

Pressure switches-information

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Pressure switch setting references

Pressure switches

Pressure switches are typically used to maintain pressure in a tank (or similar closed system) between a pre-set upper and lower pressure value. In a "standard action" or Normally Closed (NC) pressure switch application, the upper pressure value at which a pressure switch breaks an electric circuit is called the cut-out pressure. The lower pressure value by which the pressure switch makes an electric circuit is called the cut-in pressure. Both cut-out and cut-in pressures within a given range can be adjusted on the pressure switch. In a "reverse action" or Normally Open (NO) pressure switch application, the upper setting point makes an electric circuit and the lower setting point breaks the electric circuit. The pressure switch related difference between cut-in and cut-out pressures is called "hysteresis". Every pressure switch allows the natural differential or hysteresis to be increased by a differential adjustment screw. An easy two-point control with a pressure switch is thus feasible.

Control pressure switches

Control pressure switches represent a special group within pressure switches. These devices are especially suitable for monitoring and controlling purposes. Depending on the model, SPDT's with or without gold flashed contacts, for example, for PLC applications or isolated NO and NC contacts are available. Depending on the pressure switch type, loads with a max. power consumption of 1.1 kW can be started directly.

Unloader valves- (EV) and delayed unloader valves (AEV)

Air compressor applications particularly reciprocating compressors, often use what is called an unloader valve. The function of the unloader valve is to remove the pressure from the piston of a compressor so that when it re-starts it can move freely and prevent the motor from stalling. The delayed unloader valve, on the other hand, additionally assists the motor when starting in that it remains open until a certain pressure (approx. 2 bars) is reached, thus giving the motor additional time to reach its full speed and torque.

The Installation instructions for our unloader valves, containing all the technical data and variations, are available for download on our homepage.

Pressure switch settings

Please make sure all power is disconnected before attempting to adjust pressure settings! When calibrating the pressure switch it will be necessary to apply pressure to the device. Use a calibrated pressure gage to adjust the switches set points.

When the main pressure spring is adjusted, the cut-in and cut-out value of all pressure switches change proportionally. In other words, the differential pressure remains the same. If the range between cut-in and cut-out value is to be increased, the differential pressure screw must be used.

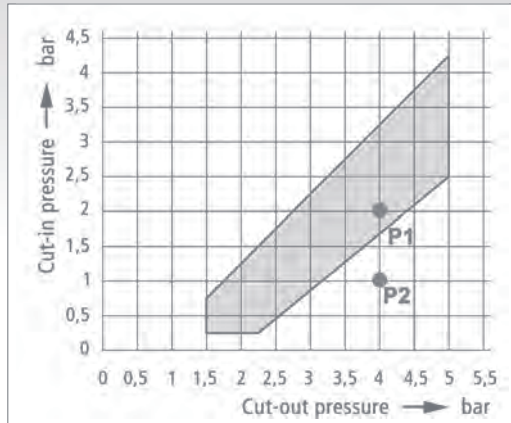
When carrying out a differential pressure adjustment on the pressure switch types MDR 1, MDR 11, MDR 2 and MDR 21 the cut-out pressure value changes and the cut-in pressure value remains constant. (Notice: As a standard, the MDR 1 / MDR 11 are delivered without a differential adjustment screw but a differential adjustment screw is available as an accessory).

For all other pressure switch types the cut-in pressure value changes and the cut-out pressure value remains constant.

In the pressure diagram, each pair of cut-in and cut-values are represented by a point. If the point is within the shaded area of the diagram, then these pair of values can be set on the pressure switch. If the point is outside the shaded area, then these pair of values cannot be set on the pressure switch.



Example of a pressure setting using the MDR 5 pressure diagram



The coordinates of a cut-out pressure of 4 bar and a cut-in pressure of 2 bar intersect at a point P1 which lies within the shaded pressure range (pressure diagram of the respective pressure switch).

These two values can be adjusted on the pressure switch MDR 5/5.

The coordinates of a cut-out pressure of 4 bar and a cut-in pressure of 1 bar intersect at a point P2 which lies outside the shaded pressure range of the diagram. Accordingly, this pair of pressure values cannot be adjusted on the pressure switch MDR 5/5.

Flange versions

Many pressure switches are available with different flanges. The (first) dimension refers always to the main pressure port. All other ports are always 1/4" ports.

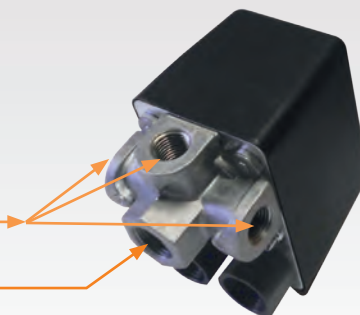
The name F4 1/2" means that there is a flange with 4 ports, in which the main pressure port is 1/2" female and the remaining 3 ports are 1/4" female. The example illustrates this fact:

Flange F4 1/2"

→ 4 ports

3 x 1/4"

1 x 1/2" - Main pressure port



Repeatability

The permissible tolerance of the switching values (repeatability) is < 3% less than the upper range value.

Service

Our service offers you the possibility of carrying out pressure settings depending on your requirements.

Of course, we can also mount any accessories you may need on demand, profiting at the same time from a complete warranty.

High performance pressure switches for AC currents

Overview



Type designation	MDR 1	MDR 1	MDR 11	MDR 11	MDR 2	MDR 21
Media *1	air	water	air	water	air / water	air / water
No. of poles	2 pole	2 pole	2 pole	2 pole	2 pole	2 pole
Contact function	2 N.C.	2 N.C.	2 N.C.	2 N.C.	2 N.C.	2 N.C.
Voltage	230 V	230 V	230 V	230 V	230 V	230 V
Motor switching capacity	4,0 kW	4,0 kW	4,0 kW	4,0 kW	2,2 kW	2,2 kW
Rated current	20 A	20 A	20 A	20 A	16 A	24 A
Flange types *2	G 1/4" F4 1/4" F4 3/8" F4 1/4" NPT	G 1/4" steel G 1/4" steel Ü	G 1/4" F4 1/4" F4 3/8" F4 1/4" NPT	G 1/4" steel G 1/4" steel Ü	G 1/4" F4 1/4" F4 3/8" F4 1/2"	G 1/4" F4 1/4" F4 3/8" F4 1/2" F4 1/4" NPT
Pressure ranges (bar) Cut-out pressure from - to	1 2,5 - 11	1 2,5 - 6	1 2,5 - 11	1 2,5 - 6	2 1,5 - 12	2 1,5 - 12
Degree of Protection	IP 44	IP 44	IP 41/44	IP 41/44	IP 44	IP 41/44
Permissible media temperature: Air	-5...80 °C		-5...80 °C		-5...80 °C	-5...80 °C
Permissible media temperature: Water		70 °C		70 °C		
Max. cross-section (fine stranded)	2,5 mm²	2,5 mm²	2,5 mm²	2,5 mm²	2,5 mm²	2,5 mm²
Standard Cable glands	with PG 11 Z/ZK	with PG 11 Z/ZK	with PG 13,5 Z/ZK	with PG 13,5 Z/ZK	with 2 x WN *4 (Accessory PG11 – 13,5)	with 2 x WN *4 (Accessory PG11 – 13,5)
Standard On / Off lever	with/without EA	without EA	with EA	with EA	with/without EA	with/without EA
Standard Differential setting	without differential setting (only as accessory)	without differential setting (only as accessory)	without differential setting (only as accessory)	without differential setting (only as accessory)	with differential setting	with differential setting
Standard Delayed (AEV) Unloader valve (EV)	differential setting	without	with AEV (Accessory EV)	without	without (Accessory EV, AEV)	without (Accessory EV, AEV)

* Table refers to catalogue product

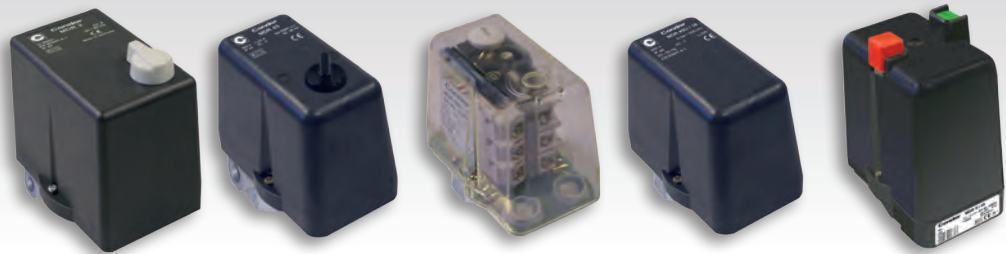
*1 Preferred / most used media, further media, see table on page 22 or on demand

*2 e.g. four-way flange F4 3/8" (main connection G3/8", additionally 3 x G 1/4" ports)

*3 Ü = switch need not be turned, use swivel nut for mounting

*4 WN = grommet

Overview



Type designation	MDR 3	MDR 4	MDR 4 SD	MDR 4 SU	MDR 5
Media ^{*1}	Air and water	Air and water	Air and water	Air and water	Air and water
No. of poles	3 pole	3 pole	3 pole	3 pole	3 pole
Contact function	3 NC	3 NC	3 NC	3 NO	3 NC
Voltage ^{*3}	400 V	400 V	400 V	400 V	400 V
Motorschaltvermögen	7,5 kW (11 kW ^{*6})	5,5 kW	5,5 kW	4 kW	5,5 kW
Flange types ^{*2}	G 1/2" G 1/4" F4 1/2" F4 3/8" F4 1/4" F4 1/4" NPT	G 1/2" G 1/4" G 1/2" + G 1/4" F4 1/2" F4 3/8" F4 1/4"	G 1/2" G 1/4"	G 1/2"	G 1/2" G 1/2" + G 1/4"
Degree of protection	IP 54	IP 44	IP 44	IP 44	IP 54 / IP 65 ^{*5}
Permissible media temperature: Air	-5...80 °C	-5...80 °C	-5...80 °C	-5...80 °C	-5...80 °C
Permissible media temperature: Water	80 °C	80 °C	80 °C	80 °C	80 °C
max. cross-section (fine stranded)	4,0 mm ²	2,5 mm ²	2,5 mm ²	2,5 mm ²	2,5 mm ²
Standard Cable glands	with 2 x WN ^{*4} (Accessory PG11 - 16)	with 2 x WN ^{*4} (Accessory PG11 - 13,5)	with 2 x WN ^{*4} (Accessory PG11 - 13,5)	with 2 x WN ^{*4} (Accessory PG11 - 13,5)	without (Accessory M 20)
Standard On / Off lever	with/without EA	with/without EA	without EA	without EA	with/without EA
Standard Differential setting	with differential setting	with differential setting	with differential setting	with differential setting	with differential setting
Standard delayed (AEV) – unloader valve (EV)	without (Accessory EV, AEV)	without (Accessory EV, AEV)	without (Accessory EV, AEV)	without (Accessory EV, AEV)	without (Accessory EV, AEV)

* Table refers to catalogue product

^{*1} Preferred / most used media, further media, see table on page 22 or on demand

^{*2} e.g. four-way flange F4 3/8" (main connection G3/8", additionally 3 x G 1/4" ports)

^{*3} Higher voltages on demand

^{*4} WN = grommets

^{*5} Special execution without on / off switch

^{*6} 11 kW on request

Overview



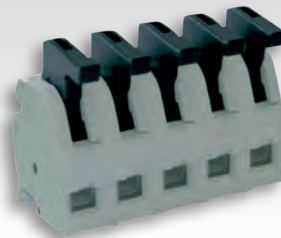
Type designation	MDR F..H Die-cast aluminum	MDR-F..Y Plastic	MDR-F..HE Stainless steel	MDR-F..HH High pressure	MDR-F.. Reset function
Contact function	1 SPDT*1	1 SPDT*1	1 SPDT*1	1 SPDT*1	1 SPDT*1
Voltage	230 V	230 V	230 V	230 V	230 V
Motor switching capacity	0,55 kW	0,55 kW	0,55 kW	0,55 kW	0,55 kW
Current AC 15	4 A	4 A	4 A	4 A	4 A
Flange types Standard (bold)	G 3/8" G 1/2" G 1/4" 1/4" NPT Inner thread (Die-cast aluminum)	G 3/8" Inner thread (plastic)	G 1/4" Inner thread (Stainless steel)	G 3/8" Inner thread (Stainless steel + throttle)	Further flanges on demand
Pressure ranges (bar) Cut-out pressure from - to	6 0,11 - 32	5 0,11 - 16	2 1 - 30	3 8 - 250	as MDR-F..H further pressure ranges on demand
Degree of Protection	IP 54 / IP 65	IP 54 / IP 65	IP 54 / IP 65	IP 54 / IP 65	IP 54 / IP 65
Cable glands	WN / M 20	WN / M 20	WN / M 20	WN / M 20	WN / M 20
Permissible media temperature *2	- 25 .. + 70 °C	- 20 .. + 50 °C	200 °C	70 °C	according to selection
Type designation	VdS to 16 bar UL/GL Atex	VdS to 10 bar GL to 12,5 bar Atex	- - Atex	UL / GL Atex	- GL on request Atex on request

*1 = SPDT with gold-flashed contacts for special applications on request

Connection system



Industrial screw version
(standard)



Industrial clamp version
(upon request)

Overview

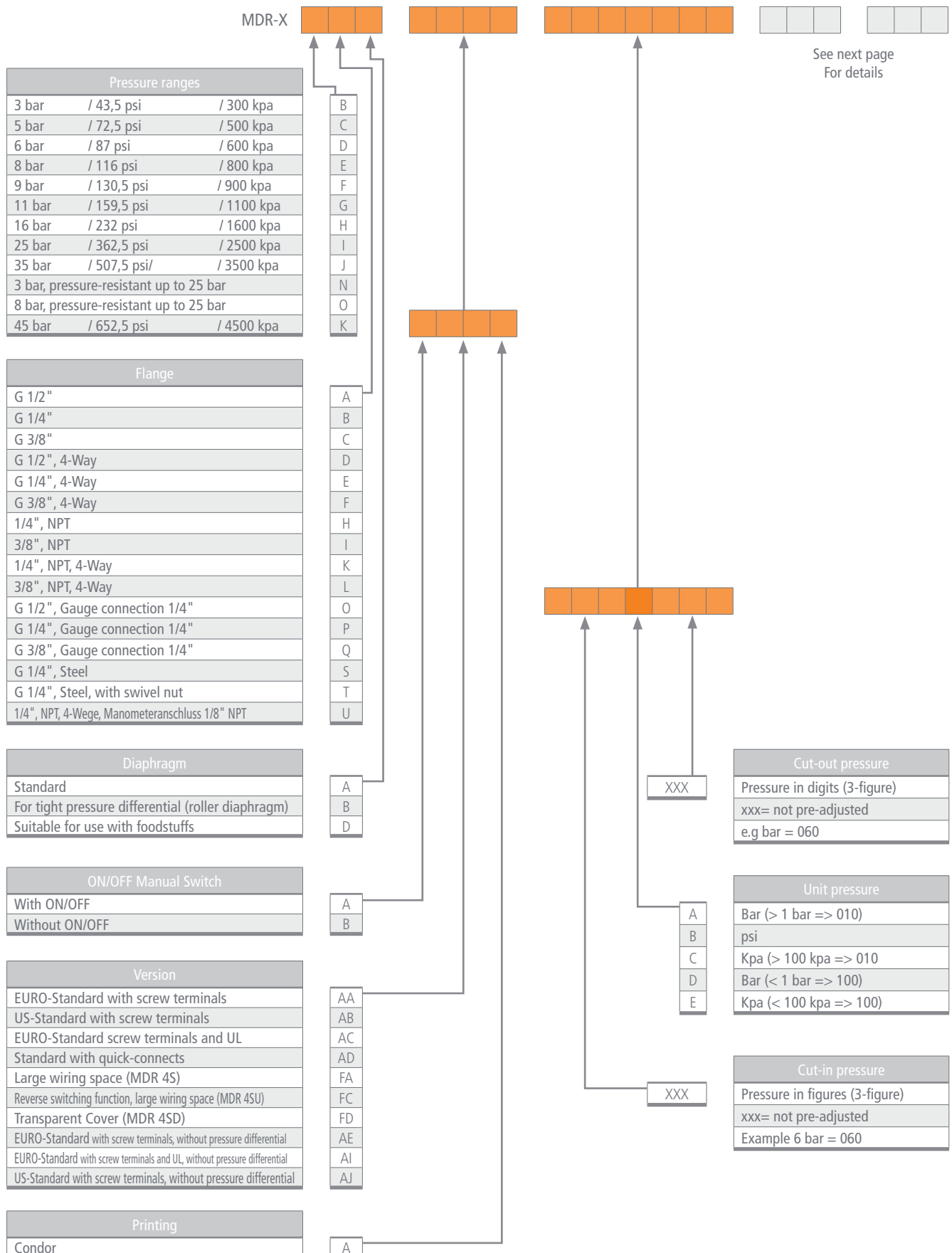


Type designation	MDR – F Vacuum	MDR - P	MDR - K	MDR 43	MDR 53
Contact function	1 SPDT ^{*1} / 2 SPDT's	1 SPDT ^{*1}	2 SPDT's	1 N:C: 1 N.O.	1 SPDT
Voltage	230 V	230 V	230 V	230 V	230 V
Motor switching capacity	0,55 kW	0,55 kW	0,55 kW	1,1 kW	0,55 kW
Current AC 15	4 A	4 A	4 A	8 A	4 A
Flange types Standard (bold)	G 1/4" Inner thread	G 1/4" Outer thread	G 1/4" Outer thread	G 1/2" G 1/4" Inner thread (Die-cast aluminium)	G 1/2" Inner thread (Die-cast aluminium)
Pressure ranges Cut-out pressure from ... to	2 - 0,7 - 3 bar	optional 0,3 - 16 bar	3 0,5 - 11 bar	4 0,5 - 16 bar	4 0,3 - 16 bar
Degree of Protection	IP 54 / IP 65	IP 65	IP 67	IP 44	IP 54
Cable glands	WN / M 20	Coupling	Coupling	optional	optional
Permissible media temperature ^{*2}	- 25 .. + 70 °C	- 25 .. + 70 °C	- 40 .. + 70 °C	- 30 .. + 80 °C	- 30 .. + 80 °C
Type designation	- - Atex				

^{*1} = SPDT with gold-flashed contacts for special applications on request

^{*2} = further temperature ranges on request

For high performance pressure switches MDR 1 up to MDR 5 and control pressure switches MDR 43 and MDR 53 For decoding of pressure switch types: Standard settings

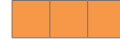
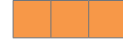




Type code

For high performance pressure switches MDR 1 up to MDR 5 and control pressure switches MDR 43 und MDR 53 For decoding of pressure switch types: Accessories

MDR-X



Valves
Without unloader valves
Unloader valves EV, screw fitting 6 mm
Unloader valves EV i, screw fitting 1/4"
Unloader valves EV S, quick-connect 6 mm
Unloader valves EV W, 90°, screw fitting 6 mm
Unloader valves EV Wi, 90°, screw fitting 1/4"
Unloader valves EV WS, 90°, quick-connect. 6 mm
Unloader valves EV M5, screw fitting 6 mm, port fitting M5
Unloader valves EVi M5, screw fitting 1/4", port fitting M5
Unloader valves EV WSi, 90°, quick-connect 1/4"
Unloader valves EV Ei, screw fitting 1/4"
Unloader valves EV H, screw fitting 6 mm
Unloader valves EV L, screw fitting 6 mm, port fitting 6 mm
Unloader valves EV Li, screw fitting 1/4", port fitting 6 mm
Unloader valves AEV, screw fitting 6 mm
Unloader valves AEV i, screw fitting 1/4"
Unloader valves AEV S, quick connect 6 mm
Unloader valves AEV W, 90°, screw fitting 6 mm
Unloader valves AEV Wi, 90°, screw fitting 1/4"
Unloader valves AEV WS90°, quick-connect 6 mm
Unloader valves AEV WSi, 90°, quick-connect 1/4"
Unloader valves EV E, screw fitting 6 mm for MDR 5, 6
Unloader valves EV 5, screw fitting 6 mm, port fitting 6 mm
Unloader valves EV Si, quick-connect 6 mm

Cable glands
Without cable glands
Cable grommets / blanking plug
PG 11 conduit
PG 11 complete
PG 11 Z with strain relief
PG 11 ZK with strain relief and cable support
PG 13.5 conduit
PG 13.5 complete
PG 13.5 Z with strain relief
PG 13.5 ZK with strain relief and cable support
PG 16 conduit
PG 16 complete
PG 16 Z with strain relief
PG 16 ZK with strain relief and cable support
PG 16/13,5 ZK with strain relief and cable support
PG 16/13,5 Z with strain relief
PG 16/11 complete

X
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X	X
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D	D
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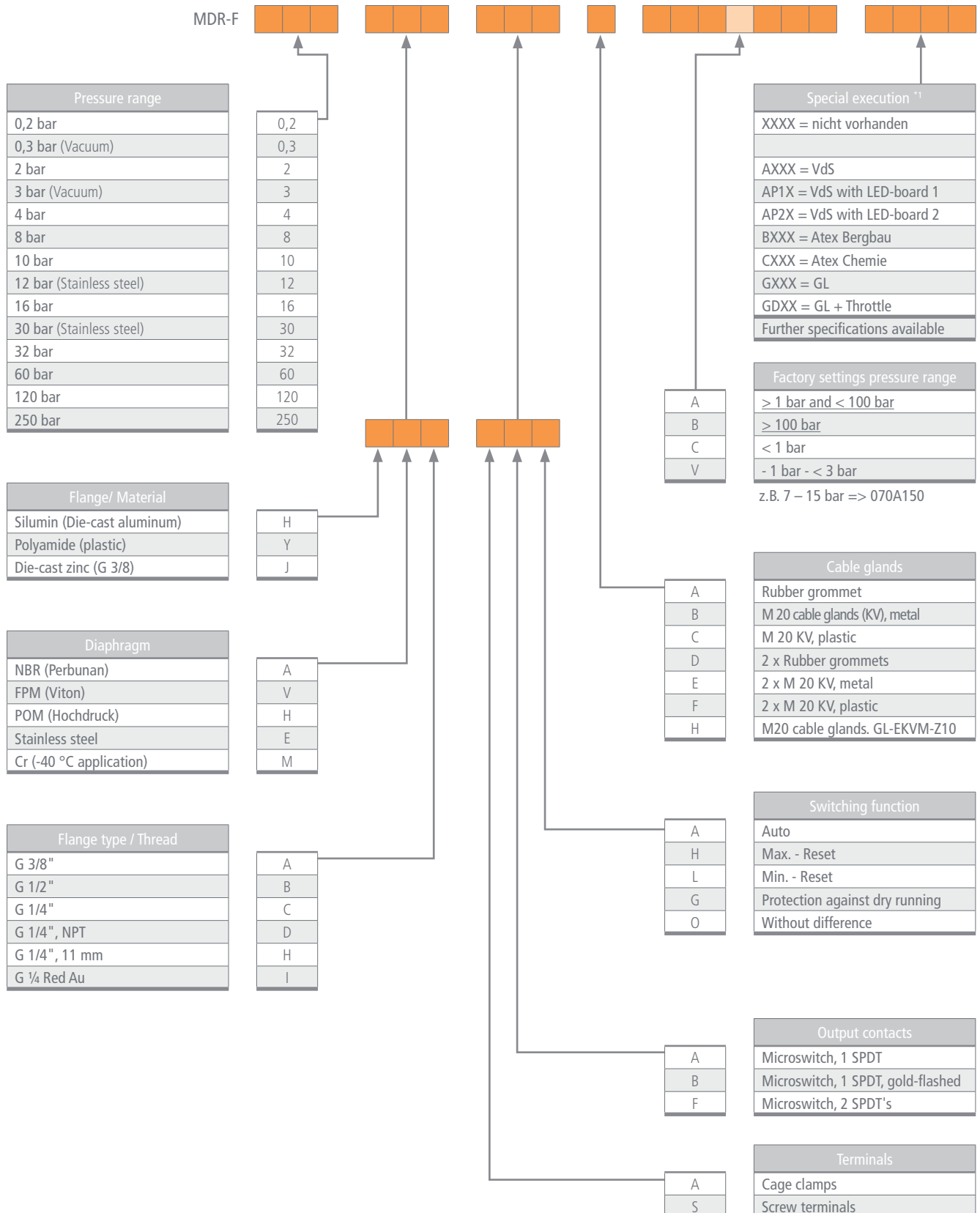
Special Accessories
Without special accessories
ST Mini Barb EV/AEV connector for plastic tubing
Terminal cover, VBG 4 MDR 2
Additional cable glands PG 9V MDR 3
Hourmeter kit 400 V / 50 Hz
Hourmeter kit 230 V / 50 Hz

Releases
Without release
Undervoltage release 230 V / 50 Hz
Undervoltage release 400 V / 50 Hz
Undervoltage release 480 V / 60 Hz
Undervoltage release 240 V / 60 Hz
Shunt release 24 V / 50 Hz
Shunt release 110 V / 50 Hz
Shunt release 230 V / 50 Hz
Undervoltage release 24 V / 50 Hz
Shunt release 400 V / 50 Hz
Undervoltage release 400 V / 50 Hz + phase monitoring board

Releases (Note: use off small/capital initial letters)
Without overload relay
Without contact block
Overload relay 0.63 – 1.0 A
Overload relay 1.0 – 1.6 A
Overload relay 1.6 – 2.5 A
Overload relay 2.5 – 4.0 A
Overload relay 4.0 – 6.3 A
Overload relay 6.3 – 10.0 A
Overload relay 10.0 – 16.0 A
Overload relay 16.0 – 20.0 A
Overload relay 20.0 – 24.0 A
Overload relay 20.0 – 30.0 A, 2 pole
Overload relay 10.0 – 16.0 A, for higher switching capacity
Overload relay 16.0 – 20.0 A, for higher switching capacity
Overload relay 20.0 – 24.0 A, for higher switching capacity
Overload relay 0.86 - 1.5 A
Overload relay 1.5 - 2.45 A
Overload relay 2.4 - 4.2 A
Overload relay 4.0 - 7.0 A
Overload relay 6.1 - 10.3 A
Overload relay 9.0 - 14.0 A
Overload relay 11.0 - 18.0 A
Overload relay 18.0 - 25.0 A, 2 pole

Type code for control pressure switch MDR-F

For decoding pressure switch types:
Standard settings, Accessories and Special Execution



Diaphragm media resistance for pressure switches

Type of pressure switch	MDR 3 RM MDR 5 MDR F MDR-P MDR-K	MDR F MDR P	MDR F (high pressure)	MDR F	MDR 43 MDR 53	MDR 1 MDR 11	MDR 2 MDR 21 MDR 3 MDR 4
Catalogue page	37 ff, 50 ff, 57 ff, 70 ff, 73 ff	57 ff, 70 ff	59 ff	58 ff	76 ff, 78 ff	25 ff, 29 ff	31 ff, 34 ff, 37 ff, 45 ff
Medium Diaphragm material	NBR Perbunan	FPM Viton	Polyacetal POM	Stainless steel	CR + PA6.6 603 C	TPE Hytrel	NBR/SBR NL348-1
Acetone CH_3COCH_3		X		1			
Acetylene $\text{HC} \equiv \text{CH}$	1	1	1	1	1	1	
Air		X		1			
Ammonia, watery 100 %		1		1			
Ammonia, 25 % (ammonia solution)	1	1	1	1		2	
Benzene		1		1		2	
Butane C_4H_{10}	1	1	1	1	1	1	
Butyl acetate $\text{CH}_3\text{COOC}_4\text{H}_9$		X		1		2	
Butyl alcohol $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-CH}_2\text{-OH}$				1			
Carbon dioxide CO_2		2					
Carbonic acid H_2CO_3	1	1	1	1			2
Chlorine Cl_2		1		1			
Cooling liquid	1	1	1	1	1		
Diesel	1	1	1	1	1		
Dimethylbenzene $\text{C}_6\text{H}_4(\text{CH}_3)_2$		1			1		
Ethyl acetate $\text{CH}_3\text{COOC}_2\text{H}_5$	1	1	1	1		1	
Ethylene glycol $\text{CH}_2\text{OH-CH}_2\text{OH}$				1		2	
Fuel oil	1	1	1	1	1		
Gasoline	1	1	1	1			
Glycerol $\text{CH}_2\text{OH-CHOH-CH}_2\text{OH}$	1	1					
Hydrogen H_2	1	1	1	1	1	1	
Methyl chloride CH_3Cl	1	1	1	1			
Mineral oils		1		1			2
Natural gas	1	1	1	1	1	1	1
Nitrogen N_2		1		1			
Oxygen O_2	1	1		1	2	1	2
Ozone		1		1			
Perchloroethylene $\text{CCl}_2=\text{CCl}_2$		1		1			
Petroleum	1	1		1			
Phenolic acid $\text{C}_6\text{H}_5(\text{OH})$				1			
Propane C_3H_8	1	1	1	1	1		
Protective gas		1		1			
Silicon oil				1			
Sulphur dioxide SO_2				1	1		
Silicon oil	1	1			1		
Synthetic oils	1	1	1	1			
Toluene (Phenylmethane) $\text{C}_6\text{H}_5\text{CH}_3$	1	1		1			2
Trichlorethene $\text{CHCl}_2=\text{CCl}_2$		1		1			
Urine		1		1			
Vegetable oil	1	1	1	1	1	1	1
Vinegar 25 %	1	1	1	1	1	1	
Water H_2O	1	1	1	1	1	1	
Water Distilled, aired	1	1	1	1	1	1	
Water sea water	1	1		1			

1 = resistant, 2 = limited resistance, x = not resistant, empty field = not tested

The data of a.m. table does not only result from laboratory tests but also from long-lasting experiences. These are reference points. As the chemical effect of a given media may be affected by additives, temperature differences and mixtures amongst themselves, we recommend to carry out a media resistance test before using the product.