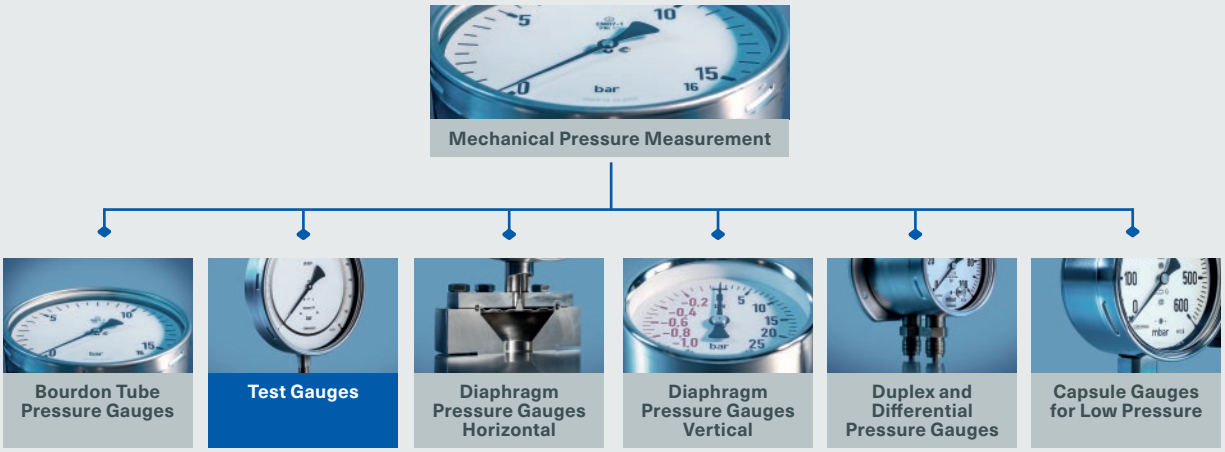
Heading 2

ARMANO

Mechanical Pressure Measurement

Test gauges

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 standard range of mechanical pressure measuring instruments from our product range test gauges.

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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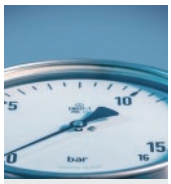
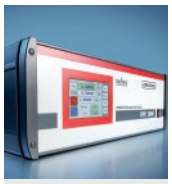
Our Products at a Glance


Mechanical Pressure Measurement

Electronic Pressure Measurement

Chemical Seal Mounting


Calibration Technology

Mechanical Temperature Measurement

Electrical Temperature Measurement

Thermowells & Accessories

Applications

Test gauges are suitable for the measurement of positive and negative overpressures between 0 – 0.6 and 0 – 1600 bar for liquid or gaseous media.
These mechanical pressure measuring instruments are manufactured with the utmost precision from high-quality components. What distinguishes these test gauges from standard pressure gauges is the low friction movement, the high-quality measuring element with considerably higher precision, a scale with fine division as well as a knife edge pointer for exact reading. The information given in DIN EN 837-2 have to be considered for the selection of the suitable measuring instrument. In particular, it has to be ensured that the medium does not corrode any of the wetted parts.

Fields of Application

- Precision monitoring in process technology
- Control and adjustment of pressure gauges
- Test benches, testing devices
- Calibration laboratories, gauging offices
- Materials testing
- Research institutes, laboratories
- Aerospace technology

Media	Pressure Ranges
for gaseous and liquid media	from 0 – 0.6 bar to 0 – 1600 bar

Specifics

- Instrument number on the dial
- Available certificates for the accuracy:
  - inspection certificate 3.1 according to EN 10204
  - DKD calibration certificate
- Instruments in sealable design
- Test gauges with pressure ranges up to 0 – 25 bar: calibration with air (“G” on the dial for gas)
- Test gauges with higher pressure ranges: calibration with liquid (“F” on the dial for fluid)

Upon request, we can calibrate test gauges with pressure ranges up to 160 bar with air, and below 40 bar (from 0 – 4 bar) with liquid.

Test gauges with the inscription “G” are intended for the measurement of gaseous media, those with the inscription “F” are intended for the measurement of liquid media. In accordance with DIN EN 837-1, the measuring accuracy applies to the medium printed on the dial.
Please also note: When calibrating compound gauges for liquid media, the vacuum range cannot be tested. The device is considered as “vacuum-proof”.

General Features

Selection Criteria

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. Please compare the selection criteria for pressure gauges described in our operating instruction, which can be found as pdf file on our website.

Standard Material Combinations

Ordering code	Pressure ranges	Connection	Bourdon tube
– 1	≤ 40 bar	brass	bronze
	60 bar	brass	CuBe
	≥ 100 bar	brass	stainless steel 316L
	600 bar	brass	NiFe alloy
– 3	< 600 bar	stainless steel 316L	stainless steel 316L
	≥ 600 bar	stainless steel 316L	NiFe alloy

Process Connections

According to DIN EN 837-1, our Bourdon tube test gauges are available with the following process connection as standard:

- G ½ B (½" BSP)

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

- ½" NPT or M 20x1.5

Further versions are available as customised product.

Pressure Ranges

Bar is the preferred pressure unit according to DIN EN 837-1. In this model overview, the available pressure ranges are indicated in bar. Beyond that, there are several further pressure units available, e.g. psi, mmWS, kg/cm², kPa, MPa. Multiple scales are available as well.
Special scales for almost all instruments can be manufactured upon request.

Metrological Features

Construction

The design of the measuring system is basically the same for all models. Bourdon tube, socket with thread connection, movement, scale and pointer form a self-contained unit ready for measurement. The case and the ring with glass window basically serve as protection against external influences.
All instruments are equipped with an internal resilient zero stop pin at the movement.

Bourdon Tube Measuring System, Circular Form

Bourdon Tube Measuring System, Helical Form

Accuracy According to DIN EN 837-1

The accuracy class indicates the error limits as a percentage of the measuring span. The accuracy class also defines the limit value for the hysteresis of the instruments. Please regard possible limitations in the data sheets.

- Class 0.6 (indication accuracy better than ±0.6 % of the full scale value at +20 °C (+68 °F))
- Class 0.25 (indication accuracy better than ±0.25 % of the full scale value at +20 °C (+68 °F))

Metrological Features

Pressure Limitations

To guarantee a long service life, 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

Temperature Limitations

Class 0.6 %

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

Ordering code	Joint	Unfilled	Filled
– 1	soft soldered	+60 °C (+140 °F)	+60 °C (+140 °F)
	silver brazed	+100 °C (+212 °F)	+100 °C (+212 °F)
– 3		+200 °C (+392 °F)	+100 °C (+212 °F)

Class < 0.6 %

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

Please regard possible limitations in the data sheets.

- Reference temperature: +20 °C (+68 °F)

Other temperature specifications such as ambient, operating, transport and storage temperature are the defining criteria that test gauges can permanently withstand without a loss of quality at reference temperature.
If the operating temperatures deviate from the reference temperature, additional temperature errors do occur. Test gauges should thus be operated at +20 °C ±2 °C (+68 °F ±3.6 °F).
For use at deviating temperatures, the test gauges can be adjusted for these temperatures in accordance with EN 837-1. Alternatively, temperature-compensated measuring instruments such as our digital pressure gauge DPG 1030 are recommended for these applications.

Additional Accessories

Additional Electrical Accessories

Mounting and installation of additional electrical accessory is available upon request, although rarely demanded.
cf. data sheets heading 9

Chemical Seals

Upon special request, test gauges can also be provided with chemical seals.
cf. data sheets heading 7

Dial / Standard Scales / Scale Division

Dial inscriptions, pressure range, scale divisions and figures on the scale are designed according to DIN EN 837-1. The standard dial is white with black inscription. Standard pressure ranges and scale divisions can be found in the table below.
The knife edge pointer for exact reading is made of aluminum black. Optionally, the device can be supplied with mirror scale.

Nominal Case Sizes 100, 160 and 250 – Class 0.6

Pressure ranges according to DIN EN 837-1 in bar		Smallest subdivision of the scale (bar)[1] NCS 160, 250	NCS 100
vacuum	−0.6 / 0	0.005	0.005
	−1 / 0	0.005	0.01
compound range	−1 / +0.6	0.01	0.02
	−1 / +1.5	0.02	0.02
	−1 / +3	0.02	0.05
	−1 / +5	0.05	0.05
	−1 / +9	0.05	0.1
	−1 / +15	0.1	0.2
pressure	0 – 0.6	0.005	0.005
	0 – 1	0.005	0.01
	0 – 1.6	0.01	0.02
	0 – 2.5	0.02	0.02
	0 – 4	0.02	0.05
	0 – 6	0.05	0.05
	0 – 10	0.05	0.1
	0 – 16	0.1	0.2
	0 – 25	0.2	0.2
	0 – 40	0.2	0.5
	0 – 60	0.5	0.5
	0 – 100	0.5	1
	0 – 160	1	2
	0 – 250	2	2
	0 – 400	2	5
	0 – 600	5	5
	0 – 1000	5	10
	0 – 1600	10	20

Pressure ranges in psi		Smallest subdivision of the scale (psi)[1] NCS 160, 250	NCS 100
vacuum	−30" Hg / 0	−0.1" Hg	−0.2" Hg
compound range	−30" Hg / +15	upon request	upon request
	−30" Hg / +30		
	−30" Hg / +60		
	−30" Hg / +100		
	−30" Hg / +160		
	−30" Hg / +200		
	−30" Hg / +300		
	−30" Hg / +600		
pressure	0 – 10	0.05	0.1
	0 – 15	0.1	0.1
	0 – 30	0.2	0.2
	0 – 60	0.5	0.5
	0 – 100	0.5	1
	0 – 160	1	2
	0 – 200	1	2
	0 – 300	2	2
	0 – 400	2	5
	0 – 600	5	5
	0 – 800	5	10
	0 – 1000	5	10
	0 – 1500	10	10
	0 – 2000	10	20
	0 – 3000	20	20
	0 – 4000	20	50
	0 – 5000	25	50
	0 – 6000	50	50
	0 – 10000	50	100
	0 – 15000	100	100
	0 – 20000	100	200

Nominal Case Sizes 250 – Class 0.25

Pressure ranges according to DIN EN 837-1 in bar		Smallest subdivision of the scale (bar) NCS 250
vacuum	−0.6 / 0	0.002
	−1 / 0	0.005
compound range	−1 / +0.6	0.005
	−1 / +1.5	0.01
	−1 / +3	0.02
	−1 / +5	0.02
	−1 / +9	0.05
	−1 / +15	0.05
pressure	0 – 0.6	0.002
	0 – 1	0.005
	0 – 1.6	0.005
	0 – 2.5	0.01
	0 – 4	0.02
	0 – 6	0.02
	0 – 10	0.05
	0 – 16	0.05
	0 – 25	0.1
	0 – 40	0.2
	0 – 60	0.2
	0 – 100	0.5
	0 – 160	0.5
	0 – 250	1
	0 – 400	2
	0 – 600	2

Pressure ranges in psi		Smallest subdivision of the scale (psi) NCS 250
vacuum	−30" Hg / 0	−0.1" Hg
compound range	−30" Hg / +15	upon request
	−30" Hg / +30	
	−30" Hg / +60	
	−30" Hg / +100	
	−30" Hg / +160	
	−30" Hg / +200	
	−30" Hg / +300	
	−30" Hg / +600	
pressure	0 – 10	0.05
	0 – 15	0.05
	0 – 30	0.1
	0 – 60	0.2
	0 – 100	0.5
	0 – 160	0.5
	0 – 200	1
	0 – 300	1
	0 – 400	2
	0 – 600	2
	0 – 800	5
	0 – 1000	5
	0 – 1500	5
	0 – 2000	10
	0 – 3000	10
	0 – 4000	20
	0 – 5000	25
	0 – 6000	20
	0 – 10000	50

Movement

The low friction, high quality movement is made of brass / German silver.
Movements made of stainless steel are available upon request at extra charges.

[1] partially finer scale division for versions with mirror scale

Standard Range

RFCh / RFChG	
Case / ring	bayonet ring case stainless steel
Case filling	without / with
Accuracy	class 0.6
Nominal size	100, 160, 250 mm
Wetted parts	– 1 brass[1)] – 3 stainless steel 316L[2)]
Pressure ranges	0 – 0.6 bar to 0 – 1600 bar 0 – 2.5 bar to 0 – 1600 bar
Data sheet	2201

Safety Version

RFSCh 160 RFSChG 160	
Case / ring	bayonet ring case stainless steel
Case filling	without / with
Accuracy	class 0.6
Nominal size	160 mm
Wetted parts	– 1 brass[1)] – 3 stainless steel 316L[2)]
Pressure ranges	0 – 0.6 bar to 0 – 1600 bar 0 – 2.5 bar to 0 – 1600 bar
Data sheet	2600

Test Pressure Gauge with Portable Case

RFPCh 160	
Case / ring	bayonet ring case stainless steel
Case filling	without / with
Accuracy	class 0.6
Nominal size	160 mm
Wetted parts	– 1 brass[1)] – 3 stainless steel 316L
Pressure ranges	0 – 0.6 bar to 0 – 600 bar
Data sheet	2102

[1)] ≥ 100 bar: Bourdon tube stainless steel, pressure range max. 0 – 600 bar
[2)] ≥ 600 bar: Bourdon tube NiFe alloy

Customer Solutions

Numerous customer solutions are available for almost all models. Thus, only a few examples are specified below. Further versions can be found in the data sheets or other technical documents 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!

Class 0.25

RFCh 250 – 1

Manufactured with highest precision, these test gauges with accuracy class 0.25 are supplied as standard with:

mirror scale, 270°

optional
zero point adjustment via turnable dial (±5 scale graduation marks)
knurled screw on the front side through the window

pressure ranges
type – 1 0 – 0.6 bar to 0 – 600 bar

GOST Standards

MO 250 – 1

We, for example, manufacture test gauges according to the Russian standard with accuracy classes ±0.6, ±0.4, ±0.25 and ±0.15
Features
from class 0.4: movement with eccentric adjustment, anti parallax pointer
from class 0.25: as above, with scale 315°, 400 graduation marks

ASME Standards

RFCh 160

Test Gauges in accordance with the American standard ASME are also available. These versions are generally required for the US market with "Grade 3A", which corresponds to a tolerance of ±0.25 % without limiting the hysteresis within tolerance band. The instruments are equipped with a mirror scale and are optionally available with zero point adjustment (turnable dial).

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.

Any Questions?

We are pleased to offer our help and answer any of your questions and provide background information on our pressure gauges. We can only optimise the measuring instrument for your specific case of application when receiving exact, complete information on the process or a precise specification of the required measuring system.

Your contact persons:

We have prepared checklists for you to help you with the specification of your instruments.
PDF versions for printing at www.armano-messtechnik.com

Checklist Pressure Gauges

ARMANO

Heading 1 – 4, 6

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