All Stainless Steel Bourdon Tube Pressure Gauges

acc. to EN 837 for industrial applications

Zertifiziertes QM-System
DIN EN ISO 9001
Zertifikat-Nr. 01017

measuring • monitoring • analysing

MAN-R

- Housing:
  63 mm, 100 mm, 160 mm
  (option: 80 mm)
- Connection:
  G¼ (63 mm housing)
  G½ (100,160 mm housing)
- Material
  Housing: stainless steel
  Connection: stainless steel
- Measuring ranges:
  -1 ... 0 bar ... 0 ... +1000 bar
- Accuracy class:
  1.0 (1.6 with 63 mm)
- Option: damping liquid, contacts, transmitter

P1

KOBOLD companies worldwide:

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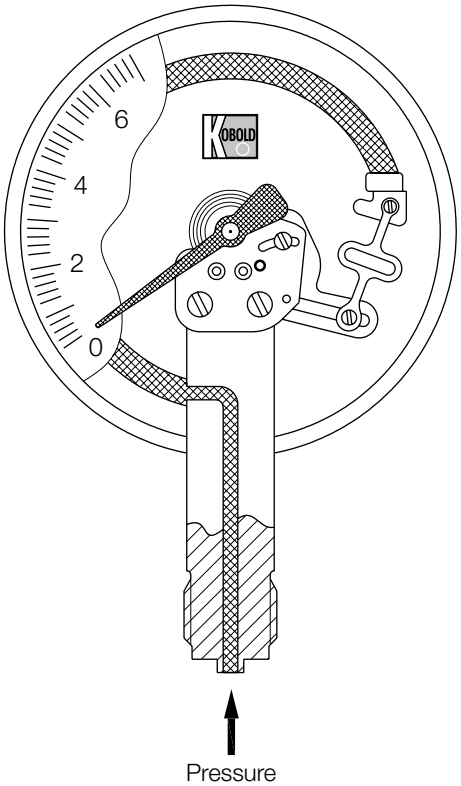
Application

The KOBOLD all stainless steel pressure gauges are ideal for the hard conditions and the resulting high demands on pressure measurement in production facilities in chemical industry and other comparable areas. Resistance to aggressive media and environments is achieved by using high-graded materials such as stainless steel both for the movement and the housing. They can be used for liquid or gaseous substances which do not crystallize and are not highly viscous. The extensive range of options allows the user to adapt the instruments to his own special requirements. All the pressure gauges comply with general international guidelines and take account of standard as well as application-specific requirements. They are the result of the over 70 years experience we have in building pressure gauges.

Measuring principle

Mechanical pressure measurement uses the principle of an elastic measuring element, which generates a precisely defined, reproducible deflection when subjected to pressure. The motion works convert this into a rotary motion of the pointer. The pressure at the measuring element can be read on the scale of the dial.

Unifilar drawing



Housing

The following housing diameters are available:

63 mm, 100 mm and 160 mm. The housing material is stainless steel. The gauges can also be produced in nominal size 80 mm.

Installation

The gauges are most often installed straight into the customer's screw necks. Depending on the required installation the instruments can be supplied with a panel clamp, triangular front ring or mounting flange.

Connection

The gauges with 63 and 80 mm housing diameter are supplied with a G¼ connecting thread as standard, gauges with housing diameter of 100 mm and above with G½ connecting thread. 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. Other connection types are available on request.

Measuring ranges

The measuring ranges are graduated according to DIN recommendations and lie between -1...0 bar and 0...1000 bar. Other scales with measuring ranges up to 4000 bar or scales in PSI, Pa or with your company logo are available on request.

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. Silicone fillings of various viscosities are also optionally available.

Contacts

For monitoring the system pressure, gauges with 100 mm or 160 mm diameter can be fitted with up to four limit contacts. Slow action, magnetic spring, inductive and pneumatic contacts are also available (see data sheet »Contact Fittings for Pressure Gauges« MAN-..S/M/I/P).

Fields of application

- Chemical and petrochemical industries
- Plastics and paper-manufacturing industries
- Food and beverage industries
- Machine and plant construction

No responsibility taken for errors;
subject to change without prior notice.

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Technical Details

* Special filling: Paraffin oil for higher temperatures (on request) or with contacts.

Connection/Housing		**NG 63**		**NG 100**		**NG 160**	
		Model					
Bottom connection	**MAN-...**	**...RD25...**	**...RD75...**	**...RF26...**	**...RF76...**	**...RG26...**	**...RG76...**
Back connection	**MAN-...**	**...RD27...** centrical	**...RD77...** centrical	**...RF28...** eccentrical	**...RF78...** eccentrical	**...RG28...** eccentrical	**...RG78...** eccentrical
Triangular front ring Back connection	**MAN-...**	**...RD27B...** centrical	**...RD77B...** centrical	**...RF28K...** eccentrical	-	**...RG28K...** eccentrical	**...RG78K...** eccentrical
Front flange Back connection	**MAN-...**	**...RD27V...** centrical	**...RD77V...** centrical	**...RF28V...** eccentrical	**...RF78V...** eccentrical	**...RG28V...** eccentrical	**...RG78V...** eccentrical
Accuracy class		1.6		1.0			
Housing material		stainless steel 1.4301					
Filling		-	glycerine*	-	glycerine*	-	glycerine*
Bezel		stainless steel 1.4301					
Pointer		aluminium, black anodized					
Movement		stainless steel					
Throttle D=		from 60 bar D = 0.5 mm					
Glass		Polyamide		safety glass			
Measuring element		stainless steel 1.4571					
Protection		IP 65	IP 67	IP 65	IP 67	IP 65	IP 67
Overrange protection		none		short time 1.3 times (from 1000 bar 1.1x) of full scale			
Weight		see table					
Ambient temperature		-20...+80 °C	-20...+60 °C	-20...+80 °C	-20...+60 °C	-20...+80 °C	-20...+60 °C
Connection		stainless steel 1.4571					
Thread connection		G¼ male		G½ male			
Max. medium temperature		80 °C					
Contacts		none		max. 4 cont.	max. 3 cont.	max. 4 cont.	max. 3 cont.
Indicating range		**Code of indicating range**					
-0.6 ...0 bar		-	-	..AC	..AC	..AC	..AC
-1...0 bar		..AD	..AD	..AD	..AD	..AD	..AD
-1...+0.6 bar		..A0	..A0	..A0	..A0	..A0	..A0
-1...+1.5 bar		..A1	..A1	..A1	..A1	..A1	..A1
-1...+3 bar		..A2	..A2	..A2	..A2	..A2	..A2
-1...+5 bar		..A3	..A3	..A3	..A3	..A3	..A3
-1...+9 bar		..A4	..A4	..A4	..A4	..A4	..A4
-1...+15 bar		..A5	..A5	..A5	..A5	..A5	..A5
0...0.6 bar		-	-	-	..B1	..B1	..B1
0...1 bar		..B2	..B2	..B2	..B2	..B2	..B2
0...1,6 bar		..B3	..B3	..B3	..B3	..B3	..B3
0...2,5 bar		..B4	..B4	..B4	..B4	..B4	..B4
0...4 bar		..B5	..B5	..B5	..B5	..B5	..B5
0...6 bar		..B6	..B6	..B6	..B6	..B6	..B6
0...10 bar		..B7	..B7	..B7	..B7	..B7	..B7
0...16 bar		..B8	..B8	..B8	..B8	..B8	..B8
0...25 bar		..B9	..B9	..B9	..B9	..B9	..B9
0...40 bar		..B0	..B0	..B0	..B0	..B0	..B0
0...60 bar		..C1	..C1	..C1	..C1	..C1	..C1
0...100 bar		..C2	..C2	..C2	..C2	..C2	..C2
0...160 bar		..C3	..C3	..C3	..C3	..C3	..C3
0...250 bar		..C4	..C4	..C4	..C4	..C4	..C4
0...400 bar		..C5	..C5	..C5	..C5	..C5	..C5
0...600 bar		..C6	..C6	..C6	..C6	..C6	..C6
0...1000 bar		..D7	..D7	..D7	..D7	..D7	..D7

No responsibility taken for errors;
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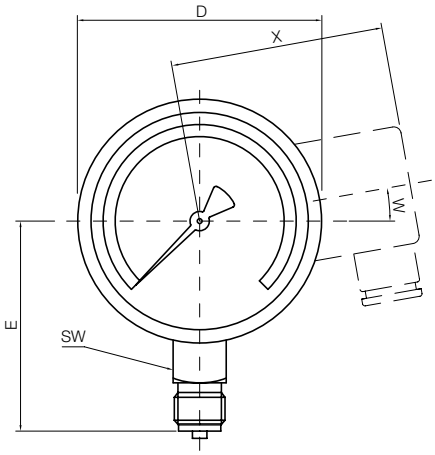
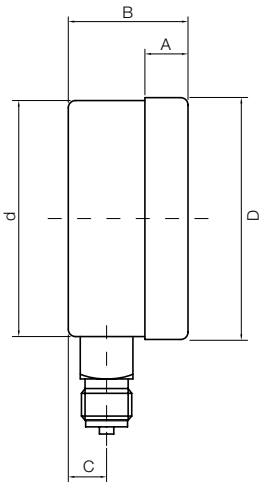
Dimensions

Bottom connection

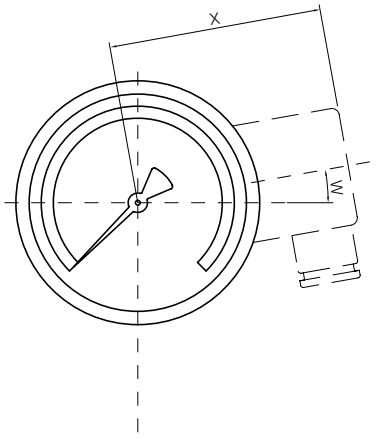
Code	NG	A	B without contact	B 1 or 2 contacts	B 3 contacts	B 4 contacts	C	d	D	E	H	SW	W	X
MAN-RD 25/75	63 mm	6	31	-	-	-	13	62	68	55	-	14	-	-
MAN-RF 26/76	100 mm	17	48	82	97	110	15	100	101	86.5	54	22	0	88
MAN-RG 26/76	160 mm	21	50	101	120	120	15	159	162	117	56	22	0	118

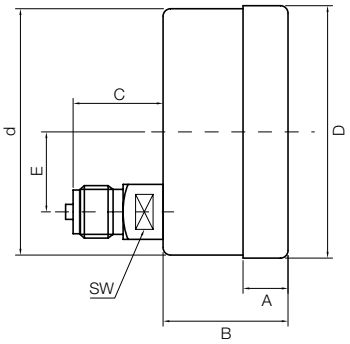




Back connection

Code	NG	A	B without contact	B 1 or 2 contacts	B 3 contacts	B 4 contacts	C	d	D	E	H	SW	W	X
MAN-RD 27/77	63 mm	6	28	-	-	-	26	63	68	0	-	14	-	-
MAN-RF 28/78	100 mm	17	49	82	97	110	34	100	101	32.5	54	22	0	88
MAN-RG 28/78	160 mm	21	50	101	120	120	34	159	162	32.5	56	22	0	118





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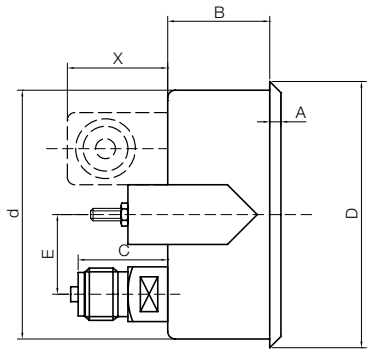
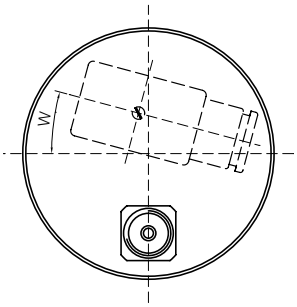
Dimensions (continued)

Triangular front ring with clamp

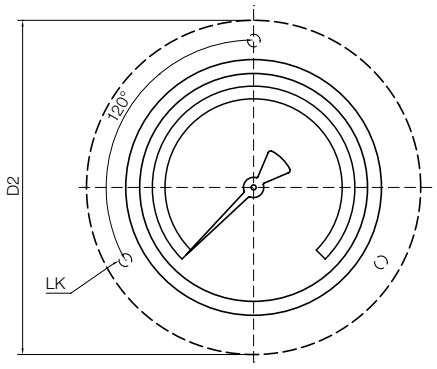
Code	NG	A	B without contact	B 1 or 2 contacts	B 3 contacts	B 4 contacts	C	d	D	E	SW	W	X
MAN-RD 27/77	63 mm	6	26	-	-	-	26	62	68	0	14	-	-
MAN-RF 28 K	100 mm	5	41	88	105	105	34	101	107	32.5	22	0	42
MAN-RG 28/78 K	160 mm	5	44	98	145	145	30	160	162	50	22	0	42

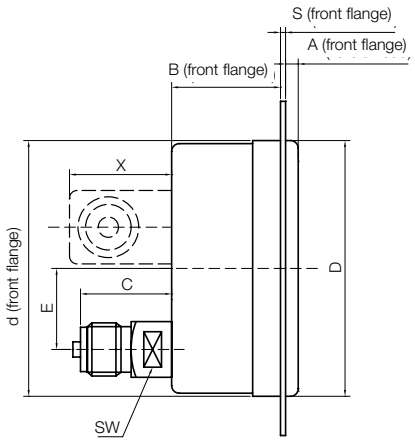


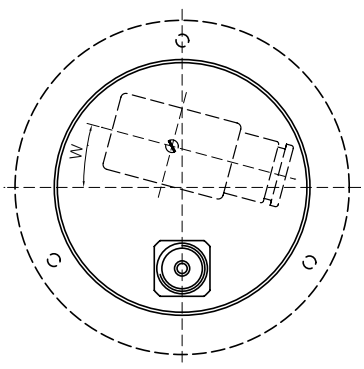


Front flange

Code	NG	A	B without contact	B 1 or 2 contacts	B 3 contacts	B 4 contacts	C	d	D	D2	E	LK	S	SW	W	X
MAN-RD 27/77 V	63 mm	7	24	-	-	-	26	62	68	85	0	75	1	14	-	-
MAN-RF 28/78 V	100 mm	6	43	86	92	105	34	104	101	132	32.5	116	2	22	15	42
MAN-RG 28/78 V	160 mm	6	43	95	110	110	34	164	161	196	32.5	178	2	22	15	42







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Weights

		without contact	up to 2 contacts	3 contacts	4 contacts
Code	**Housing-filling**	**Weight [kg]**	**Weight [kg]**	**Weight [kg]**	**Weight [kg]**
NG 63					
MAN-RD 25	without	0.13	-	-	-
MAN-RD 27	without	0.12	-	-	-
MAN-RD 27B	without	0.15	-	-	-
MAN-RD 27V	without	0.15	-	-	-
MAN-RD 75	with	0.21	-	-	-
MAN-RD 77	with	0.20	-	-	-
MAN-RD 77B	with	0.23	-	-	-
MAN-RD 77V	with	0.23	-	-	-
NG-100					
MAN-RF 26	without	0.5	0.7	0.75	0.8
MAN-RF 28	without	0.5	0.7	0.75	0.8
MAN-RF 28K	without	0.6	0.8	0.85	0.9
MAN-RF 28V	without	0.6	0.8	0.85	0.9
MAN-RF 76	with	0.8	1.2	1.3	-
MAN-RF 78	with	0.8	1.2	1.3	-
MAN-RF 78 V	with	0.9	1.3	1.4	-
NG 160					
MAN-RG 26	without	1.0	1.3	1.4	1.5
MAN-RG 28	without	1.0	1.3	1.4	1.5
MAN-RG 28 K	without	1.1	1.4	1.5	1.6
MAN-RG 28 V	without	1.1	1.5	1.6	1.7
MAN-RG 76	with	1.8	2.8	3.2	-
MAN-RG 78	with	1.8	2.8	3.2	-
MAN-RG 78 K	with	1.9	2.9	3.3	-
MAN-RG 78 V	with	1.9	2.9	3.3	-

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Magnetic spring contacts/slow-action contacts

Limit monitor with 1 contact		
Switching function (when the limit value is exceeded)	**Order code Magnetic spring contact**	**Order code Slow action contact**
Contact closes	**..M1**	**..S1**
Contact opens	**..M2**	**..S2**
Contact switches over, that is, contact opens, contacts closes	**..M3**	**..S3**

Limit monitor with 2 contacts		
First and second contact closes	**..M11**	**..S11**
1. Contact closes 2. Contact opens	**..M12**	**..S12**
1. Contact opens 2. Contact closes	**..M21**	**..S21**
First and second contact opens	**..M22**	**..S22**
First and second contact switches over	**..M33**	**..S33**

Limit monitor with 3 contacts		
3 contacts close	**..M3A**	**..S3A**
3 contacts open	**..M3Z**	**..S3Z**
3 contacts, switching function upon customer specification	**..M3G**	**..S3G**

Limit monitor with 4 contacts		
4 contacts close	**..M4A**	**..S4A**
4 contact open	**..M4Z**	**..S4Z**
4 conatcts, switching function upon customer specification	**..M4G**	**..S4G**

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Inductive contacts/pneumatic contacts

Limit monitor with 1 contact			
If the pressure gauge moves clockwise it will move the control lug when the set limit is exceeded	**Control action**	**Order code Inductive contact**	**Order code Pneumatic contact**
out of the control head	Control current/air current circuit is closed	**..I1**	**..P1**
into the control head	Control current/air current circuit is opened	**..I2**	**..P2**

Limit monitor with 2 contacts			
of the 1. and 2. contact from the control head	Control current/air current circuits are closed	**..I11**	**..P11**
of the 1. contact from the control head of the 2. contact in the control head	1. Control current/air current circuit closes 2. Control current/air current circuit opens	**..I12**	**..P12**
of the 1. contact from the control head of the 2. contact in the control head	1. Control current/air current circuit opens 2. Control current/air current circuit closes	**..I21**	**..P21**
of the 1. and 2. contact from the control head	Control current/air current circuits are opened	**..I22**	**..P22**

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Pin assignment

Contact	Cable box (standard)	DIN 43651 (round Hirschmann)
Magnetic-/ slow action contact	K = contact / R = conductor	plus cable connection
1 Conductor	E = earth / mass	
M/S 1	K=1 R=2 E=6	K=1 R=2 E=E
M/S 2		
M/S 3	K11=1 K13=2 R1=3 E=6	K11=1 K13=2 R1=3 E=6
M/S 11	K1=1 K2=2 R=3 E=6	K1=1 K2=2 R=3 E=E
M/S 12		
M/S 21		
M/S 22		
M/S 33	K11=1 K13=2 K21=3 K23=4 R2=5 E=6	K11=1 K13=2 K21=3 K23=4 R2=5 E=E
M/S 111	K1=1 K2=2 K3=3 R=4 E=6	K1=1 K2=2 K3=3 R=4 E=E
M/S 112		
M/S 121		
M/S 122		
M/S 211		
M/S 212		
M/S 221		
M/S 222		
M/S 1111	K1=1 K2=2 K3=3 K4=4 R=5 E=6	K1=1 K2=2 K3=3 K4=4 R=5 E=E
M/S 1112		
M/S 1121		
M/S 1211		
M/S 1122		
M/S 1221		
M/S 1222		
M/S 2111		
M/S 2112		
M/S 2121		
M/S 2211		
M/S 2122		
M/S 2212		
M/S 2221		
M/S 2222		

Contact	Cable box (standard)	DIN 43651 (round Hirschmann)
Magnetic-/slow action contact	K = contact / R = conductor	plus cable connection
Separated return conductor	E = earth / mass	
M/S 11	K1=1 R1=3 K2=2 R2=4 E=6	K1=1 R1=3 K2=2 R2=4 E=E
M/S 12		
M/S 21		
M/S 22		
M/S 33	K11=1 K13=2 R1=3 K21=4 K23=5 R2=6 E=E	K11=1 K13=2 R1=3 K21=4 K23=5 R2=6 E=E
M/S 111	K1=1 R1=2 K2=3 R2=4 K3=5 R3=6 E=E	K1=1 R1=2 K2=3 R2=4 K3=5 R3=6 E=E
M/S 112		
M/S 121		
M/S 122		
M/S 211		
M/S 212		
M/S 221		
M/S 222		

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Pin assignment

Contact	Cable box (standard)	DIN 43651 (round Hirschmann))
Inductive contact	**K = contact / R = conductor**	**plus cable connection**
	E = earth / mass	
I 1	-K=1 +K1=2 E=6	-K=1 +K2=2 E=E
I 2		
I 11	-K1=1 +K1=3 -K2=2 +K2=4 E=E	-K=1 +K1=3 -K2=2 +K2=4 E=E
I 12		
I 21		
I 22		
I 111	-K1=1 +K1=2 -K2=3 +K2=4 -K3=5 +K3=6 E=E	-K=1 +K1=2 -K2=3 +K2=4 -K3=5 +K3=6 E=E
I 112		
I 121		
I 122		
I 211		
I 212		
I 221		
I 222		

Contact	DIN 43650	M12; 5 pole
Magnetic-/ slow action contact	**(Cube plug)**	
1 Conductor	**K = contact / R = conductor / E = earth / mass**	
M/S 1	K=1 R=2 E=E	K=1 R=2 E=5
M/S 2		
M/S 3	K11=1 K13=2 R1=3 E=E	K11=1 K13=2 R1=3 E=5
M/S 11	K1=1 K2=2 R=3 E=E	K1=1 K2=2 R=3 E=5
M/S 12		
M/S 21		
M/S 22		
M/S 33	not possible	not possible
M/S 111	not possible	K1=1 K2=2 K3=3 R=4 E=5
M/S 112		
M/S 121		
M/S 122		
M/S 211		
M/S 212		
M/S 221		
M/S 222		

Contact	DIN 43650	M12; 5 pole
Magnetic-/ slow action contact	**(Cube plug)**	
Separated return conductor	**K = contact / R = conductor / E = earth / mass**	
M/S 11	not possible	K1=1 R1=3 K2=2 R2=4 E=5
M/S 12		
M/S 21		
M/S 22		
Inductive contact		
I 1	-K1=1 +K1=2 E=E	-K1=1 +K1=2 E=5
I 2		
I 11	not possible	-K1=1 +K1=3 -K2=2 +K2=4 E=5
I 12		
I 21		
I 22		

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Zertifiziertes QM-System
DIN EN ISO 9001
Zertifikat-Nr. 01017

Bourdon Tube Pressure Gauges

acc. to EN 837 · for industrial applications

measuring • monitoring • analysing

MAN-R / MAN-Q

- Housing:
  63 mm, 80 mm, 100 mm, 160 mm
  Rectangular casing:
  96 x 96 mm, 144 x144 mm
  Options:
  40 mm, 50 mm, 250 mm, 400 mm
- Connection:
  G ¼ (63, 80 mm housing)
  G ½ (100,160 mm housing)
- Material
  Housing: stainless steel, steel, aluminium
  Connection: brass
- Measuring ranges:
  -1 ... 0 bar ... 0 ... +1000 bar
- Options: liquid filling; contacts; transmitter

P1

KOBOLD companies worldwide:

AUSTRALIA, AUSTRIA, BELGIUM, BULGARIA, CANADA, CHINA, CZECHIA, FRANCE, GERMANY, GREAT BRITAIN, HUNGARY, INDIA, INDONESIA, ITALY, MALAYSIA, MEXICO, NETHERLANDS, PERU, POLAND, REPUBLIC OF KOREA, SPAIN, SWITZERLAND, THAILAND, TUNISIA, TURKEY, USA, VIETNAM

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Application

These KOBOLD pressure gauges can be used for all applications where accuracy, repeatability and long-term stability are of special importance. They can be used for liquid or gaseous substances which do not crystallize, are not highly viscous and do not corrode brass.

The extensive range of options allows the user to adapt the instruments to his own special requirements. All the pressure gauges comply with general international guidelines and take account of standard as well as application-specific requirements. KOBOLD Bourdon tube pressure gauges are the re sult of over 70 years experience in building pressure gauges.

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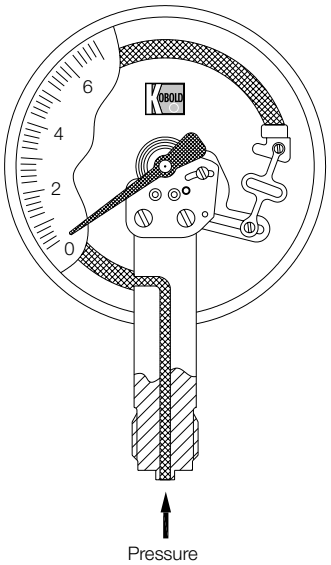
Mechanical pressure measurement uses the principle of an elastic measuring element, which generates a precisely defined, reproducible deflection when subjected to pressure. The motion works convert this into a rotary motion of the pointer. The pressure at the measuring element can be read on the scale of the dial.

Housing

The following housing diameters are available: 63 mm, 80 mm, 100 mm and 160 mm. The housing is made of stainless steel. As an alternative to the 100 mm or 160 mm diameter pressure gauge, the devices can also be supplied with a robust aluminium housing. This option is only available from KOBOLD and has proven ideal for very robust use in filled equipment, e.g. in ship's diesel engines. It is also available with a rectangular profile housing for integration into control panels. This is available as 96 x 96 mm and 144 x 144 mm versions. Housings are optionally available with 40 mm, 50 mm, 250 mm or 400 mm nominal diameters.

Unifilar Drawing



Installation

The gauges are most often installed straight into the customer's screw necks. Optional gauge models with an installation border on the front are also available for installation into or onto control panels.

Connection

The gauges with 63 and 80 mm housing diameter are supplied with a G¼ connecting thread as standard, gauges with housing diameter of 100 mm and above with G½ connecting thread. The connection is made of brass. 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. Other connection types are available on request.

Measuring Ranges

The measuring ranges are graduated according to DIN re commendations and lie between -1...0 bar and 0...1000 bar. Other scales with measuring ranges in PSI, Pa or with your company logo are available on request.

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. Silicone fillings of various viscosities are also optionally available.

Contacts

For monitoring the system pressure, gauges with 100 mm or 160 mm diameter can be fitted with up to four limit contacts. Slow action, magnetic spring, inductive and pneumatic contacts are also available (see data sheet »Contact Fittings for Pressure Gauges« MAN-..S/M/I/P).

Fields of Application

- Mechanical engineering
- Hydraulics
- Compressors
- Pumps
- Plant construction

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Technical Details · NG 63/80, Rectangular Casing

	Round housing			Profile housing	
Connection/Housing	**NG 63**	**NG 63**	**NG 80**	**96x96**	**144x144**
	Model				
Bottom connection **MAN-...**	**...RD21...**	**...RD71...**	**...RE22...**	-	-
Back connection **MAN-...**	**...RD23...** centrical	**...RD73...** centrical	**...RE24...** eccentric	-	-
Triangular front ring with clamp, Back connection **MAN-...**	**...RD23B...** centrical	**...RD73B...** centrical	**...RE24K...** eccentric	**...QF14B...**	**...QG14B...**
Front flange Back connection **MAN-...**	**...RD23V...** centrical	**...RD73V...** centrical	**...RE24V...** eccentric	-	-
Accuracy class	1.6			1.0	
Housing version	stainless steel 1.4301			steel, nickel plated	
Filling	-	glycerine	-	-	-
Ring/housing	stainless steel 1.4301			light metal / steel, nickel plated	
Pointer	aluminium, black anodized, partly plastic			aluminium, black anodized	
Movement	brass				
Throttle	from 60 bar D = 0.5 mm				
Window	polycarbonate		instrument glass		
Measuring element	CuSn (from 100 bar stainless steel 1.4571)				
Protection	IP 65	IP 67	IP 65	IP 54 from ahead	
Overrange protection	1.2 times		short-term 1.3 times (from 1000 bar 1.1 times) of full scale		
Weight	siehe Tabelle		0.4 kg	0.7 kg	1.2 kg
Ambient temperature	-20...+60 °C				
Connection	brass				
Thread connection	G¼ male			G½ male	
Max. medium temperature	80 °C				
Contacts	no			yes, max. 4 contacts	
Options	Trailing pointer, marking pointer, oil-free and decreased, special scale, dual scale bar + psi ex stock				
Indicating range	**Code of indicating range**				
-0.6...0 bar	-	-	..AC	..AC	..AC
-1...0 bar	..AD	..AD	..AD	..AD	..AD
-1...+0.6 bar	..A0	..A0	..A0	..A0	..A0
-1...+1.5 bar	..A1	..A1	..A1	..A1	..A1
-1...+3 bar	..A2	..A2	..A2	..A2	..A2
-1...+5 bar	..A3	..A3	..A3	..A3	..A3
-1...+9 bar	..A4	..A4	..A4	..A4	..A4
-1...+15 bar	..A5	..A5	..A5	..A5	..A5
0...0.6 bar	-	-	-	..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
0...40 bar	..B0	..B0	..B0	..B0	..B0
0...60 bar	..C1	..C1	..C1	..C1	..C1
0...100 bar	..C2	..C2	..C2	..C2	..C2
0...160 bar	..C3	..C3	..C3	..C3	..C3
0...250 bar	..C4	..C4	..C4	..C4	..C4
0...400 bar	..C5	..C5	..C5	..C5	..C5
0...600 bar	..C6	..C6	..C6	..C6	..C6
0...1000 bar	-	-	-	..D7	..D7

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Technical Details · NG 100

Connection/Housing		Model			
Bottom connection	**MAN-...**	**...RF22...**	**...RF32...**	**...RF72...**	**...RF62...**
Back connection	**MAN-...**	**...RF24...** eccentric	**...RF34...** eccentric	**...RF74...** eccentric	**...RF64...** eccentric
Triangular front ring with clamp, back connection	**MAN-...**	**...RF24K...** eccentric	**...RF34K...** eccentric	-	**...RF64K...** eccentric
Front flange Back connection	**MAN-...**	**...RF24V...** eccentric	**...RF34V...** eccentric	**...RF74V...** eccentric	**...RF64V...** eccentric
Accuracy class		1.0			
Housing version		stainless steel 1.4301	aluminium	stainless steel 1.4301	aluminium
Filling		-	-	glycerine (paraffin with contact)	
Ring		stainless steel 1.4301	steel black	stainless steel 1.4301	steel black
Pointer		aluminium, black anodized			
Movement		brass			
Throttle		from 60 bar D = 0.5 mm			
Window		instrument glass			
Measuring element		CuSn (from 100 bar stainless steel 1.4571)			
Protection		IP 65		IP 67	
Overrange protection		short-term 1.3 times (from 1000 bar 1.1 times) of full scale			
Weight		see table			
Ambient temperature		-20 ... +60 °C			
Connection		brass			
Thread connection		G ½ male			
Max. medium temperature		80 °C			
Contacts		max. 3	max. 4	max. 3	max. 4
Options		Trailing pointer, marking pointer, oil-free and decreased, special scale			
Indicating range		**Code of indicating range**			
-0.6 ... 0 bar		..AC	..AC	..AC	..AC
-1 ... 0 bar		..AD	..AD	..AD	..AD
-1 ... +0.6 bar		..A0	..A0	..A0	..A0
-1 ... +1.5 bar		..A1	..A1	..A1	..A1
-1 ... +3 bar		..A2	..A2	..A2	..A2
-1 ... +5 bar		..A3	..A3	..A3	..A3
-1 ... +9 bar		..A4	..A4	..A4	..A4
-1 ... +15 bar		..A5	..A5	..A5	..A5
0 ... 0.6 bar		..B1	..B1	..B1	..B1
0 ... 1 bar		..B2	..B2	..B2	..B2
0 ... 1.6 bar		..B3	..B3	..B3	..B3
0 ... 2.5 bar		..B4	..B4	..B4	..B4
0 ... 4 bar		..B5	..B5	..B5	..B5
0 ... 6 bar		..B6	..B6	..B6	..B6
0 ... 10 bar		..B7	..B7	..B7	..B7
0 ... 16 bar		..B8	..B8	..B8	..B8
0 ... 25 bar		..B9	..B9	..B9	..B9
0 ... 40 bar		..B0	..B0	..B0	..B0
0 ... 60 bar		..C1	..C1	..C1	..C1
0 ... 100 bar		..C2	..C2	..C2	..C2
0 ... 160 bar		..C3	..C3	..C3	..C3
0 ... 250 bar		..C4	..C4	..C4	..C4
0 ... 400 bar		..C5	..C5	..C5	..C5
0 ... 600 bar		..C6	..C6	..C6	..C6
0 ... 1000 bar		..D7	..D7	..D7	..D7

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Technical Details · NG 160

Connection/Housing		Model			
Bottom connection	**MAN-...**	**...RG22...**	**...RG32...**	**...RG72...**	**...RG62...**
Back connection	**MAN-...**	**...RG24...** eccentrical	**...RG34...** eccentrical	**...RG74...** eccentrical	**...RG64...** eccentrical
Triangular front ring and clamp, back connection	**MAN-...**	-	**...RG34K...** eccentrical	-	**...RG64K...** eccentrical
Front flange Back connection	**MAN-...**	**...RG24V...** eccentrical	**...RG34V...** eccentrical	**...RG74V...** eccentrical	**...RG64V...** eccentrical
Accuracy class		1.0			
Housing version		stainless steel 1.4301	aluminium	stainless steel 1.4301	aluminium
Filling		-	-	glycerine (paraffine with contact)	
Ring		stainless steel 1.4301	steel black	stainless steel 1.4301	steel black
Pointer		aluminium, black anodized			
Movement		brass			
Throttle		from 60 bar D = 0.5 mm			
Window		instrument glass			
Measuring element		CuSn (from 100 bar stainless steel 1.4571)			
Protection		IP 65		IP 67	
Overrange protection		short-term 1.3 times (from 1000 bar 1.1 times) of full scale			
Weight		see table			
Ambient temperature		-20 ... +60 °C			
Connection		brass			
Thread connection		G ½ male			
Max. medium temperature		80 °C			
Contacts		max. 3	max. 4	max. 3	max. 4
Options		Trailing pointer, marking pointer, oil-free and decreased, special scale			
Indicating range		**Code of indicating range**			
-0.6 ... 0 bar		..AC	..AC	..AC	..AC
-1 ... 0 bar		..AD	..AD	..AD	..AD
-1 ... +0.6 bar		..A0	..A0	..A0	..A0
-1 ... +1.5 bar		..A1	..A1	..A1	..A1
-1 ... +3 bar		..A2	..A2	..A2	..A2
-1 ... +5 bar		..A3	..A3	..A3	..A3
-1 ... +9 bar		..A4	..A4	..A4	..A4
-1 ... +15 bar		..A5	..A5	..A5	..A5
0 ... 0.6 bar		..B1	..B1	..B1	..B1
0 ... 1 bar		..B2	..B2	..B2	..B2
0 ... 1.6 bar		..B3	..B3	..B3	..B3
0 ... 2.5 bar		..B4	..B4	..B4	..B4
0 ... 4 bar		..B5	..B5	..B5	..B5
0 ... 6 bar		..B6	..B6	..B6	..B6
0 ... 10 bar		..B7	..B7	..B7	..B7
0 ... 16 bar		..B8	..B8	..B8	..B8
0 ... 25 bar		..B9	..B9	..B9	..B9
0 ... 40 bar		..B0	..B0	..B0	..B0
0 ... 60 bar		..C1	..C1	..C1	..C1
0 ... 100 bar		..C2	..C2	..C2	..C2
0 ... 160 bar		..C3	..C3	..C3	..C3
0 ... 250 bar		..C4	..C4	..C4	..C4
0 ... 400 bar		..C5	..C5	..C5	..C5
0 ... 600 bar		..C6	..C6	..C6	..C6
0 ... 1000 bar		..D7	..D7	..D7	..D7

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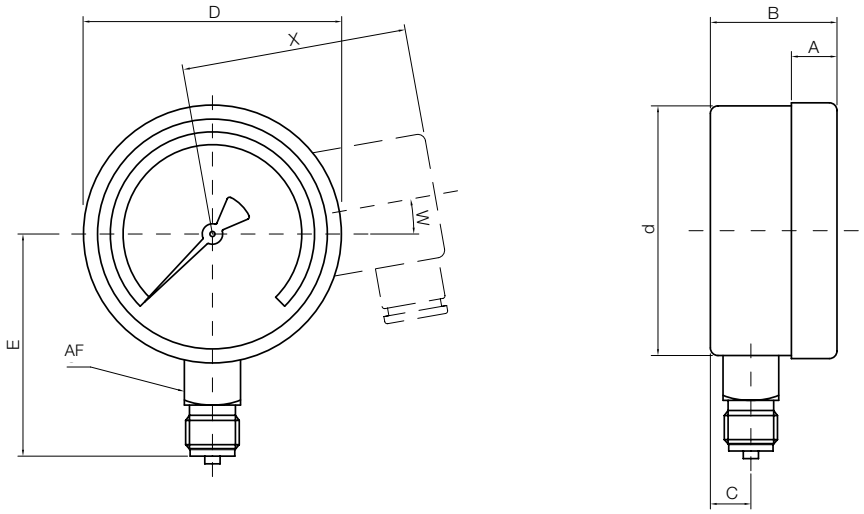
Dimensions

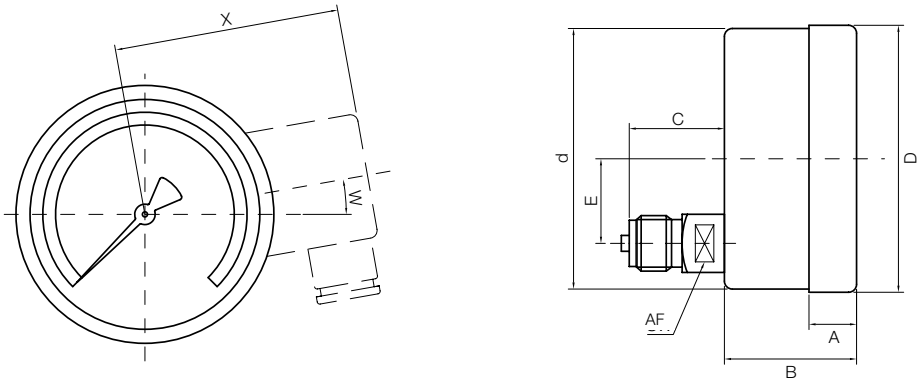
Bottom connection

Code	NG	A	B without contact	B 1 or 2 contacts	B 3 contacts	B 4 contacts	C	d	D	E	AF	W	X
MAN-RD 21/71	63 mm	6	31	-	-	-	13	52	68	55	14	-	-
MAN-RE 22	80 mm	5	43.5	-	-	-	16	80	84	76	22	-	-
MAN-RF 22/72	100 mm VA	17	48	82	97	110	15	100	101	86.5	22	0	88
MAN-RF 32/62	100 mm Alu	-	43	91	107	107	15	100	-	86.5	27	0	88
MAN-RG 22/72	160 mm VA	21	50	101	120	120	15	159	162	117	22	0	118
MAN-RG 32/62	160 mm Alu	-	48	101	127	127	18.5	160	-	115	27	25°	118



Back connection

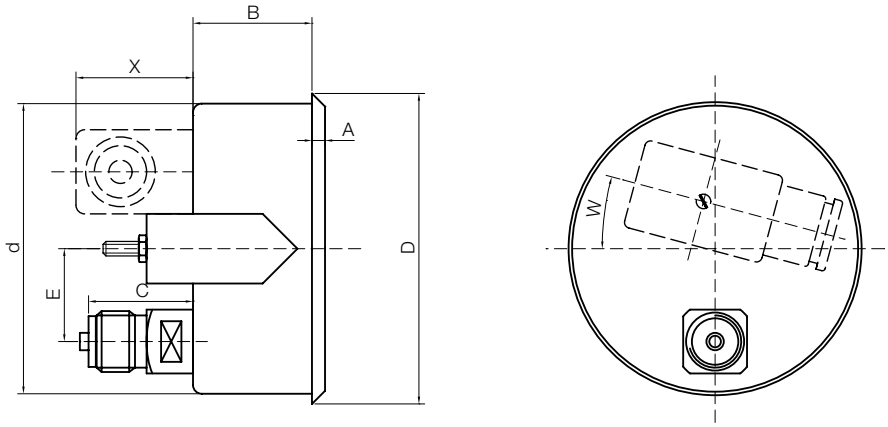
Code	NG	A	B without contact	B 1 or 2 contacts	B 3 contacts	B 4 contacts	C	d	D	E	AF	W	X
MAN-RD 23/73	63 mm	6	28	-	-	-	26	63	68	0	14	-	-
MAN-RE 24	80 mm	5	43.5	-	-	-	35	80	84	0	22	-	-
MAN-RF 24/74	100 mm VA	17	49	82	97	110	36	100	101	32.5	17	0	88
MAN-RF 34/64	100 mm Alu	-	43	91	107	107	34	100	-	32.5	27	0	88
MAN-RG 24/74	160 mm VA	21	50	101	120	120	34	159	162	32.5	17	0	118
MAN-RG 34/64	160 mm Alu	-	48	101	127	127	30	160	-	50	27	25°	118



Dimensions

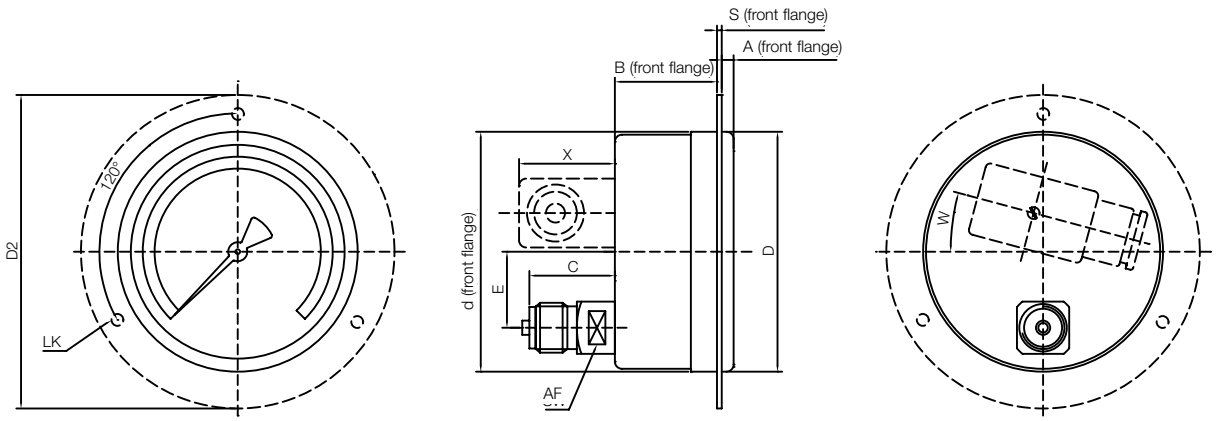
Triangular front ring with clamp

Code	NG	A	B without contact	B 1 or 2 contacts	B 3 contacts	B 4 contacts	C	d	D	E	AF	W	X
MAN-RD 23/73 B	63 mm	6	26	-	-	-	26	62	68	0	14	-	-
MAN-RE 24 K	80 mm	5	43.5	-	-	-	35	80	84	0	22	-	-
MAN-RF 24 K	100 mm VA	5	41	88	105	105	36	101	107	32.5	17	0	42
MAN-RF 34/64 K	100 mm Alu	5	41	88	105	105	34	100	107	32.5	27	0	42
MAN-RG 34/64 K	160 mm VA	5	45	98	145	145	30	160	162	50	22	0	42



Front flange

Code	NG	A	B without contact	B 1 or 2 contacts	B 3 contacts	B 4 contacts	C	d	D	E	LK	S	AF	W	X
MAN-RD 23/73 V	63 mm	7	24	-	-	-	26	62	68	0	75	1	14	-	-
MAN-RF 24/74 V	100 mm VA	6	43	86	92	105	36	104	101	32.5	116	2	17	15	42
MAN-RF 34/64 V	100 mm Alu	5	40	86	102	102	34	100	100	32.5	116	2	27	15	42
MAN-RG 24/74 V	160 mm VA	6	43	95	110	110	34	164	161	32.5	178	2	17	15	42
MAN-RG 34/64 V	160 mm Alu	9	42	93	118	118	30	160	160	50	178	2	27	15	42



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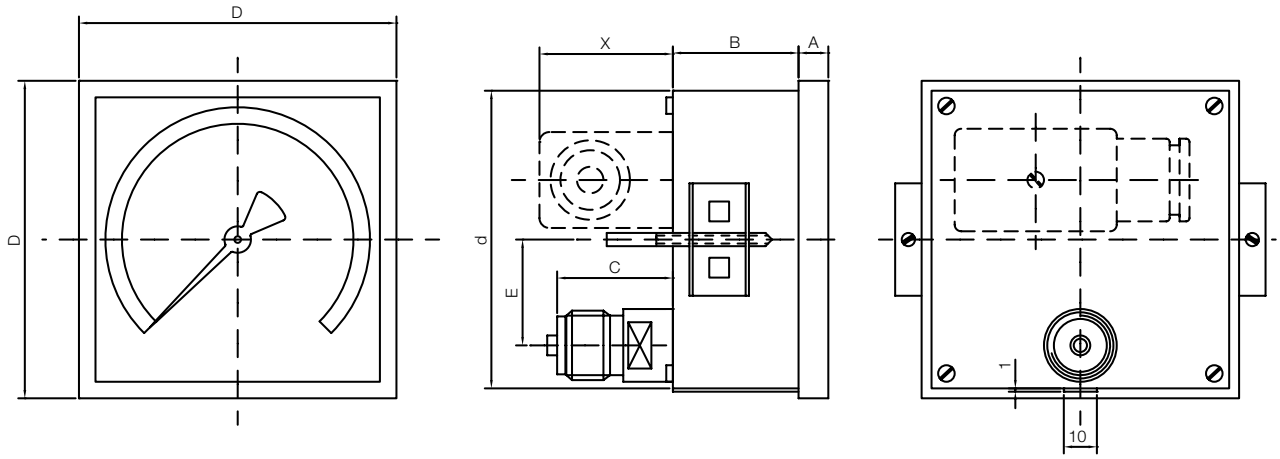
Dimensions

Rectangular casing

Code	NG	A	B without contact	B 1 or 2 contacts	B 3 contacts	B 4 contacts	C	d	D	E	AF	X
MAN-QF	96 x 96	9	40	81	85	92	34	90	96	32	17	42
MAN-QG	144 x 144	9	47	90	97	127	34	135	144	32	17	42



Weight

NG 63		without contact	up to 2 contacts	3 contacts	4 contacts
Code	**Housing filling**	**Weight [kg]**	**Weight [kg]**	**Weight [kg]**	**Weight [kg]**
MAN-RD 21	without	0.14	-	-	-
MAN-RD 23	without	0.15	-	-	-
MAN-RD 23 B	without	0.18	-	-	-
MAN-RD 23 V	without	0.18	-	-	-
MAN-RD 71	with	0.21	-	-	-
MAN-RD 73	with	0.22	-	-	-
MAN-RD 73 B	with	0.25	-	-	-
MAN-RD 73 V	with	0.25	-	-	-

NG 80					
MAN-RE 22	without	0.4	-	-	-
MAN-RE 24	without	0.4	-	-	-
MAN-RE 24 K	without	0.4	-	-	-
MAN-RE 24 V	without	0.4	-	-	-
MAN-RE 72	with	0.55	-	-	-
MAN-RE 74	with	0.55	-	-	-
MAN-RE 74 K	with	0.55	-	-	-
MAN-RE 74 V	with	0.55	-	-	-

NG 100					
MAN-RF 22	without	0.5	0.7	0.75	0.8
MAN-RF 24	without	0.5	0.7	0.75	0.8
MAN-RF 24 K	without	0.6	0.8	0.85	0.9
MAN-RF 24 V	without	0.6	0.8	0.85	0.9
MAN-RF 32	without	0.6	0.8	0.85	0.9
MAN-RF 34	without	0.7	0.9	0.95	1.0
MAN-RF 34 K	without	0.7	0.9	0.95	1.0
MAN-RF 34 V	without	0.7	0.9	0.95	1.0

Weight (continued)

NG 100		without contact	up to 2 contacts	3 contacts	4 contacts
Code	**Housing filling**	**Weight [kg]**	**Weight [kg]**	**Weight [kg]**	**Weight [kg]**
MAN-RF 62	with	0.9	1.3	1.4	1.5
MAN-RF 64	with	1.0	1.4	1.5	1.6
MAN-RF 64 K	with	1.0	1.4	1.5	1.6
MAN-RF 64 V	with	1.0	1.4	1.5	1.6
MAN-RF 72	with	0.8	1.2	1.3	-
MAN-RF 74	with	0.8	1.2	1.3	-
MAN-RF 74 V	with	0.9	1.3	1.4	-

NG 160					
MAN-RG 22	without	1.0	1.3	1.4	1.5
MAN-RG 24	without	1.0	1.3	1.4	1.5
MAN-RG 24 V	without	1.1	1.4	1.5	1.6
MAN-RG 32	without	1.1	1.5	1.6	1.7
MAN-RG 34	without	1.2	1.5	1.7	1.8
MAN-RG 34 K	without	1.3	1.6	1.7	1.8
MAN-RG 34 V	without	1.3	1.6	1.7	1.8
MAN-RG 62	with	1.9	2.9	3.4	3.6
MAN-RG 64	with	1.9	2.9	3.4	3.6
MAN-RG 64 K	with	2.0	3.0	3.5	3.7
MAN-RG 64 V	with	2.0	3.0	3.5	3.7
MAN-RG 72	with	1.8	2.8	3.2	-
MAN-RG 74	with	1.8	2.8	3.2	-
MAN-RG 74 V	with	1.9	2.9	3.3	-

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Magnetic spring contacts/slow-action contacts

Limit monitor with 1 contact		
Switching function (when the limit value is exceeded)	**Order code Magnetic spring contact**	**Order code Slow action contact**
Contact closes	**..M1**	**..S1**
Contact opens	**..M2**	**..S2**
Contact switches over, that is, contact opens, contacts closes	**..M3**	**..S3**

Limit monitor with 2 contacts		
First and second contact closes	**..M11**	**..S11**
1. Contact closes 2. Contact opens	**..M12**	**..S12**
1. Contact opens 2. Contact closes	**..M21**	**..S21**
First and second contact opens	**..M22**	**..S22**
First and second contact switches over	**..M33**	**..S33**

Limit monitor with 3 contacts		
3 contacts close	**..M3A**	**..S3A**
3 contacts open	**..M3Z**	**..S3Z**
3 contacts, switching function upon customer specification	**..M3G**	**..S3G**

Limit monitor with 4 contacts		
4 contacts close	**..M4A**	**..S4A**
4 contact open	**..M4Z**	**..S4Z**
4 conatcts, switching function upon customer specification	**..M4G**	**..S4G**

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Inductive contacts/pneumatic contacts

Limit monitor with 1 contact			
If the pressure gauge moves clockwise it will move the control lug when the set limit is exceeded	**Control action**	**Order code Inductive contact**	**Order code Pneumatic contact**
out of the control head	Control current/air current circuit is closed	**..I1**	**..P1**
into the control head	Control current/air current circuit is opened	**..I2**	**..P2**

Limit monitor with 2 contacts			
of the 1. and 2. contact from the control head	Control current/air current circuits are closed	**..I11**	**..P11**
of the 1. contact from the control head of the 2. contact in the control head	1. Control current/air current circuit closes 2. Control current/air current circuit opens	**..I12**	**..P12**
of the 1. contact from the control head of the 2. contact in the control head	1. Control current/air current circuit opens 2. Control current/air current circuit closes	**..I21**	**..P21**
of the 1. and 2. contact from the control head	Control current/air current circuits are opened	**..I22**	**..P22**

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Pin assignment

Contact	Cable box (standard)	DIN 43651 (round Hirschmann)
Magnetic-/ slow action contact	K = contact / R = conductor	plus cable connection
1 Conductor	E = earth / mass	
M/S 1	K=1 R=2 E=6	K=1 R=2 E=E
M/S 2		
M/S 3	K11=1 K13=2 R1=3 E=6	K11=1 K13=2 R1=3 E=6
M/S 11	K1=1 K2=2 R=3 E=6	K1=1 K2=2 R=3 E=E
M/S 12		
M/S 21		
M/S 22		
M/S 33	K11=1 K13=2 K21=3 K23=4 R2=5 E=6	K11=1 K13=2 K21=3 K23=4 R2=5 E=E
M/S 111	K1=1 K2=2 K3=3 R=4 E=6	K1=1 K2=2 K3=3 R=4 E=E
M/S 112		
M/S 121		
M/S 122		
M/S 211		
M/S 212		
M/S 221		
M/S 222		
M/S 1111	K1=1 K2=2 K3=3 K4=4 R=5 E=6	K1=1 K2=2 K3=3 K4=4 R=5 E=E
M/S 1112		
M/S 1121		
M/S 1211		
M/S 1122		
M/S 1221		
M/S 1222		
M/S 2111		
M/S 2112		
M/S 2121		
M/S 2211		
M/S 2122		
M/S 2212		
M/S 2221		
M/S 2222		

Contact	Cable box (standard)	DIN 43651 (round Hirschmann)
Magnetic-/slow action contact	K = contact / R = conductor	plus cable connection
Separated return conductor	E = earth / mass	
M/S 11	K1=1 R1=3 K2=2 R2=4 E=6	K1=1 R1=3 K2=2 R2=4 E=E
M/S 12		
M/S 21		
M/S 22		
M/S 33	K11=1 K13=2 R1=3 K21=4 K23=5 R2=6 E=E	K11=1 K13=2 R1=3 K21=4 K23=5 R2=6 E=E
M/S 111	K1=1 R1=2 K2=3 R2=4 K3=5 R3=6 E=E	K1=1 R1=2 K2=3 R2=4 K3=5 R3=6 E=E
M/S 112		
M/S 121		
M/S 122		
M/S 211		
M/S 212		
M/S 221		
M/S 222		

No responsibility taken for errors;
subject to change without prior notice.

Pin assignment

Contact	Cable box (standard)	DIN 43651 (round Hirschmann))
Inductive contact	K = contact / R = conductor	plus cable connection
	E = earth / mass	
I 1	-K=1 +K1=2 E=6	-K=1 +K2=2 E=E
I 2		
I 11	-K1=1 +K1=3 -K2=2 +K2=4 E=E	-K=1 +K1=3 -K2=2 +K2=4 E=E
I 12		
I 21		
I 22		
I 111	-K1=1 +K1=2 -K2=3 +K2=4 -K3=5 +K3=6 E=E	-K=1 +K1=2 -K2=3 +K2=4 -K3=5 +K3=6 E=E
I 112		
I 121		
I 122		
I 211		
I 212		
I 221		
I 222		

Contact	DIN 43650	M12; 5 pole
Magnetic-/ slow action contact	(Cube plug)	
1 Conductor	K = contact / R = conductor / E = earth / mass	
M/S 1	K=1 R=2 E=E	K=1 R=2 E=5
M/S 2		
M/S 3	K11=1 K13=2 R1=3 E=E	K11=1 K13=2 R1=3 E=5
M/S 11	K1=1 K2=2 R=3 E=E	K1=1 K2=2 R=3 E=5
M/S 12		
M/S 21		
M/S 22		
M/S 33	not possible	not possible
M/S 111	not possible	K1=1 K2=2 K3=3 R=4 E=5
M/S 112		
M/S 121		
M/S 122		
M/S 211		
M/S 212		
M/S 221		
M/S 222		

Contact	DIN 43650	M12; 5 pole
Magnetic-/ slow action contact	(Cube plug)	
Separated return conductor	K = contact / R = conductor / E = earth / mass	
M/S 11	not possible	K1=1 R1=3 K2=2 R2=4 E=5
M/S 12		
M/S 21		
M/S 22		
Inductive contact		
I 1	-K1=1 +K1=2 E=E	-K1=1 +K1=2 E=5
I 2		
I 11	not possible	-K1=1 +K1=3 -K2=2 +K2=4 E=5
I 12		
I 21		
I 22		

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subject to change without prior notice.

1/01 - 2026