Process pressure transmitter
Model IPT-10, standard version
Model IPT-11, flush diaphragm

Applications

- Process engineering
- Pharmaceutical industry
- Food and beverage industry

Special features

- Ex protection per ATEX and FM
- For applications to SIL-2 (SIL-3)
- Metallic and ceramic measuring cells available
- Seven different case variants
- Configuration via DTM (Device Type Manager) according to FDT concept (Field Device Tool), e.g. PACTware

Fig. left: Model IPT-10, standard version
Fig. right: Model IPT-11, flush diaphragm

Description

With its 4 ... 20 mA, HART®, PROFIBUS® PA or FOUNDATION™ Fieldbus output signals, combined with either intrinsic safety or flameproof enclosure (in accordance with ATEX and FM), the model IPT-1x is ideally suited to applications requiring these features. The electronics of all of these transmitters, even for the flameproof variant, are intrinsically safe. Thus it is possible to make adjustments on the instrument in EX areas while the instrument is live.

Versatile in application
As a result of the available measuring ranges of 0 ... 0.1 bar to 0 ... 4,000 bar and a freely selectable turndown, the instrument can be used in almost any application. The large number of process connections and the possibility of choosing between metallic and ceramic measuring cells enables the use of this transmitter 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 operation module, which can be fitted in four positions. The operation 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 a corresponding Distributed Control Systems.

Data sheets showing similar products:
UniTrans®, universal transmitter for various applications; models UT-10 and UT-11; see data sheet PE 86.01
Differential pressure transmitter; model DPT-10; see data sheet PE 86.21

Measuring ranges

Relative pressure (bar)								
	Metallic measuring cell				Ceramic measuring cell			
Measuring range	**0 ... 0.4**	**0 ... 1.6**	**0 ... 6**	**0 ... 16**	**0 ... 0.1**	**0 ... 0.4**	**0 ... 1**	**0 ... 2.5**
Overpressure limit	2	10	35	80	15	30	35	50
Burst pressure	2.4	12	42	96	15	30	35	50
Measuring range	**0 ... 40**	**0 ... 100**	**0 ... 250**	**0 ... 600**	**0 ... 5**	**0 ... 10**	**0 ... 25**	**0 ... 60**
Overpressure limit	80	200	500	1,200	65	90	130	200
Burst pressure	400	800	1,200	2,400 [1]	65	90	130	200
Measuring range	**0 ... 1,000**	**0 ... 1,600**	**0 ... 2,500**	**0 ... 4,000**				
Overpressure limit	1,500	2,000	3,000	4,400				
Burst pressure	3,000	4,000	5,000	7,000				

1) For model IPT-11: The value specified in the table applies only when sealing is made using a sealing ring below the hexagon. Otherwise max. 1,600 bar applies.

Other measuring ranges can be set via turndown.
For measuring ranges above 600 bar only the model IPT-10 is available.
Measuring ranges in absolute pressure are available in the same increments as in relative pressure. Metallic measuring cells only up to 0 … 16 bar absolute and ceramic measuring cells up to 0 ... 60 bar absolute.

Vacuum and +/- measuring range (bar)								
	Metallic measuring cell				Ceramic measuring cell			
Measuring range	**-1 ... 0**	**-1 ... +0.6**	**-1 ... +3**	**-1 ... +5**	**-1 ... +1.5**	**-1 ... +10**	**-1 ... +25**	**-1 ... +60**
Overpressure limit	5	10	17	35	50	90	130	200
Burst pressure	6	12	20	41	50	90	130	200
Measuring range	**-1 ... +15**	**-0.2 ... +0.2**	**-0.1 ... +0.3**		**-0.1 ... +0.1**	**-0.05 ... +0.05**		
Overpressure limit	80	2	2		15	15		
Burst pressure	96	3	3		15	15		

	Metallic measuring cell	Ceramic measuring cell
Vacuum safety	Yes [1]	from measuring range 1 bar

1) Not for oxygen applications

Accuracy

	Metallic measuring cell	Ceramic measuring cell
Accuracy at room temperature [1]	Measuring ranges < 1,600 bar: ≤ 0.1 % of span Measuring ranges ≥ 1,600 bar: ≤ 0.6 % of span	≤ 0.075 % of span Measuring range 0.1 bar abs.: ≤ 0.25 % of span
Adjustability of zero point	-5 ... +95 %	-20 ... +95 %
Non-linearity	≤ 0.05 % of span BFSL (IEC 61298-2)	≤ 0.05 % of span BFSL (IEC 61298-2)
Non-repeatability	≤ 0.1 % of span	≤ 0.1 % of span
Behaviour with turndown [2]		
■ 1:1 ... 5:1 with measuring range 0.4 ... 1,000 bar (metal) 0.1 ... 60 bar (ceramic)	No change in accuracy	No change in accuracy
■ > 5:1 with measuring range 0.4 ... 1,000 bar (metal) 0.1 ... 60 bar (ceramic)	< 0.02 % x turndown	< 0.015 % x turndown
■ 1:1 ... 2:1 with measuring range ≥ 1,600 bar	< 0.6 %	-
■ 1:1 ... 5:1 with measuring range 0.1 bar absolute	-	< 0.25 %
■ > 5:1 with measuring range 0.1 bar absolute	-	0.05 % x turndown
Long-term stability [3]	≤ (0.1 % x turndown) / year	≤ (0.1 % x turndown) / year
Rated temperature range		
■ without display	-40 ... +80 °C	0 ... 100 °C
■ with display	-15 ... +70 °C	0 ... 70 °C

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) Measuring ranges ≤ 1,000 bar maximum recommended turndown 20:1
Measuring ranges > 1,000 bar maximum recommended turndown 2:1
3) At reference conditions

	Metallic measuring cell	Ceramic measuring cell
Thermal change zero point and span (reference temperature 20 °C)		
■ in compensated range 0 ... 100 °C	< 0.05 % / 10 K x turndown	< 0.05 % + 0.1 % x turndown < 0.1 % + 0.1 % x turndown with 0.1 bar absolute
■ outside compensated range	typical < 0.05 % / 10 K x turndown	< 0.05 % + 0.15 % x turndown typical 0.15 % + 0.15 % x turndown with 0.1 bar absolute
Thermal change of the current output (reference temperature 20 °C)		
for 4 ... 20 mA output at -40 ... +80 °C	< 0.05 % / 10 K, max. 0.15%	< 0.05 % / 10 K, max. 0.15%

Materials

	Metallic measuring cell	Ceramic measuring cell
Wetted parts	Stainless steel 316Ti [2] Hastelloy C4/C276 Elgiloy 2.4711	Stainless steel 316L [1] Hastelloy C4/C276 Titanium grade 2 PVDF Oxide ceramic Al_2O_3 Glass solder
O-ring (only for model IPT-11)	NBR FPM FKM / EPDM	EPDM FFKM / FKM FFKM FKM

1) Stainless steel 316L corresponds to 1.4404 or 1.4435
2) Stainless steel 316Ti corresponds to 1.4571

Case	Material
Single chamber case, plastic	PBT, polyester
Single chamber case, aluminium	Aluminium
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	Aluminium
Double chamber case, cast stainless steel	Stainless steel 316L

Operating conditions

Temperatures

Permissible temperature ranges	
Ambient	
■ with display	-20 ... +70 °C
■ without display	-40 ... +80 °C
Medium	
■ Oxygen applications [1)]	-20 ... +60 °C
■ Aseptic connections	-20 ... +150 °C
Storage	-40 ... +80 °C

1) Oxygen application only possible with metallic measuring cell.

Vibration resistance

4 g (5 ... 100 Hz) per GL characteristic curve 2
Does not apply to double chamber case from stainless steel.

Shock resistance

100 g (6 ms) per IEC 60068-2-27

Instrument safety

- Ingress protection: IP 66/67
- Electrical safety: Overvoltage category III
  Protection class II

Explosion protection

see "Approvals, directives and certificates"
The operating conditions and safety-relevant data in the approval documents must observed.

Process limits dependent upon the sealing material

	Metallic measuring cell	Ceramic measuring cell
without sealing	-40 ... +105 °C	-
FKM	-20 ... +105 °C (option: -20 ... +150 °C)	-40 ... +150 °C
EPDM	-40 ... +105 °C (option: -40 ... +150 °C)	-40 ... +150 °C
NBR	-20 ... +105 °C	-
FFKM	-	-30 ... +150 °C
FFKM / FKM	-	-20 ... +150 °C

Display

LC display with backlighting.
Background grey with black digits.

Generally each instrument can be ordered with or without digital indicator.
The mounting position of the display depends on the case.

- Single chamber case: Top
- Double chamber case: Top or lateral
  For double chamber cases with Ex d approval only a top mounting position is possible.

The different cases can be found under "Dimensions in mm".

Output signal

Signal type
4 ... 20 mA
4 ... 20 mA (2-wire with a superimposed communication signal HART®)
FOUNDATION™ Fieldbus
PROFIBUS® PA

Load in Ω
$(U_B - U_{Bmin)} / 0.023$ A

U_B = applied power supply (s. table "Power supply")
U_{Bmin} = Minimum power supply (s. table "Power supply")

Damping
0 ... 999 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.

Settling time
250 ms

Voltage supply

Power supply

Signal type	without Ex	Ex ia	Ex d
4 ... 20 mA	DC 12 ... 36 V	DC 14 ... 30 V	DC 20 ... 36 V
4 ... 20 mA (2-wire with a superimposed communication signal HART®)	DC 14 ... 36 V	DC 14 ... 30 V	DC 20 ... 36 V
FOUNDATION™ Fieldbus	DC 9 ... 32 V	DC 9 ... 24 V	DC 12 ... 32 V
PROFIBUS® PA	DC 9 ... 32 V	DC 9 ... 24 V	DC 12 ... 32 V

While the backlighting of the display is active, the following voltage ranges apply:

Signal type	without Ex	Ex ia	Ex d
4 ... 20 mA	DC 22.5 ... 36 V	DC 22.5 ... 30 V	DC 22.5 ... 36 V
4 ... 20 mA (2-wire with a superimposed communication signal HART®)	DC 22.5 ... 36 V	DC 22.5 ... 30 V	DC 22.5 ... 36 V
FOUNDATION Fieldbus™	DC 12 ... 32 V	DC 12 ... 24 V	DC 12 ... 32 V
PROFIBUS® PA	DC 12 ... 32 V	DC 12 ... 24 V	DC 12 ... 32 V

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)
- Humidity: 45 ... 75 % relative
- Characteristic curve determination: Terminal method per IEC 61298-2
- Curve characteristics: linear
- Reference mounting position: vertical, diaphragm points downward

Process connections

Model IPT-10

Standard process connections for model IPT-10	
Design	**Sizes**
EN 837	G 1/2 B
ANSI / ASME B1.20.1	1/2 NPT
	1/2 NPT female

Standard high-pressure connections for model IPT-10 from 1,600 bar	
Design	**Sizes**
-	M16 x 1.5 female
	9/16-18 UNF female

Model IPT-11

Standard process connections for model IPT-11	
Design	**Sizes**
Flush	G 1/2 B
	G 1 B
	G 1 1/2 B
	G 1 hygienic

Special connections	
Design	**Sizes**
Tri-clamp	1 1/2"
	2"
	2 1/2" [1]
VARIVENT®	Form F
	Form N
Grooved union nut DIN 11851	DN 25
	DN 40
	DN 50
NEUMO BioContol® [2]	Size 50
	Size 65
Clamp connection DIN 11864-3	DN 40
	DN 50

1) only available for ceramic measuring cell
2) BioControl® is a registered trademark of Neumo.

Diaphragm seals

The model IPT-10 process transmitter can be adapted to the harshest conditions in the process industry by using diaphragm or diaphragm in-line seals. 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.

Pressure transmission medium

	Metallic measuring cell	Ceramic measuring cell
Model IPT-10		
Measuring range < 16 bar	Synthetic oil, halocarbon oil	Dry measuring cell
Measuring range > 16 bar	Dry measuring cell	Dry measuring cell
Model IPT-11	Synthetic oil, halocarbon oil	Dry measuring cell

Halocarbon oil generally with oxygen applications, not with vacuum and absolute pressure < 1 bar abs.
Optionally FDA-listed media for the food industry are available.

Approvals, directives and certificates

Approvals

Directive	
ATEX	Category II 1G, 1/2 G, 2G Ex ia IIC T6 Category II 1/2 G, 2 G Ex d ia IIC T6 Category II 1/2 D, 2 D IP 66/67 T*
FM	Intrinsically safe div. 1 class I, II, III groups A, B, C, D, E, F and G and class I, zone 0, group IIC Explosion proof - intrinsically safe div. 1 class I groups A, B, C, D und class I, zone 1, group IIC
SIL-2	up to 1,000 bar, only for 4 ... 20 mA HART with one-channel architecture (1oo1D) per IEC 61508 / IEC 61511
SIL-3	up to 1,000 bar, only for 4 ... 20 mA HART with two-channel, diversely redundant architecture (1oo2D) per IEC 61508 / IEC 61511

The operating conditions and safety-relevant data in the approval documents must be observed.

CE conformity

- EMC 2004/108/EC interference emission and interference immunity per EN 61326-1 (industrial application), interference emission limit class B
- ATEX directive 94/9/EG
- Pressure equipment directive 97/23/EG

Electrical connections

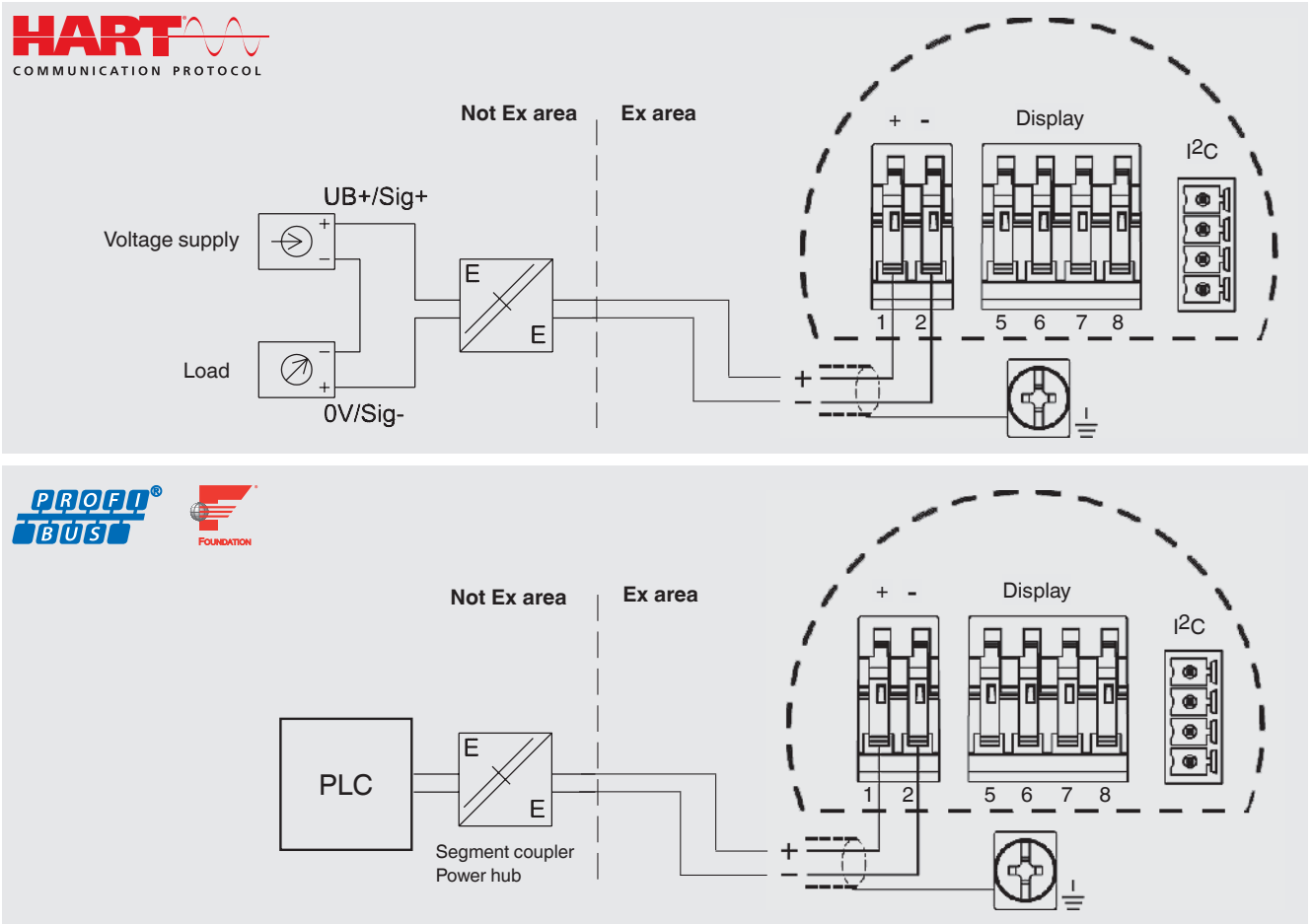
Connection

Spring-loaded terminals for lines up to 2.5 mm² (AWG 14)

Electrical safety

Reverse polarity protection is ensured

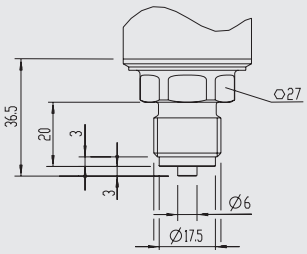
Connection diagrams



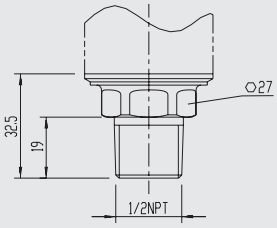
Dimensions in mm

Standard process connections for model IPT-10

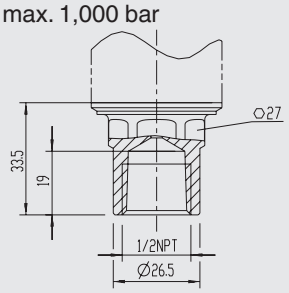
G 1/2 B EN 837
max. 1,600 bar



1/2 NPT
ANSI/ASME B1.20.1
max. 1,000 bar

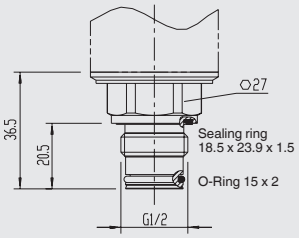


1/2 NPT female
ANSI/ASME B1.20.1
max. 1,000 bar

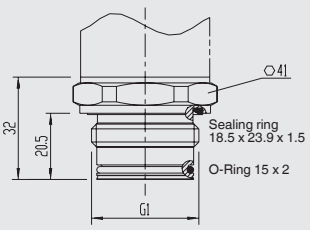


Standard process connections for model IPT-11

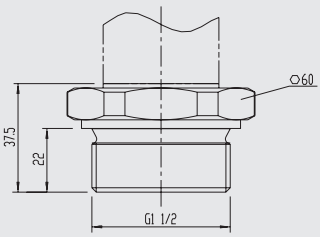
G 1/2 B, flush
with O-ring



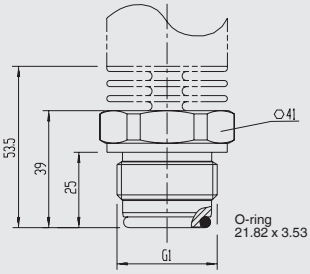
G 1 B, flush
with O-ring



G 1 1/2 B, flush
without O-ring

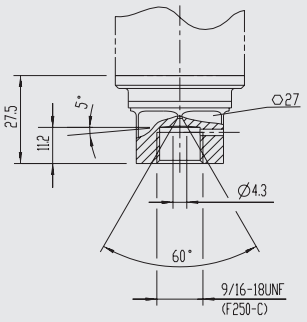


G 1 hygienic, flush
up to 150 °C

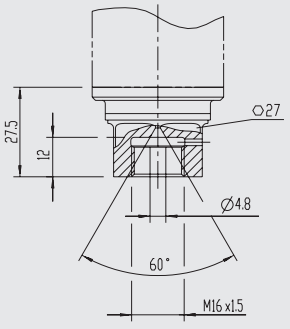


Standard high-pressure connections for model IPT-10

9/16-18 UNF female F 250-C
from 1,600 bar

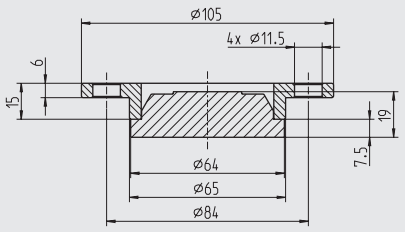


M16 x 1.5 female
with sealing cone
ab 1,600 bar

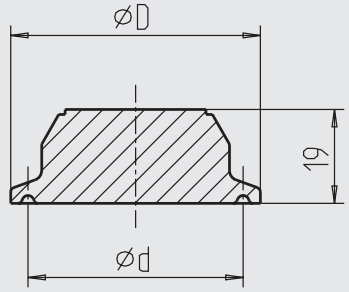


Special connections for model IPT-11

DRD

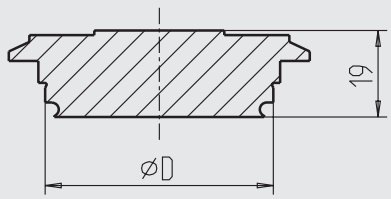


Clamp



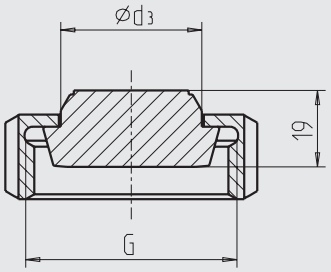
Design		Dimensions in mm	
		ØD	Ød
Tri-clamp	1 1/2"	50	43.5
	2"	64	56.6
	2 1/2"	77.5	70.5

VARIVENT®



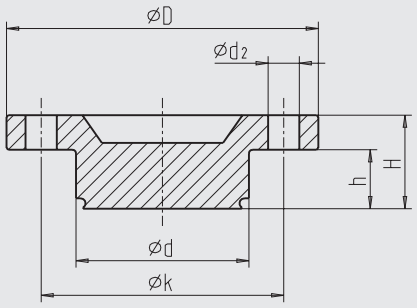
Design		Dimensions in mm
		ØD
VARIVENT®	Form F	50
	Form N	68

Grooved union nut DIN 11851
with conical coupling, for pipes per DIN 11850



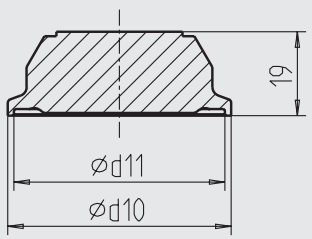
Design		Dimensions in mm	
		G	Ød3
DIN 11851	DN 25	Rd 52 x 1/6	44
	DN 40	Rd 65 x 1/6	48
	DN 50	Rd 78 x 1/6	61

NEUMO
BioControl®



Design		Dimensions in mm					
		Ød	Ød2	ØD	Øk	h	H
BioControl®	Size 50	50	4x9	90	70	17	27
	Size 65	68	4x11	120	95	17	27

Clamp connection DIN 11864-3
Clamp connection with notch for pipe dimensions per DIN 11850 and 11866 row A



Design		Dimensions in mm	
		Ød10	Ød11
DIN 11864-3	DN 40	64	53.7
	DN 50	77.5	65.7

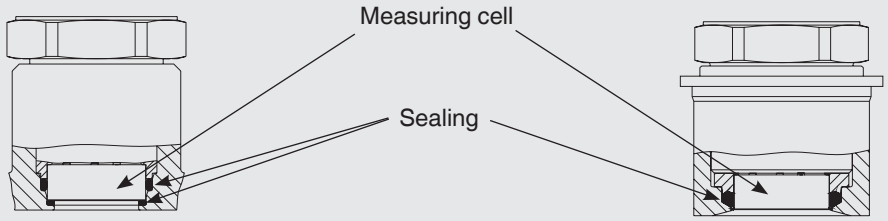
Schematic diagram of sealing concept, ceramic measuring cell

Double sealing for increased safety

Application: All process connections except for G 1 flush

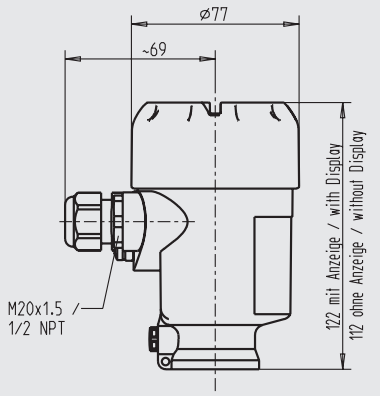
Absolutely flush form seal

Application: VARIVENT®

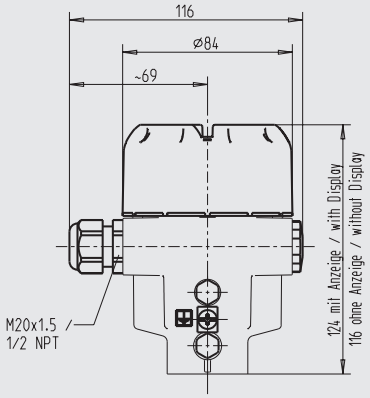


Case variants

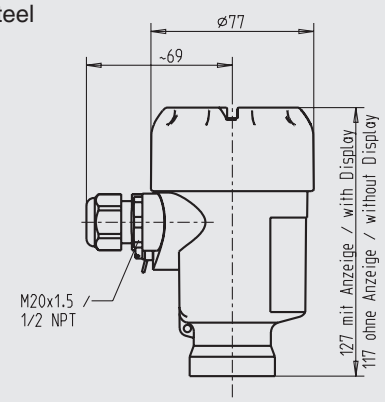
Single chamber case, plastic



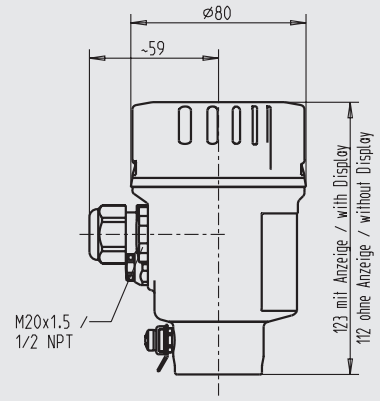
Single chamber case, aluminium



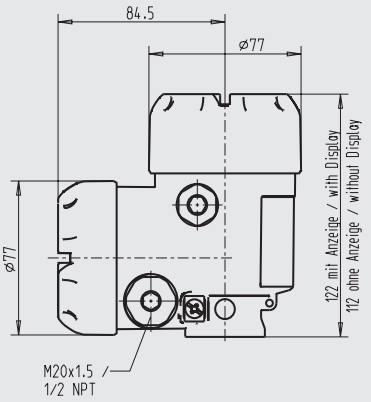
Single chamber case, cast stainless steel



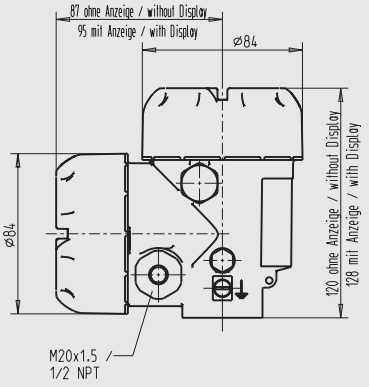
Single chamber case, electropolished stainless steel, deep-drawn



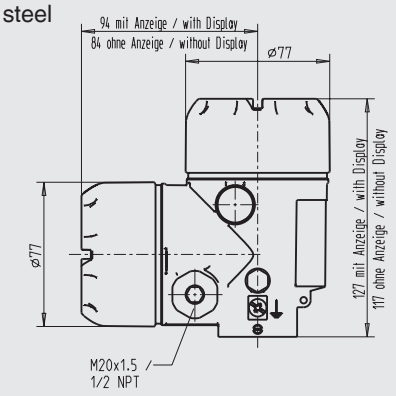
Double chamber case, plastic



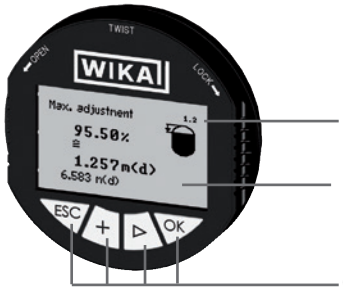
Double chamber case, aluminium



Double chamber case, cast stainless steel



Display and operating module

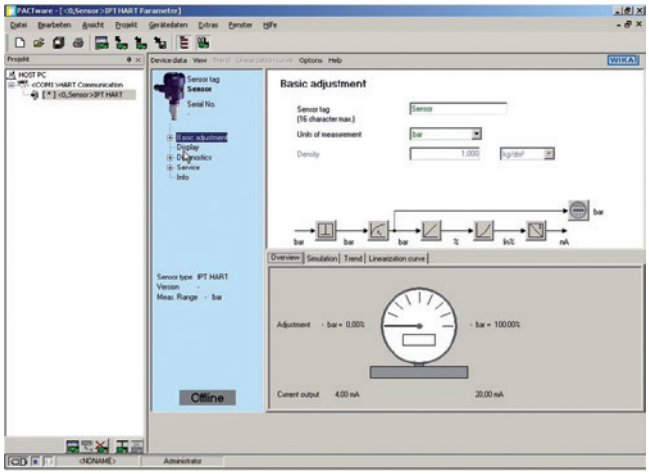


Menu languages:

- German
- English
- French
- Spanish
- Polish
- Italian
- Dutch
- Japanese
- Chinese

5-digit measured value display, optionally with bar graph display

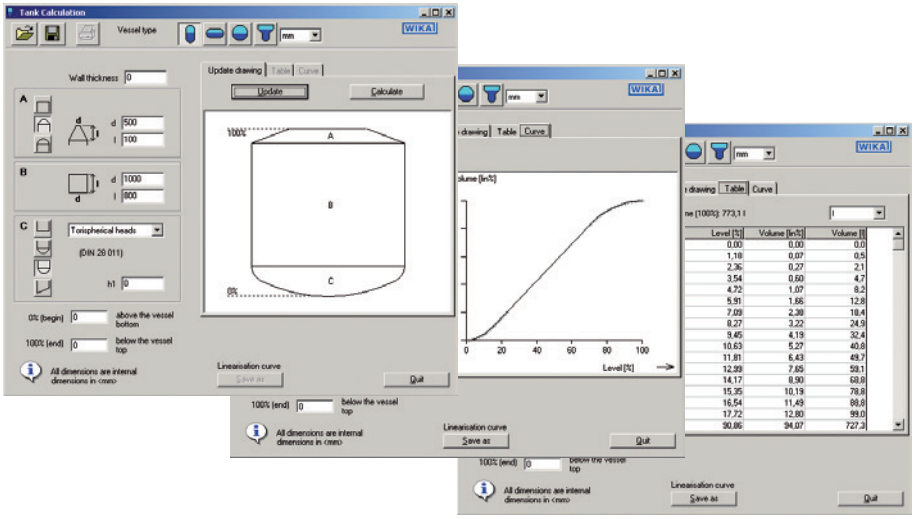
User interface DTM



For HART® output signals, Profibus® PA and FF, 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

	Model	Description	Order no.
	**DIH52-F**	Display module DIH52-F 5-digit display, 20-segment bargraph, 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. Optionally explosion protection per ATEX	on request
	**Model 010031**	HART® modem for USB-interface	11025166
	Model 010001	HART® modem for RS-232 interface	7957522
	Model 010041	HART® modem for Bluetooth interface [EEx ia] IIC	11364254
	**FC475HR1EKL9**	HART® protocol, Li-Ion battery, voltage supply AC 100 ... 240 V coloured display with backlighting, Bluetooth and infrared interface ATEX, FM, CSA and IECEx(i) (including FISCO, if available)	on request
	FC475HR1EKLU	HART® protocol, NIMH battery, voltage supply AC 90 ... 240 V with EASY UPGRADE, ATEX II 2G (1GD) EEx ia IIC T4	on request
	**MFC5150**	HART® protocol, universal voltage supply, cable set with 250 Ω resistance, with explosion protection	on request
		Welding socket for process connection G ½ flush	1192299
		Welding socket for process connection G 1 flush	1192264
		Welding socket for process connection G 1 ½ flush	2158982
		Welding socket for process connection G 1 hygienic flush	2166011
		Welding socket for process connection G 1 flush-ceramic	13305441
		Welding socket for process connection G 1 ½ flush-ceramic	13318366
		Mounting bracket for wall or pipe mounting, stainless steel	11495210
		Overvoltage limit for transmitters, 4 ... 20 mA, 1/2 NPT, series connection	14013656
		Overvoltage limit for transmitters, 4 ... 20 mA, M12 x 1.5, series connection	14002489
		Overvoltage limit for transmitters, FF / Profibus®, 1/2 NPT, series connection	14013658
		Overvoltage limit for transmitters 4 ... 20 mA, M20 x 1.5, Ex d with flameproof enclosure	12140503
		Display and operation module, case cover aluminium with window	12298884
		Display and operation module, case cover cast stainless steel with window	12298906
		Display and operation module, case cover plastic with window	13315277
		Display and operation module, case cover electropolished stainless steel with window	13315269
		External display and operation module, aluminium case, ATEX Ex ia	12298825
		External display and operation module, cast stainless steel case, ATEX Ex ia	12298850
		External display and operation module, aluminium case	12354954
		External display and operation module, cast stainless steel case	12355101
		External display and operation module, electropolished stainless steel case	14031516

Ordering information

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

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