

In-line process transmitter

Hygienic design

Model DMSU22SA

WIKA data sheet DS 95.03



For further approvals,
see page 8



Applications

- Hygienic in-line pressure measurement for the pharmaceutical industry and for aseptic food processing
- Suitable for the production of active pharmaceutical ingredients (API)
- For the monitoring of processes with sterile steam
- For gases, vapour; liquid, pasty, powdery and crystallising media

Special features

- Dead-space free hygienic design with thick-walled sensor tube from stainless steel
- In-line pressure measurement with sensor tube without system fill fluid
- Continuous sensor monitoring of the double-tube system prevents contamination of process and environment
- Suitable for SIP and CIP
- EHEDG-certified and 3-A-compliant

Description

The certified hygienic design of the model DMSU22SA in-line process transmitter fulfils the constantly growing requirements for process monitoring on plant for sanitary applications. Measurement is done by means of a deformation of the inner sensor tube of the double-tube system due to the applied pressure. This deformation produces a signal change, which the transmitter converts into the measuring signal. This version combines the demands for digitalisation and process reliability. Versions with HART® protocol are able to transmit not only the measuring signal, but also the status of the continuous sensor monitoring of the double-tube system to the process control system as required.



In-line process transmitter, model DMSU22SA

Configurator



Standard articles



The patented sensor tube solution of the in-line process transmitter, in combination with the sensor monitoring within the double-tube system, provides optimum protection against process and environmental contamination.

The in-line process transmitter can be supplied with all common process connections for sanitary applications and fulfils the applicable standards for them, e.g. EHEDG, 3-A and ASME BPE.

This product, WIKA model DMSU22SA, includes a patented WIKA development (e.g. US 2021404898A1).

Indicative image of in-line process transmitter

The in-line process transmitter consists of a process transmitter and a sensor tube with an additional monitoring element for measuring the pressure between the support tube and the sensor tube.



Functional principle of sensor monitoring

Normal operation

In normal operation, the pressure measurement and the sensor monitoring operate without restrictions within the performance limits of the overall system. The space in the double-tube system is evacuated. With the monitoring element, this vacuum is measured. While the vacuum is intact, no alarm signal is output.

Sensor monitoring

In the event of a sensor break, the monitored pressure in the interstitial space of the double-tube system increases. Through the continuous measurement, this change is registered in the process transmitter and displayed. Depending on the version, the alarm signals on the current loop are also output via the HART® protocol. This WIKA double-tube system is the solution for critical processes where the medium should not find its way into the environment, nor should the product be contaminated.

Alarm signal of sensor monitoring	Pressure increase in the interstitial space of the double-tube system	
	≥ 100 ... < 300 mbar [≥ 1.45 ... < 4.35 psi]	≥ 300 mbar [≥ 4.35 psi]
Display and operating unit	Alarm message: “Diaphragm rupture”	Alarm message: “Diaphragm rupture”
Current output, 4 ... 20 mA	No signal adaptation	Residual current Depending on setting 3.5 mA or 21.5 mA
HART® communication	Instrument status: “Diaphragm rupture”	Instrument status: “Diaphragm rupture”

Specifications

In-line process transmitter		
Material		
Wetted	Sensor tube and process connection	Stainless steel 1.4435 (316L)
Non-wetted	Support tube: Stainless steel	
	For other materials, see case head, electrical connection and display and operating unit, model DI-PT-U	
Surface finish quality		
Wetted	Sensor tube and process connection	Ra ≤ 0.76 μm [30 μin] per ASME BPE SF3 Ra ≤ 0.38 μm [15 μin] per ASME BPE SF4, electropolished
	Wetted weld seams meet the requirements of ASME BPE 2022 chapter 6 part MJ	
Case head	Plastic case (PBT) with conductive surface per EN 60079-0:2012, colour: night blue RAL5022 Stainless steel case 1.4308 (CF-8), precision-cast Stainless steel case 1.4308 (CF-8) with electropolished surface (suitable for pharmaceutical, food and hygienic industries)	

Measuring range

Nominal measuring range 0 ... 16 bar [0 ... 200 psi]. Other measuring ranges can be set via turndown.

The smallest span for the turndown is 4 bar [58 psi] and is freely selectable within the nominal measuring range.

For example, the instrument can also be set to 0 ... 6 bar [0 ... 100 psi] or -1 ... +6 bar [-14.5 ... +100 psi].

Gauge pressure	
bar	0 ... 16
psi	0 ... 200

Vacuum and +/- measuring ranges ¹⁾	
bar	-1 ... +15
psi	-14.5 ... +200

¹⁾ Under vacuum, sensor monitoring is only possible to a restricted extent

Absolute pressure	
bar	0 ... 16
psi	0 ... 200

Other units settable (→ See page 6).

Vacuum/overload safety	
Vacuum resistance	Yes
Overload safety ¹⁾	■ 1.5 times for medium temperature $\leq 70 \text{ }^{\circ}\text{C}$ [$\leq 158 \text{ }^{\circ}\text{F}$] ■ 1.2 times for medium temperature $> 70 \text{ }^{\circ}\text{C}$... $\leq 150 \text{ }^{\circ}\text{C}$ [$> 158 \text{ }^{\circ}\text{F}$... $\leq 302 \text{ }^{\circ}\text{F}$]
Maximum allowable pressure (PS)	Corresponds to the measuring range full scale value (max. 16 bar [232 psi])

¹⁾ Related to the nominal measuring range

Output signal

Output signal	
Signal types	■ 4 ... 20 mA with HART® signal (HART® rev. 7) ■ 4 ... 20 mA
Load in Ω	$\leq (U+ - 12 \text{ V}) / 0.023 \text{ A}$ (Non-Ex version) U+ = Applied supply voltage (→ See "Auxiliary power")
Damping	0 ... 99.9 s, adjustable After the set damping time the instrument outputs 63 % of the applied pressure as output signal.
Settling time t_{90}	
Without HART®	60 ms
With HART®	80 ms
Refresh rate	
Without HART®	20 ms
With HART®	50 ms

Process connection

Standard	
Clamp connection per DIN 32676	→ See page 9
Clamp connection per ASME BPE	→ See page 9
Aseptic threaded pipe connection per DIN 11864-1, with threaded coupling	→ See page 10
Aseptic clamp connection per DIN 11864-3, with clamp with notch	→ See page 11
Aseptic clamp connection per DIN 11864-3, with clamp with groove	→ See page 11

→ Other process connections on request

Accuracy

Accuracy specifications	
Compensated ambient temperature range	-10 ... +80 °C [14 ... 176 °F]
Adjustability	
Zero point	-20 ... +95 % (downwards, the adjustability is always limited by the minimum pressure of 0 bar abs. [0 psia])
Span	-120 ... +120 % with a difference between zero point and span of max. 120 % of the nominal measuring range, including overload
Turndown, TD	Maximum recommended turndown 4:1
Accuracy in the compensated ambient temperature range, GRB	1 % of span The accuracy includes non-linearity, hysteresis, zero point and end value deviation, in line with the definition per IEC 62828-1. The instrument must be in thermal equilibrium for this. For this, the ambient and process temperatures must remain constant over a longer period of time to prevent heat flow through the instrument.
Accuracy with turndown, GTD	$GTD = GRB * (TD+7) / 8$
Long-term stability ¹⁾	$\leq 1 \%$ of span

1) Valid at reference conditions per IEC 62828-1

Reference conditions per IEC 62828-1

Reference conditions per IEC 62828-1	
Temperature	23 °C ±2 °C [73 °F ±7 °F]
Supply voltage	DC 23 ... 25 V
Air pressure	860 ... 1,060 mbar [86 ... 106 kPa, 12.5 ... 15.4 psi]
Air humidity	45 ... 75 % r. h.
Characteristic curve determination	Terminal method per IEC 62828-1
Curve characteristics	Linear

Auxiliary power

Auxiliary power	
Auxiliary power	
Supply voltage U+	DC 12 ... 36 V

→ For more information, see “Approvals”

Electrical connection

Electrical connection		
Cable glands M20 x 1.5		
Stainless steel cable gland in Hygienic Design	Sealing	FDA-compliant
	Cable diameter	6 ... 12 mm [0.24 ... 0.47 in]
	Ingress protection per IEC 60529	IP66/67
Stainless steel cable gland	Sealing	NBR
	Cable diameter	7 ... 12 mm [0.28 ... 0.47 in]
	Ingress protection per IEC 60529	IP66/67
Plastic, PA	Sealing	NBR
	Cable diameter	6 ... 12 mm [0.24 ... 0.47 in]
	Ingress protection per IEC 60529	IP66/67
Brass, nickel-plated	Sealing	NBR
	Cable diameter	5 ... 9 mm [0.2 ... 0.35 in]
	Ingress protection per IEC 60529	IP66/67
Angular connector DIN 175301-803A with mating connector	Wire cross-section	Max. 1.5 mm ² (AWG 16)
	Ingress protection per IEC 60529	IP65 ¹⁾
Circular connector M12 x 1 (4-pin) without mating connector	Ingress protection per IEC 60529	IP65 ¹⁾
Spring-loaded terminals	Wire cross-section: Wire or strand: 0.2 ... 2.5 mm ² (AWG 24 ... 14) Stranded wire with end splice: 0.2 ... 1.5 mm ² (AWG 24 ... 16)	
Electrical safety	Reverse polarity protection	

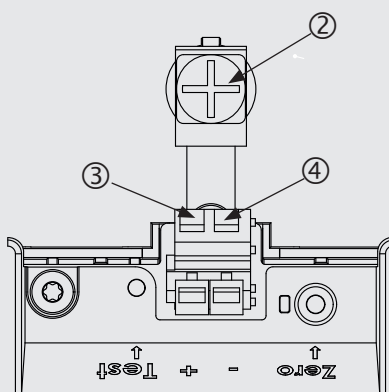
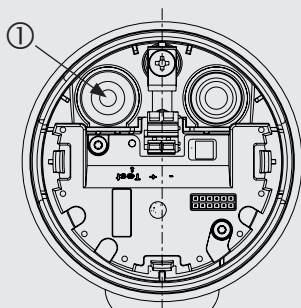
1) The stated ingress protection only applies when plugged in using mating connectors that have the appropriate ingress protection.

Pin assignment

Cable gland M20 x 1.5 and spring-loaded terminals

Outlet for connection cable

Pin assignment



- ① Cable gland
- ② Shield
- ③ Positive power supply terminal U+
- ④ Negative power supply terminal U-

Display and operating unit, model DI-PT-U

Display and operating unit, model DI-PT-U	
Display type	LC display ¹⁾
Refresh rate	200 ms
Main display	4 ½-digit
Segment display	Character size 14 mm [0.55 in]
Additional display	Selectable via menu, three-line scale range
Bar graph display	20 segments, radial, pressure gauge simulation
Adjustable units	
Pressure units	■ bar ■ psi ■ mbar ■ MPa ■ kPa ■ hPa ■ Pa ■ mH₂O ■ mmH₂O ■ ftH₂O ■ inH₂O ■ mHg ■ mmHg ■ inHg ■ kg/cm² ■ g/cm² ■ Torr
Free unit	A free character string (6 characters) can be defined as a unit
Operating state	Display via symbols
Operating temperature	-20 ... +60 °C [-4 ... +140 °F]
Storage temperature	-25 ... +80 °C [-13 ... +176 °F]
Operation	4 buttons for the recall and operation of the settings
Colours	
Background	Light grey
Digits	Black
Display size	Separated into main and segment displays
Ingress protection per IEC/EN 60529	IP40 (without cover)
Material	Case from ABS, window from polyester film

1) For the process transmitter only this display may be used. → For order number, see "Accessories and spare parts".

Operating conditions

Operating conditions	
Permissible air humidity	≤ 93 % r. h.
Permissible temperature ranges	
Ambient	-10 ... 40 °C [14 ... 104 °F]
Medium	-10 ... +150 °C [14 ... 302 °F]
Storage	-25 ... +80 °C [-13 ... +176 °F]
Vibration resistance	
Plastic case	4 g, 5 ... 100 Hz
Stainless steel case	0.7 g, 5 ... 100 Hz
Shock resistance	
Plastic case	150 g
Stainless steel case	150 g
Ingress protection per IEC/EN 60529	IP65
	The ingress protection only applies with closed case head and closed cable glands.

Approvals

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	
	3-A ²⁾ Hygienic design This instrument is 3-A marked, based on a third party verification for conformance to the 3-A standard.	USA
	EHEDG ²⁾ Hygienic Design	European Union

1) With electrostatic discharge, a short-term, increased error of up to 1 % of the nominal measuring range can occur.

2) Conformity only applies to process connections that are marked with the relevant conformity logo.

Manufacturer's declaration

Logo	Beschreibung
-	Wetted materials are not of animal origin (ADI-free)
-	Regulation (EC) 2023/2006 (GMP)
-	GB 4806.1-2016 China National Food Safety Standard - Good Manufacturing Practice GB 31603-2015 (GMP)
-	Suitability of wetted materials for drinking water in accordance with the European 4MS initiative

Certificates

Certificates	
Certificates	■ 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) ■ Others on request
Calibration	Factory calibration certificate
Recommended calibration interval	1 year (dependent on conditions of use)

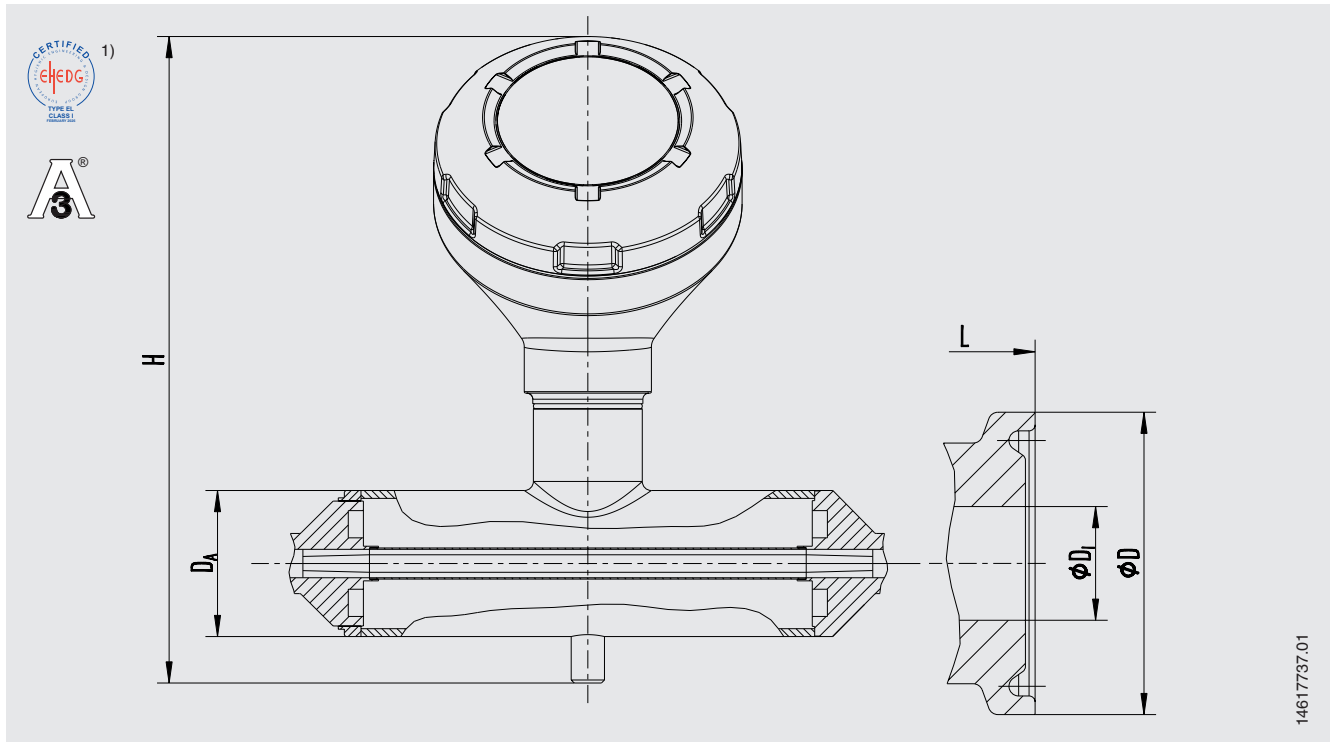
Patents, property rights

Patent number	Description
CN 113454431A; EP 3938750A1; US 2021404898A1; WO 2020182945A1	Tube sensor with deformation body

→ For approvals and certificates, see website

Dimensions in mm [in]

Clamp connection per DIN 32676 or ASME BPE



Process connection: Clamp connection per DIN 32676

Pipe standard per DIN 11866 row A and DIN 11850 row 2

DN	PN ^{2) 3)}	Dimensions in mm [in]				
		Pipe outer-Ø D _A	Pipe inner Ø D _i	Clamp Ø D	L	H
25	16	60 [2.362]	26 [1.024]	50.5 [1.988]	314 [12.36]	226 [8.90]

Process connection: Clamp connection per ASME BPE

Pipe standard per DIN 11866 row C or ASME BPE

DN	PN ^{2) 3)}	Dimensions in mm [in]				
		Pipe outer-Ø D _A	Pipe inner Ø D _i	Clamp Ø D	L	H
½"	16	48 [1.89]	9.4 [0.37]	25 [0.984]	210 [8.27]	214 [8.43]
¾"	16	48 [1.89]	15.8 [0.622]	25 [0.984]	280 [11.02]	214 [8.43]

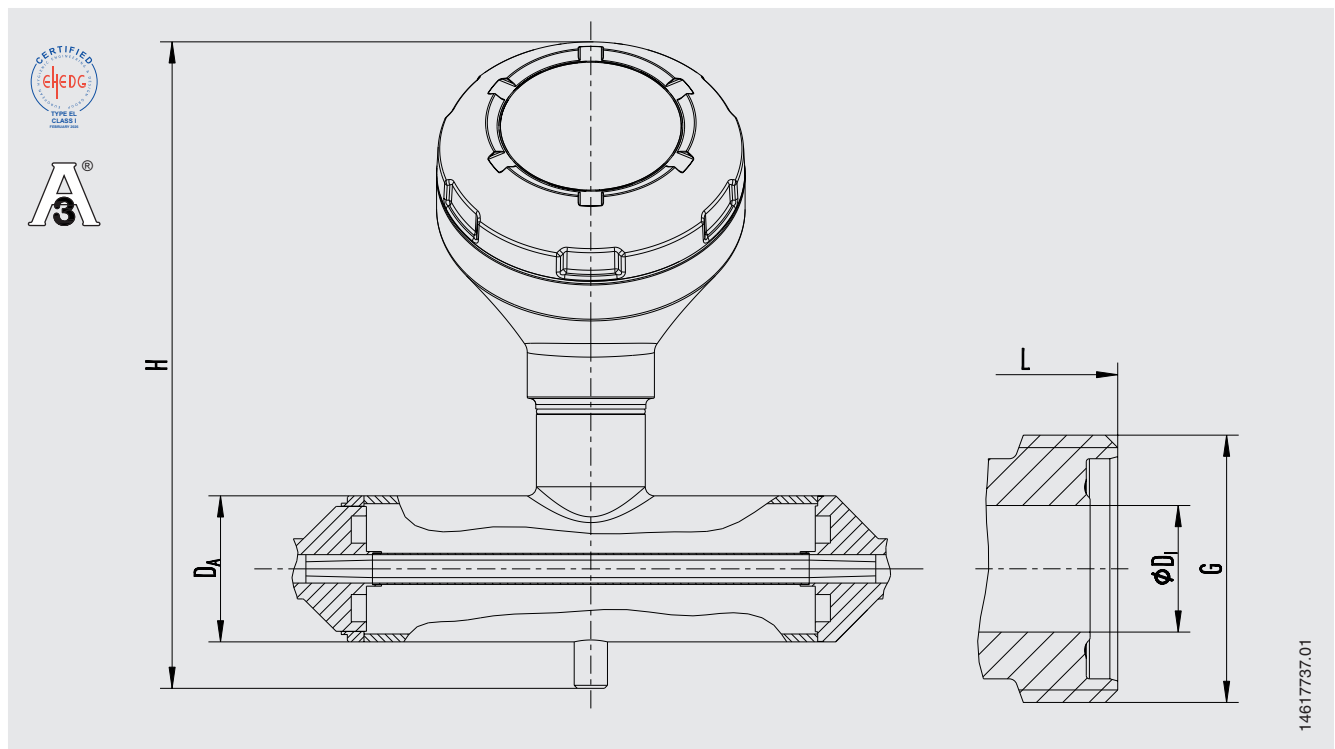
1) EHEDG conformity only in combination with TRI-CLAMP[®] seals Combifit International B.V., The Netherlands.

2) For maximum pressure range consider pressure rating of clamp.

3) The specification PN in accordance with the above-mentioned standards is used exclusively for the classification of the connection. The maximum allowable pressure PS within the meaning of the Pressure Equipment Directive 2014/68/EU is independent of this and is marked on the diaphragm seal.

→ Further dimensions and higher nominal pressures on request

Aseptic threaded pipe connection per DIN 11864-1, with threaded coupling



Process connection: Aseptic threaded pipe connection per DIN 11864-1, form A Pipe standard per DIN 11866 row A and DIN 11850 row 2

DN	PN ^{1) 2)}	Dimensions in mm [in]				
		Pipe outer-Ø D _A	Pipe inner Ø D _i	G	L	H
25	16	60 [2.362]	26 [1.024]	RD 52 x 1/8 [2.047 x 1/8]	328 [12.91]	226 [8.90]

Process connection: Aseptic threaded pipe connection per DIN 11864-1, form A Pipe standard per DIN 11866 row C or ASME BPE

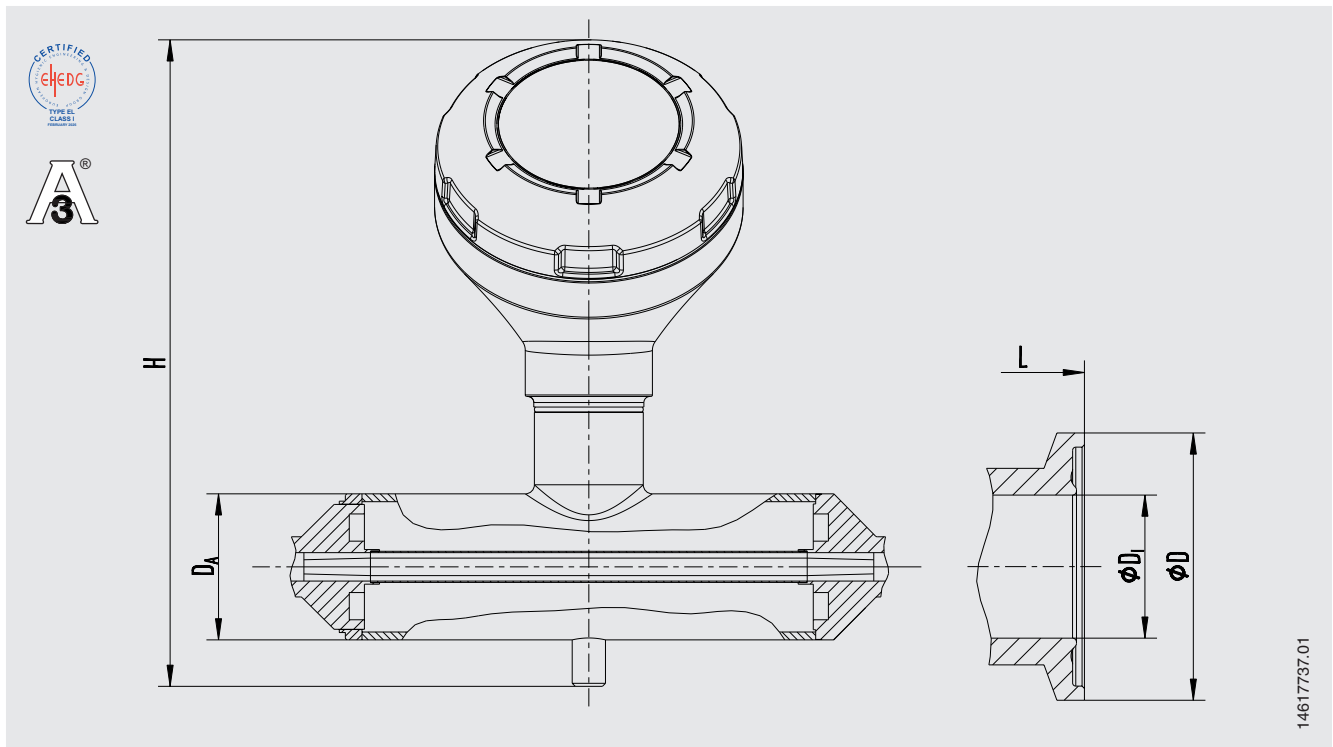
DN	PN ^{1) 2)}	Dimensions in mm [in]				
		Pipe outer-Ø D _A	Pipe inner Ø D _i	G	L	H
1/2"	16	48 [1.89]	9.4 [0.37]	RD 28 x 1/8 [1.102 x 1/8]	224 [8.82]	214 [8.43]
3/4"	16	48 [1.89]	15.8 [0.622]	RD 34 x 1/8 [1.339 x 1/8]	294 [11.57]	214 [8.43]

1) For maximum pressure range consider pressure rating of clamp.

2) The specification PN in accordance with the above-mentioned standards is used exclusively for the classification of the connection. The maximum allowable pressure PS within the meaning of the Pressure Equipment Directive 2014/68/EU is independent of this and is marked on the diaphragm seal.

→ Further dimensions and higher nominal pressures on request

Aseptic clamp connection per DIN 11864-3, with clamp with notch



Process connection: Aseptic clamp connection per DIN 11864-3, form A Pipe standard per DIN 11866 row A and DIN 11850 row 2

DN	PN ^{1) 2)}	Dimensions in mm [in]				
		Pipe outer-Ø D _A	Pipe inner Ø D _i	Clamp Ø D	L	H
25	16	60 [2.362]	26 [1.024]	50.5 [1.988]	314 [12.36]	226 [8.90]

Process connection: Aseptic clamp connection per DIN 11864-3, form A Pipe standard per DIN 11866 row C or ASME BPE

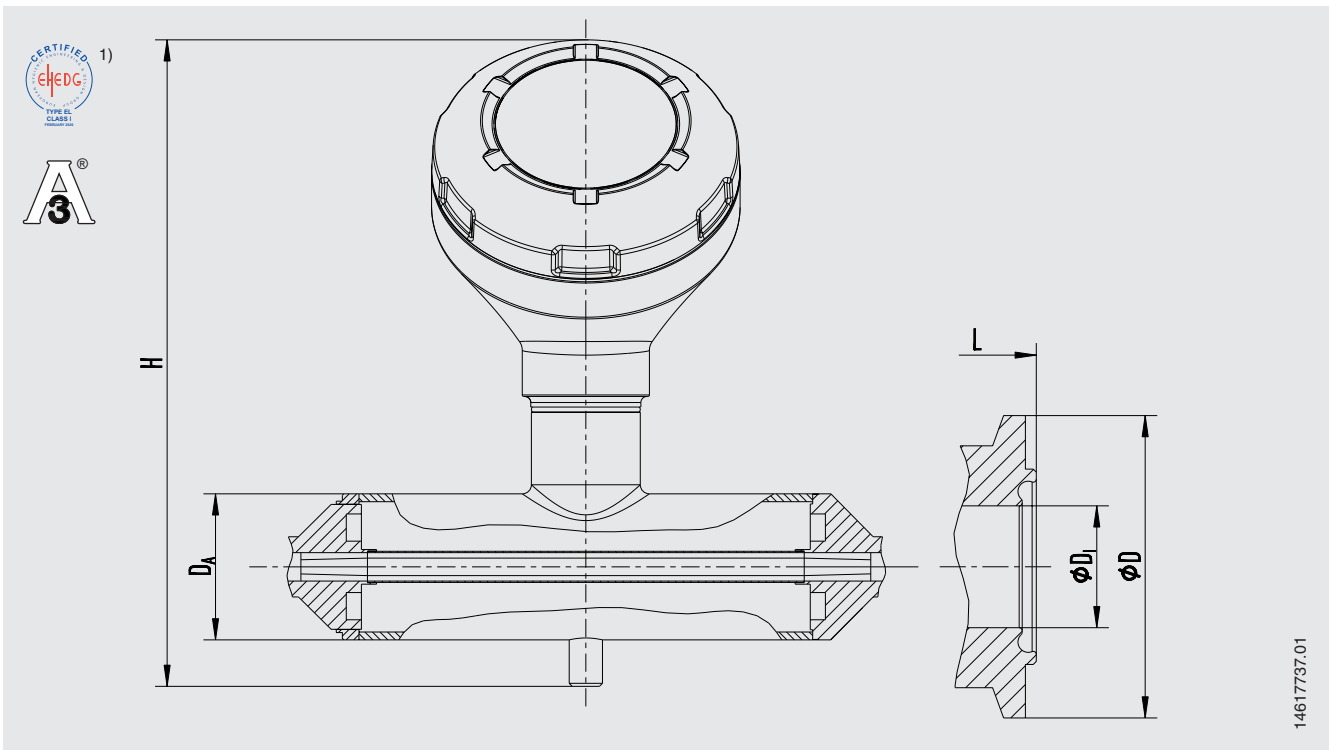
DN	PN ^{1) 2)}	Dimensions in mm [in]				
		Pipe outer-Ø D _A	Pipe inner Ø D _i	Clamp Ø D	L	H
½"	16	48 [1.89]	9.4 [0.37]	34 [1.339]	210 [8.27]	214 [8.43]
¾"	16	48 [1.89]	15.8 [0.622]	34 [1.339]	280 [11.02]	214 [8.43]

1) For maximum pressure range consider pressure rating of clamp.

2) The specification PN in accordance with the above-mentioned standards is used exclusively for the classification of the connection. The maximum allowable pressure PS within the meaning of the Pressure Equipment Directive 2014/68/EU is independent of this and is marked on the diaphragm seal.

→ Further dimensions and higher nominal pressures on request

Aseptic clamp connection per DIN 11864-3, with clamp with groove



Process connection: Aseptic clamp connection per DIN 11864-3, form A
Pipe standard per DIN 11866 row A and DIN 11850 row 2

DN	PN ¹⁾	Dimensions in mm [in]				
		Pipe outer-Ø D _A	Pipe inner Ø D _i	Clamp Ø D	L	H
25	16	60 [2.362]	26 [1.024]	50.5 [1.988]	314 [12.36]	226 [8.90]

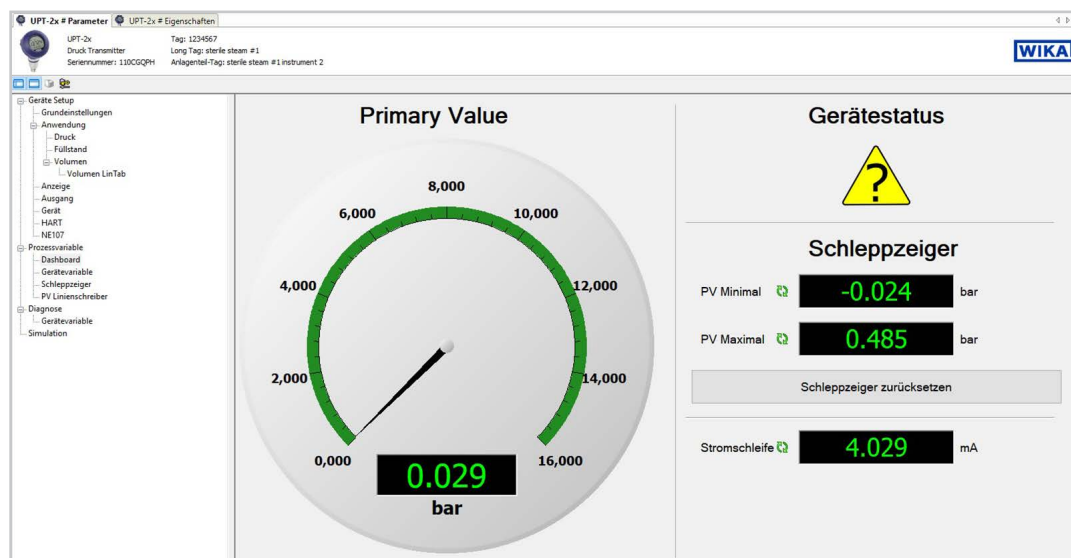
Process connection: Aseptic clamp connection per DIN 11864-3, form A
Pipe standard per DIN 11866 row C or ASME BPE

DN	PN ¹⁾	Dimensions in mm [in]				
		Pipe outer-Ø D _A	Pipe inner Ø D _I	Clamp Ø D	L	H
½"	16	48 [1.89]	9.4 [0.37]	34 [1.339]	210 [8.27]	214 [8.43]
¾"	16	48 [1.89]	15.8 [0.622]	34 [1.339]	280 [11.02]	214 [8.43]

- 1) EHEDG conformity only in combination with TRI-CLAMP® seals Combitfit International B.V., The Netherlands.
- 2) For maximum pressure range consider pressure rating of clamp.
- 3) The specification PN in accordance with the above-mentioned standards is used exclusively for the classification of the connection. The maximum allowable pressure PS within the meaning of the Pressure Equipment Directive 2014/68/EU is independent of this and is marked on the diaphragm seal.

→ Further dimensions and higher nominal pressures on request

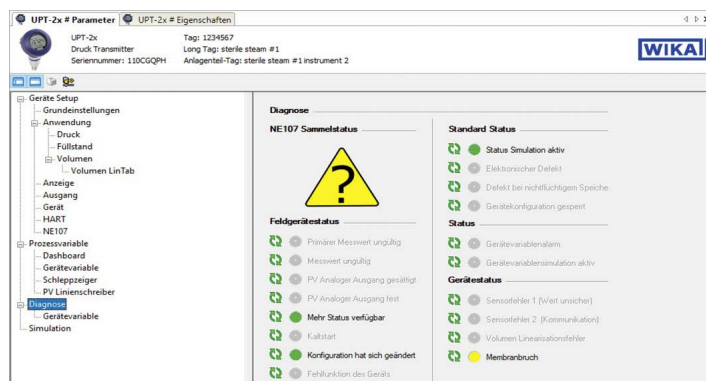
Sensor monitoring via DTM



For HART® 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.

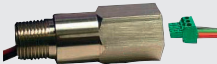
Diagnosis: Sensor tube break

In the event of a leaking sensor tube, the monitored pressure in the interstitial space of the double-tube system increases. If this monitoring pressure exceeds certain values, a warning signal is transmitted first and then an alarm signal if the pressure continues to rise. This allows the user to analyse faults to the second. The user thus has the advantage of reducing to a minimum any production errors that may occur.



The message used in the screenshot, "Diaphragm break", corresponds to the diagnosis: Sensor break

Accessories and spare parts

Description		Order number
	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
	Overvoltage protection for transmitters, 4 ... 20 mA, M20 x 1.5, series connection	14002489
	Display and operating unit, model DI-PT-U The display and operating unit can be attached in 90° steps. The display and operating unit features a main display and an additional display. The main display shows the output signal. The additional display shows different values, at the same time as the main display - these values can be selected by the user. The process transmitter can be configured via the display and operating unit. Only this display may be used for installation into the process transmitter.	14090181
	Hygienic cable gland M20 x 1.5 Cable diameter: 6 ... 12 mm [0.24 ... 0.47 in]	11348691

Ordering information

Model / Explosion protection / Ignition protection type / Zone / Medium temperature / Unit / Pressure type / Measuring range / Accuracy / Type of process connection / Sealing form / Tube standard / Surface roughness / Output signal / Sensor monitoring / Case version / Digital display / Electrical connection / Special features of the version



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