

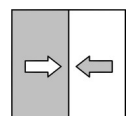


Data sheet

DA09

Differential pressure measuring unit
Pressure levels PN10/PN25

Diaphragm manometer
CrNi-steel model



1 Product and functional description

1.1 Performance features

Areas of application

- Chemical, petrochemical industry
- Process technology
- Marine and offshore technology
- Power plant technology
- Mechanical and plant engineering

Important features

- Highly corrosion resistant
- CrNi-steel model
- Use with aggressive media
- Highly durable
- Variable connection technology
- With fluid filling as an option
- Optional additional equipment such as contact element or rotation angle encoder

1.2 Function diagram

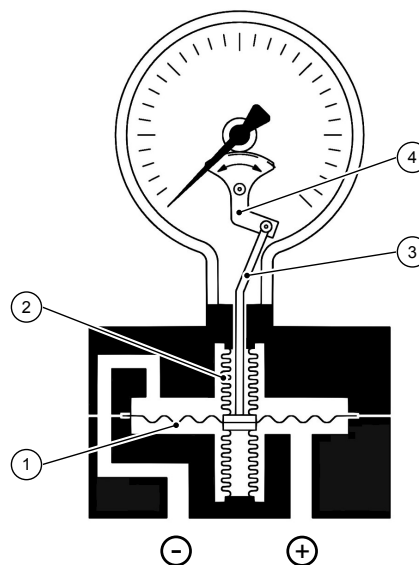


Fig. 1: Function diagram

1 Measuring diaphragm	2 Bellows
3 Tie rod	4 Motion train

1.3 Design and mode of operation

The measuring system comprises a diaphragm and two separate pressure chambers. Differential pressure between the chambers causes axial movement of the diaphragms. A tie rod transfers this movement to an indicator.

The seal between the pressure chamber and tie rod is realised with metal bellows. To compensate the static operating pressure, the measuring system is symmetrical.

1.4 Equipment versions

The illustrations are just examples. The equipment features can be combined according to the order code.

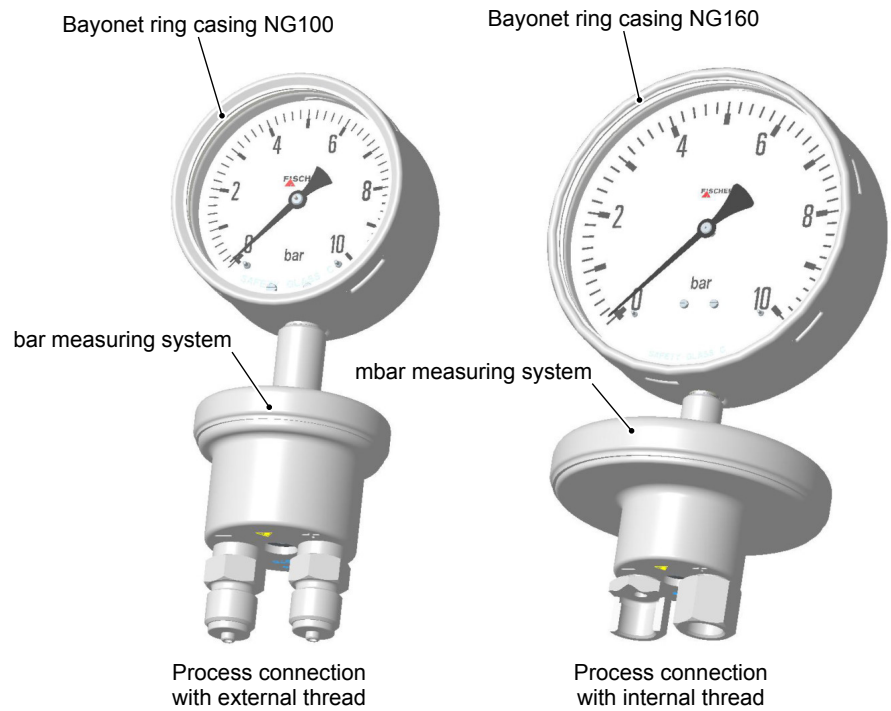


Fig. 2: Equipment versions NG100, NG160

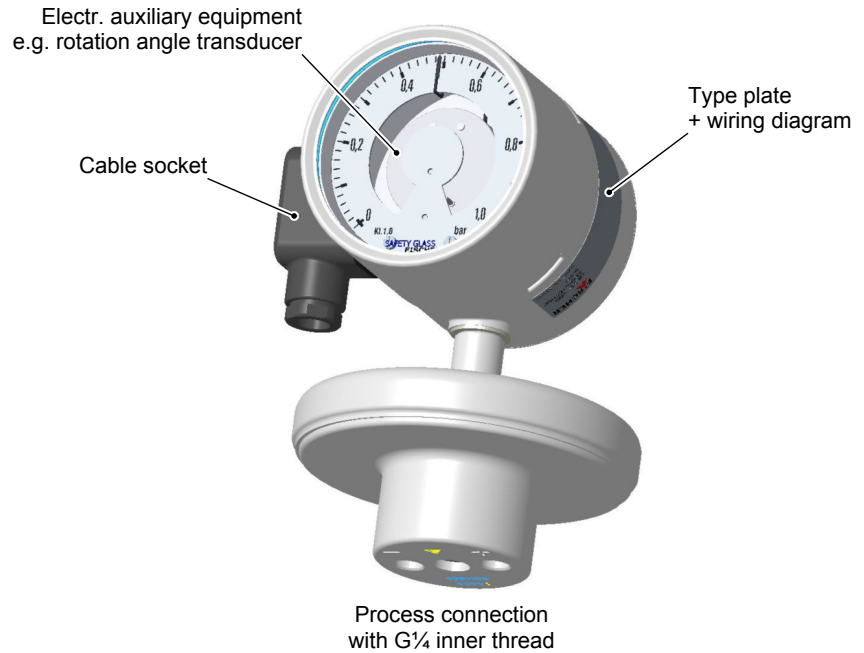


Fig. 3: Equipment versions additional equipment

2 Technical Data

2.1 General

Please also observe the order code here.

2.2 Input variables

Measuring variable

Absolute pressure for gaseous, fluid and aggressive media.

Measuring ranges [bar, mbar]

Measuring range	PN	Measuring range	PN
0 ... 0.6 bar	25 bar	-1 ... 0.6 bar	25 bar
0 ... 1 bar	25 bar	-1 ... 1.5 bar	25 bar
0 ... 1.6 bar	25 bar	-1 ... 3 bar	25 bar
0 ... 2.5 bar	25 bar	-1 ... 5 bar	25 bar
0 ... 4 bar	25 bar		
0 ... 6 bar	25 bar		
0 ... 10 bar	25 bar		
0 ... 16 bar	25 bar		
0 ... 25 bar	25 bar		
0 ... 25 mbar	10 bar	-40 ... 60 mbar	10 bar
0 ... 40 mbar	10 bar	-60 ... 100 mbar	10 bar
0 ... 60 mbar	10 bar	-100 ... 150 mbar	10 bar
0 ... 100 mbar	10 bar	-150 ... 250 mbar	25 bar
0 ... 160 mbar	10 bar		
0 ... 250 mbar	10 bar		
0 ... 400 mbar	25 bar		
0 ... 600 mbar	25 bar		

Measuring ranges [kPa, PSI]

Measuring range	PN	Measuring range	PN
0 ... 2.5 kPa	10 bar	0 ... 3 PSI	10 bar
0 ... 4 kPa	10 bar	0 ... 5 PSI	25 bar
0 ... 6 kPa	10 bar	0 ... 10 PSI	25 bar
0 ... 10 kPa	10 bar	0 ... 15 PSI	25 bar
0 ... 16 kPa	10 bar	0 ... 30 PSI	25 bar
0 ... 25 kPa	10 bar	0 ... 60 PSI	25 bar
0 ... 40 kPa	25 bar	0 ... 100 PSI	25 bar
0 ... 60 kPa	25 bar	0 ... 250 PSI	25 bar
0 ... 100 kPa	25 bar	0 ... 300 PSI	25 bar
0 ... 160 kPa	25 bar		
0 ... 250 kPa	25 bar		
0 ... 400 kPa	25 bar		
0 ... 600 kPa	25 bar		

Pressure load

Idle load	Scale upper value
Alternating load	Scale upper value
Overload capability on one side (+) and (-)	10 x Scale upper value ≤ PN

2.3 Measurement accuracy

Accuracy class	1.6
Characteristic curve deviation	± 1.6 % of the measuring range (FS)
Temperature influence (Reference + 20°C)	± 0.8 %FS / 10K
Influence of static pressure for measuring ranges (MBR) < 250 mbar	≤ 0,1 % + $\frac{0,004 \%}{\text{MBR [bar]}}$
Influence of static pressure for measuring ranges (MBR) ≥ 250 mbar	≤ $\frac{0,1 \%}{\text{bar}}$

2.4 Operating conditions

Permissible ambient temperature	-20 ... +80 °C
Admissible storage temperature	-20 ... +80 °C
Admissible media temperature	≤ 100 °C
Type of protection	IP 66 acc. to EN 60529

2.5 Construction design**Materials**

	Material	Material no.
Bayonet ring housing NG100, NG160	CrNi steel	1.4301, 1.4404
Safety housing	CrNi steel	1.4404
Process connection	CrNi steel	1.4404
Motion train	CrNi steel	
Dial face and needle	Aluminium, painted, printed	
Inspection disk	Safety laminated glass	

Parts in contact with the medium

	Material	Material no.
Pressure chamber	CrNi steel	1.4404
Diaphragm MB ≤ 400 mbar	CrNi steel	1.4571
Diaphragm MB ≥ 600 mbar	NiCrCo alloy	DURATHERM®
Bellows	NiCr. alloy	Alloy 625
Seal	Metal seal	

Process connection

	Material	Material no.
Connecting piece and port	CrNi steel	1.4404
Cutting ring screw connections	CrNi steel	1.4571

Electrical connection

In the case of devices with additional electronic equipment, the connection is realised using a cable socket attached to the side and/or with a Han 7D connector on the power plant models. The pin assignment depends on the ordered mode and is stated in the data sheet KE or KE09.

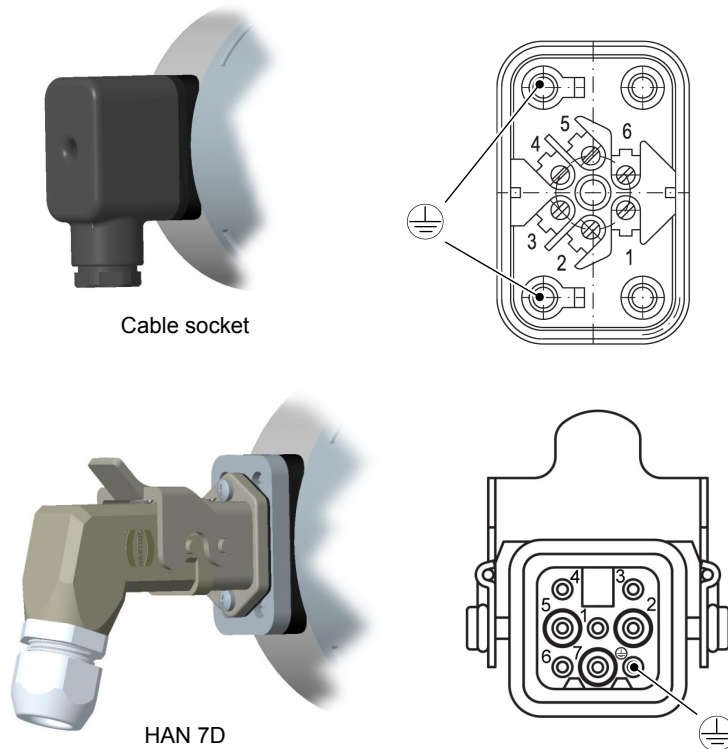


Fig. 4: Cable socket

Cable socket

Number of screw terminals	6 + 2PE
Rated current	See data sheet KE
Rated voltage	250 V
Cable diameter	up to 1.5 mm ² with wire protection
Cable screw connection	M20 x 1.5, terminal range 7 ... 13 mm

HAN 7D

No. of crimp contacts	7 + PE
Rated current	See data sheet KE
Rated voltage	50 V
Cable diameter	1 mm ²
Cable screw connection	M20 x 1.5, terminal range 7 ... 13 mm

Assembly

Direct assembly	Mounted to the pipes
Wall mounting	Flanged assembly plate
Pipe mounting	Flanged assembly plate and attachment bracket
Mounting position	Vertical
Weight	Depending on the version 2,7 ... 7 kg

Additional Attachments

Contact elements

Limit signal transmitters (contacts) and capacitive rotation angle transducers with an output signal proportional to the angular position can be fitted into a housing augmented by a corresponding bayonet ring connector.

A certain minimum pressure level is required to operate this kind of contact element, which is why there is a lower limit for the mbar measuring ranges. This limit depends on the model type and is stated in the section 'General'.

The measuring deviation increases by $\pm 0.5\%$ per contact when the contacts are driven and switched.

For more information and the order key, please refer to the data sheet:

- for limit switch in [data sheet KE](#)
- for rotation angle converter in the [data sheet KE09](#)

Fluid charging

Under aggravated operating conditions, such as vibrations and extreme pressure fluctuations, or in order to avoid condensation forming if used outdoors, the casing can be filled with the following fluids depending in the type of contacts installed:

without contacts	Paraffin oil, glycerine, silicon oil
Low-action contacts	Paraffin oil, silicon oil
Magnetic spring contacts	Silicon oil
Inductive contacts	Paraffin oil, silicon oil
Rotation angle transducer	no filling possible

Marker needle

A settable red marker can be attached to the scale to clearly show a certain pressure (limit value).

Trailing needle

The trailing needle is 'dragged' with the measured value indicator. As there is no fixed connection between the two needles, one-off maximum values are stored. The trailing needle can be reset using an adjusting dial in the window. Trailing needles cannot be used in conjunction with contacts. A certain minimum pressure level is required to move the drag indicator, which is why there is a lower limit for the mbar measuring ranges. This limit depends on the model type and is stated in the section 'General'.

Shut-off fitting

Three-spindle equalisation and shut-off valve DZ93 or four-spindle equalisation and shut-off valve DZ94.

- Material 1.4404
- Functions: Shut-off, pressure compensation

2.6 Dimensional drawings

All dimensions in mm unless otherwise stated

2.6.1 Standard version

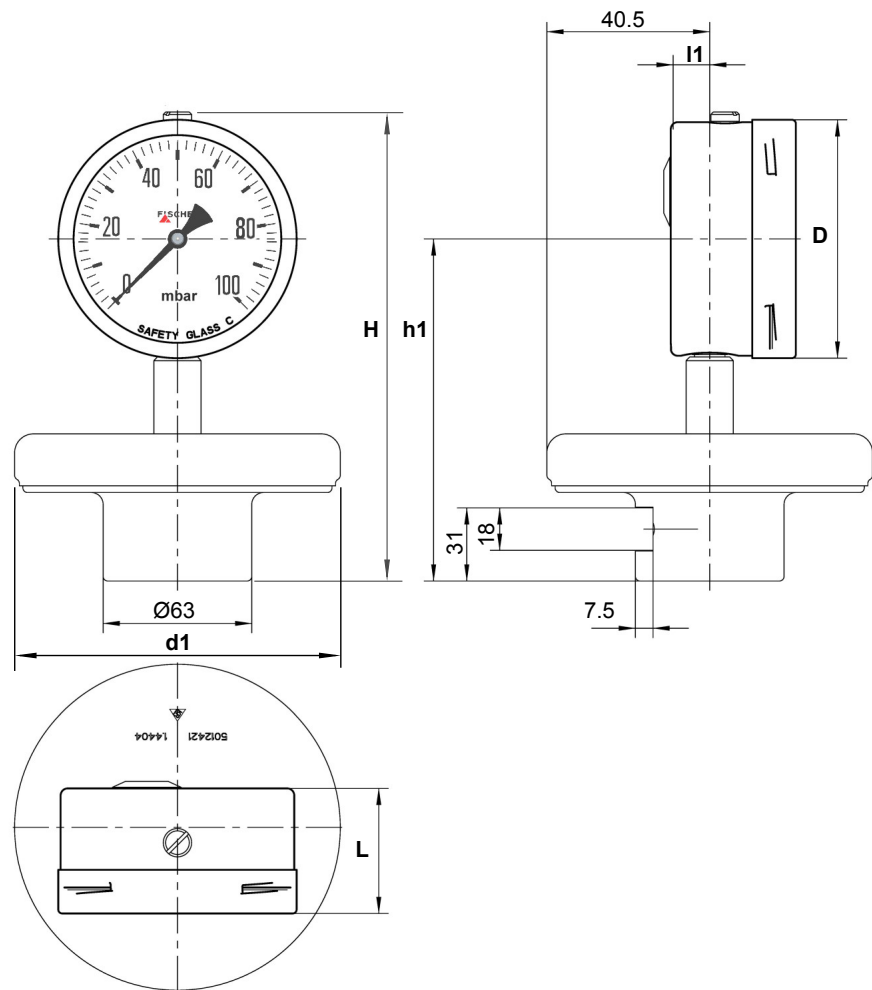


Fig. 5: Dimensional picture 25 ... 250 mbar

Measuring range 25...250 mbar

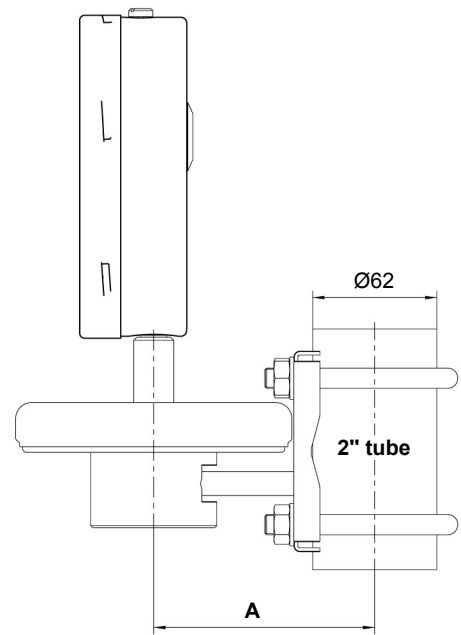
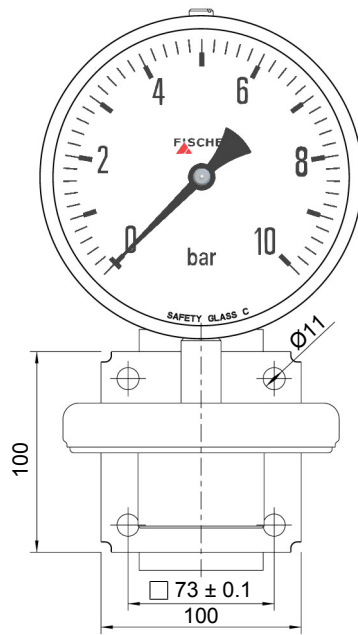
Housing	Tol.	D	d1	H	h1	L	I1
NG100	± 0.1	101	138	199	145	53	15.5
NG160	± 0.1	161	138	259	175	53.5	16.5

Measuring ranges 0.4 ... 25 bar

Housing	Tol.	D	d1	H	h1	L	I1
NG100	± 0.1	101	81	198	144	53	15.5
NG160	± 0.1	161	81	258	174	54.5	16.5

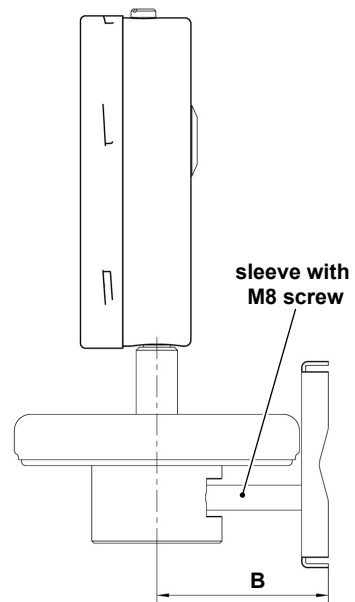
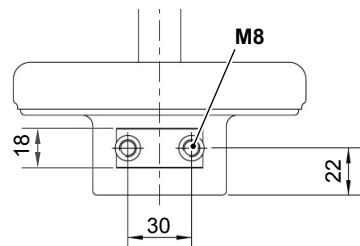
2.6.2 Tube and wall mounting

The dimensions stated apply for all housing models. The example shown is a bayonet ring housing NG160.



Tube assembly

Measuring range	Tol.	A	B
25 ... 250 mbar	± 0.1	110.4	83
0.4 ... 25 bar	± 0.1	54.5	81.9



wall mounting

Fig. 6: Tube and wall mounting

2.6.3 Process connection

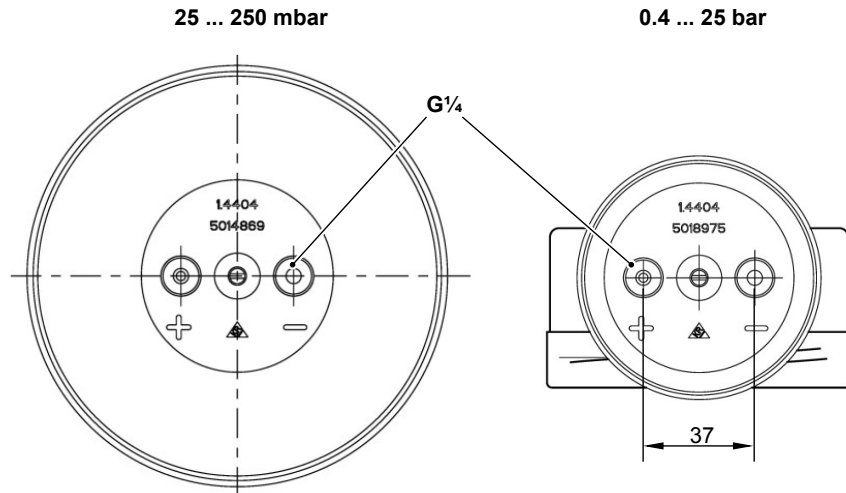


Fig. 7: Process connection

2.6.3.1 Connection port with cylindrical external thread

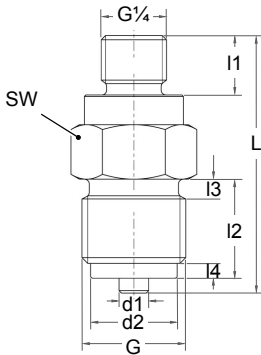


Fig. 8: Connecting port G

G	d1	d2	L	I1	I2	I3	I4	SW
Tol.	±0.1	±0.2	±0.3	±0.2	±0.2	±0.1	±0.1	
G½	6	17.5	52	12	23	4	3	22
G¼	5	9.5	39	12	15	3	2	19

SW:= Key width

2.6.3.2 Connection shanks with tapered external thread

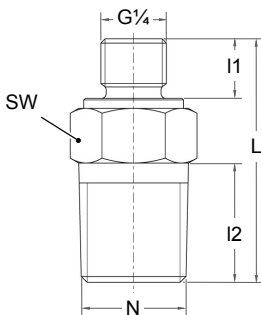


Fig. 9: Connecting port NPT

N	L	I1	I2	SW
Tol.	±0.3	±0.2	±0.2	
½-14 NPT	49	12	24	22
¼-18 NPT	42	12	18	19

SW:= Key width

2.6.3.3 Connecting port with inner thread

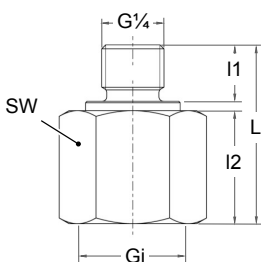


Fig. 10: Connecting port Gi

Gi	L	I1	I2	SW
Tol.	±0.3	±0.2	±0.2	
G½	38	12	24	27
½-14 NPT	38	12	24	27
¼-18 NPT	32	12	18	19

SW:= Key width

2.6.4 Additional Attachments

2.6.4.1 Safety model

The device can be supplied in a safety housing acc. to DIN 837 with an unbreakable partition wall and a rear wall that can be blown out (S3).

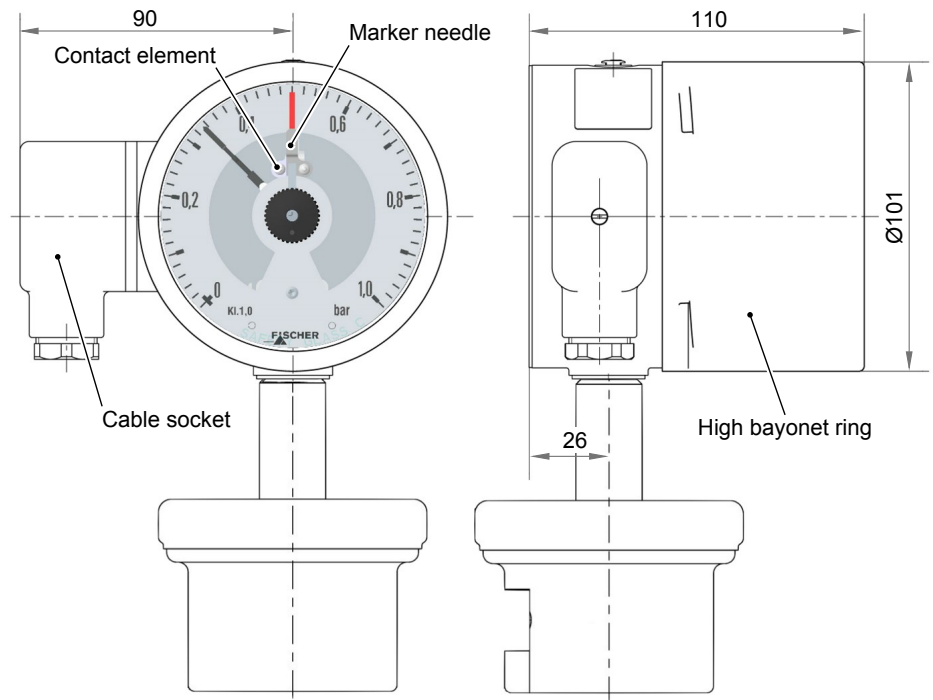


Fig. 11: Safety housing

2.6.4.2 Bayonet ring housing

Model with cable socket

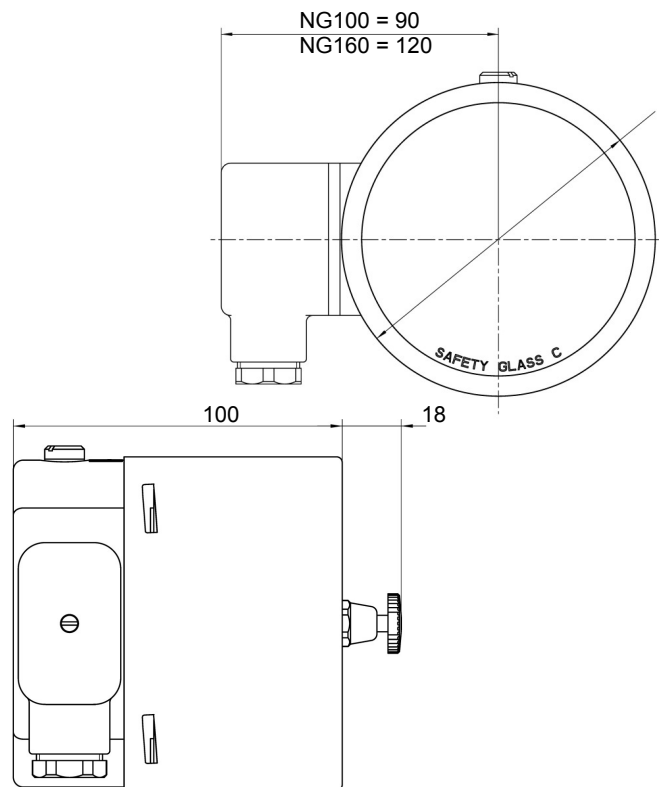


Fig. 12: Bayonet ring housing with cable socket

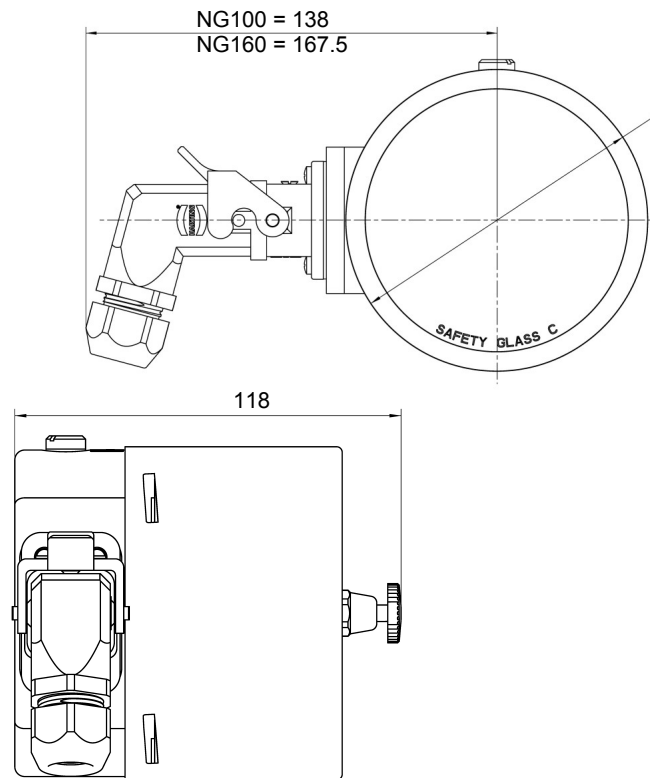
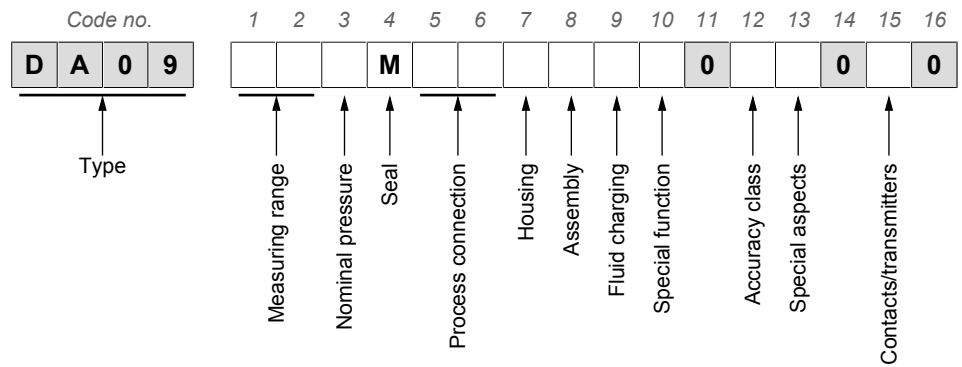
Model with HAN 7D (power plant)

Fig. 13: Bayonet ring housing with HAN 7D

3 Order Codes



[1.2]	Measuring range	PN	[1.2]	Measuring range	PN
01	0 ... 0.6 bar	25 bar	32	-1 ... 0.6 bar	25 bar
02	0 ... 1 bar	25 bar	33	-1 ... 1.5 bar	25 bar
03	0 ... 1.6 bar	25 bar	34	-1 ... 3 bar	25 bar
04	0 ... 2.5 bar	25 bar	35	-1 ... 5 bar	25 bar
05	0 ... 4 bar	25 bar			
06	0 ... 6 bar	25 bar			
07	0 ... 10 bar	25 bar			
08	0 ... 16 bar	25 bar			
09	0 ... 25 bar	25 bar			
56	0 ... 25 mbar (180° scale)	10 bar	70	-40 ... 60 mbar	10 bar
57	0 ... 40 mbar	10 bar	72	-60 ... 100 mbar	10 bar
58	0 ... 60 mbar	10 bar	74	-100 ... 150 mbar	10 bar
59	0 ... 100 mbar	10 bar	76	-150 ... 250 mbar	25 bar
60	0 ... 160 mbar	10 bar			
82	0 ... 250 mbar	10 bar			
83	0 ... 400 mbar	25 bar			
C1	0 ... 600 mbar	25 bar			
[1.2]	Measuring range	PN	[1.2]	Measuring range	PN
N3	0 ... 2.5 kPa (180° scale)	10 bar	H1	0 ... 3 PSI	10 bar
N4	0 ... 4 kPa	10 bar	H2	0 ... 5 PSI	25 bar
N5	0 ... 6 kPa	10 bar	H3	0 ... 10 PSI	25 bar
E5	0 ... 10 kPa	10 bar	H4	0 ... 15 PSI	25 bar
E6	0 ... 16 kPa	10 bar	H5	0 ... 30 PSI	25 bar
E7	0 ... 25 kPa	10 bar	H6	0 ... 60 PSI	25 bar
E8	0 ... 40 kPa	25 bar	H7	0 ... 100 PSI	25 bar
F1	0 ... 60 kPa	25 bar	Q1	0 ... 250 PSI	25 bar
F2	0 ... 100 kPa	25 bar	P1	0 ... 300 PSI	25 bar
F3	0 ... 160 kPa	25 bar			
F4	0 ... 250 kPa	25 bar			
F5	0 ... 400 kPa	25 bar			
F6	0 ... 600 kPa	25 bar			

[3]	Nominal pressure (PN)	
E	10 bar = 1 MPa ≈ 145 PSI	MB ≤ 250 mbar = 25 kPa ≈ 3.63 PSI
G	25 bar = 2.5 MPa ≈ 362 PSI	MB ≥ 400 mbar = 40 kPa ≈ 5.80 PSI

The rated pressure ranges (PN) are linked to the measuring ranges (MB) and cannot be freely combined.

[4]	Seal
M	Metal seal

[5.6]	Process connection (EN 873)	Material
01	Inner thread G $\frac{1}{4}$	1.4404
03	Inner thread G $\frac{1}{2}$	
04	Inner thread $\frac{1}{4}$ - 18 NPT	
05	Inner thread $\frac{1}{2}$ - 14 NPT	
11	External thread G $\frac{1}{4}$	
13	External thread G $\frac{1}{2}$	
14	External thread $\frac{1}{4}$ - 18 NPT	
15	External thread $\frac{1}{2}$ - 14 NPT	

[7]	Housing	Material	
S	Bayonet ring housing Ø100	1.4404	
T	Bayonet ring housing Ø160		
0	Safety housing Ø100		Acc. to EN 837
P	Safety housing Ø160		Acc. to EN 837

[8]	Assembly
0	Direct connection (Standard)
R	Pipe mounting
W	Wall mounting

[9]	Fluid charging	
0	Without fluid filling	
3	Without fluid filling; suitable for O ₂ measurements (free of oil and grease)	
1	Glycerine	Only for units without contacts
4	Paraffin oil	For installed inductive contacts
5	Silicon oil	For units with and without contacts

It is not possible to fill fluids into units with an installed capacitive position encoder.

[10]	Special function	
0	Without special function	
1	Adjustable marker needle	
2	Resettable drag needle	Measuring range ≥ 60 mbar

[12]	Accuracy class	
C	1.0	
B	1.6	Standard version

[13]	Special aspects
0	None
L	Increased load change resistance

[15]	Contacts/transmitters	
0	No contacts/transmitters	
1	Contacts as per data sheet KE	Measuring range \geq 100 mbar
2	Rotation angle encoder in accordance with data sheet KE09	Measuring range \geq 100 mbar
5	Contacts with socket	Power plant model

3.1 accessories

Order no.	Planned measures
DZ93 00HE##	Three-spindle compensating and shut-off valve
DZ94 00HE##	Four-spindle equalisation and shut-off valve with venting valve

For more information, please see the data sheet [DZ93-94](#).

3.2 Information about the document

This document contains all technical data about the device. Great care was taken when compiling the texts and illustrations; Nevertheless, errors cannot be ruled out.

Subject to technical amendments.



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