



## Differential Pressure Gauges with Bourdon Tube for Industrial Applications



measuring  
•  
monitoring  
•  
analysing

### MAN-DF



- Housing: 100 mm, 160 mm
- Connection: 2 x G 1/2 male
- Material  
Housing: steel black,  
aluminium, stainless steel  
Connection: brass, stainless steel
- Indicating range:  
0 ... +0.6 bar ... 0 ... +400 bar
- Differential pressure range:  
0.1 ... +0.3 bar ... 0 ... +300 bar
- Options:  
Damping liquid, contacts



P1

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### Application

These KOBOLD pressure gauges are suitable for measuring of liquid and gaseous medias, although this should not be viscous or susceptible to crystallization. These are used wherever the primary pressure, the after-pressure and the resulting pressure differential are to be displayed at the same time. A cheaper available alternative to the differential pressure gauge that uses a diaphragm is the model with direct display of the differential pressure.

### Measuring principle

Mechanical pressure measurement uses the principle of an elastic measuring element, which generates a precisely defined, reproducible deflection when subjected to pressure.

2 variations are available:

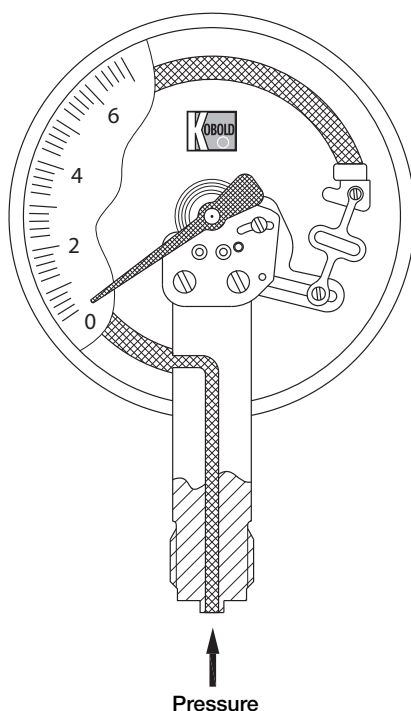
#### Reading 2 single pressures and the differential pressure

Both pointers turn around the same axle and indicate the values separately. The pointer on the low-pressure side has the form of a dial. On this dial the pressure difference between the low and high pressure side is given which may not exceed 50% of the full measuring range. Each single value can be read off directly.

#### Reading just the differential pressure (MAN-DG12R..)

Two linked Bourdon tube systems are mounted in the housing in parallel, and when the pressure rises they both move in the same direction. The pointer only moves when the distension of the two diaphragms is different and it then indicates the differential pressure on the scale direct.

### Unifilar drawing



### Housing

The following housing diameters are available: 100 mm and 160 mm. The housing materials are available in steel, black painted, aluminium or stainless steel.

### Installation

The gauges are usually built straight into the threaded socket in the customer's system.

### Connection

Gauges are supplied with a G 1/2 male connecting thread as standard. The connector is made of brass or 1.4571 stainless steel. For viscous, crystallising, aggressive materials or higher temperature materials to prevent the material being measured from penetrating into the measuring system. Other connection types are available on request.

### Measuring ranges

Gauges that show the two different pressures are graduated according to DIN recommendations and lie between 0...0.6 bar and 0...400 bar. Up to 50% of the respective measuring ranges can be read as differential pressure giving differential pressure ranges of 0.1...0.3 bar to 100...300 bar. Gauges with differential pressure display (MAN-DR12R..) are available for measuring ranges from 0...1 bar to 0...60 bar.

### Damping liquid

Pressure gauges with liquid filling are used in locations with high alternating dynamic loads, strong vibrations and pulses. The filling ensures easy readability through steady pointer movement even when subjected to extreme loading and heavy vibration. The lubricating effect of the glycerine also keeps wear to a minimum. Glycerine is always used as a matter of principle. In gauges with a contact or an electrical measuring transducer, liquid paraffin is used as a non-conductive alternative.

Silicon fillings of various viscosities are also optionally available.

### Contacts


For monitoring the system pressure, gauges with a direct differential pressure display (MAN-DG 12R) can be fitted with up to 3 limit contacts. Slow action, magnetic spring, inductive and pneumatic contacts are also available.

### Fields of application:

- Industrial heaters
- Filter monitoring
- Water-recycling plant
- Brake test benches



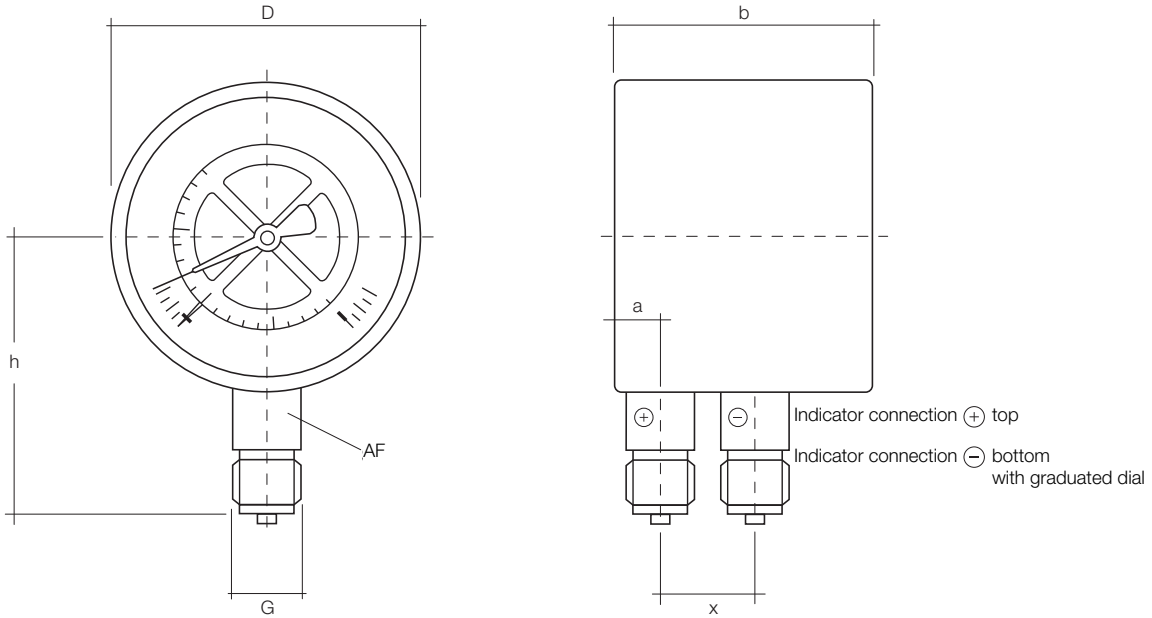
**Technical Details**

Differential pressure gauges		Individual pressures (calculate difference)					Differential pressure indication
Connection/housing		NG 100			NG 160		NG 160
Bottom connection 	MAN-...	...DF12...	...DF52...	...DF16...	...DG12...	...DG26...	...DG12R...
Accuracy class	1.6					1.6	
Diameter	100 mm			160 mm		160 mm	
Housing version	steel, black	st. steel 1.4301	steel, black	st. steel 1.4301	Alu, back flange		
Filling	-	glycerine	-	-	-		
Ring	brass	st. steel 1.4301	steel, black	st. steel 1.4301	steel, black		
Pointer	aluminium, black anodized						
Movement	brass	st. steel 1.4301	brass	st. steel 1.4301	brass		
Throttle	Ms. Ø 0,4 / Ø 0,8 (optional)					from 60 bar, Ø 0,5	
Window	instrument glass	safety glass	instrument glass	safety glass	instrument glass		
Measuring element	CuZn		st. steel 1.4301	CuZn	st. steel 1.4301	CuZn	
Protection	IP 33	IP 67	IP 33	IP 33	IP 33	IP 54	
Overrange protection	short time 1.3 times of full scale						
Weight	1.0 kg	1.3 kg	1.0 kg	1.6 kg	1.6 kg	2.6 kg	
Ambient temperature	-20...+60°C		-20...+100°C	-20...+60°C	-20...+100°C	-20...+60°C	
Connection	brass		st. steel 1.4571	brass	st. steel 1.4571	brass	
Thread connection	G 1/2 male						
Max. temperature of medium	+60°C		+100°C	+60°C	+100°C	+60°C	
Contacts	none					max. 3	
<b>Differential pressure</b>	<b>Indicating range*</b>	<b>Code of indicating range</b>					
0.1 ... 0.3 bar	0...0.6 bar	..B1	..B1	..B1	..B1	..B1	-
0.2 ... 0.5 bar	0...1 bar	..B2	..B2	..B2	..B2	..B2	-
0.3 ... 0.8 bar	0...1.6 bar	..B3	..B3	..B3	..B3	..B3	-
0.5 ... 1.25 bar	0...2.5 bar	..B4	..B4	..B4	..B4	..B4	-
0.7 ... 2 bar	0...4 bar	..B5	..B5	..B5	..B5	..B5	-
1 ... 3 bar	0...6 bar	..B6	..B6	..B6	..B6	..B6	-
2 ... 5 bar	0...10 bar	..B7	..B7	..B7	..B7	..B7	-
3 ... 5 bar	0... 16 bar	..B8	..B8	..B8	..B8	..B8	-
5 ... 12.5 bar	0... 25 bar	..B9	..B9	..B9	..B9	..B9	-
7 ... 20 bar	0... 40 bar	..B0	..B0	..B0	..B0	..B0	-
10 ... 30 bar	0... 60 bar	..C1	..C1	..C1	..C1	..C1	-
20 ... 30 bar	0... 100 bar	..C2	..C2	..C2	..C2	..C2	-
30 ... 80 bar	0... 160 bar	..C3	..C3	..C3	..C3	..C3	-
50 ... 125 bar	0... 250 bar	..C4	..C4	..C4	..C4	..C4	-
70 ... 200 bar	0...400 bar	..C5	..C5	..C5	..C5	..C5	-
	0... 1 bar	-	-	-	-	-	..B2
	0... 1.6 bar	-	-	-	-	-	..B3
	0... 2.5 bar	-	-	-	-	-	..B4
	0... 4 bar	-	-	-	-	-	..B5
	0... 6 bar	-	-	-	-	-	..B6
	0... 10 bar	-	-	-	-	-	..B7
	0... 16 bar	-	-	-	-	-	..B8
	0... 25 bar	-	-	-	-	-	..B9
	0... 40 bar	-	-	-	-	-	..B0
	0... 60 bar	-	-	-	-	-	..C1

\* Negative or positive, or negative and positive overpressure.  
The required display range is to be selected depending on the maximum total overpressure that occurs!



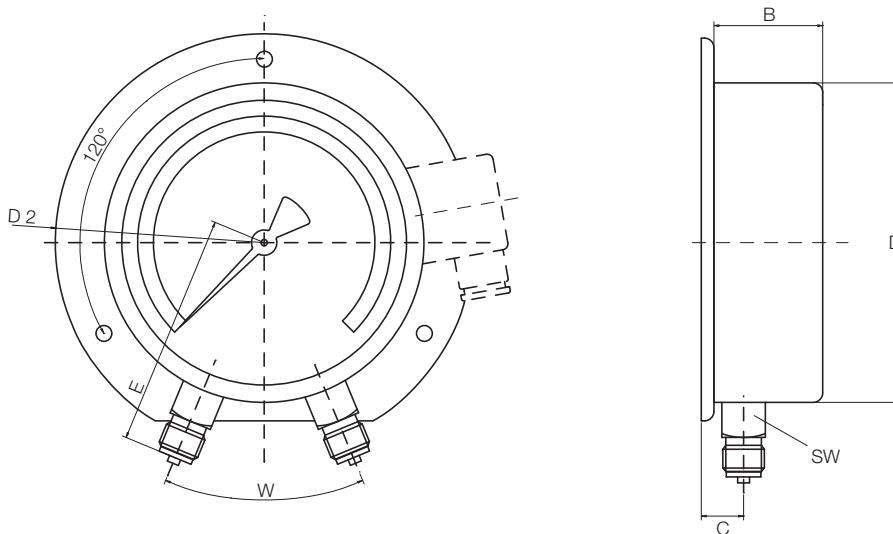
MAN-DF12, MAN-DF52, MAN-DF16, MAN-DG12, MAN-DG26



Dimensions

Design	NG	Dimensions [mm]						
		$a \pm 0.5$	$b \pm 0.5$	$x \pm 0.5$	$D \pm 0.5$	G	$h \pm 1$	AF
DF12.., DF16..; DF52..	100	15.5	82	32	100	G $\frac{1}{2}$ A	87	22
DG12.., DG16..	160	15.5	86,5	32	160	G $\frac{1}{2}$ A	118	22

MAN-DG12R



Dimensions

Model	NG	Dimensions [mm]								
		B	B up to 3 contacts	C	D	D <sub>2</sub>	E	W	SW	X
MAN-DG12R...	160	58	120	22	160	196	115	45°	22	118

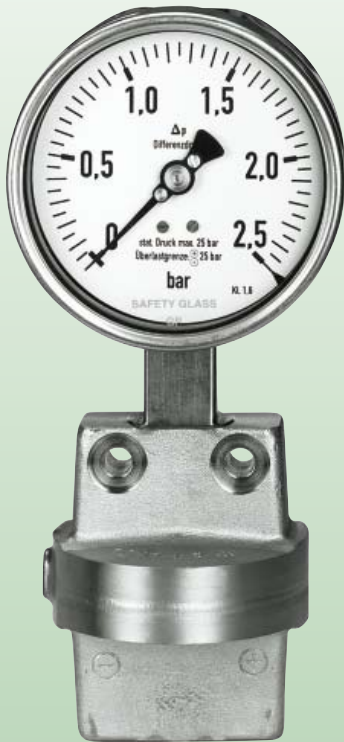


## Diaphragm Differential Pressure Gauges for Industrial Applications



measuring  
•  
monitoring  
•  
analysing

### MAN-D



- Housing: 100 mm, 160 mm
- Connection:  
2 x G 1/4 female, 2 x G 1/2 female,  
cutting ring 6 mm
- Material  
Housing: stainless steel, aluminium  
Connection: stainless steel
- Indicating range:  
0... +16 mbar ... 0... +40 bar
- $p_{\max}$ : 400 bar



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### Application

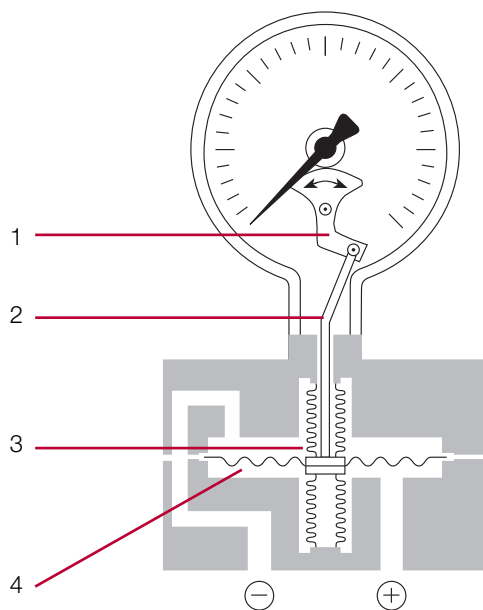
Differential pressure gauges with diaphragms are suitable for liquid or gaseous media, that are neither crystallise nor highly viscous. Due to the materials available these pressure gauges can also be used for chemically aggressive media. Fully stainless steel pressure gauges are ideally suited for use with chemically aggressive ambient conditions. These are used wherever the differential pressure resulting between intake and delivery pressures are to be displayed.

### Measuring principle

The process medium chambers (+) and (-) are separated by a diaphragm. The difference in pressure between the (+) and (-) i-medium chambers deflects the diaphragm. This deflection (travel) is transmitted to the pointer via a push rod causing a pointer deflection in proportion to the difference in pressure. Metal bellows seal the two pressure chambers away from the gauge case. Metal supporting elements guarantee overload protection.

In contrast to this the differential pressure gauges MAN-DF2G or MAN-DG2G work with two »hydraulically« coupled diaphragm elements, between the pressure transmitting fluid is enclosed. If both diaphragm elements are subjected to different pressures this is transmitted to the movement which causes a deflection of the pointer proportional to the differential pressure.

### Unifilar drawing



1. Measuring membrane
2. Metal bellows
3. Connecting rod
4. Indicator works

### Housing

The following housing diameters are available: 100 mm and 160 mm. The housing materials are available in stainless steel or aluminium.

### Installation

The pressure gauges are usually built directly into the customer's existing pipe system or into a valve block.

### Connection

The gauges are supplied with G ¼ female, G ½ female or with a 6 mm cutting ring connection as standard. The connection is made of stainless steel. Diaphragm seals can be mounted for viscous, crystallising, aggressive materials or higher temperature materials to prevent the material being measured from penetrating into the measuring system.

### Measuring ranges

The differential pressure display is graduated according to DIN recommendations and lie between 0...16 mbar and 0...40 bar.

### Damping liquid

Pressure gauges with liquid filling are used in locations with high alternating dynamic loads, strong vibrations and pulses. The filling ensures easy readability through steady pointer movement even when subjected to extreme loading and heavy vibration. The lubricating effect of the glycerine also keeps wear to a minimum. Glycerine is always used as a matter of principle. In gauges with a contact or an electrical measuring transducer, liquid paraffin is used as a non-conductive alternative. Silicon fillings of various viscosities are also optionally available.

### Contacts

For monitoring the system pressure and controlling process flows can be fitted up to three limit contacts. Gauges can be supplied with magnetic spring or inductive contacts (for the MAN-DG3Y also slow action or pneumatic contacts) (see chapter »Contact Installations«).

### Analogue output

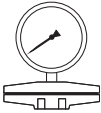
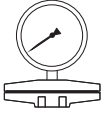

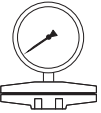
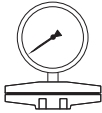
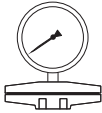
Versions with an analogue output are available for transmitting the reading onto an indicating device or a control unit.

### Fields of application:

- Industrial heaters
- Filter monitoring
- Water-recycling plant
- Brake test benches



**Technical Details**

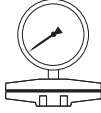
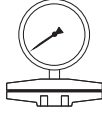
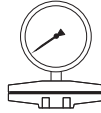


Diaphragm Differential Pressure Gauges						
Model/Code	MAN-...	...DF25...	...DG25...	...DF75...	...DG75...	...DG3Y...
						
Accuracy class	1.6					1.6
Diameter	100 mm	160 mm	100 mm	160 mm	160 mm	
Housing version	stainless steel			stainless steel filled		aluminium
Ring	stainless steel			stainless steel		steel black
Pointer	Aluminium					aluminium
Movement	stainless steel					brass
Throttle	none					none
Window	safety glass					instrument glass
Measuring element	stainless steel					stainless steel
Sealing	without					
Protection	IP 54			IP 67		IP 54
Overrange protection	see following table					
Weight	see dimensions					
Ambient temperature	-20 ... +60°C					
Connection	stainless steel					
Thread connection	G ¼ female					6 mm cutting ring
Max. temperature of medium	100°C			80°C		
Contacts	max. 2 contacts					max. 3 contacts
<b>Indicating range</b>	<b>Code of indicating range</b>					
0...16 mbar	F8*	F8*	F8*	F8*	-	
0...25 mbar	F9	F9	F9	F9	-	
0...40 mbar	F0	F0	F0	F0	-	
0...60 mbar	F1	F1	F1	F1	-	
0...100 mbar	F2	F2	F2	F2	F2	
0...160 mbar	F3	F3	F3	F3	F3	
0...250 mbar	F4	F4	F4	F4	F4	
0... 0.4 bar	BA	BA	BA	BA	BA	
0... 0.6 bar	B1	B1	B1	B1	B1	
0... 1 bar	B2	B2	B2	B2	B2	
0... 1.6 bar	B3	B3	B3	B3	B3	
0... 2.5 bar	B4	B4	B4	B4	B4	
0... 4 bar	B5	B5	B5	B5	B5	
0... 6 bar	B6	B6	B6	B6	B6	
0...10 bar	B7	B7	B7	B7	B7	
0... 16 bar	B8	B8	B8	B8	B8	
0... 25 bar	B9	B9	B9	B9	B9	

\* only for accuracy class 2.5

Continuation next page



## Diaphragm Differential Pressure Gauges for Industrial Applications Model MAN-D



Diaphragm Differential Pressure Gauges: Option output for all indication ranges						
Model/code	MAN-...	...DF25...	...DG25...	...DF75...	...DG75...	...DG3Y...
						
Contacts See Chapter »Contact Installations«						
or	<b>Analogue output</b>	<b>Code</b>				
	Current output 4-20 mA	A4	-	A4	-	on request
<b>other options</b>						
3-spindle press. compensation & shut-off valve, Ms	-	-	-	-	-	-
3-spindle press. compensation & shut-off valve, VA	-	-	-	-	-	-
Sealing FPM instead of NBR	-	-	-	-	-	-
Housing with filling	-	-	-	-	-	without*
Safety according to DIN 16006	without*	without*	without*	without*	without*	-
Oil- and grease free for oxygen	without*	without*	without*	without*	without*	on request
Bracket for wall mounting	without*	without*	without*	without*	without*	without*
Bracket for pipe mounting	without*	without*	without*	without*	without*	on request
spindle valve block G ½ male	without*	without*	without*	without*	without*	-
3-spindle valve block G ½ male	without*	without*	without*	without*	without*	-
Pressure room ventilation	without*	without*	without*	without*	without*	on request
Connection right	without*	without*	without*	without*	without*	-

\* Please specify in writing!

Indicating range	MAN-DF25... MAN-DG25... MAN-DF75... MAN-DG75...		MAN-DG3Y...	
	Max.	Overload	Max.	Overload
0...16 mbar	2.5 bar	2.5 bar	-	-
0...25 mbar	2.5 bar	2.5 bar	-	-
0...40 mbar	2.5 bar	2.5 bar	-	-
0...60 mbar	6 bar	2.5 bar	-	-
0...100 mbar	6 bar	2.5 bar	2.5 bar	2.5 bar
0...160 mbar	6 bar	2.5 bar	2.5 bar	2.5 bar
0...250 mbar	6 bar	2.5 bar	2.5 bar	2.5 bar
0... 0.4 bar	25 bar	4 bar	4 bar	4 bar
0... 0.6 bar	25 bar	6 bar	6 bar	6 bar
0... 1 bar	25 bar	10 bar	10 bar	10 bar
0... 1.6 bar	25 bar	16 bar	16 bar	16 bar
0... 2.5 bar	25 bar	25 bar	25 bar	25 bar
0... 4 bar	25 bar	25 bar	25 bar	25 bar
0... 6 bar	25 bar	25 bar	25 bar	25 bar
0...10 bar	25 bar	25 bar	25 bar	25 bar
0... 16 bar	25 bar	25 bar	25 bar	25 bar
0... 25 bar	25 bar	25 bar	25 bar	25 bar





Diaphragm Differential Pressure Gauges PN 40/100/250/400			
Model/Code	MAN-...	...DF2G...	...DG2G...
			
Accuracy class	1.6		
Diameter	100 mm	160 mm	
Housing version	stainless steel		
Ring	stainless steel		
Pointer	aluminium		
Movement	stainless steel		
Throttle	none		
Window	safety glass		
Measuring element	stainless steel		
Sealing	FPM		
Protection	IP 54 (IP 67 with filled housing)		
Overload (rest load)	40 bar (option 400 bar)		
Weight	see dimensions		
Ambient temperature	-20 ... +60°C		
Connection	stainless steel		
Thread connection	G ½ female		
Max. temperature of medium	100 °C		
	<b>Indicating range</b>	<b>Code of indicating range</b>	
	0...60 mbar	F1	F1
	0...100 mbar	F2	F2
	0...160 mbar	F3	F3
	0...250 mbar	F4	F4
	0... 0.4 bar	BA	BA
	0... 0.6 bar	B1	B1
	0... 1 bar	B2	B2
	0... 1.6 bar	B3	B3
	0... 2.5 bar	B4	B4
	0... 4 bar	B5	B5
	0... 6 bar	B6	B6
	0...10 bar	B7	B7
	0... 16 bar	B8	B8
	0... 25 bar	B9	B9
	0... 40 bar	B0	B0

Option output			
Contacts See Chapter »Contact Installations«			
or	<b>Analogue output</b>	<b>Code</b>	
	Current output 4-20 mA	-	A4

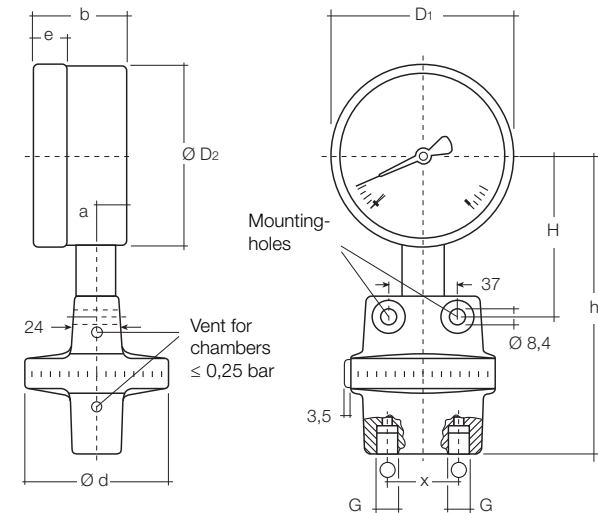
<b>other options</b>	<b>Code</b>	
Bracket for wall mounting	without*	without*
Bracket for pipe-mounting	without*	without*
Spindle valve block G ½ A	without*	without*
3-spindle valve block G ½ A	without*	without*
Housing with filling	without*	without*
Overpress. sec. 100/250/400 bar instead of 40 bar	without*	without*

\* Please specify in writing!

**Model: MAN-DF25..., -DG25..., -DF75..., -DG75...**

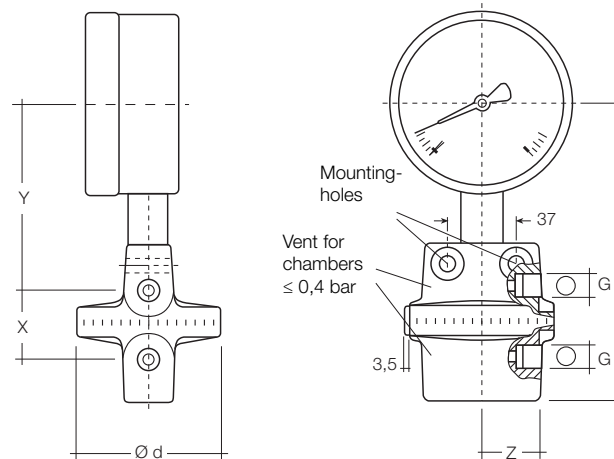
**Standard version**

Connection 2 x G ¼ female thread, bottom



**Option**

Connection 2 x G ¼ female thread, right hand side



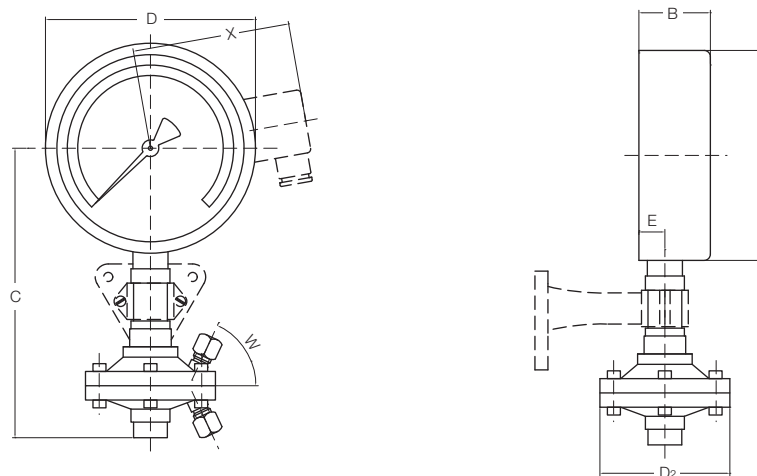
NG	Indication range [bar]	Dimensions [mm]											Weight [kg] *	
		a	b	D <sub>1</sub>	D <sub>2</sub>	d	e	G	h±1	H	X	Y		Z
100	≤ 0.25	15.5	49.5	101	99	140	17.5	G ¼	171	90	37	104	69	1.5
100	≤ 0.25	15.5	49.5	101	99	78	17.5	G ¼	171	87	37	104	32	1.90
100	≤ 0.25	15.5	49.5	161	159	140	17.5	G ¼	201	120	37	134	69	2.25
100	≤ 0.25	15.5	49.5	161	159	78	17.5	G ¼	201	117	37	134	32	1,40

Connection according to DIN 16288, symbol Z

\* Weight for instruments with filling onr request

**Version with cutting ring connection**

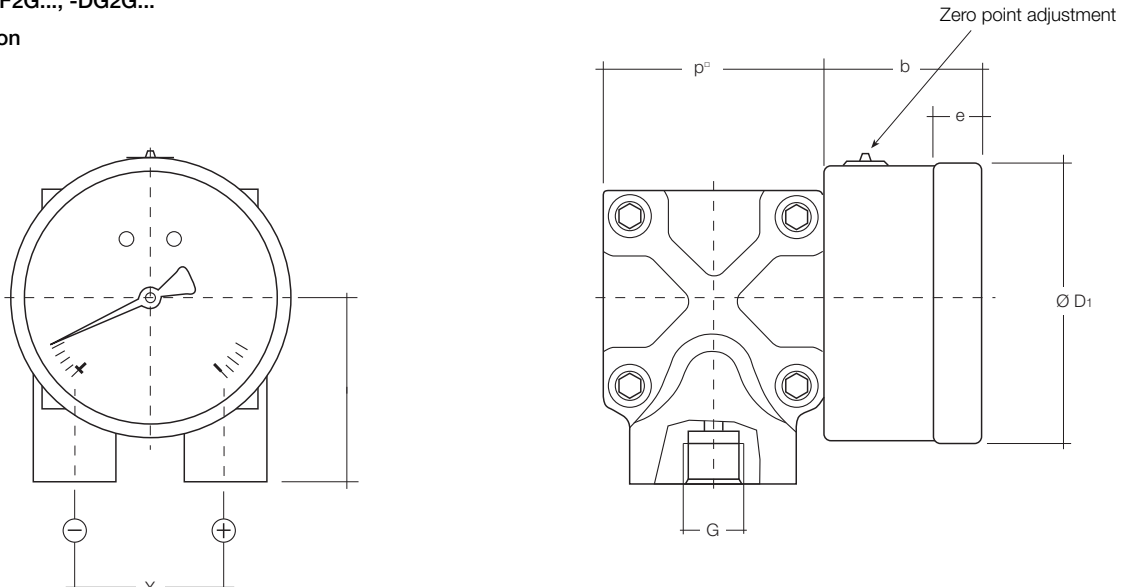
**MAN-DG3Y...**



NG	Indication range [mbar]	Dimensions [mm]										Weight [kg] *		
		B without contact	B 1 + 2-x contact	B 3 x contact	C	D	D <sub>2</sub>	E	SW	W	X	without contact	1 + 2-x contact	3 x contact
160	to 250	54	91	107	220	160	100/140	20	17	65°	118	4.0	4.4	4.5
160	from 400	54	91	107	220	160	100/140	20	17	65°	118	2.7	3.1	3.2

Model: MAN-DF2G..., -DG2G...

Standard version



Model	Indicating range [bar]	Dimensions [mm]							Mass [kg]
		b	Ø D <sub>1</sub>	e	G	h±1	p <sup>□</sup>	x	
MAN-DF 2G...	≤ 0.25	58.5*	101	17,5*	G ½	86	140	54	12.1
	≥ 0.4	58.5*	101	17,5*	G ½	64	85	54	3.6
MAN-DG 2G...	≤ 0.25	65.5**	161	17,5*	G ½	86	140	54	12.5
	≥ 0.4	65.5**	161	17,5*	G ½	64	82	54	4.0

\* Series DF 26...M, DF 26...I with one limit signal transmitter: plus 39 mm  
 \*\* Series DG 26...M, DG 26...I with one limit signal transmitter: plus 36 mm  
 Series DG 26...A4 with current output: plus 50 mm

Connection acc. to EN837

### Option

Bracket for wall or pipe mounting

