT female (IEC 61518-A) Stainless steel, PN 420, form A, NACE-compliant, 3.1 material certificate	13382552
	5-valve manifold, form A, ¼ NPT female (IEC 61518-A) Stainless steel, PN 420, form A, NACE-compliant, 3.1 material certificate	13382561
	Oval flange, ¼ NPT, stainless steel (2 pieces) Stainless steel, PN 420, form A, NACE-compliant, 3.1 material certificate	13382609
	Oval flange, ½ NPT, stainless steel (2 pieces) Stainless steel, PN 420, form A, NACE-compliant, 3.1 material certificate	13382595
	Set of sealing plugs, ¼ NPT, 316L (2 pieces) For the vents at the differential pressure sensor Included in delivery with lateral venting, except for process connection from Hastelloy	14035620
	Set of vent valves, ¼ NPT, 316L (2 pieces) For the vents at the differential pressure sensor Included in delivery, except for process connection from Hastelloy	14368975
	Instrument mounting bracket for wall or pipe mounting with mounting bracket and screws, stainless steel	11553945
	Overvoltage protection For transmitters, 4 ... 20 mA, M20 x 1.5, series connection	14002489
	For transmitters, PROFIBUS® PA, M20 x 1.5, series connection	14013659
	Model DI-PT-R display and operating module, case cover aluminium with window	12298884
	Model DI-PT-R display and operating module, case cover electropolished cast stainless steel with window	13315269
	Model DI-PT-R display and operating module, case cover plastic with window	13315277
	Model DI-PT-R display and operating module, case cover cast stainless steel with window for single chamber case	12298906
	Model DI-PT-R display and operating module, case cover cast stainless steel with window for double chamber case	14045598
		Model DI-PT-E external display and operating module, aluminium case
		12354954
		12355101
	Model DI-PT-E external display and operating module, plastic case	14134247

Ordering information

Approval / Case / Cable length / Display / Output signal / Electrical connection / Maximum operating pressure / Measuring range / Process connection / Sealing / Accuracy / Mounting / Additional equipment / Cleaning / Sensor filling / Certificates / Scaling

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