

Process transmitter

With capacitive ceramic measuring cell

Models CPT-20, CPT-21

WIKA data sheet PE 86.07



for further approvals
see page 10



Applications

- Chemical and petrochemical industries
- Process engineering
- Pulp and paper industry
- Water and wastewater
- Hazardous areas

Special features

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



Model CPT-21 with flush process connection

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 CPT-2x is ideally suited to applications with the highest demands on measurement technology.

Robust and highly accurate

The capacitive ceramic measuring cell delivers especially accurate measured values, particularly with small measuring ranges. As a result of the special sealing concept, operation in almost all industries and applications is possible without difficulties.

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 thirteen 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.

Measuring ranges

Gauge pressure				
bar	0 ... 0.025	0 ... 0.1	0 ... 0.4	0 ... 1
	0 ... 2.5	0 ... 5	0 ... 10	0 ... 25
	0 ... 60	0 ... 100		
psi	0 ... 0.4	0 ... 1.5	0 ... 5	0 ... 15
	0 ... 30	0 ... 75	0 ... 150	0 ... 300
	0 ... 500	0 ... 1,450		

Absolute pressure				
bar	0 ... 0.1	0 ... 0.4	0 ... 1	0 ... 2.5
	0 ... 5	0 ... 10	0 ... 25	0 ... 60
	0 ... 100			
psi	0 ... 0.4	0 ... 1.5	0 ... 5	0 ... 15
	0 ... 30	0 ... 150	0 ... 300	0 ... 900
	0 ... 1,450			

Vacuum and +/- measuring range				
bar	-0.025 ... +0.025	-0.05 ... +0.05	-0.2 ... +0.2	-0.5 ... +0.5
	-1 ... 0	-1 ... +1.5	-1 ... +5	-1 ... +10
	-1 ... +25	-1 ... +60	-1 ... +100	
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 ... +900	-14.5 ... +1,450		

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 (from measuring range 0 ... 1 bar [0 ... 15 psi]) Minimum pressure at 0 ... 0.025 bar [0 ... 0.4 psi]: -0.05 bar [-0.8 psi] Minimum pressure at 0 ... 0.1 bar [0 ... 1.5 psi]: -0.2 bar [-3 psi] Minimum pressure at 0 ... 0.4 bar [0 ... 5 psi]: -0.8 bar [-14 psi]
Overload safety	
Measuring range ≤ 1 bar [15 psi]	35 times
Measuring range ≤ 10 bar [150 psi]	9 times
Measuring range ≤ 60 bar [900 psi]	3 times
Measuring range ≤ 100 bar [1,450 psi]	2 times

Output signals

Output signals	
Signal types	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 power supply (see table "Power supply") U_{Bmin} = Minimum power supply (see table "Power supply")
Damping	0.0 ... 999.9 s, adjustable After the set damping time the instrument outputs 63 % of the applied pressure as output signal. Example: A pressure impulse increases from 0 to 10 bar with a damping 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)

Voltage supply

Power supply (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 9.6 ... 32 V	DC 13.5 ... 32 V

Power supply (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 9.6 ... 17.5 V Fisco)	DC 13.5 ... 24 V (DC 13.5 ... 17.5 V Fisco)

Accuracy specifications

Accuracy specifications	
Accuracy at room temperature ¹⁾	0.05 % of span (option: 0.1 % or 0.2 %)
Adjustability	
Zero point	-20 ... +95 % (downwards, the adjustability is always limited by the minimum pressure of 0 bar abs.)
Span	-120 ... +120 % with a difference between zero point and span of a max. 120 % of the nominal measuring range (downwards, the adjustability is always limited by the minimum pressure of 0 bar abs.)
Turndown	unlimited Max. turndown for SIL applications 10:1
Non-linearity	Depending on the accuracy at room temperature
Accuracy at room temperature 0.05 %	≤ 0.05 % of span BFSL (IEC 61298-2)
Accuracy at room temperature 0.1 %	≤ 0.1 % of span BFSL (IEC 61298-2)
Accuracy at room temperature 0.2 %	≤ 0.2 % of span BFSL (IEC 61298-2)
Non-repeatability	Depending on the accuracy at room temperature
Accuracy at room temperature 0.05 %	≤ 0.05 % of span BFSL (IEC 61298-2)
Accuracy at room temperature 0.1 %	≤ 0.1 % of span BFSL (IEC 61298-2)
Accuracy at room temperature 0.2 %	≤ 0.2 % of span BFSL (IEC 61298-2)
Behaviour with turndown	
1:1 ... 5:1	No change in accuracy
> 5:1	(basic accuracy / 5) x turndown
Long-term stability at reference conditions	
Measuring range 0 ... 0.025 bar	< 0.1 % x turndown (1 year) < 0.2 % x turndown (5 years) < 0.4 % x turndown (10 years)
All other measuring ranges	< 0.05 % x turndown (1 year) < 0.1 % x turndown (5 years) < 0.2 % x turndown (10 years)
Thermal change, zero point and span (reference temperature 20 °C [68 °F])	
in compensated range 0 ... 100 °C [32 ... 212 °F]	< 0.075 % / 10 K (max. 0.15 %)
outside compensated range	< 0 °C: < 0.15 % / 10 K > 100 °C: < 0.05 % / 10 K
Thermal change of the current output ²⁾ (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.

2) Not valid for PROFIBUS® PA and FOUNDATION™ Fieldbus.

Reference conditions (per IEC 61298-1)

Reference conditions (per IEC 61298-1)	
Temperature	15 ... 25 °C (59 ... 77 °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

Operating conditions

Operating conditions	
Permissible temperature ranges	Pay attention to restrictions to temperature ranges with Ex approvals
Ambient	-20 ... +70 °C (-4 ... 158 °F) (with digital indicator) -40 ... +80 °C (-40 ... 176 °F) (without digital indicator)
Medium	see sealing material
Storage	-60 ... +80 °C (-76 ... 176 °F)
Restrictions to medium temperature due to sealing material	For oxygen applications max. 60 °C [140 °F]
FKM	-20 ... +130 °C (option: -20 ... +150 °C) [-4 ... +266 °F (option: -4 ... +302 °F)]
EPDM	-40 ... +130 °C (option: -40 ... +150 °C) [-40 ... +266 °F (option: -40 ... +302 °F)]
FFKM	-20 ... +130 °C (option: -20 ... +150 °C) [-4 ... +266 °F (option: -4 ... +302 °F)]
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 (mechanical shock)	50 g (2.3 ms) 2 g (for double chamber case, cast stainless steel)
Instrument safety	
Ingress protection per IEC/EN 60529	IP66/67 IP66/IP68 (0.2 bar) for absolute pressure sensors Option: IP66/IP68 (1 bar) or IP68 (25 bar)
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

Digital indicator (option)

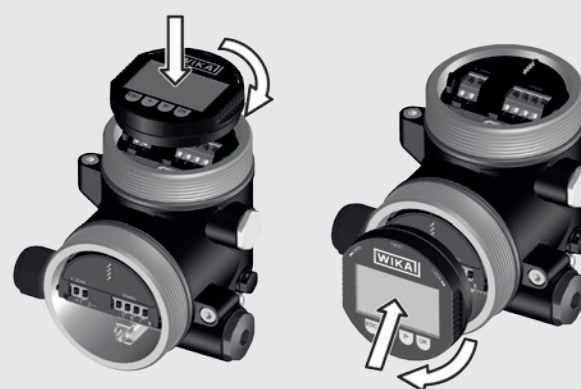
Specifications				
Backlighting	Yes			
Background	Grey, black digits			
Upgradable	Yes (for order numbers, see "Accessories")			
Menu languages	German	Polish	Chinese	Turkish
	English	Italian	Russian	
	French	Dutch	Portuguese	
	Spanish	Japanese	Czech	
Display size	5-digit measured value display, adjustable (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

Single chamber case



Double chamber case



Materials

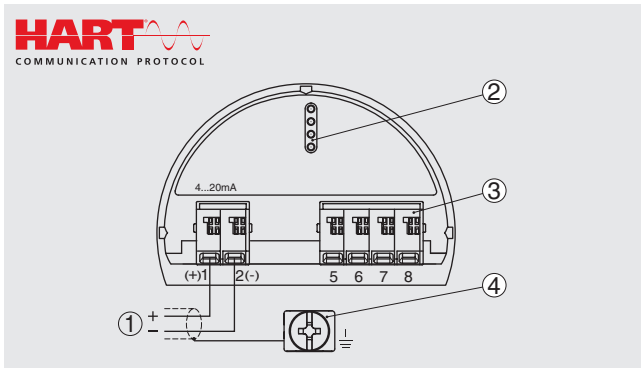
Materials	
Wetted parts	
Process connection	Stainless steel 316L PVDF Alloy C22 (2.4602) Alloy C276 (2.4819) Duplex (1.4462) Titanium grade 2
Diaphragm	Sapphire ceramic with glass seam (> 99.9 % Al ₂ O ₃ ceramic)
Sealing of the measuring cell	
Standard process connections	FKM (options: EPDM, FFKM)
Flush process connections	FKM (options: EPDM, FFKM)
Sealing material (at the process connection)	Not included in delivery Exception G 1 A ISO228-1 flush with O-ring FKM (option: EPDM)
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

Stainless steel 316L corresponds to 1.4404 or 1.4435

Electrical connections

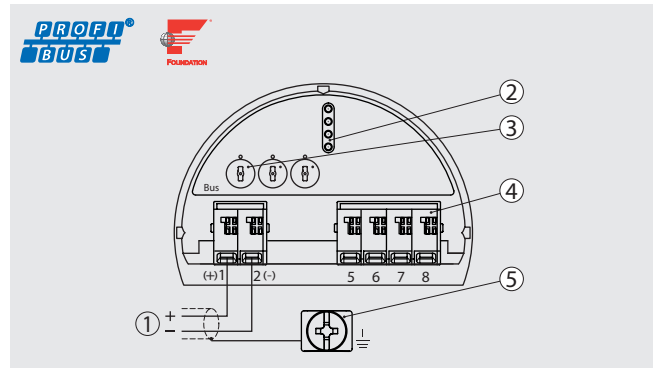
Specifications	
Spring-loaded terminals	Wire cross-section: Wire or strand: 0.2 ... 2.5 mm ² (AWG 24 ... 14) Strand with end splice: 0.2 ... 1.5 mm ² (AWG 24 ... 16)
Cable glands M20 x 1.5	
Plastic, PA	Sealing from NBR Cable diameter: 5 ... 9, 6 ... 12, 10 ... 14 mm
Brass, nickel-plated	Sealing from NBR Cable diameter: 5 ... 9, 6 ... 12, 9 ... 13 mm (for armoured cable)
Stainless steel	Sealing from NBR Cable diameter: 7 ... 12 mm
Cable glands ½ NPT	
sealed with blind plug	
Plastic, PA	Cable diameter: 5 ... 9 mm
Brass, nickel-plated	Cable diameter: 6 ... 12 mm
Brass, nickel-plated	Cable diameter: 9 ... 13 mm (for armoured cable)
Electrical safety	Reverse polarity protection

Connection compartment for single chamber case



4 ... 20 mA or 4 ... 20 mA / HART®

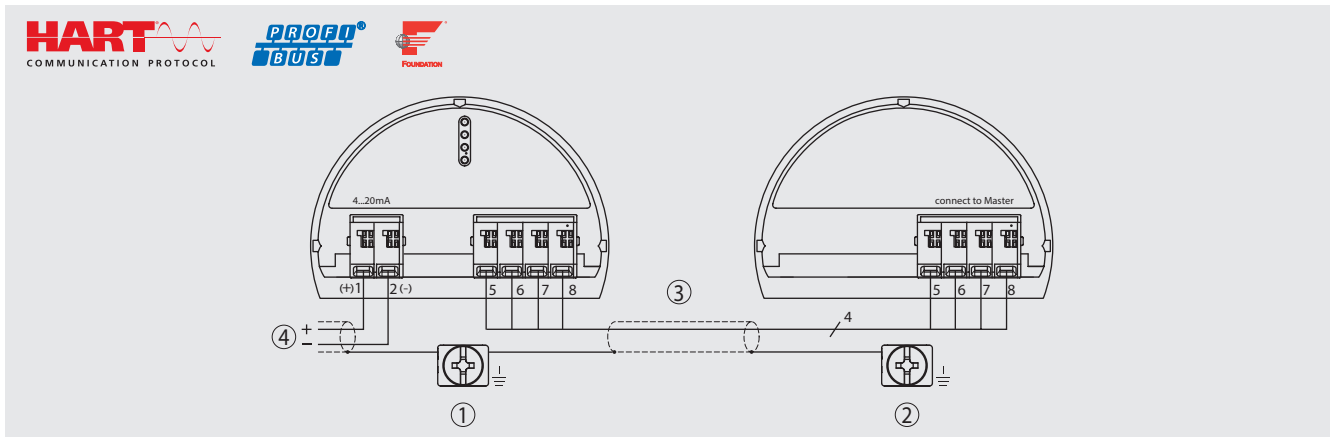
- | | |
|---|---|
| ① | Voltage supply / signal output |
| ② | Interface of digital indicator |
| ③ | Connection terminals for external display and operating unit and slave electronics for electronic differential pressure measurement (not for instruments without HART®) |
| ④ | Ground terminal for cable shield |



PROFIBUS® PA / FOUNDATION™ Fieldbus

- | | |
|---|---|
| ① | Voltage supply / signal output |
| ② | Interface of digital indicator |
| ③ | Simulation switch (1 = operation with simulation release)
Address setting for PROFIBUS |
| ④ | Connection terminals for external display and operating unit and slave electronics for electronic differential pressure measurement |
| ⑤ | Ground terminal for cable shield |

Differential pressure measurement, master/slave



Master/slave

- | | |
|---|--|
| ① | Master |
| ② | Slave |
| ③ | Master/slave connection cable (standard cable length 5 m, maximum cable length 25 m) |
| ④ | Voltage supply / signal output (master) |

Process connections



Standard process connections for model CPT-20	
EN 837	G ½ M20 x 1.5
ISO 228-1	G ¼ A female, G ½ A male
ANSI / ASME B1.20.1	¼ NPT female, ½ NPT male

Flush process connections for model CPT-21	
ISO 228-1	G ½ G 1 A
DIN 3852-A	G 1 ½ A

Aseptic process connections for model CPT-21	
DIN 32676, ISO 2552	Clamp 1" Clamp 1 ½" Clamp 2"
VARIVENT®	DN 32
Threaded pipe connection per DIN 11851	DN 40 DN 50

Flanges for model CPT-21	
DIN 2501	DN 40, PN 40 DN 50, PN 40 DN 80, PN 40
ASME B16.5	2", 150 lbs 3", 150 lbs

Approvals

Logo	Description	Country
	<p>EU declaration of conformity</p> <ul style="list-style-type: none"> ■ EMC directive ■ Pressure equipment directive ■ RoHS directive ■ ATEX directive <p>Hazardous areas</p> <p>- 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 IIIC T135 °C Da] Zone 21 dust [II 2D Ex ia IIIC T135 °C Db]</p> <p>- 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 tb ia IIIC T135 °C Db]</p>	European Union
	<p>IECEx</p> <p>Hazardous areas</p> <p>- 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 IIIC T135 °C Da] Zone 21 dust [Ex ia IIIC T135 °C Db]</p> <p>- 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 tb ia IIIC T135 °C Db]</p>	International

Approvals and certificates, see website

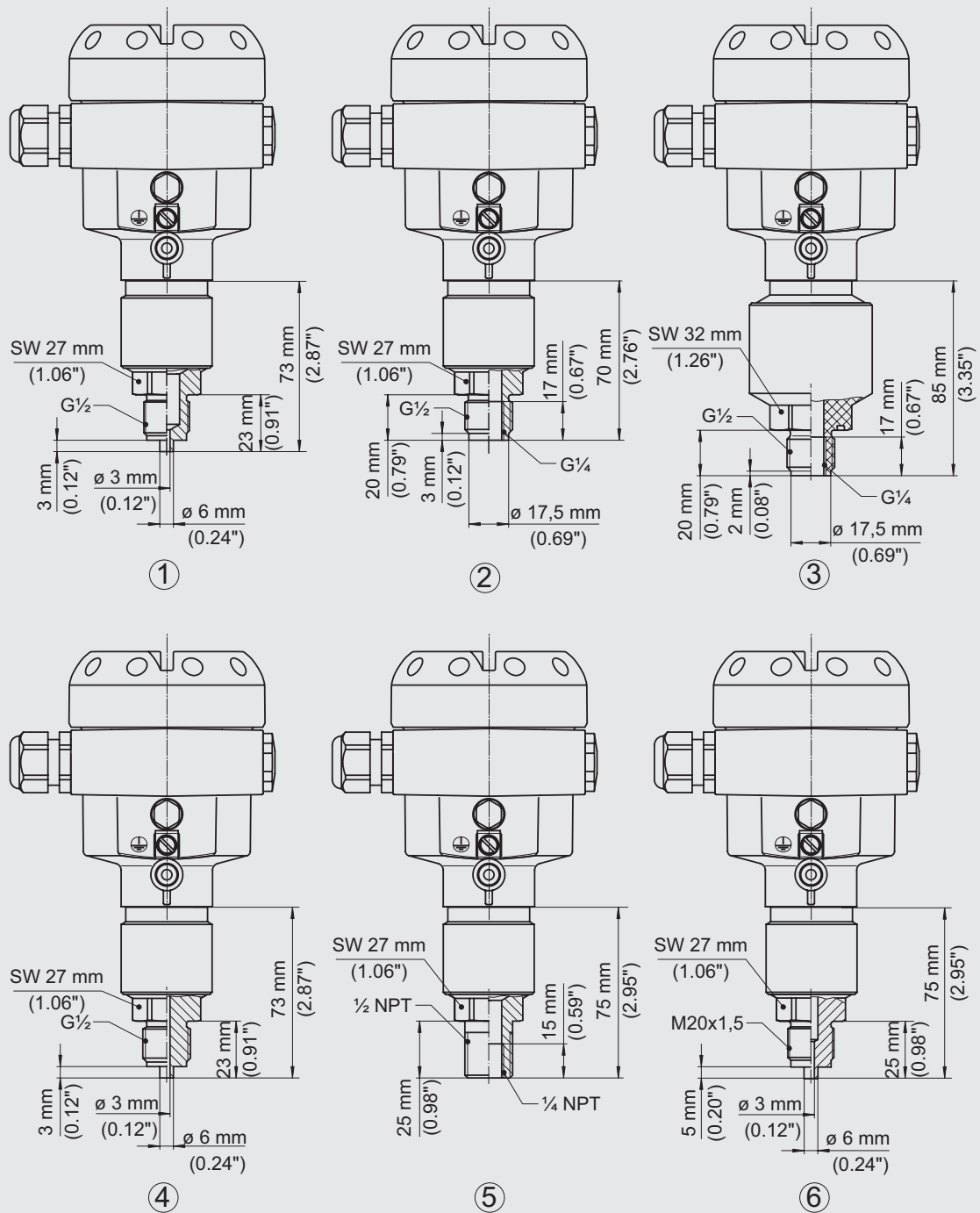
Manufacturer's information and certificates

Logo	Description
	<p>SIL 2 (option) ¹⁾ Functional safety</p>
-	<p>NAMUR recommendations</p> <p>NE21 - Electromagnetic compatibility of equipment NE43 - Signal level for failure information NE53 - Compatibility of field instruments NE107 - Self-monitoring and diagnostics</p>

1) only for output signal 4 ... 20 mA with HART®

Dimensions in mm (inch)

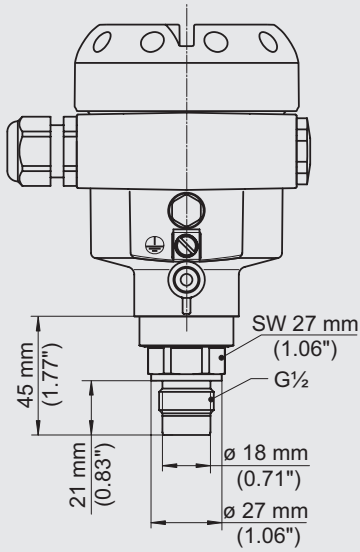
Standard process connections for model CPT-20



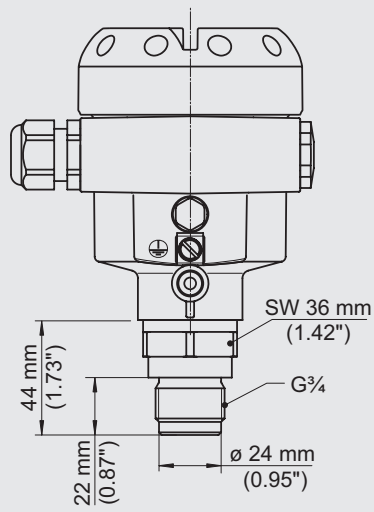
Standard process connections for model CPT-20

①	EN 837	G 1/2
②	ISO 228-1	G 1/4 A female, G 1/2 male
③	ISO 228-1	G 1/4 A female, G 1/2 male (PVDF)
④	EN 837	G 1/2 (volume reduced)
⑤	ANSI / ASME B1.20.1	1/4 NPT female, 1/2 NPT male
⑥	EN 837	M20 x 1.5

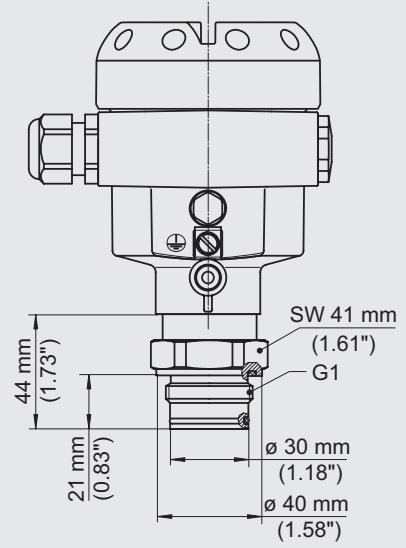
Flush process connections for model CPT-21



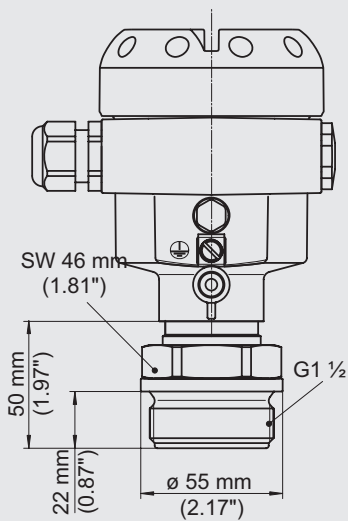
①



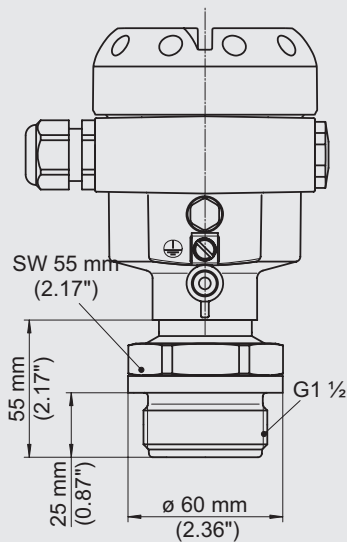
②



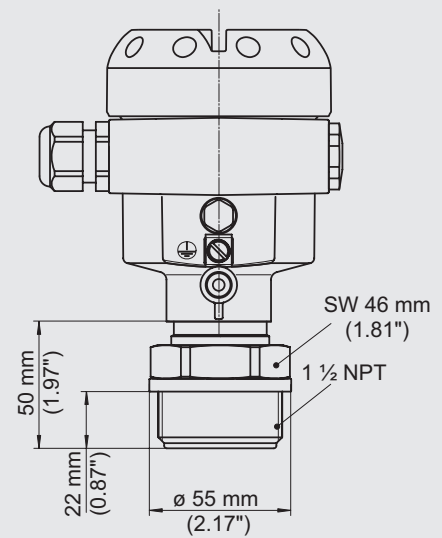
③



④



⑤

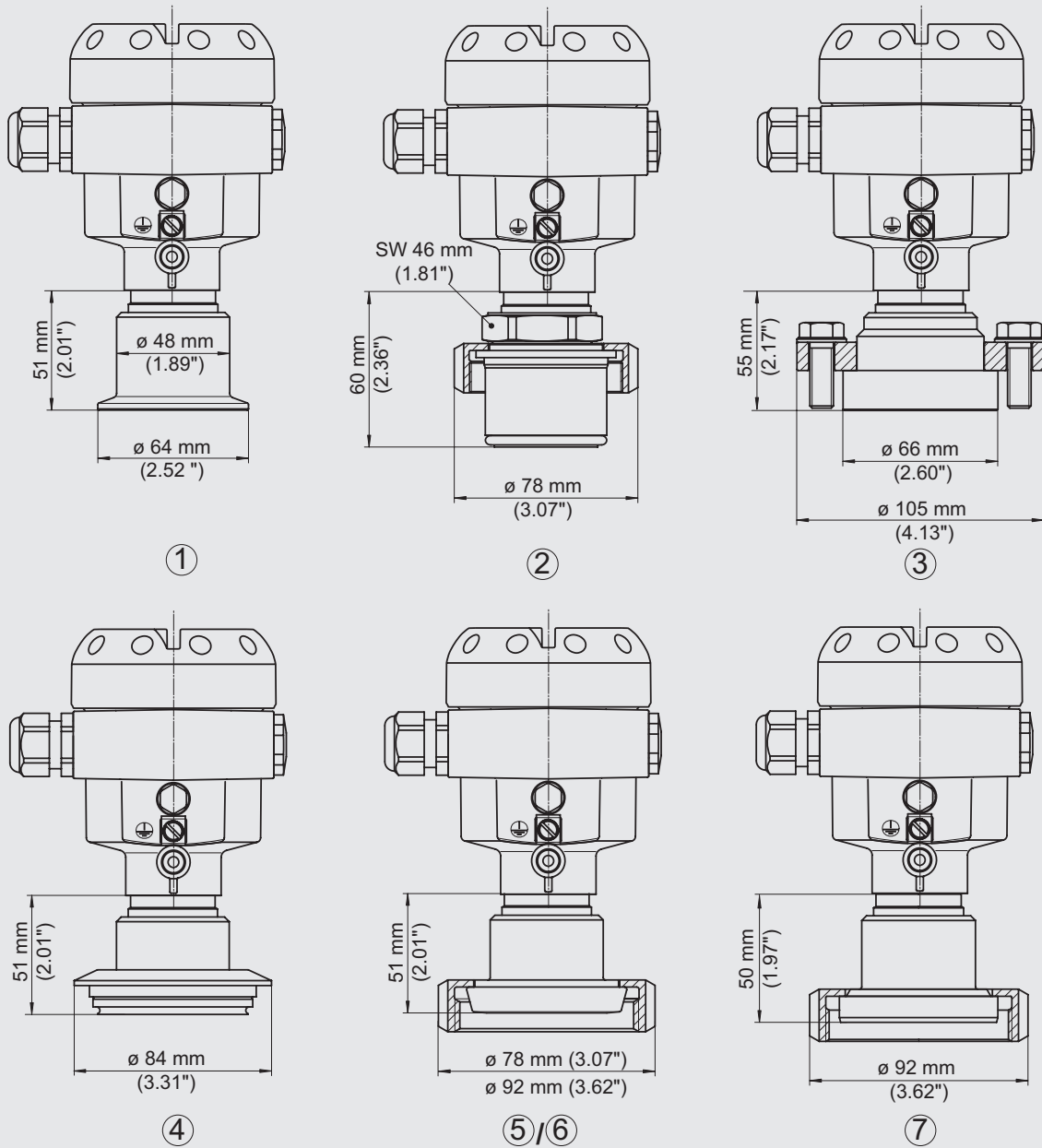


⑥

Flush process connections for model CPT-21

①	ISO 228-1	G 1/2
②	DIN 3852-E	G 3/4
③	ISO 228-1	G 1 A
④	DIN 3852-A	G 1 1/2
⑤	DIN 3852-A-B	G 1 1/2 A
⑥	ANSI / ASME B1.20.1	1 1/2 NPT

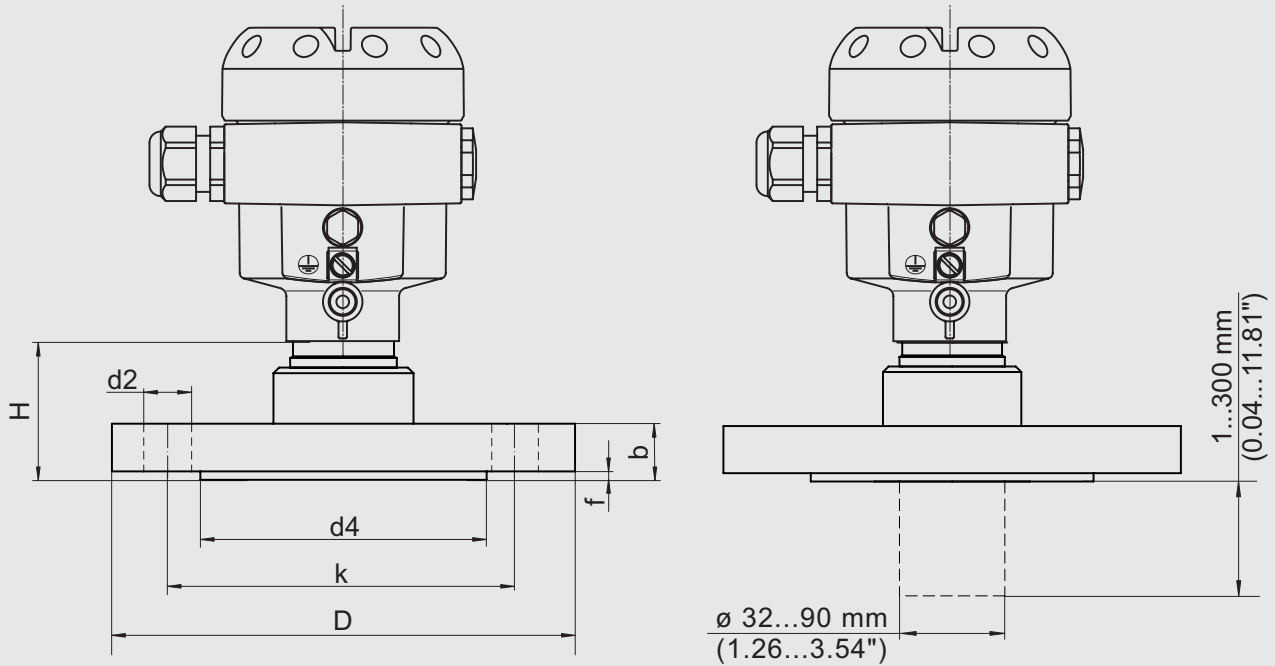
Aseptic process connections for model CPT-21



Aseptic process connections for model CPT-21

①	DIN 32676, ISO 2552	Clamp 2"
②	DIN 11851 with grooved union nut	Form F, DN 40
③	EN 1092-1 collar, DIN 2527	DRD, DN 25
④	VARIVENT®	DN 32
⑤	Threaded pipe connection per DIN 11851	DN 40
⑥	Threaded pipe connection per DIN 11851	DN 50
⑦	Threaded pipe connection per DIN 11864-1	DN 50

Flanges for model CPT-21



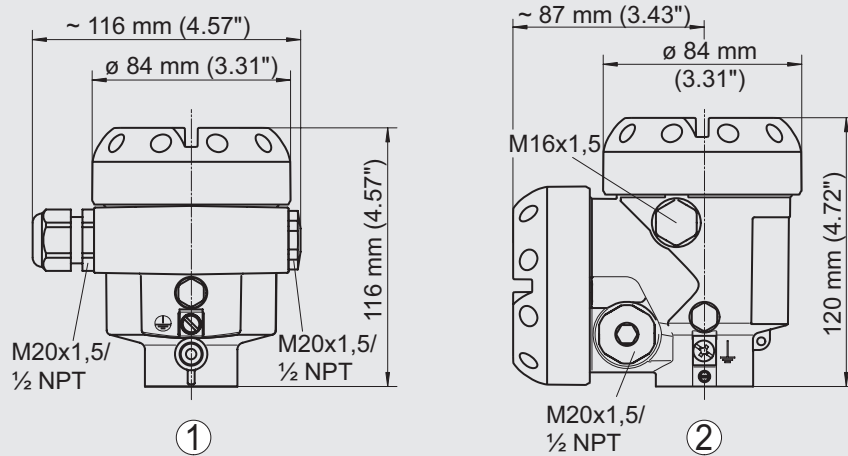
mm	DN	PN	D	b	k	d2	d4	f	H
①	40	40	150	18	110	4xø18	88	3	50
	50	40	165	20	125	4xø18	102	3	50
	80	40	200	24	160	8xø18	138	3	51
②	2"	150 lbs	152,4	19,1	120,7	4xø19,1	91,9	3,2	51
	3"	150 lbs	190,5	23,9	152,4	8xø19,1	127	3,2	51

inch	DN	PN	D	b	k	d2	d4	f	H
①	40	40	5.91"	0.71"	4.33"	4xø 0.71"	3.46"	0.12"	1.97"
	50	40	6.50"	0.79"	4.92"	4xø 0.71"	4.02"	0.12"	1.97"
	80	40	7.87"	0.95"	6.30"	8xø 0.71"	5.43"	0.12"	2.01"
②	2"	150 lbs	6"	0.75"	4.75"	4xø 0.75"	3.62"	0.13"	2.01"
	3"	150 lbs	7.5"	0.94"	6"	8xø 0.75"	5"	0.13"	2.01"

Flanges for model CPT-21

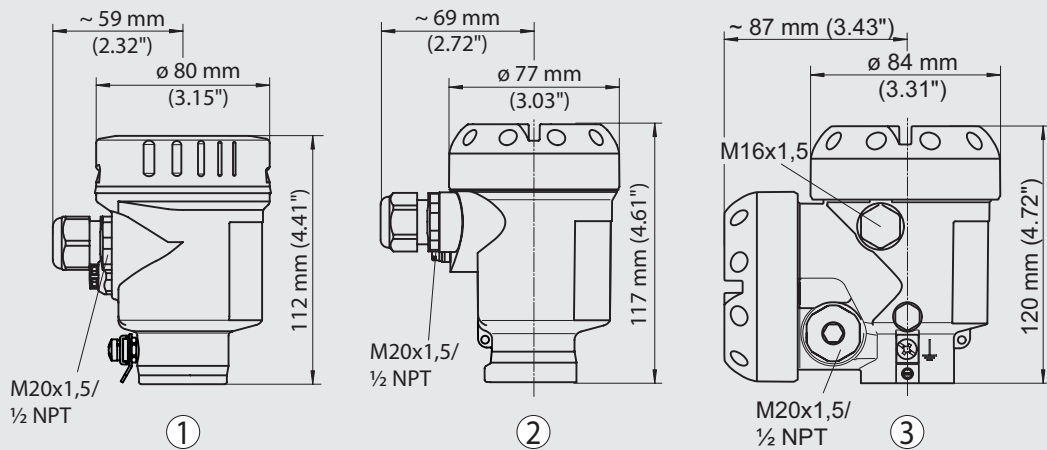
- ① DIN 2501
- ② ASME B16.5

Case dimensions



Case (aluminium)

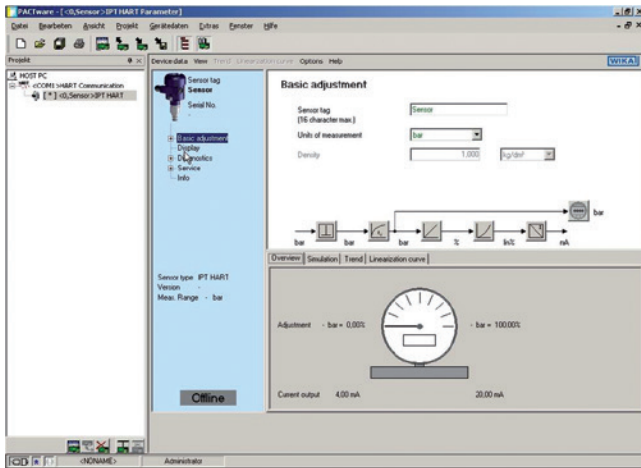
- ① Single chamber case, powder-coated aluminium
- ② Double chamber case, powder-coated aluminium



Case

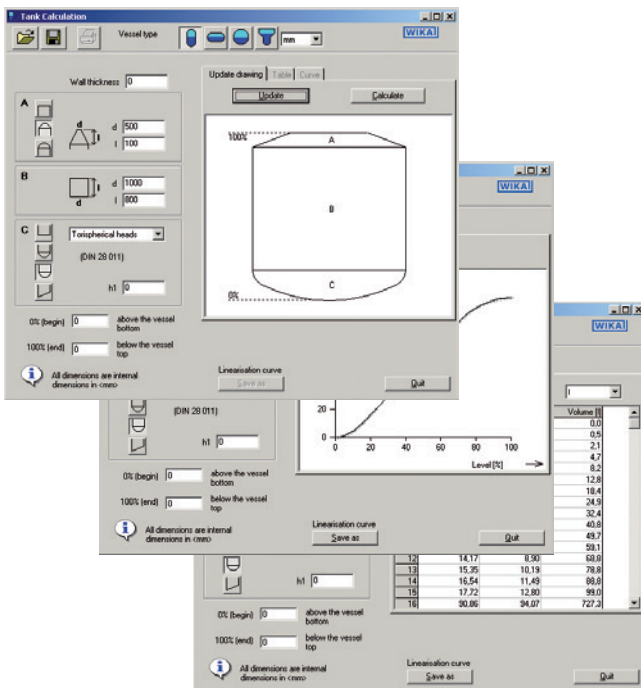
- ① Single chamber case, deep-drawn and electropolished stainless steel, e.g. for hygienic applications
- ② Single chamber case, plastic ABS or precision-cast stainless steel
- ③ Double chamber case, plastic ABS or precision-cast stainless steel

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 no.
	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	on request
	HART® modem USB interface, model 010031 RS-232 interface, model 010001 Bluetooth® interface [EEx ia] IIC, model 010041	 11025166 7957522 11364254
	HART® modem, PowerXpress USB interface 2.0 Voltage supply via USB or AC 100/250 V, 50/60 Hz power supply unit Requires Windows 98, 2000, XP (32-bit), VISTA (32-bit), Windows 7 (32/64-bit)	14133234
	Hand-held, model FC475HP1EKLUGMT HART® protocol, Li-Ion battery, voltage supply AC 100 ... 240 V, colour display with backlighting, Bluetooth® and infrared interface, ATEX, FM, CSA and IECEx(i)	14025585
	Hand-held, model FC475FP1EKLUGMT HART® protocol and FF Bus, Li-Ion battery, voltage supply AC 100 ... 240 V, colour display with backlighting, Bluetooth® and infrared interface, ATEX, FM, CSA and IECEx(i)	14025730
	Hand-held, model MFC5150X HART® protocol, universal voltage supply, cable set with 250 Ω resistance, with DOF upgrade, ATEX and cULus	14104078
	Instrument mounting bracket for wall or pipe mounting, stainless steel	14236577
	Overvoltage limit for transmitters, 4 ... 20 mA, ½ NPT, series connection, Ex i and Ex d Overvoltage limit for transmitters, 4 ... 20 mA, M20 x 1.5, series connection, Ex i and Ex d Overvoltage limit for transmitters, FF / PROFIBUS, ½ NPT, series connection, Ex i and Ex d	14013656 14002489 14013658
	Model DI-PT-R display and operating module, case cover aluminium with window Model DI-PT-R display and operating module, case cover cast stainless steel with window Model DI-PT-R display and operating module, case cover plastic with window Model DI-PT-R display and operating module, case cover electropolished stainless steel with window Model DI-PT-R display and operating module, case cover cast stainless steel with window for double chamber case	12298884 12298906 13315277 13315269 14045598
	Model DI-PT-E external display and operating module, aluminium case Model DI-PT-E external display and operating module, cast stainless steel case Model DI-PT-E external display and operating module, electropolished stainless steel case Model DI-PT-E external display and operating module, plastic case	12354954 12355101 14031516 14134247

Ordering information

Model / Measuring range / Output signal / Accuracy / Process connection / Sealing / Electrical connection / Digital indicator / Case version / Approval

© 05/2018 WIKA Alexander Wiegand SE & Co. KG, all rights reserved.
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.



WIKAL Alexander Wiegand SE & Co. KG
Alexander-Wiegand-Straße 30
63911 Klingenberg/Germany
Tel. +49 9372 132-0
Fax +49 9372 132-406
info@wika.de
www.wika.de