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

Contact Device

for Pressure Gauges

measuring • monitoring • analysing

MAN-..S/M/I/P

- For housing diameter 100 mm or 160 mm
- Slow-action contacts
- Magnetic spring contacts
- Inductive contacts
- Pneumatic contacts

P1

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Application

Electromechanical and electronic limit monitors serve to open and close electrical switching circuits depending on the position of the instrument display. They are suitable for fitting in housings with 100 and 160 mm Ø.

The limit values are adjusted from outside with a setting lock. The limit monitor is set with a detachable key to the value at which the switching operation is to be carried out. The rotary knob can also be permanently mounted on the inspection glass.

The construction of the limit monitor is such that the instrument can continue operating past the setting pointer after successful contact operation.

The maximum setting range is approximately 270 degrees. Ambient temperatures of -20 °C ... +70 °C have no effect on the reliability performance.

We strongly recommend the use of our contact protection relays in applications with high breaking capacities or vibrations, or for service in damping liquids (oil). These relays have been specially designed for electromechanical limit monitors and their use is mandatory.

Electrical connection

The standard electrical connection uses a lateral 6-pin cable socket (Screwed cable connection M20x1.5 for cable diameters from 7...13 mm, wire diameter up to 1.5 mm²).

The following connection variations are optionally available:

- M12 plug, 5-pin
- Harting plug incl. mating plug
- DIN 43 650 cable box, 3-pin (valve plug)
- DIN 43 651 device plug and cable box, 6-pin with earth contact
- Cable box with illuminated display
- Cable (cable length acc. to cable customer specifications)

In the cases of pressure gauges with edging on the front or with a triangular front ring with bracket the electrical connection is on the back.

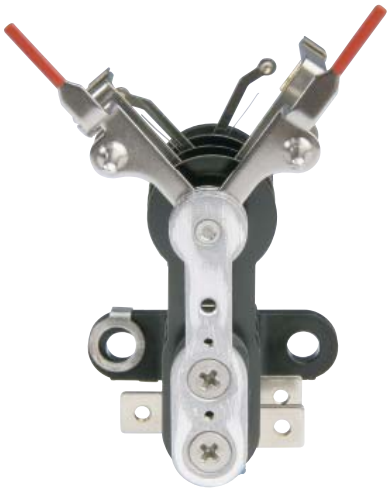
Other connection types are available on request.

Damping liquid

Only electrically non-conductive fluids can be used as damping fluids for contact pressure gauges. We use liquid paraffin as standard. The following contacts are available:

- Slow action contacts
- Magnetic spring contacts
- Inductive contacts
- Pneumatic contacts

Magnetic spring contacts



Magnetic spring contacts are suitable for service under almost all operating conditions. They are almost completely insensitive to vibrations.

The contact pin carrier of the setting pointer is fitted with an adjustable magnet which pulls in the wiper shortly before the set value is reached. Arcing is thus avoided and the pin is prevented from being scorched. Because the magnetic force becomes effective during the switching operation with this construction, the setting pointer must be advanced or retarded by the forming differential gap of approximately 3-6% of full scale value.

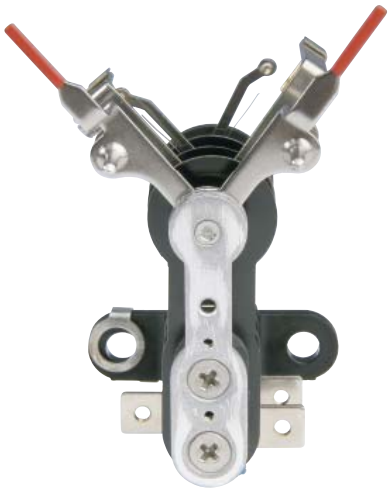
Switching values with standard contact material silver-nickel (80/20)

Switching voltage:	max. 250 $V_{AC/DC}$
Breaking capacity:	max. 30 W / 50 VA
Switching current:	max. 0,6 A
Alternative contact materials:	gold/silver (80/20) or platinum (values on request)

Where there are multiple contacts, these are joined together with a common return. As an option, the pressure gauges with twin contacts are also available with a separate return. It is also possible to produce a coupled second contact with a fixed switching distance for the first contact according to customer specifications.

1/02-2014

Slow-action contacts



These contacting devices switch free of delay in the same way as the motion of the actual-value pointer. They should be used where no contact loading is required and the instruments are not exposed to vibrations. Due to sparking the contacting devices should not be used where there is a danger of explosion. Care should also be taken that the contacting devices are not exposed to the effects of aggressive vapours.

Switching values with standard contact material silver-nickel (80/20)

Switching voltage:	max. 250 $V_{AC/DC}$
Breaking capacity:	max. 10 W / 18 VA
Switching current:	max. 0,6 A
Alternative contact materials:	gold/silver (80/20) or platinum (values on request)

Where there are multiple contacts, these are joined together with a common return. As an option, the pressure gauges with twin contacts are also available with a separate return. It is also possible to produce a coupled second contact with a fixed switching distance for the first contact according to customer specifications.

Inductive contacts according to DIN 19234 (Namur)

The inductive contact device comprises mainly the control head (initiator) attached to the setpoint pointer with its completely assembled encapsulated electronics and mechanical assembly with moving control vane. The control vane is moved by the instrument pointer (setpoint pointer). The control head is supplied with DC voltage.

When the control vane is immersed in the air gap of the control head, its inner resistance increases (damped condition, the initiator is high-resistive). The resulting change in current intensity is the input signal for the switching amplifier in the control unit. Inductive contacts are suitable for service where explosion protection and high reliability and switching rate, that is, long service life, are required.

Advantages of the inductive contact device:

- Long service life with non-contact switching
- Negligible reaction on the display
- Insensitive to aggressive environments (encapsulated electronics)
- Nominal voltage: 8 V_{DC} (Ri = 1 kΩ)

Pneumatic contacts

Pneumatic limit signal transmitters work without contact and with a very low feedback onto the mechanical pressure measuring system. They do not generate any electrical contact problems like wear, welding or excessive contact transfer resistance. Pneumatic contacts are used where controls work using pneumatic regulation and require high reliability and switching frequency, i.e. a longer life.

Advantages of inductive limit signal transmitters:

- Works without electricity
- Long life due to non-touching contact making
- Low feedback to the display
- Non-sensitive to aggressive surroundings due to its construction

Functional principle

The pneumatic limit signal transmitter basically consists of a control head mounted on the set-point indicator (proximity switch) and the mechanical construction with the moving control lug. The control lug is moved by the instrument indicator (actual reading indicator). The proximity switches integrated into the pneumatic contacts work using the air jet cutting procedure. The proximity switches are constructed in such a way that there are two nozzles axially opposite each other on each of the air gap. One is a jet nozzle and one a diffuser. A constant supply air with 1.4 bar ± 0.1 bar is required as auxiliary power. A capillary restriction in the intake, in front of the jet nozzle, reduces the pressure to approximately 0.1 bar. The exit pressure at the diffuser is approximately 40 mbar. The air jet is interrupted by dipping the control lug into the proximity switch. There is no switching delay when the set-point indicator and actual value indicator are congruent.

A downstream low pressure switch (binary transformer P/P or P/E) transforms the output pressure of 40 mbar into a standard signal of 1.4 bar (P/P) or into an electrical signal (P/E).

Switch functions

- Pointer movement clockwise: open or close
- Open: The air jet is interrupted by dipping the control lug into the proximity switch
- Close: The air jet is closed by the control lug emerging from the proximity switch
- Indicator in front of the contact mark
  4.: Pneumatic contact
- Indicator behind the contact mark shows the switching operation
  1: Close
  2: Open

1/02-2014

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**

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		

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		

1/02-2014