

# Diaphragm monitoring system with clamp connection

## For sanitary applications

### Model DMS-FP

WIKA data sheet DS 95.20



#### Applications

- Hygienic pressure measurement for the pharmaceutical industry and for aseptic food processing
- Pressure/vacuum measurement on pipelines, fermenters, bioreactors and vessels as well as with processing and transport of high-quality media
- Suitable for the production of active pharmaceutical ingredients (API)
- For gases, vapour; liquid, pasty, powdery and crystallising media

#### Special features

- Double-diaphragm system to ensure the separation of the process and the pressure measuring instrument
- Clamp connection easy to open for cleaning and seal replacement
- Suitable for SIP and CIP

#### Description

The WIKA combinations consisting of diaphragm seal, pressure measuring instrument and monitoring element are best suited for the harshest and hygienic measuring tasks. The systems can withstand the cleaning vapour temperatures occurring in SIP processes and ensure a sterile connection between the medium to be measured and the diaphragm seal.

The patented diaphragm monitoring has been designed specifically for the highest safety requirements in the pharmaceutical and biotechnology industries. The monitoring element is mainly used for electrical signal transmission of the diaphragm condition. In addition, the diaphragm condition is displayed on a dial with red/green areas.

In the event of a diaphragm rupture, a second, internal diaphragm in the pressure measuring instrument ensures the reliable separation of the environment and the process.



Diaphragm monitoring system, model DMS-FP

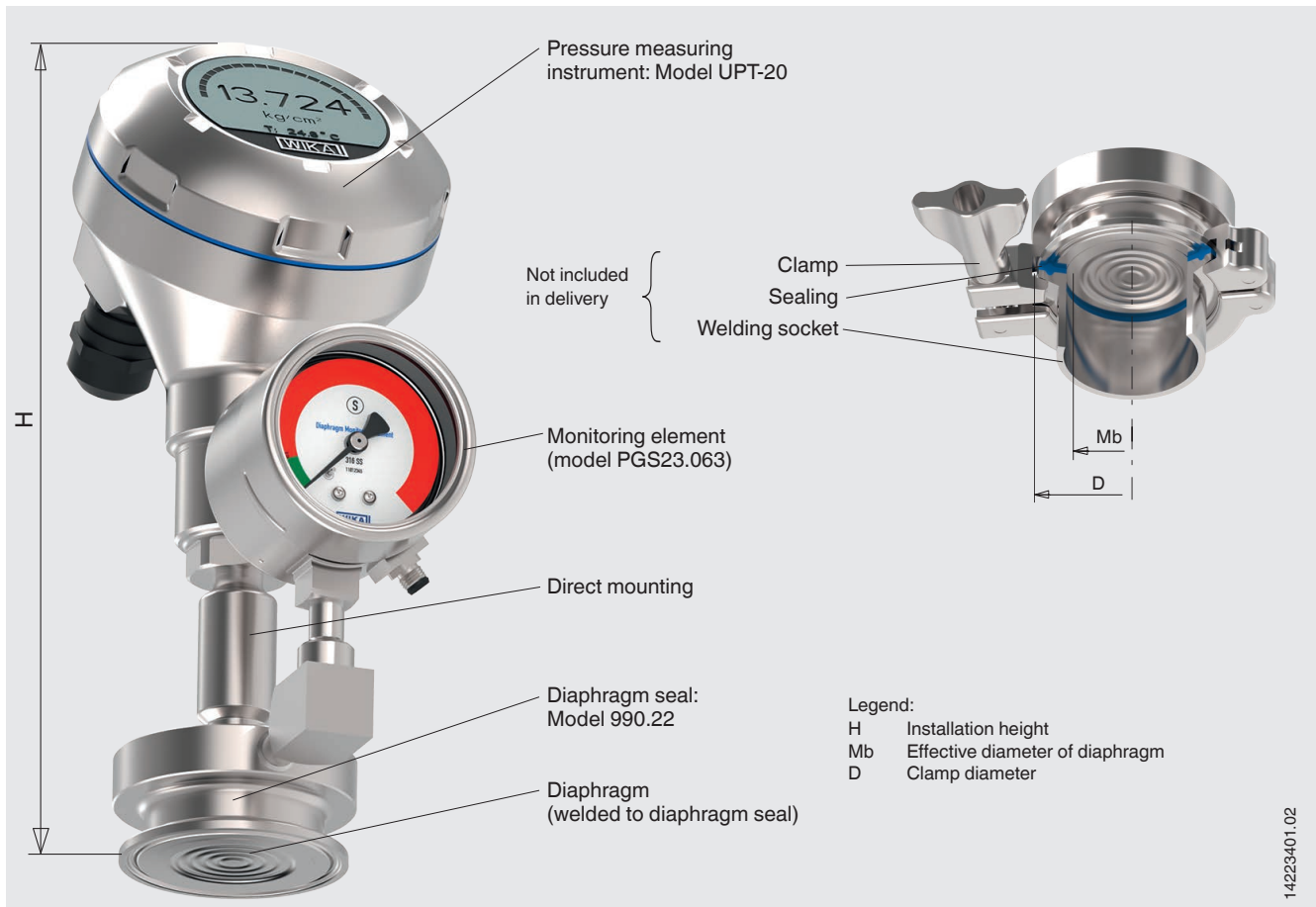
Mounting of the diaphragm seal to the measuring instrument is made as direct mounting as standard. A fluid inside the system, which is explicitly chosen to suit the particular application, hydraulically transmits the pressure to the pressure measuring instrument.

Diaphragm seals with clamp connection have been specifically developed for use in sterile processes and are integrated into the process by means of a clamp. This ensures the hygienic process integration of the diaphragm monitoring system.

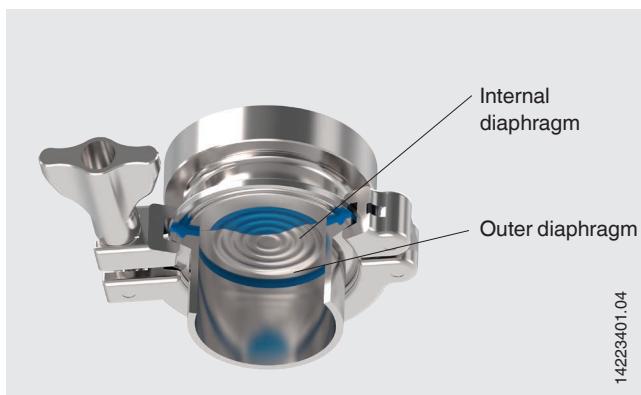
The product WIKA model DMS-FP is protected under granted patent DE 19949831 and is subject to several pending patents, so e.g. US 2018180505, DE 102016015447, CN 108240885.

## Illustrative example of a diaphragm monitoring system

The diaphragm monitoring system is a combination of pressure measuring instrument and diaphragm seal with an additional monitoring element for the diaphragm condition.



## Functional principle of diaphragm monitoring



WIKA's double-diaphragm design is the solution for critical processes where neither the medium should find its way into the environment, nor should the system fill fluid find its way into the product.

### Normal operation

In normal operation, the pressure measurement and the diaphragm monitoring operate without limitations within the performance limits of the overall system design. The space between the two diaphragms is evacuated. This vacuum is measured with the monitoring element and the status is displayed in the green area; there is no electrical alarm signal.

### Diaphragm rupture

In the event of a diaphragm rupture, the pressure monitored in the intermediate space increases. As soon as the display of the monitoring element exceeds the preset limit value, an electrical/optical alarm signal is issued. This signals a diaphragm rupture.

### Safety

The measuring technology of the monitoring element withstands the process pressure despite the diaphragm rupture. The measuring function of the overall system remains unrestricted. The process reliability is guaranteed because the materials of the two diaphragms are made of the same material as the wetted parts of the diaphragm seal. The overall system is, nevertheless, damaged and must be replaced immediately.

## Specifications

Diaphragm seal system			
<b>Version</b>	Pressure measuring instrument mounted to a diaphragm seal with clamp connection, welded		
<b>Scale range</b>	0 ... 2.5 [0 ... 40]	0 ... 4 [0 ... 60]	0 ... 6 [0 ... 100]
<b>Gauge pressure in bar [psi]</b>	0 ... 10 [0 ... 150]	0 ... 16 [0 ... 250]	0 ... 25 [0 ... 400]
<b>Scale range <sup>1)</sup></b>	-1 ... 1.6 [-30 inHg ... 25]	-1 ... 3 [-30 inHg ... 45]	-1 ... +5 [-30 inHg ... +70]
<b>Vacuum in bar [psi]</b>	-1 ... 10 [-30 inHg ... 145]	-1 ... 15 [-30 inHg ... 220]	-1 ... 25 [-30 inHg ... 360]
<b>Permissible temperature range</b>	+10 ... +80 °C [+50 ... +176 °F] for CIP and SIP max. +130 °C [+266 °F] +10 ... +40 °C [+50 ... +104 °F] +10 ... +60 °C [+50 ... +140 °F]		
<b>Ingress protection per IEC/EN 60529</b>	IP65		
<b>Material <sup>2)</sup></b>	Diaphragm: Stainless steel 1.4435 (316L); UNS S31603 Diaphragm seal: Stainless steel 1.4435 (316L); UNS S31603		
<b>Surface roughness</b>	wetted Ra ≤ 0.38 µm [15 µin] per ASME BPE SF4, electropolished [except for weld seam] non-wetted Ra ≤ 0.76 µm [30 µin] [except for weld seam]		
<b>Mounting type</b>	Direct mounting		
<b>Level of cleanliness of wetted parts</b>	Oil and grease free per ASTM G93-03 level F WIKA standard (< 1,000 mg/m <sup>2</sup> )		
<b>System fill fluid</b>	Medicinal white mineral oil KN 92 (FDA 21 CFR 172.878, 21 CFR 178.3620(a); USP, EP, JP)		

1) Under vacuum, diaphragm monitoring is only possible to a limited extent

2) Other materials on request

Monitoring element <sup>3)</sup>	Switch contact and dial with red/green areas (contact pressure gauge, model PGS23.063)	Dial with red/green areas (Bourdon tube pressure gauge, model 232.30.063)
<b>Dial display</b>	Pointer in green range → Outer diaphragm intact Pointer in red range → Outer diaphragm defective	
<b>Nominal size</b>	63 [2.5"]	
<b>Material</b>	Case Stainless steel, with solid baffle wall (Solidfront) and blow-out back Pressure element Stainless steel 316L Movement Stainless steel Bayonet ring Stainless steel Pointer/dial Aluminium Window Laminated safety glass	
<b>Switch behaviour</b>	Switch point set to -0.2 bar rel. and rising pressure Switch point not reached → Outer diaphragm intact Switch point reached → Outer diaphragm defective	Without
<b>Switch contact</b>	Reed switch model 851 No control unit and no power supply required Direct switching up to 150 V, 0.5 A Also suitable for direct triggering of a programmable logic controller (PLC) Free from wear as without contact	Without
<b>Electrical connection</b>	Cable bushing with 2 m cable (optional connectors available on request)	Without
<b>Ingress protection per IEC/EN 60529</b>	IP65	IP54

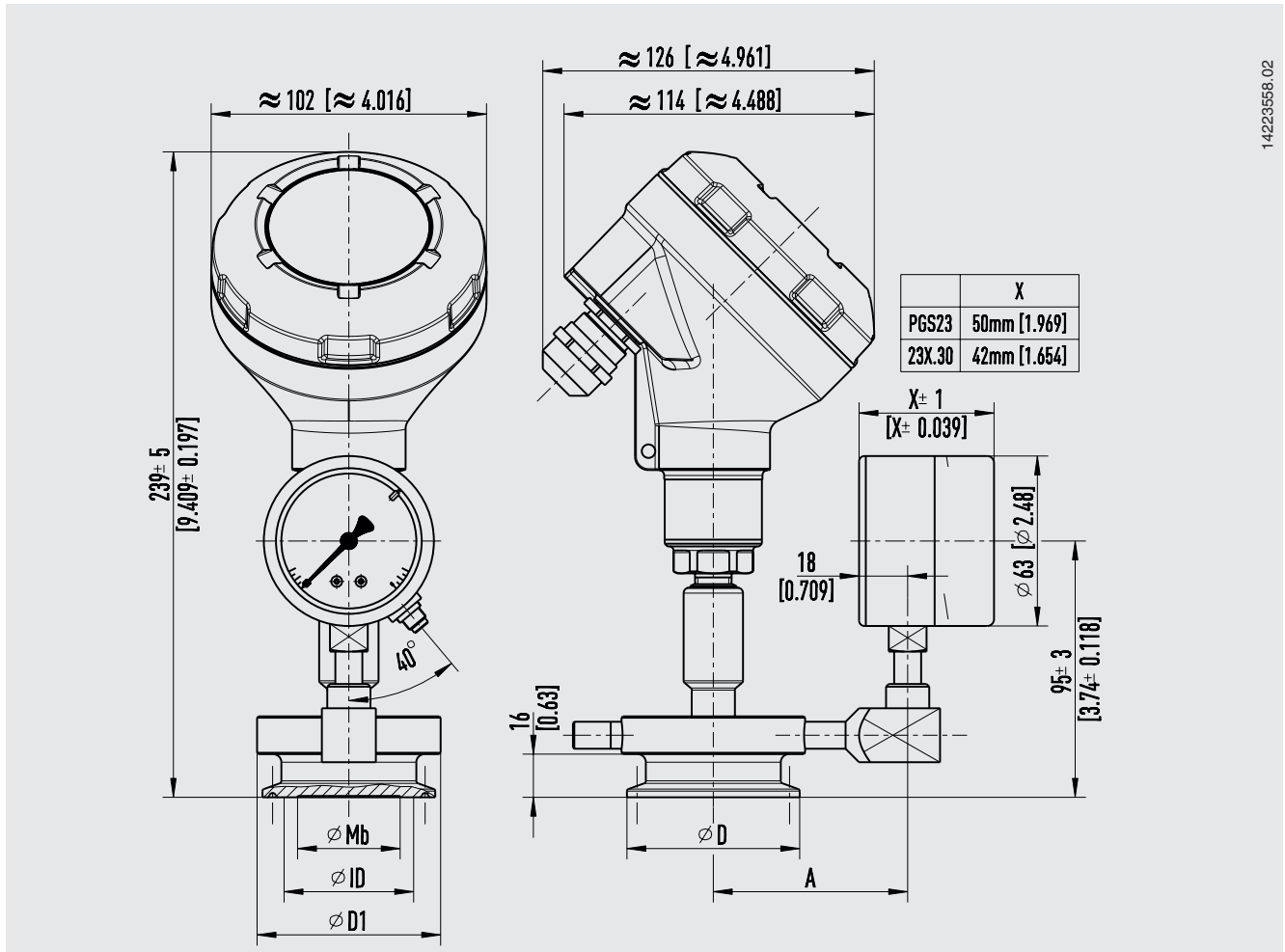
3) In the event of a diaphragm rupture, the diaphragm monitoring is specified for process pressures ≥ 0 bar rel.

The model PGS23.063 is recommended, since the electrical switch contact can be used for external alarm devices  
 For further information on the models PGS23.063 and 232.30.063 see data sheets PV 22.03 and PM 02.04

## Pressure measuring instrument: Process transmitter model UPT-20

Model UPT-20	
Output signal	4 ... 20 mA
Load in $\Omega$	$\leq (U_+ - U_{\min}) / 0.023 \text{ A}$
Power supply	DC 12 ... 36 V
Accuracy specifications	0.10 % of span
Material	
Case	Stainless steel 316Ti, electropolished or plastic (PBT)
Sensor	Stainless steel 316L

### Dimensions in mm [in]



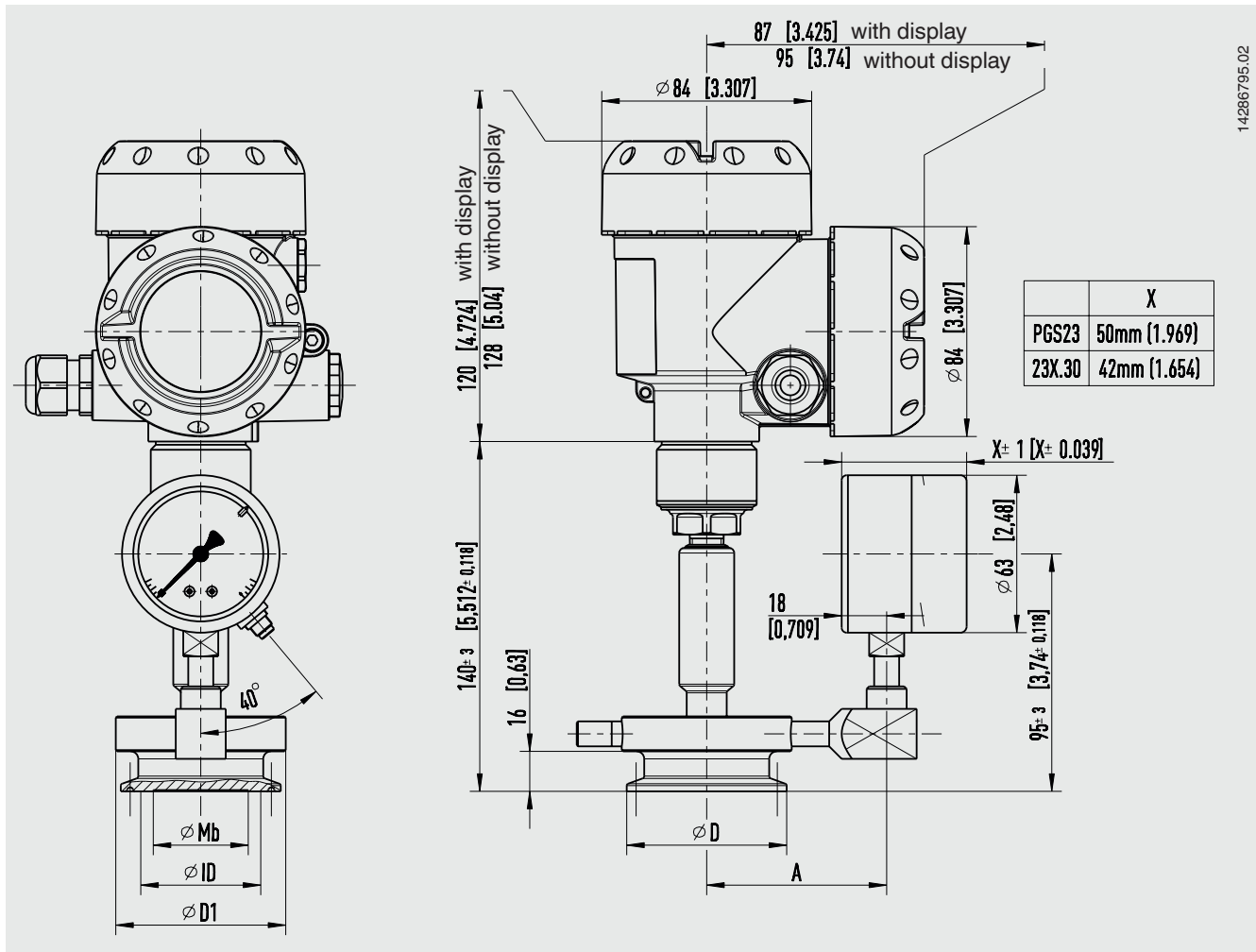
For further information on model UPT-20 see data sheet PE 86.05

# Pressure measuring instrument: Process transmitter model IPT-20

Model IPT-20	
<b>Output signal</b>	4 ... 20 mA 4 ... 20 mA with a superimposed HART® communication signal (option: SIL qualification) HART® specification: 7.3 FOUNDATION™ Fieldbus PROFIBUS® PA
<b>Load in <math>\Omega</math></b>	$(U_B - U_{Bmin}) / 0.022 A$ $U_B$ = Applied power supply $U_{Bmin}$ = Minimum power supply
<b>Accuracy at room temperature <sup>1)</sup></b>	Measuring ranges < 40 bar: $\leq 0.1$ % of span
<b>Material</b> Case Sensor	Double chamber case, aluminium die-casting AlSi10Mg, powder-coated on PE basis Stainless steel 316L

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.

## Dimensions in mm [in]



For further information on model IPT-20 see data sheet PE 86.06

# Pressure measuring instrument: Digital pressure gauge model CPG1500

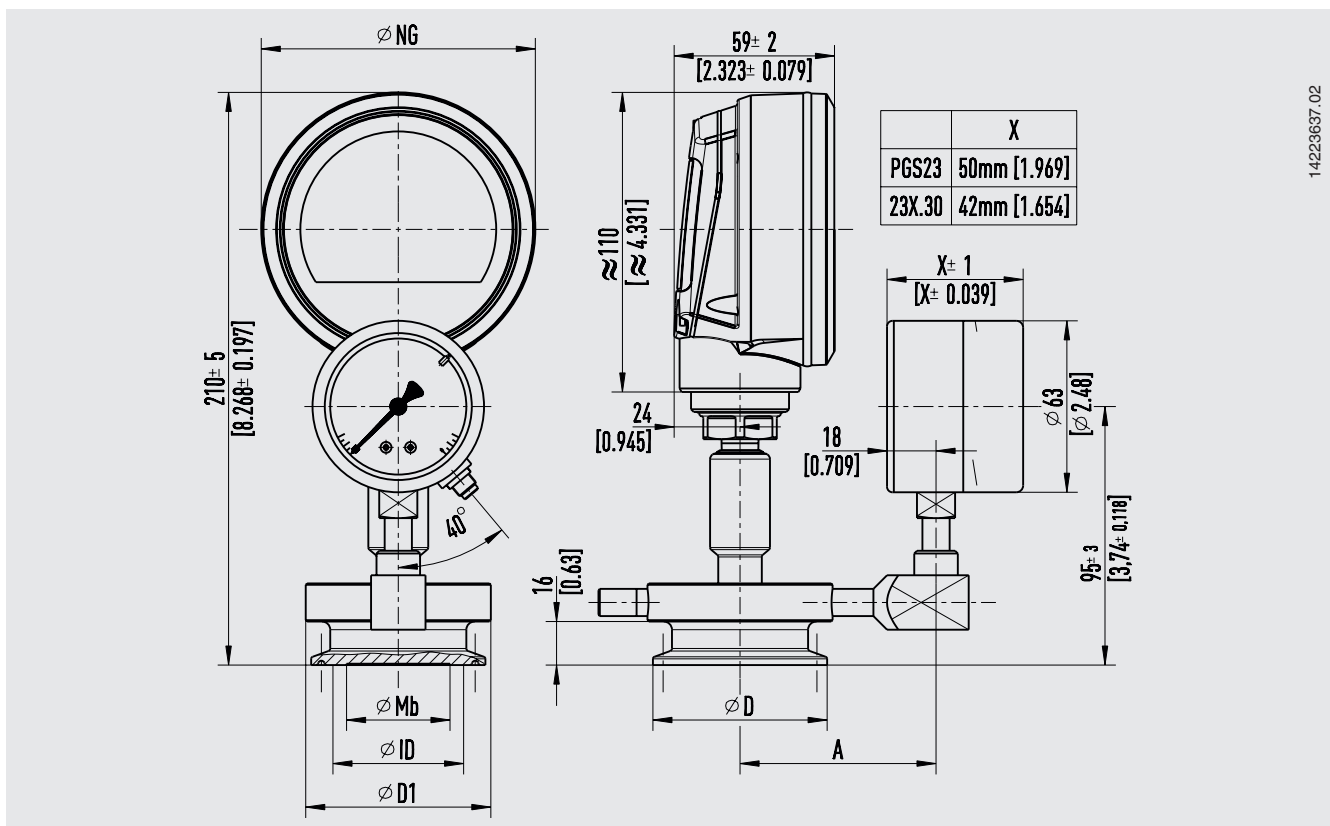
Model CPG1500	
Accuracy <sup>1)</sup>	0.1 % FS
Display	5 ½-digit 7-segment display (incl. a large matrix area for auxiliary information) Bar graph, 0 ... 100 % Selectable backlighting
Rotatable case	The case is rotatable by 330°.
Resolution	4 ... 5 ½ digits; adjustable
Voltage supply	
Power supply	3 x 1.5 V AA alkaline batteries <sup>2)</sup>
Maximum voltage	DC 4.95 V (sparking)
Battery life	typical 2,000 ... 2,500 h (without backlighting and WIKA-Wireless not active)
Battery status display	Symbol display with 4 bars indicates the battery status in 25 % steps
Material	
Case	Aluminium die-casting, nickel-plated
Sensor	Stainless steel 316

1) It is defined by the total measurement uncertainty, which is expressed with the coverage factor (k = 2) and includes the following factors: the intrinsic performance of the instrument, the measurement uncertainty of the reference instrument, long-term stability, influence of ambient conditions, drift and temperature effects over the compensated range during a periodic zero point correction.

2) For hazardous areas, only the following models are permitted:

- Duracell, Simply by Duracell MN1500
- Duracell, Duralock Plus Power MN1500
- Varta, RAYOVAC Maximum Plus 4006

## Dimensions in mm [in]

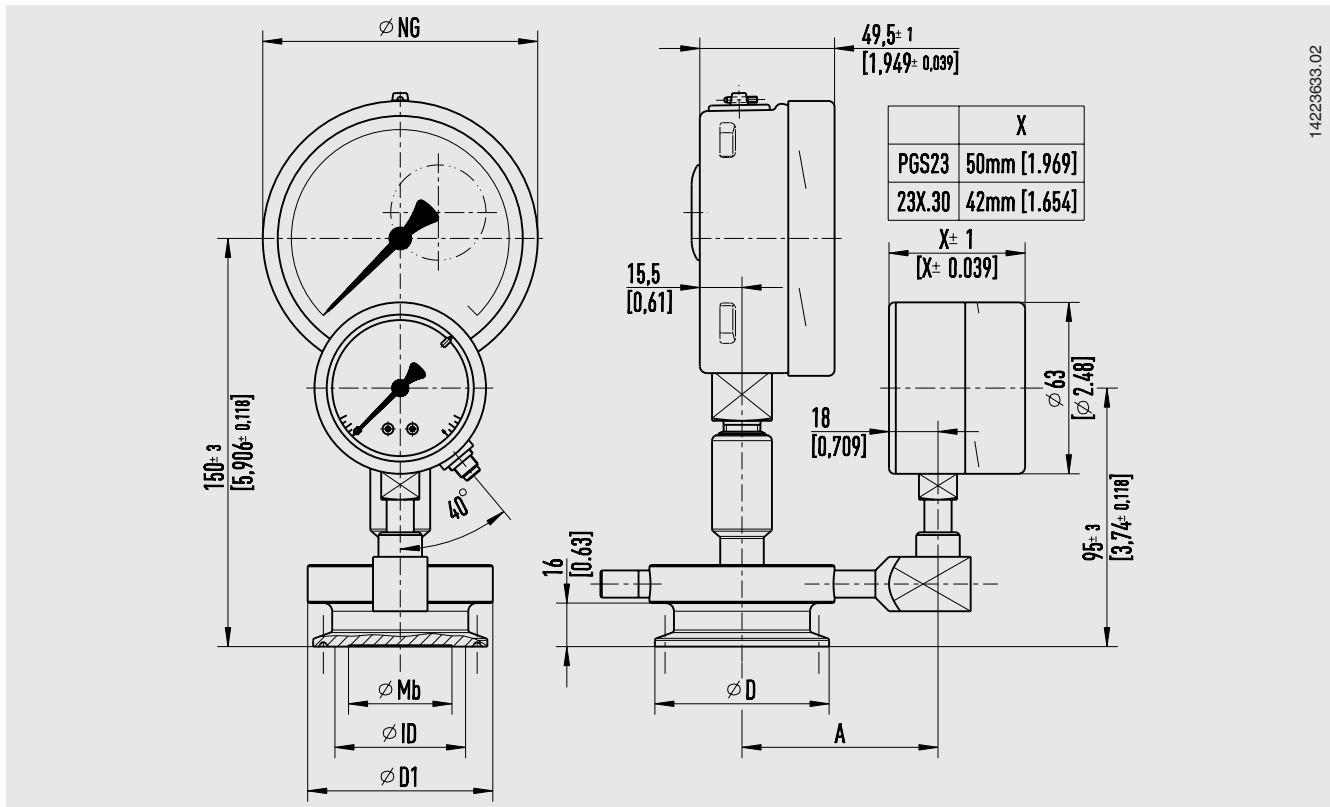


For further information on model CPG1500 see data sheet CT 10.51

# Pressure measuring instrument: Bourdon tube pressure gauge model 23x.50.100

Model 23x.50,100	
Nominal size	100 [4.0"]
Ingress protection per IEC/EN 60529	IP65
Pressure limitation	Steady: 3/4 x full scale value Fluctuating: 2/3 x full scale value Short time: Full scale value
Material	
Case	Stainless steel, with solid baffle wall (Solidfront) and blow-out back, scale ranges $\leq 0 \dots 16$ bar (lower mount) with compensating valve to vent case
Pressure element	Stainless steel 316L
Movement	Stainless steel 316L
Dial	Aluminium, white, black lettering
Pointer	Aluminium, black
Window	Laminated safety glass

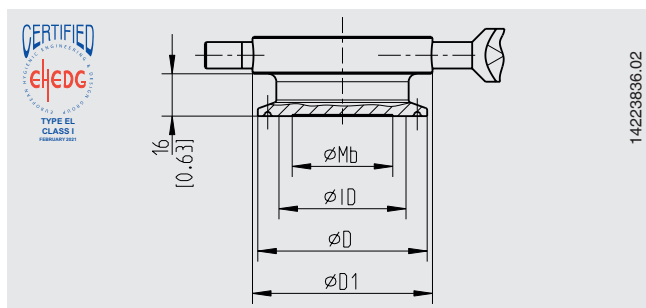
## Dimensions in mm [in]



For further information on model 23x.50.100 see data sheet PM 02.04

# Diaphragm seal model 990.22

Dimensions in mm [in]



**Type of process connection: Clamp connection per DIN 32676**

Pipe standard: Pipes per DIN 11866 row C or ASME BPE

DN	For pipe Outer $\varnothing$ x wall thickness	PN <sup>1)</sup>	D	D1	ID <sup>2)</sup>	Mb	A <sup>3)</sup>
1 1/2"	38.1 x 1.65 [1.5 x 0.065]	40	50.5 [1.988]	58 [2.283]	35.3 [1.39]	29 [1.142]	67 [2.638]
2"	50.8 x 1.65 [2 x 0.065]		64 [2.52]	68 [2.677]	48 [1.89]	38 [1.496]	72 [2.835]

**Type of process connection: Clamp connection per DIN 32676**

Pipe standard: Pipes per DIN 11866 row B or ISO 1127 row 1

DN	For pipe Outer $\varnothing$ x wall thickness	PN <sup>1)</sup>	D	D1	ID <sup>2)</sup>	Mb	A <sup>3)</sup>
1 1/2"	42.4 x 2 [1.67 x 0.079]	40	50.5 [1.988]	58 [2.283]	35.3 [1.39]	29 [1.142]	67 [2.638]
2"	48.3 x 2 [1.901 x 0.079]		64 [2.52]	68 [2.677]	48 [1.89]	38 [1.496]	72 [2.835]

**Type of process connection: Clamp connection**

Pipe standard: Pipes per BS4825 part 3 and O.D. tube

DN	For pipe Outer $\varnothing$ x wall thickness	PN <sup>1)</sup>	D	D1	ID <sup>2)</sup>	Mb	A <sup>3)</sup>
1 1/2"	38.1 x 1.6 [1.5 x 0.062]	40	50.5 [1.988]	58 [2.283]	35.3 [1.39]	29 [1.142]	67 [2.638]
2"	50.8 x 1.6 [2 x 0.062]		64 [2.52]	68 [2.677]	48 [1.89]	38 [1.496]	72 [2.835]

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

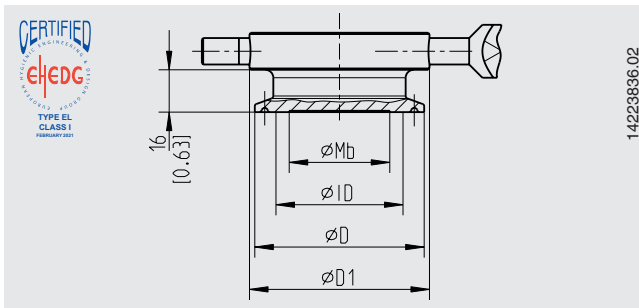
2) Dimension ID is given as guideline for the inner diameter of the seal. Depending on the application, ID must be adjusted using the EHEDG guidelines.

3) Dimension A is shown in the assembly drawings from page 5.



# Diaphragm seal models 990.52 and 990.53

Dimensions in mm [in]



## Diaphragm seal model 990.52

Type of process connection: Clamp connection per DIN 32676

Pipe standard: Pipes per DIN 11866 row A or DIN 11850 row 2

DN	For pipe Outer Ø x wall thickness	PN <sup>1)</sup>	D	D1	ID <sup>2)</sup>	Mb	A <sup>3)</sup>
40	41 x 1.5 [1.614 x 0.06]	40	50.5 [1.988]	58 [2.283]	38.2 [1.504]	29 [1.142]	67 [2.638]
50	53 x 1.5 [2.087 x 0.06]		64 [2.52]	68 [2.677]	50.2 [1.976]	38 [1.496]	72 [2.835]

## Diaphragm seal model 990.53

Type of process connection: Clamp connection per ISO 2852

Pipe standard: Pipes per ISO 2037 and BS 4825 part 1


DN	For pipe Outer Ø x wall thickness	PN <sup>1)</sup>	D	D1	ID <sup>2)</sup>	Mb	A <sup>3)</sup>
38	38 x 1.2 [1.5 x 0.047]	40	50.5 [1.988]	58 [2.283]	38.2 [1.504]	29 [1.142]	67 [2.638]
40	40 x 1.2 [1.745 x 0.047]						
50	51 x 1.2 [2.008 x 0.047]		64 [2.52]	68 [2.677]	50.2 [1.976]	38 [1.496]	72 [2.835]

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

2) Dimension ID is given as guideline for the inner diameter of the seal. Depending on the application, ID must be adjusted using the EHDG guidelines.

3) Dimension A is shown in the assembly drawings from page 5.

## Approvals

Logo	Description	Country
	<b>3-A</b> Sanitary Standard  These instruments are optionally 3-A marked based on a third party verification for conformance to the 3-A standard number 74.	USA

## Certificates (option)

- 2.2 test report per EN 10204  
(e.g. FDA conformity of the system fill fluid)
- 3.1 inspection certificate per EN 10204  
(e.g. material proof, wetted metal parts with suppliers' certificate (melting analysis), measurement accuracy: Listing of the single measured values)
- Others on request

## Patents, property rights

- Diaphragm monitoring for diaphragm seals  
(US 2018180505, DE 102016015447,  
CN 108240885, NL 2019251)
- Diaphragm of diaphragm seal (DE 19949831)

Approvals and certificates, see website

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