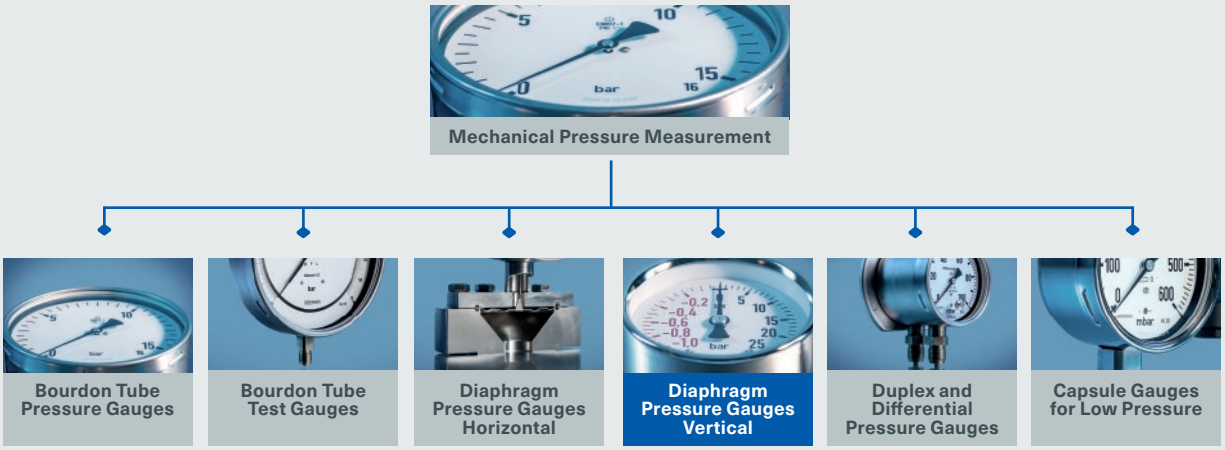
Heading 4

ARMANO

Mechanical Pressure Measurement

Diaphragm pressure gauges (vertical diaphragm)

ARMANO Messtechnik GmbH



Quality Made in Germany

Mechanical Pressure Measurement

The ARMANO Messtechnik GmbH represents tradition and innovation in the production and distribution of precision pressure and temperature measuring instruments, which have an excellent reputation worldwide – for more than 120 years.

We are continually developing customer-specific solutions for a variety of applications requiring pressure and temperature measuring technology. Their use is manifold and there are always new applications.

Mechanical pressure gauges are indicating pressure measuring instruments for gauge, absolute and differential pressure.

For the optimal solution of various applications, we distinguish between the following product categories: Bourdon tube pressure gauges, Bourdon tube test gauges, diaphragm pressure gauges (horizontal / vertical diaphragm), duplex and differential pressure gauges and capsule gauges for low pressure.

In this brochure, you will find our range of mechanical pressure measuring instruments from our product range pressure gauges with vertical diaphragm as well as a brief description of the metrological features of those instruments.
You will also find solutions for special applications such as pressure gauges for fire extinguishing pumps or for chlorine metering services.
Your instrument is not listed here? Jointly, we will find a suitable solution for your application.
Do not hesitate to contact us!

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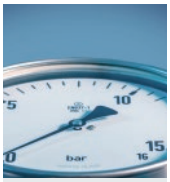
Our Products at a Glance



Mechanical Pressure Measurement

Electronic Pressure Measurement

Chemical Seal Mounting

Calibration Technology

Mechanical Temperature Measurement

Electrical Temperature Measurement

Thermowells & Accessories

Applications

Pressure gauges with vertical diaphragm are suitable for the measurement of pressure and vacuum between -1 / 0 bar and 0 – 40 bar for gaseous and liquid media, which may even be aggressive (e.g. chlorine) or viscous if the instrument version was chosen accordingly.

Fields of Application

- Oil pressure measurement at piston engines, gearings, hydraulic systems up to 40 bar
- Chlorine metering services
- NCS 80 especially for the application at fire extinguishing pumps (portable pumps, pumps on fire engines) according to DIN 14421 / DIN EN 837-3

Media	Pressure Ranges
gaseous and liquid	0 – 0.6 bar to 0 – 40 bar

Characteristics

- Insensitivity to pressure shocks and vibrations due to the higher natural frequency of the clamped diaphragm compared to the Bourdon tubes with freely movable tip
- Insensitivity to sudden pressure relief or vacuum loss, since there is no positive-locking connection between measuring element and pointer
- High overpressure resistance possible (optionally 3-times full scale value up to max. 50 bar) by means of an adequate modification of the diaphragm and the contact section of the opposing component
- Lower space requirements compared to pressure gauges with horizontal diaphragm and, in contrast to those, also available as versions for switch panel mounting

General Features

Selection Criteria

The information given in DIN EN 837-2 have to be considered for the selection of the suitable measuring instrument. In particular, the user has to ensure that the pressure medium does not corrode any of the wetted parts. A detailed description of the selection criteria can be found in the commentary of the DIN e. V. “Überdruckmessgeräte nach DIN EN 837” (“Overpressure measuring instruments according to DIN EN 837”, available in German only), published by the Beuth Verlag.

Standard Material Combinations (for the Wetted Parts)

» Materials

Depending on the process, a wide range of materials (e.g. steel) are applied to meet the demands on temperature resistance, mechanical strength and chemical resistance. Additionally, we provide particularly economic, material-saving construction types for special materials. There, only the wetted parts are made of the special material.

» Coatings / Foils

A coating / foil is a method to achieve an increased corrosion resistance. In special processes, the wetted part is coated.

Ordering code	Models	Connection	Lower flange of the diaphragm	Diaphragm	O-ring sealing
– 1	PsP 60	brass or galvanised steel or nickelplated steel	galvanised steel or nickelplated steel	steel enamelled or CuBe for –1 / 0 to 0 – 1 bar Duratherm®[1] or Inconel	NBR
– 1	PsP	brass optional aluminum	brass optional aluminum	CuBe	NBR
– 2	PsP 60 / PsPK 63	steel black enamelled, wetted parts bright	steel black enamelled, wetted parts bright	steel enamelled or CuBe for –1 / 0 to 0 – 1 bar Duratherm®[1] or Inconel fine silver foil	Viton® (FKM)
– 3	PsP 60	stainless steel 316L (1.4404)	stainless steel 316L (1.4404)	steel enamelled or CuBe protection foil 316L (1.4404) for –1 / 0 to 0 – 1 bar Duratherm®[1] or Inconel	Viton® (FKM)
– 3	PsPChg 80	stainless steel 304	stainless steel 304	CuBe	NBR

Nominal Case Sizes (NCS)

Pressure gauges with vertical diaphragm are available with the following nominal case sizes:

NCS	Case	Application
60 (2.36")	with bezel ring black	for various cases of application
63 (2½")	with plastic screw ring case	for chlorine metering services
80 (3")	stainless steel and with crimped-on ring case	for fire extinguishing pumps

Case Fillings

For this pressure gauge construction type, case fillings are available for the version for fire extinguishing pumps with crimped-on ring case, model PsPChgG 80 – 3 rm.

Process Connections

With only a few exceptions, our pressure gauges with vertical diaphragm are available with the following process connections as standard:

- G ¼ B (¼" BSP) (NCS 60, 63)
- M 20x1.5 (NCS 80 pressure gauges for fire extinguishing pumps)

Almost all models are available with the following connections without any extra charges:

- ¼" NPT or M 12x1.5 (NCS 60, 63) or
- ½" NPT or G ½ B (½" BSP) (NCS 80)

Further versions are available as customised product.

Pressure Ranges

Bar is the preferred pressure unit according to DIN EN 837-3. In this model overview, the available pressure ranges are indicated in bar. Beyond that, there are several further pressure units available, e.g. psi, kg / cm², kPa, MPa. Dual or triple scales are possible as well.
Special scales can be manufactured upon request.

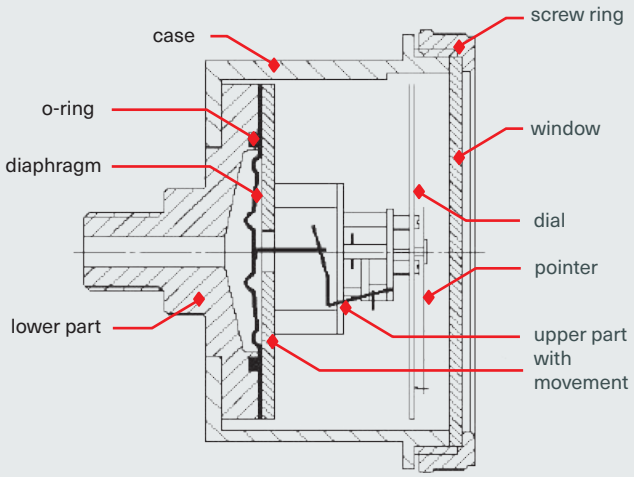
[1] NiCrCo-alloy

Metrological Features

Construction

The diaphragm of the pressure gauge models PsP... is mounted vertically, i.e. parallel behind the dial.
The lifting of the diaphragm is converted into the pointer move by two small levers and a toothed movement.

Construction Example Model PsPK



Accuracy According to DIN EN 837-3

- Class 1.6
  indication accuracy better than ±1.6 % of the span at +20 °C (+68 °F)

- Class 2.5
  when using protection foil and for NCS 80
  indication accuracy better than ±2.5 % of the span at +20 °C (+68 °F)

Pressure Limitations

To guarantee a long service life of the instruments, the pressure range should be selected according to DIN EN 837-2 in a way to ensure that the pressure load does not exceed 75 % of the full scale value for steady loads or 65 % of the full scale value for dynamic loads.

The following maximum load limits are to be regarded:

- at steady load: full scale value
- at dynamic load: 90 % of the full scale value
- overpressure: 1.3-times full scale value (optional 3-times overrange protected, max. 50 bar)

Metrological Features

Temperature Limitations

- Storage temperature: −40 / +70 °C (−40 °F / +158 °F)
- Ambient temperature: −20 / +60 °C (−4 °F / +140 °F)
- Medium temperature: +60 °C (+140 °F)

Please regard possible limitations in the data sheets. Special versions and other temperature ranges are available upon request.

- Reference temperature: +20 °C ±5 °C (+68 °F ±9 °F) (DIN EN 837-3)

If the operating temperatures of the measuring system (resilient element and movement) deviate from the reference temperature, additional deviations of the pressure indication do occur. According to DIN EN 837-3, these can be up to ±0.8 % of the span per 10 K.

Additional Electrical Accessories

The installation of additional electrical accessories is limited to:

- Reed switches for PsPK 63

Dial

Dial inscriptions, pressure range, scale divisions and figures on the scale are designed according to DIN EN 837-3.
The standard dial is white with a black inscription.
Standard pressure ranges and scale divisions can be found in the table on page 9.

Pressure Gauges for Fire Extinguishing Pumps

These pressure gauges are especially designed for the application at fire extinguishing pumps and comply with DIN 14421.

Pressure Gauges for Fire Extinguishing Pumps DIN 14421

	PsPChg 80 – 3 rm
Nominal case size	80
Pressure ranges	0 – 25 bar –1 / +25 bar
Accuracy class	2.5
Wetted parts	– 3 stainless steel / CuBe / NBR
Process connection	M 20x1.5 centre back connection
Specifics	–1 / +25 bar: zero at 12 o'clock
Data sheet	4104

Standard Scales / Scale Division for NCS 80

are available, according to DIN 14421, with the pressure ranges

0 – 25 bar

smallest subdivision of the scale = 0.5 bar

–1 / +25 bar

zero at 12 o'clock
smallest subdivision of the scale = 1 bar and
in the vacuum range = 0.05 bar

Pressure Gauges for Chlorine Metering Services

Diaphragm pressure gauges with vertical diaphragm models PsPK 63 – 2 or PsP 60 – 2 were especially designed for the application in chlorine metering systems. The lower part of the diaphragm with the connection thread is made of steel, black enamelled, the wetted parts are bright. The diaphragm is protected by a fine silver foil, which is applicable for use under vacuum. The case made of impact resistant polyamide with screw ring protects the inner parts from all external harmful influences (chloric gas).

	PsP 60	PsPK 63
Nominal case size	60	63
Pressure ranges	0 – 1 bar to 0 – 40 bar preferably: −1 / 0 bar and 0 – 16 bar	0 – 1 bar to 0 – 40 bar preferably: −1 / 0 bar and 0 – 16 bar
Accuracy class	2.5	2.5
Wetted parts	– 2 steel / fine silver foil / FKM	– 2 steel / fine silver foil / FKM
Process connection	G ¼ B bottom connection, centre back connection (rm)	G ¼ B bottom connection, centre back connection (rm)
Specifics	orifice Ø 5 mm	orifice Ø 5 mm
Data sheet	4100	4310

Standard Scales / Scale Division for the Models PsP 60, PsPK 63

Pressure ranges in bar according to DIN EN 837-3		Smallest subdivision of the scale (bar)
Vacuum	−1200 – 0 mbar	50 mbar
	−0.6 / 0[1)]	0.02
	−1 / 0	0.02
Compound range	−1 / +0.6	0.05
	−1 / +1.5	0.1
	−1 / +3	0.2
	−1 / +5	0.2
	−1 / +9	0.2
	−1 / +15	0.5
	−1 / +24	1.0

Pressure ranges in bar according to DIN EN 837-3		Smallest subdivision of the scale (bar)
Pressure	0 – 0.6[1)]	0.02
	0 – 1.0	0.02
	0 – 1.6	0.05
	0 – 2.5	0.1
	0 – 4	0.2
	0 – 6	0.2
	0 – 10	0.2
	0 – 16	0.5
	0 – 25	1
	0 – 40	2

[1)] Not available with protection foil!
More pressure ranges and units upon request, numerous versions without any extra charges!

Customer Solutions

Numerous customer solutions are available for almost all models. Thus, only a few examples are specified below. Further possibilities can be found in the data sheets or product leaflets of the respective models. Further individual special configurations are available upon request.
No matter what requirements and needs your application has, together with our technicians we will find an ideal solution for you – please contact us!

Flow-Through Pressure Gauge

PsP50 – 3 FT	
Nominal case size	50
Pressure ranges	preferably −1 / +3 bar −1 / +5 bar −1 / +9 bar −1 / +15 bar
Accuracy class	2.5
Wetted parts	– 3 stainless steel (316L) diaphragm Inconel 718 electropolished $R_a \leq 0.25$ µm
Process connection	¼" or ½" VCR, male or female
Specifics	5-times overrange protected up to max. 40 bar
T-sheet	T04-000-003

Steam Pressure Measurement in Field Kitchens

PsPKOe 63 – 3	
Nominal case size	63
Pressure range	−1 / +5 bar
Accuracy class	2.5
Case filling	oil for ambient temperatures of −35 / +140 °C
Process connection	special thread connection made of 316L, R ¾" conical DIN 2999 with extended connecting piece
Specifics	operating pressure: 1.5 – 2 bar red (critical) range: 3 – 3.5 bar not ready for use: −0.6 / 0 bar (filling and venting necessary)
Application report	AppBe M.091

Certificates and Approvals

Standards

Our company is certified according to the highest quality standards and our product portfolio meets the highest quality demands. We do not only manufacture according to product-specific instrument standards, we also offer versions with special approvals for application areas with specific requirements. The ARMANO Messtechnik GmbH is certified according to DIN EN ISO 9001.

SIL 2
SIL 3

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