

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. DE 102016005568)
- 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 ¹⁾
bar	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
psi	0 ... 36	58
	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

The given scale ranges are also available in other units, e.g. in kPa, MPa, kg/cm².

Other scales or customer-specific dials, e.g. with red mark, circular arcs or circular sectors, on request

Vacuum resistance

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

Pressure limitation

Steady: Full scale value

Fluctuating: 2/3 x full scale value

Permissible temperature	
Ambient	-20 ... +60 °C
Medium	-30 ... +150 °C
CIP, SIP	150 °C continuously for wetted parts
Autoclaving	≤ 134 °C, ≤ 20 minutes
Storage, transport	-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 per IEC/EN 60529

IP54

Process connection

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

- Clamp connection per DIN 32676 / BS4825 part 3
- Aseptic connection per DIN 11864-1 /-2 /-3
- Milk thread fitting per DIN 11851
- VARINLINE®
- NEUMO BioControl®
- Svensk Standard
- Others on request

For exact designs and nominal widths see tables from page 5

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

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 μin), (except for weld seam)

Window

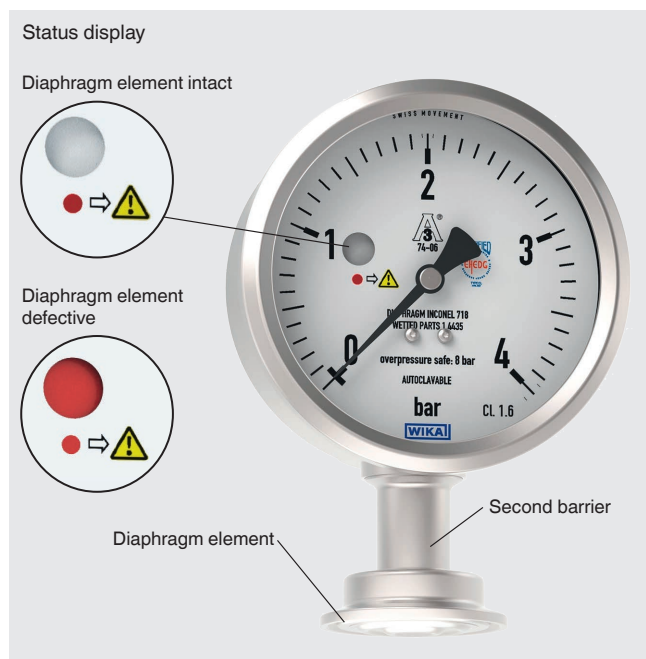
Polysulphone

Ring

Crimp ring, stainless steel 1.4301 (304)

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

Optional approvals

Logo	Description	Region
	PAC Kazakhstan Metrology, measurement technology	Kazakhstan
-	PAC Ukraine Metrology, measurement technology	Ukraine
	PAC Uzbekistan Metrology, measurement technology	Uzbekistan
-	CRN Safety (e.g. electr. safety, overpressure, ...)	Canada

Manufacturer's declaration

Logo	Description
-	Manufacturer's declaration regarding regulation (EC) no. 1935/2004; good manufacturing practice (EC) no. 2023/2006 (GMP)
-	Pressure Equipment Directive (PED) for maximum allowable pressure PS < 200 bar

Certificates

Description	
Certificates	2.2 test report per EN 10204 (e.g. state-of-the-art manufacturing, material proof, indication accuracy, free from substances of animal origin) 3.1 inspection certificate per EN 10204 (e.g. material proof for wetted metal parts, indication accuracy)
Certification packages	
Food	2.2 test report: state-of-the-art manufacturing 2.2 test report: EC approval no. 1935/2004 2.2 test report: confirmation of the surface texture of wetted metal parts 3.1 inspection certificate: list of single measured values 3.1 inspection certificate: wetted metal parts with suppliers' certificate
Pharma	2.2 test report: state-of-the-art manufacturing 2.2 test report: EC approval no. 1935/2004 2.2 test report: confirmation of the surface texture of wetted metal parts 2.2 test report: confirmation of ADI conformity (free from substances of animal origin) 2.2 test report: level of cleanliness of wetted metal parts per ASTM G93 or ISO 15001 3.1 inspection certificate: list of single measured values 3.1 inspection certificate: wetted metal parts with suppliers' certificate

Patents, property rights

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

→ For 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 ¹⁾	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 ¹⁾	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 ¹⁾	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

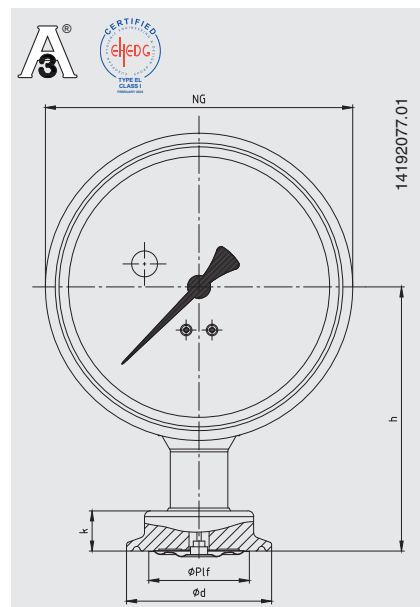
Type of process connection: clamp connection per DIN 32676

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

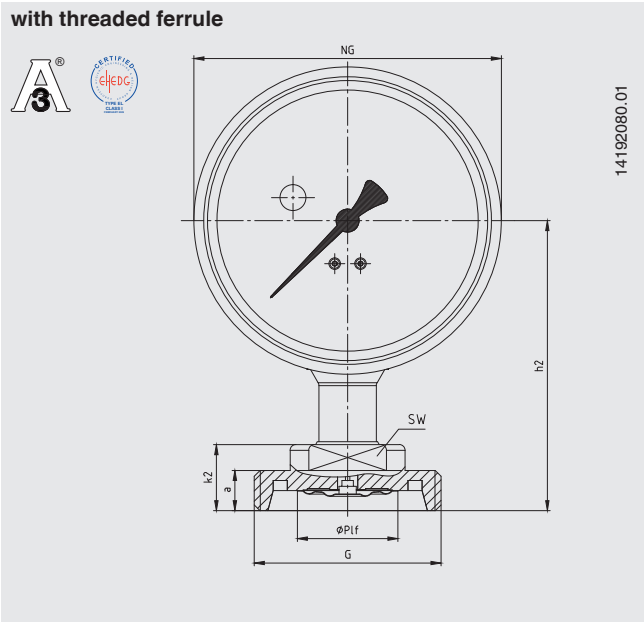
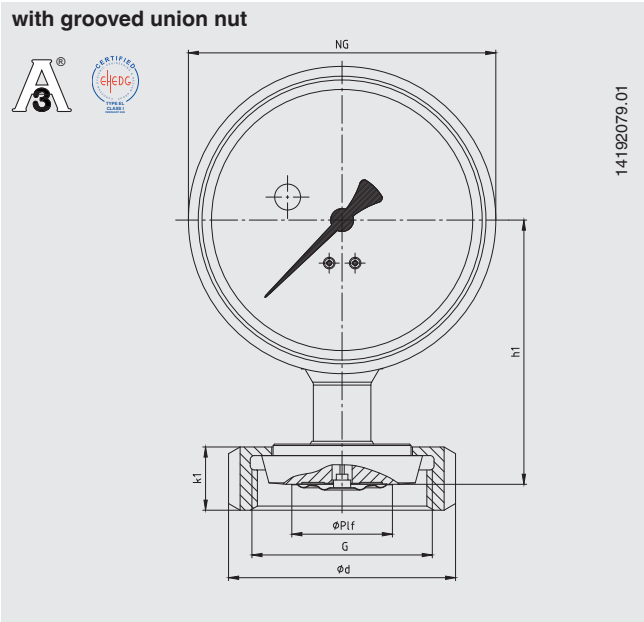
DN	For pipe Outer Ø x wall thickness	PN ¹⁾	Dimensions in mm				
			NS	h	Ø Plf	d	k
40	41 x 1.5	40	100	92	35	50.5	15
50	53 x 1.5	40	100	92	35	64	15

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



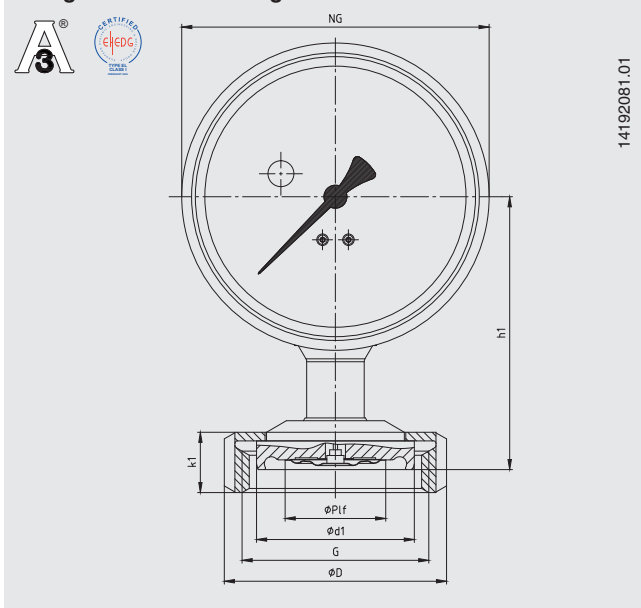
DN	For pipe Outer Ø x wall thickness	PN	Dimensions in mm									
			NS	h1	h2	Ø Plf	G	d	k1	k2	a	SW
40	41 x 1.5	40	100	92	101	35	Rd 65 x 1/6	78	22	23	14	27
50	53 x 1.5	25	100	92	101	35	Rd 78 x 1/6	92	22	23	14	27

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.

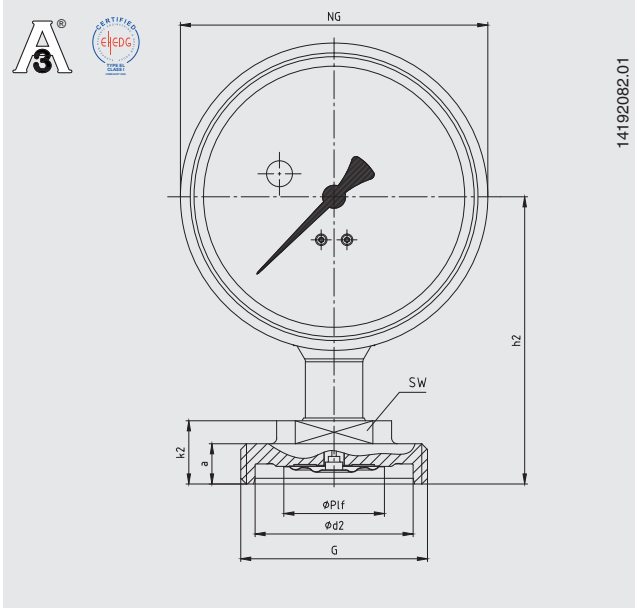
EHEDG conformity only in combination with ASEPTO-STAR k-flex upgrade, sealing from Kieselmann GmbH.

Aseptic threaded pipe connection per DIN 11864-1

with grooved ferrule and grooved union nut



with threaded ferrule



Type of process connection: aseptic threaded pipe connection per DIN 11864-1

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

DN	For pipe Outer Ø x wall thickness	PN 1)	Dimensions in mm											
			NS	h1	h2	Ø Plf	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

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

DN	For pipe Outer Ø x wall thickness	PN 1)	Dimensions in mm											
			NS	h1	h2	Ø Plf	G	d1	d2	D	k1	k2	a	SW
32	42.4 x 2.0	25	100	96	99	35	Rd 65 x 1/6	54.9	55	78	22	23	14	27
40	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

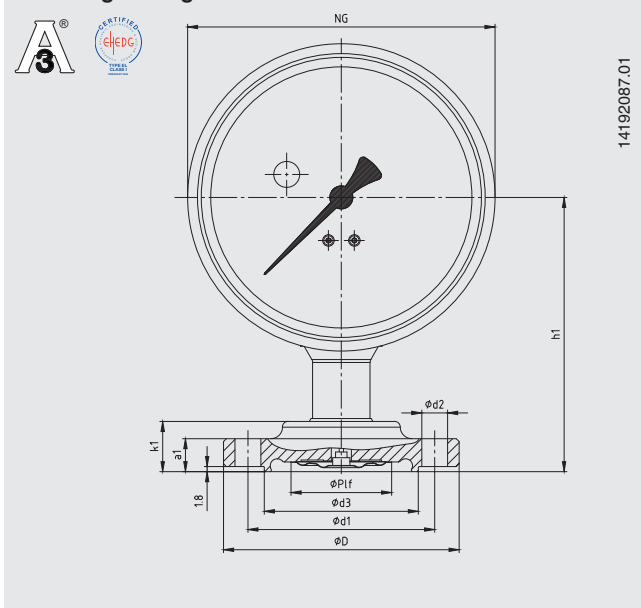
Pipe standard: pipes per DIN 11866 row C or ASME BPE

DN	For pipe Outer Ø x wall thickness	PN 1)	Dimensions in mm											
			NS	h1	h2	Ø Plf	G	d1	d2	D	k1	k2	a	SW
40	38.1 x 1.65	40	100	96	99	35	Rd 58 x 1/6	54.9	55	78	22	23	14	27
50	50.8 x 1.65	25	100	96	97	35	Rd 65 x 1/6	66.9	67	92	22	23	14	27

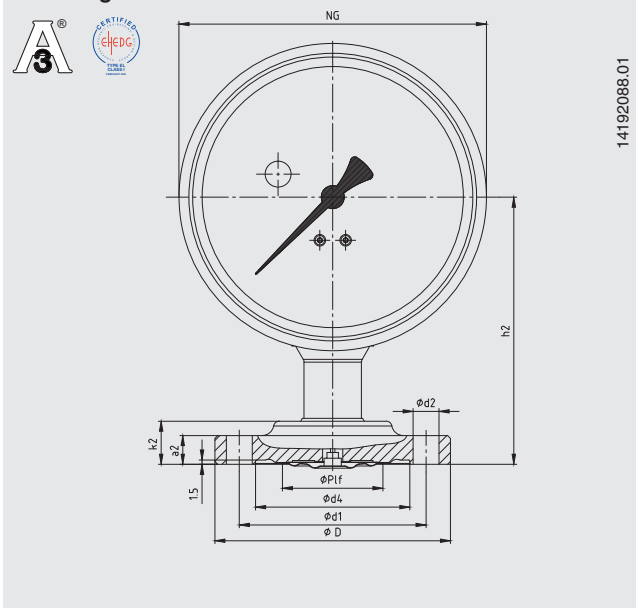
1) Permissible pressure in bar; these pressures may only be applied when using suitable sealing materials up to a temperature of -10 to +140 °C.

Aseptic flange connection per DIN 11864-2

with flange with groove



with flange with collar



Type of process connection: aseptic flange connection per DIN 11864-2

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

DN	For pipe Outer Ø x wall thickness	PN 1)	Dimensions in mm												
			NS	h1	h2	Ø Plf	d1	d2	d3	d4	D	k1	k2	a1	a2
40	41 x 1.5	25	100	95	93	35	65	4 x Ø 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 Ø 9	65.6	65.7	94	17.5	15	11.5	10

Type of process connection: aseptic flange connection per DIN 11864-2

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

DN	For pipe Outer Ø x wall thickness	PN 1)	Dimensions in mm												
			NS	h1	h2	Ø Plf	d1	d2	d3	d4	D	k1	k2	a1	a2
32	42.4 x 2.0	16	100	95	93	35	65	4 x Ø 9	54	54.1	82	17.5	15	11.5	10
40	48.3 x 2.0	16	100	95	93	35	71	4 x Ø 9	59.9	60	88	17.5	15	11.5	10

Type of process connection: aseptic flange connection per DIN 11864-2

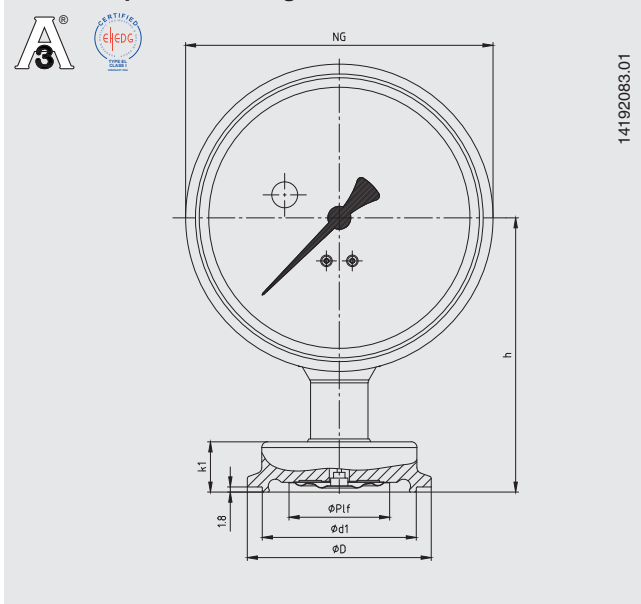
Pipe standard: pipes per DIN 11866 row C or ASME BPE

DN	For pipe Outer Ø x wall thickness	PN 1)	Dimensions in mm												
			NS	h1	h2	Ø Plf	d1	d2	d3	d4	D	k1	k2	a1	a2
40	38.1 x 1.65	25	100	95	93	35	65	4 x Ø 9	50.4	50.4	79	17.5	15	11.5	10
50	50.8 x 1.65	16	100	95	93	35	75	4 x Ø 9	63.4	63.5	92	17.5	15	11.5	10

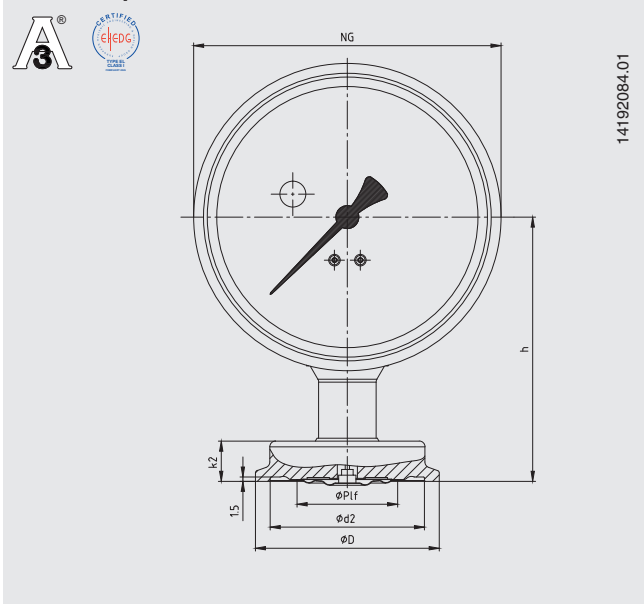
1) Permissible pressure in bar; these pressures may only be applied when using suitable sealing materials up to a temperature of -10 ... +140 °C.

Aseptic clamp connection per DIN 11864-3

with clamp ferrule with groove



with clamp ferrule with notch



Type of process connection: aseptic clamp connection per DIN 11864-3

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

DN	For pipe Outer Ø x wall thickness	PN ¹⁾	Dimensions in mm							
			NS	h	Ø Plf	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

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

DN	For pipe Outer Ø x wall thickness	PN ¹⁾	Dimensions in mm							
			NS	h	Ø Plf	d1	d2	D	k1	k2
32	42.4 x 2.0	25	100	93	35	53.6	53.7	64	17.5	15
40	48.3 x 2.0	25	100	93	35	65.6	65.7	65	17.5	15

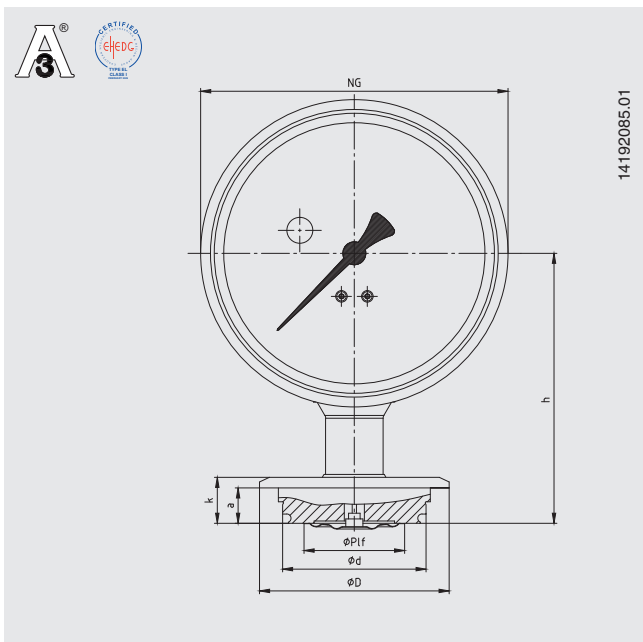
Type of process connection: aseptic clamp connection per DIN 11864-3

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

DN	For pipe Outer Ø x wall thickness	PN ¹⁾	Dimensions in mm							
			NS	h	Ø Plf	d1	d2	D	k1	k2
40	38.1 x 1.65	40	100	93	35	50.4	50.5	64	17.5	15
50	50.8 x 1.65	25	100	93	35	63.4	63.5	77.5	17.5	15

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: VARINLINE®



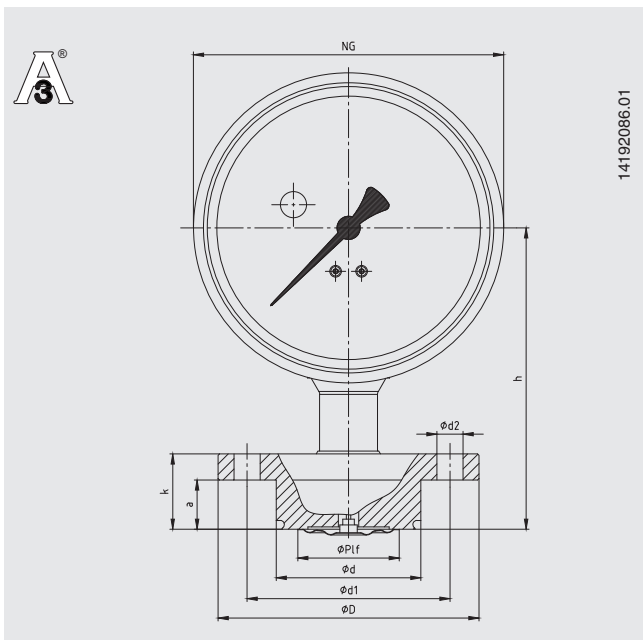
Size	PN 1)	Dimensions in mm						
		NS	h	Ø Plf	d	D	k	a
Form F	25	100	94	35	49.95	66	17	12.3
Form N	25	100	94	35	68	84	17	12.3

1) Consider pressure rating of VARINLINE® component

Suitable VARINLINE® component	EHEDG-compliant	
	Form F	Form N
Case	No	Yes
Type T case connecting flange	Yes	Yes
Type T-S case connecting flange	No	No
Type U case connecting flange	No	No
Type U-S case connecting flange	No	No
Type P tank connection flange	Yes	Yes

EHEDG-compliant only in combination with an EPDM O-ring

Type of process connection: NEUMO BioControl®



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

2) Consider pressure rating of NEUMO BioControl® connection

VARINLINE® is a registered trademark of the company GEA Tuchenhausen GmbH.
BioControl® is a registered trademark of the company NEUMO.
TRI-CLAMP® is a trademark of the company Alfa Laval AB SE.

Ordering information

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

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