

# Diaphragm pressure gauge, flush For sanitary applications, NS 100 Model PG43SA-D, with integrated diaphragm element monitoring

WIKA data sheet PM 04.17



for further approvals see  
page 4

## Applications

- Hygienic pressure measurement for the pharmaceutical and biotechnology industries
- Mechanical pressure display on pipelines, fermenters, bioreactors and vessels
- Pressure display during processing and transport of high-quality and critical media
- Suitable for the production of active pharmaceutical ingredients (API)
- For gases, vapour; liquid, pasty, powdery and crystallising media

## Special features

- Integrated diaphragm element monitoring with status display (patent, property right: e.g. DE102016005568)
- Two barriers for secure separation of the process from the atmosphere
- Mechanical pressure transmission without transmission fluid
- Completely autoclavable, suitable for CIP and SIP

## Description

The model PG43SA-D diaphragm pressure gauge has been designed specifically for the highest safety requirements in the pharmaceutical and biotechnology industries. Through its patented diaphragm element monitoring, the risk of an undetected rupture of the diaphragm is eliminated since a red warning dot is immediately displayed on the dial. If this point on the dial remains white, then the pressure element is intact and cost-intensive maintenance on the measuring point is not required.

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

The diaphragm pressure gauge transmits the pressure, purely mechanically and without transmission fluid, from the process to the pressure element. Due to their thickness, the diaphragm elements are very robust and have high overpressure safety, ensuring a safe pressure measurement without any risk of contamination.



**Model PG43SA-D, with integrated diaphragm element monitoring, NS 100**

The flush welded diaphragm element in conjunction with the aseptic process connections enables a dead-space free connection to the process. The independent pressure display, needing no external power, finds applications with the processing and transport of high-quality and critical media, for example on portable tanks.

The PG43SA-D in hygienic design can be used for CIP (cleaning in place) and SIP (sterilisation in place) and in wash-down areas, or it can be completely sterilised in an autoclave. The measuring instrument can thus be cleaned reliably and time-efficiently. The model PG43SA-D conforms to the 3-A Sanitary Standard and is certified in accordance with EHEDG.

A variety of 3.1 and 2.2 certificates are available for GMP-compliant documentation, such as a material certificate or the list of single measured values.

# Specifications

## Design

Following EN 837-3 and ASME B40.100

## Nominal size in mm

100

## Accuracy class

1.6 per EN 837-3

Option: Grade A per ASME B40.100

Scale range	Overload safety <sup>1)</sup>	
<b>bar</b>	0 ... 2.5	4
	0 ... 4	8
	0 ... 6	18
	0 ... 10	40
	0 ... 16	40
	-1 ... +1.5	4
	-1 ... +3	8
	-1 ... +5	18
	-1 ... +9	40
	-1 ... +15	40
	<b>psi</b>	0 ... 36
0 ... 60		120
0 ... 100		300
0 ... 160		580
0 ... 200		580
-30 inHg ... +30		58
-30 inHg ... +60		120
-30 inHg ... +100		300
-30 inHg ... +150		580

1) Consider max. pressure rating (PN) of the process connection, see page 4 onwards

Option: Dual scale

The given scale ranges are also available in kPa and MPa.

## Vacuum safety

All scale ranges are suitable for the vacuum typical of CIP or SIP cleaning. Positive scale ranges < 6 bar (< 100 psi) are optionally available in a vacuum-tight version (to -1 bar).

## Pressure limitation

Steady: Full scale value

Fluctuating: 2/3 x full scale value

Permissible temperature	
<b>Ambient</b>	-20 ... +60 °C
<b>Medium</b>	-30 ... +150 °C
<b>CIP, SIP</b>	150 °C continuously for wetted parts
<b>Autoclaving</b>	≤ 134 °C, ≤ 20 minutes
<b>Storage, transport</b>	-30 ... +70 °C

## Temperature effect

When the temperature of the measuring system deviates from the reference temperature (+20 °C): max. ±0.5 %/10 K of full scale value

## Ingress protection

IP54 per IEC/EN 60529

## Process connection

Stainless steel 1.4435 (316L), UNS S31603, lower mount

- Clamp connection per DIN 32676 / ISO 2852 / BS4825 part 3
- Aseptic connection per DIN 11864-1 /-2 /-3
- Milk thread fitting per DIN 11851
- VARIVENT®
- NEUMO BioControl®
- SMS threaded connection
- others on request

For exact designs and nominal widths see tables from page 4

## Pressure element

Diaphragm element, welded to the process connection, NiCr alloy 2.4668 (Inconel® 718), UNS N07718

## Surface roughness of wetted parts

$R_a \leq 0.38 \mu\text{m}$  (15  $\mu\text{in}$ ), weld seam:  $R_a \leq 0.76 \mu\text{m}$  (30  $\mu\text{in}$ )  
Option: Electropolished,  $R_a \leq 0.38 \mu\text{m}$  (15  $\mu\text{in}$ ), per ASME BPE SF4, weld seam:  $R_a \leq 0.76 \mu\text{m}$  (30  $\mu\text{in}$ )

## Level of cleanliness of wetted parts

ASTM G93 level C / ISO 15001 (residual content of non-volatile hydrocarbons  $\leq 66 \text{ mg/m}^2$ )

## Movement

Stainless steel

## Dial

Aluminium, white, black lettering

## Pointer

Aluminium, black

## Case

Stainless steel 1.4301 (304), electropolished

Surface roughness:  $R_a \leq 0.76 \mu\text{m}$  (30  $\mu\text{in}$ ), (except for weld seam)

## Window

Polysulphone

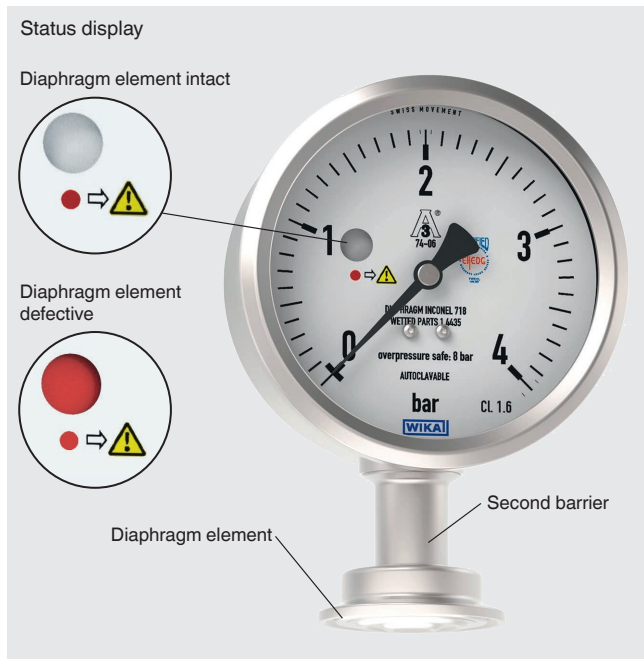
## Ring

Crimp ring, stainless steel 1.4301 (304)

VARIVENT® is a registered trademark of the company GEA Tuchenhausen.  
BioControl® is a registered trademark of the company NEUMO.

## Diaphragm element monitoring

Continuous monitoring of the pressure element



### Function

The continuous diaphragm element monitoring indicates the current state of the pressure element.

A defective diaphragm element will be immediately indicated to the user as a red warning dot on the dial (see picture).

With the aid of the status display, the integrity of the pressure element can be checked both prior to installation and during operation.

### Second barrier

The diaphragm element serves as the first barrier between the process and the atmosphere. A second barrier, located behind it, guarantees the reliable separation of ambience and process, even in the event of a rupture in the diaphragm element. The risk of any contamination between the environment and the process is eliminated by the second barrier.

### In the event of a damaged diaphragm element

- Colour of the status display changes to red
- Measuring instrument is defective and can no longer be used as a reference for the process pressure
- Dismounting and exchange of the measuring instrument must be carried out in the depressurised state
- Despite a damaged diaphragm element, due to the second barrier no exchange has occurred between process and ambience

### Option: Sterilisation of the reference chamber

The sterilisation of the reference chamber (space between the diaphragm element and the second barrier) is carried out using dry heat per ISO 20857/2010. The instrument is delivered including a 2.2 test report.

## Zero point adjustment







External zero point adjustment, setting range  $\pm 15^\circ$



The zero point adjustment can be made with a slotted screwdriver after the removal of the sealing plug on the top of the case.

Deviations in the display due to natural fluctuations in the atmospheric pressure and altitude variations can be compensated with the zero point adjustment.

## Approvals

Logo	Description	Country
	<b>EAC (option)</b> Pressure equipment directive	Eurasian Economic Community
	<b>GOST (option)</b> Metrology, measurement technology	Russia
	<b>KazInMetr (option)</b> Metrology, measurement technology	Kazakhstan
	<b>Uzstandard (option)</b> Metrology, measurement technology	Uzbekistan
	<b>3-A</b> Sanitary Standard  This instrument is 3-A marked, based on a third party verification for conformance to the 3-A standard number 74.	USA
	<b>EHEDG</b> Hygienic Equipment Design	European Community
-	<b>CRN</b> Safety (e.g. electr. safety, overpressure, ...)	Canada

## Manufacturer's information and certificates

Manufacturer's declaration regarding regulation (EC) no. 1935/2004

### Certificates (option)

- 2.2 test report per EN 10204  
(e.g. surface finish quality of wetted parts)
- 3.1 inspection certificate per EN 10204  
(e.g. material proof, wetted metallic parts with suppliers' certificate (melting analysis), measurement accuracy: Listing of the single measured values)
- Others on request

### Patents, property rights

Diaphragm pressure gauge with integrated diaphragm element monitoring (DE 102016005568, US 2016349128A1, CN 106197792)

Approvals and certificates, see website

## Dimensions in mm

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

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

DN	For pipe Outer Ø x wall thickness	PN <sup>1)</sup>	Dimensions in mm				
			NS	h	Ø Plf	d	k
1 ½"	38.1 x 1.65	40	100	92	35	50.5	15
2"	50.8 x 1.65	40	100	92	35	64	15

### 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 Ø x wall thickness	PN <sup>1)</sup>	Dimensions in mm				
			NS	h	Ø Plf	d	k
42.4	42.4 x 2	40	100	92	35	64	15
48.3	48.3 x 2	40	100	92	35	64	15

### Type of process connection: Clamp connection per BS4825 part 3

Pipe standard: Pipes per BS4825 part 1 and O.D. tube

DN	For pipe Outer Ø x wall thickness	PN <sup>1)</sup>	Dimensions in mm				
			NS	h	Ø Plf	d	k
1 ½"	38.1 x 1.6	40	100	92	35	50.5	15
2"	50.8 x 1.6	40	100	92	35	64	15

### 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>	Dimensions in mm				
			NS	h	Ø Plf	d	k
40	41 x 1.5	40	100	92	35	50.5	15
50	53 x 1.5	40	100	92	35	64	15

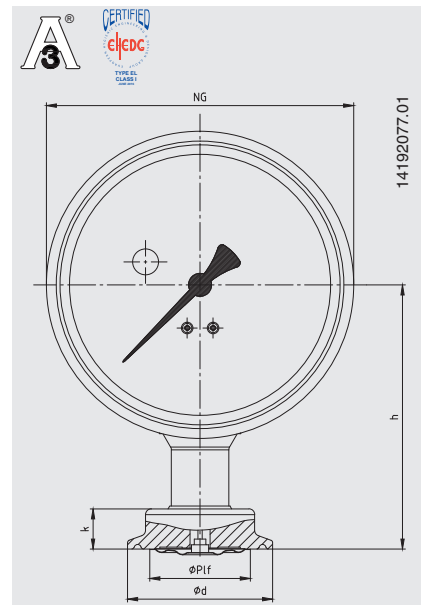
### Type of process connection: Clamp connection per ISO 2852

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

DN	For pipe Outer Ø x wall thickness	PN <sup>1)</sup>	Dimensions in mm				
			NS	h	Ø Plf	d	k
38	38 x 1.2	25	100	92	35	50.5	15
40	40 x 1.2	25	100	92	35	64	15
51	51 x 1.2	25	100	92	35	64	15

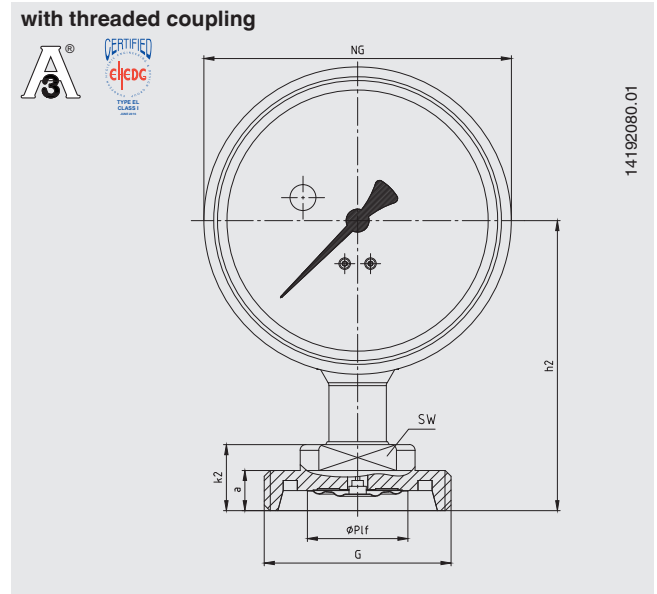
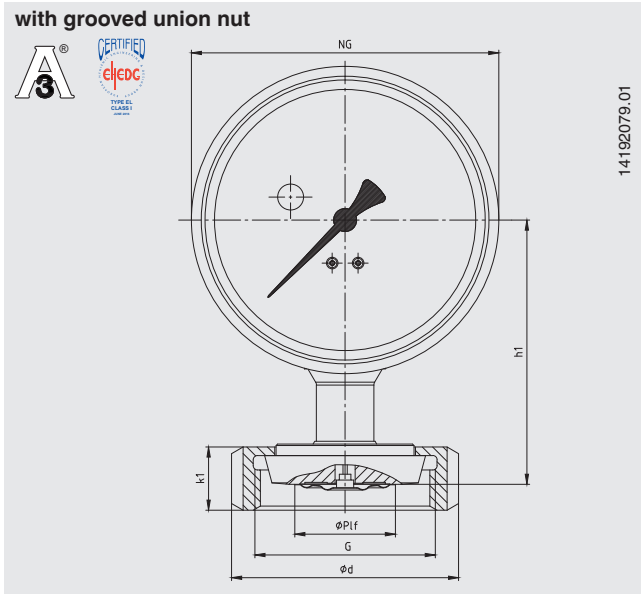
1) For maximum pressure range consider pressure rating of clamp.

EHEDG conformity only in combination with Tri-clamp sealings from Combifit International B.V.



**Type of process connection: Threaded connection per DIN 11851**

Pipe standard: Pipes per DIN 11850 row 2

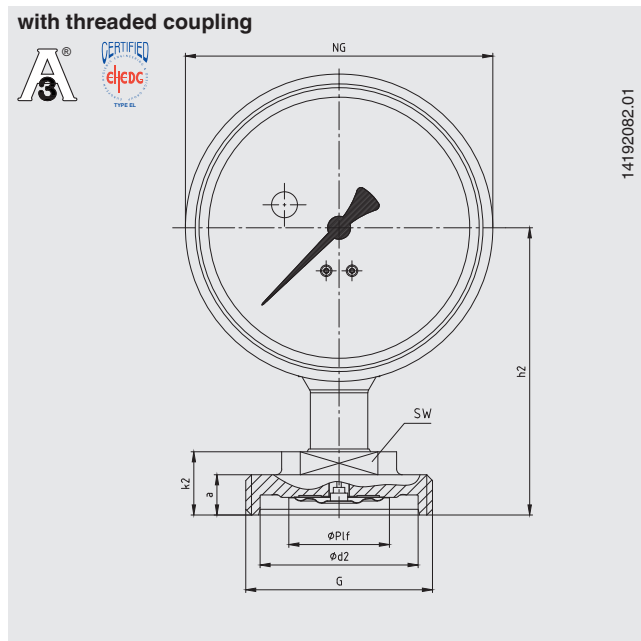
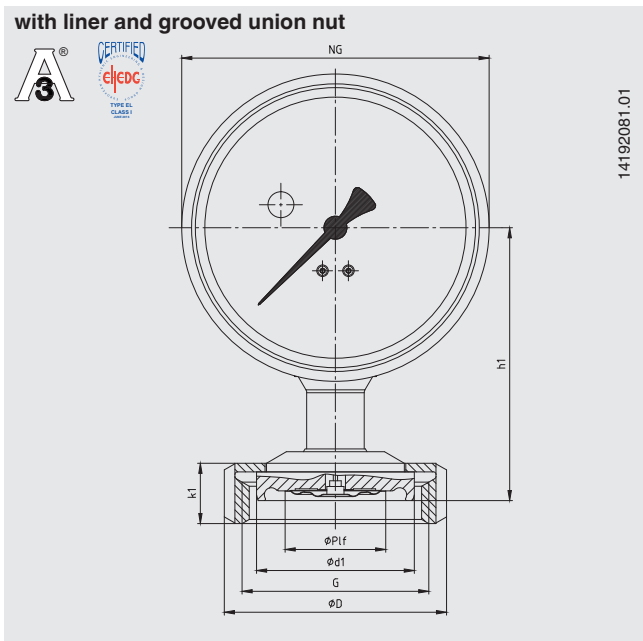


DN	For pipe Outer Ø x wall thickness	PN	Dimensions in mm									
			NS	h1	h2	Ø Plf	G	d	k1	k2	a	SW
40	41 x 1.5	40	100	92	101	35	Rd 65 x 1/6	78	22	23	14	27
50	53 x 1.5	25	100	92	101	35	Rd 78 x 1/6	92	22	23	14	27

For a 3-A conform connection of process connections with milk thread fittings per DIN 11851, profile sealings from SKS Komponenten BV or Kieselmann GmbH have to be used.

EHEDG conformity only in combination with ASEPTO-STAR k-flex upgrade, sealing from Kieselmann GmbH.

## Aseptic threaded pipe connection per DIN 11864-1 form A



### Type of process connection: Aseptic threaded pipe connection per DIN 11864-1 form A

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>	Dimensions in mm											
			NS	h1	h2	Ø P1f	G	d1	d2	D	k1	k2	a	SW
40	41 x 1.5	40	100	96	99	35	Rd 65 x 1/6	54.9	55	78	22	23	14	27
50	53 x 1.5	25	100	96	97	35	Rd 78 x 1/6	66.9	67	92	22	23	14	27

### Type of process connection: Aseptic threaded pipe connection per DIN 11864-1 form A

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

DN	For pipe Outer Ø x wall thickness	PN <sup>1)</sup>	Dimensions in mm											
			NS	h1	h2	Ø P1f	G	d1	d2	D	k1	k2	a	SW
42.4	42.4 x 2.0	25	100	96	99	35	Rd 65 x 1/6	54.9	55	78	22	23	14	27
48.3	48.3 x 2.0	25	100	96	97	35	Rd 78 x 1/6	66.9	67	92	22	23	14	27

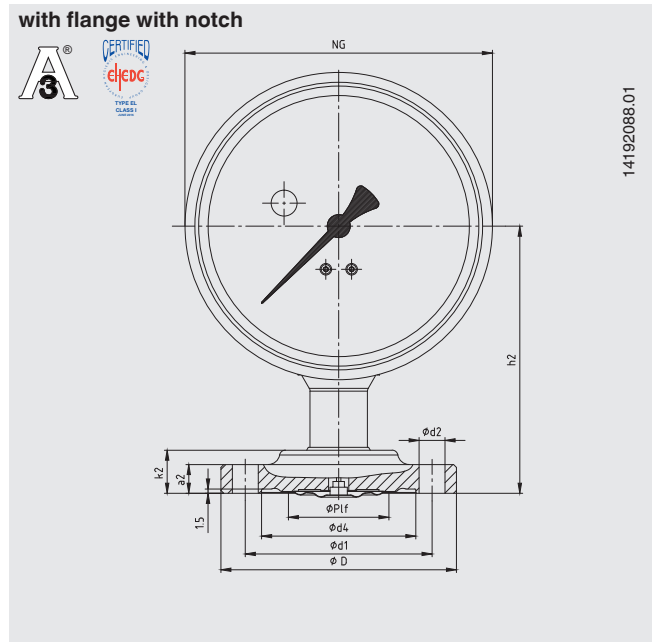
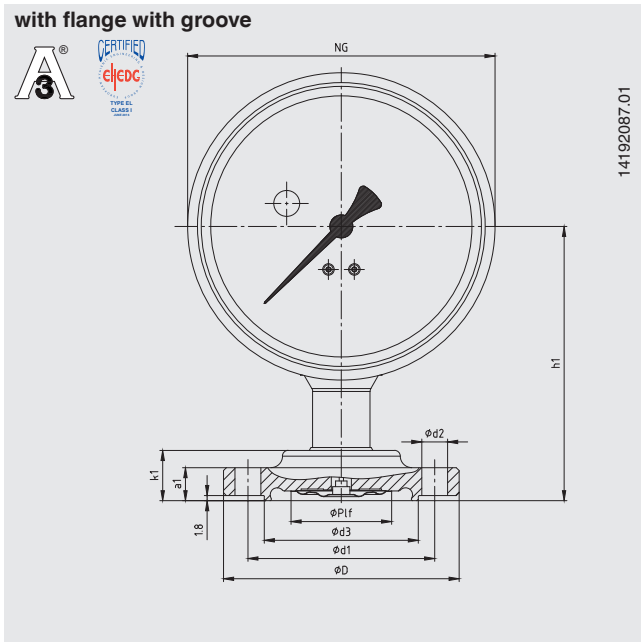
### Type of process connection: Aseptic threaded pipe connection per DIN 11864-1 form A

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

DN	For pipe Outer Ø x wall thickness	PN <sup>1)</sup>	Dimensions in mm											
			NS	h1	h2	Ø P1f	G	d1	d2	D	k1	k2	a	SW
1 ½"	38.1 x 1.65	40	100	96	99	35	Rd 58 x 1/6	54.9	55	78	22	23	14	27
2"	50.8 x 1.65	25	100	96	97	35	Rd 65 x 1/6	66.9	67	92	22	23	14	27

1) Permissible pressure in bar; these pressures may only be applied when using suitable sealing materials up to a temperature of -10 to +140 °C.

## Aseptic flange connection per DIN 11864-2 form A



### Type of process connection: Aseptic flange connection per DIN 11864-2 form A

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

DN	For pipe Outer $\phi$ x wall thickness	PN <sup>1)</sup>	Dimensions in mm												
			NS	h1	h2	$\phi$ P1f	d1	d2	d3	d4	D	k1	k2	a1	a2
40	41 x 1.5	25	100	95	93	35	65	4 x $\phi$ 9	53.6	53.7	82	17.5	15	11.5	10
50	53 x 1.5	16	100	95	93	35	77	4 x $\phi$ 9	65.6	65.7	94	17.5	15	11.5	10

### Type of process connection: Aseptic flange connection per DIN 11864-2 form A

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

DN	For pipe Outer $\phi$ x wall thickness	PN <sup>1)</sup>	Dimensions in mm												
			NS	h1	h2	$\phi$ P1f	d1	d2	d3	d4	D	k1	k2	a1	a2
42.4	42.4 x 2.0	16	100	95	93	35	65	4 x $\phi$ 9	54	54.1	82	17.5	15	11.5	10
48.3	48.3 x 2.0	16	100	95	93	35	71	4 x $\phi$ 9	59.9	60	88	17.5	15	11.5	10

### Type of process connection: Aseptic flange connection per DIN 11864-2 form A

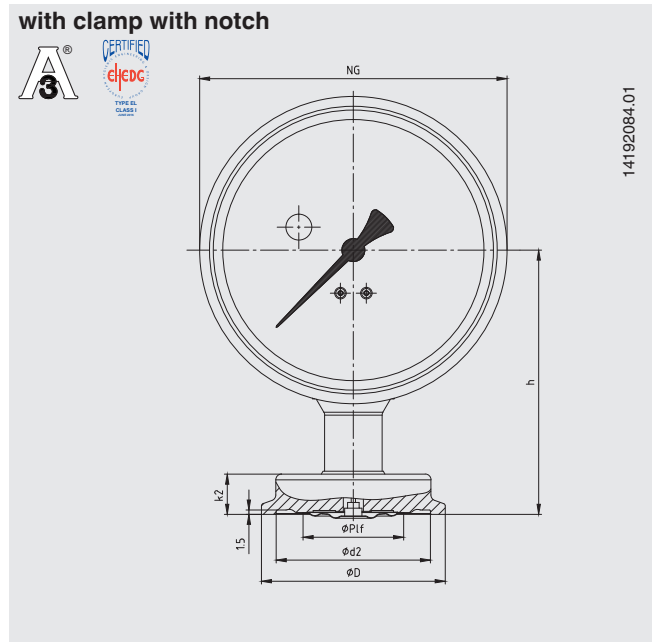
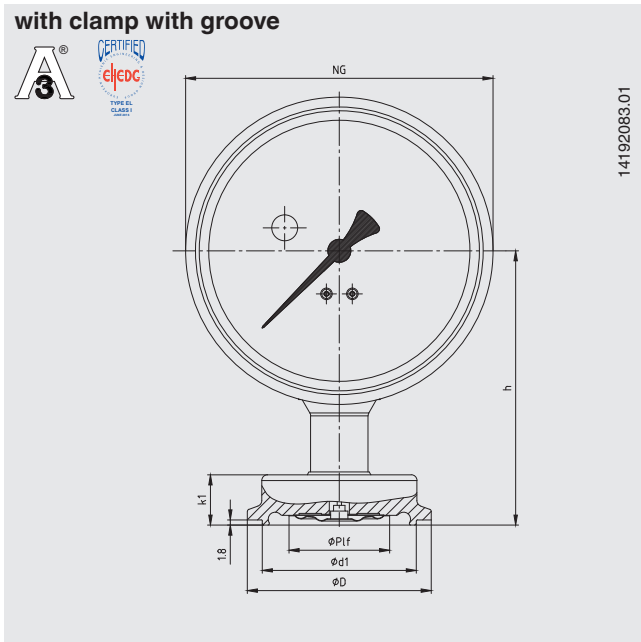
Pipe standard: Pipes per DIN 11866 row C or ASME BPE

DN	For pipe Outer $\phi$ x wall thickness	PN <sup>1)</sup>	Dimensions in mm												
			NS	h1	h2	$\phi$ P1f	d1	d2	d3	d4	D	k1	k2	a1	a2
1 1/2"	38.1 x 1.65	25	100	95	93	35	65	4 x $\phi$ 9	50.4	50.4	79	17.5	15	11.5	10
2"	50.8 x 1.65	16	100	95	93	35	75	4 x $\phi$ 9	63.4	63.5	92	17.5	15	11.5	10

1) Permissible pressure in bar; these pressures may only be applied when using suitable sealing materials up to a temperature of -10 ... +140 °C.



## Aseptic clamp connection per DIN 11864-3 form A



### Type of process connection: Aseptic clamp connection per DIN 11864-3 form A

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>	Dimensions in mm							
			NS	h	Ø P1f	d1	d2	D	k1	k2
40	41 x 1.5	40	100	93	35	53.6	53.7	64	17.5	15
50	53 x 1.5	25	100	93	35	65.6	65.7	77.5	17.5	15

### Type of process connection: Aseptic clamp connection per DIN 11864-3 form A

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

DN	For pipe Outer Ø x wall thickness	PN <sup>1)</sup>	Dimensions in mm							
			NS	h	Ø P1f	d1	d2	D	k1	k2
42.4	42.4 x 2.0	25	100	93	35	53.6	53.7	64	17.5	15
48.3	48.3 x 2.0	25	100	93	35	65.6	65.7	65	17.5	15

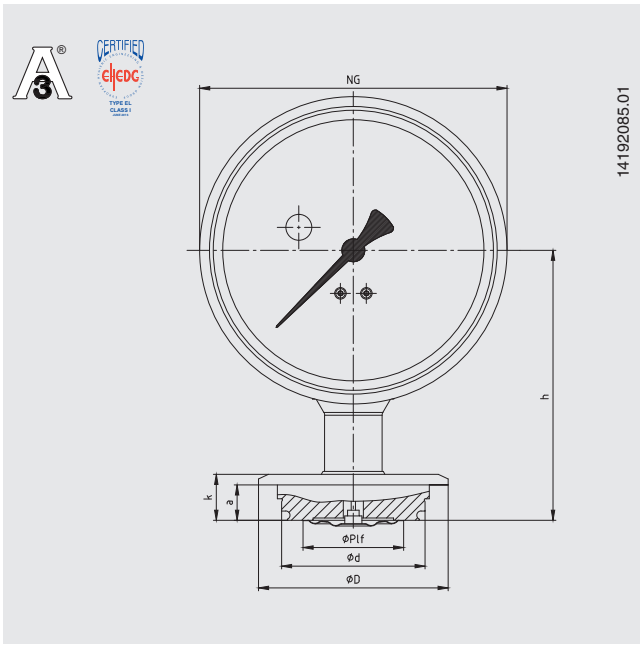
### Type of process connection: Aseptic clamp connection per DIN 11864-3 form A

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

DN	For pipe Outer Ø x wall thickness	PN <sup>1)</sup>	Dimensions in mm							
			NS	h	Ø P1f	d1	d2	D	k1	k2
1 ½"	38.1 x 1.65	40	100	93	35	50.4	50.5	64	31	28
2"	50.8 x 1.65	25	100	93	35	63.4	63.5	77.5	31	28

1) Permissible pressure in bar; these pressures may only be applied when using suitable sealing materials up to a temperature of -10 to +140 °C.

## Type of process connection: VARIVENT®



Access unit connection	PN 1)	Dimensions in mm						
		NS	h	Ø P1f	d	D	k	a
<b>Form F</b>	25	100	94	35	49.95	66	17	12.3
<b>Form N</b>	25	100	94	35	68	84	17	12.3

1) Consider pressure rating of VARINLINE® access unit

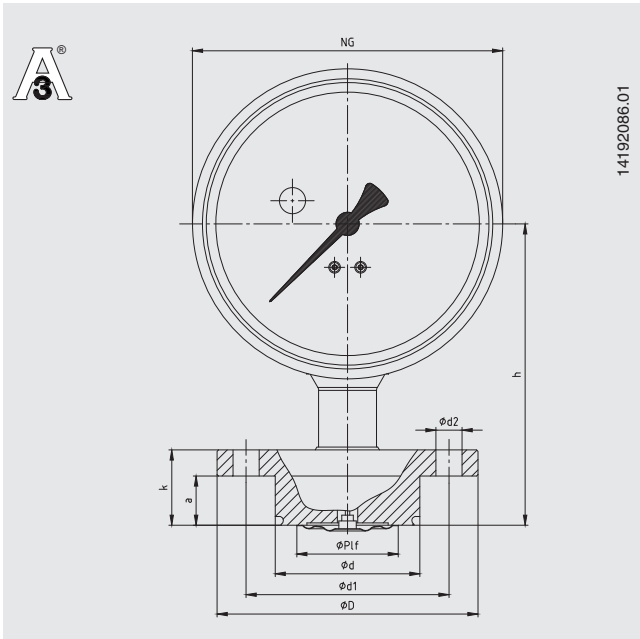
### Note:

Suitable for installation into the VARINLINE® access unit from GEA Tuchenhagen.

VARIVENT® and VARINLINE® are registered trademarks of the company GEA Tuchenhagen GmbH.

EHEDG conformity only in combination with EPDM O-ring from GEA Tuchenhagen GmbH.

## Type of process connection: NEUMO BioControl®



BioControl® connection	PN 2)	Dimensions in mm								
		NS	h	Ø P1f	d	d1	d2	D	k	a
<b>Size 50</b>	16	100	104	35	49.9	70	4 x Ø 9	90	26	17
<b>Size 65</b>	16	100	104	35	67.9	95	4 x Ø 9	120	26	17

2) Consider pressure rating of NEUMO BioControl® connection

## Ordering information

Scale range / Type of process connection, pipe standard, dimension / Overload safety / Certificates / Approvals / Options

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