Alarm contacts for pressure gauges and thermometers

Electrical alarm contacts with magnetic snap-action contacts or sliding contacts

Operating principle:
Magnetic snap-action or sliding contacts in pressure gauges resp. thermometers are designed to close or open electrical circuits with the aid of a wiper moved by the actual value pointer.

The wiper in the magnetic snap-action contact is fitted with a magnet. The circuit is closed as the moving wiper with the contact pin is attracted by the magnet and the contact springs shut. The circuit is opened as the actuating force of the pressure measuring element exceeds the effective magnetic force attracting the wiper and the contact springs open.

The basic construction of the sliding contact is the same as the magnetic snap-action contact, however the sliding contact is not fitted with a magnet and has no spring effect. The speed, with which the pins approach each other, is determined by the temporary alteration of the measuring instrument display. The switching operations succeed independently of the alteration, when the specified value pointer and the actual value pointer indicate the same measuring result.

Contact materials

Standard	**Silver-nickel**	- composite material (80% Ag, 20% Ni) standard material, high resistance against electric erosion, low propensity to welding, satisfactory electrical contact resistance minimum voltage ≥ 24 V, max. switching capacity see table 1.
Options	**Gold-silver**	- alloy (80% Au, 20% Ag) resistant to corrosion and oxidation, very low and constant electrical contact resistance, suitable for low switching currents and voltages, minimum voltage ≥ 12 V.
	Platin-irdium	- alloy (75% Pt, 25% Ir) high switching capacities, highly resistant against resistant to corrosion and oxidation.
		Special materials on request.

Table 1 Maximum electrical switching capacity: contact material silver-nickel (standard material)

Voltage DIN IEC 38 AC or DC	Magnetic snap-action contact						Sliding contact		
	unfilled gauges			filled gauges			unfilled gauges		
	Ohmic load		Inductive load	Ohmic load		Inductive load	Ohmic load		Inductive load
V	DC mA	AC mA	cosφ > 0.7 mA	DC mA	AC mA	cosφ > 0.7 mA	DC mA	AC mA	cosφ > 0.7 mA
220/230	100	120	65	65	90	40	40	45	25
110/110	200	240	130	130	180	85	80	90	45
48/48	300	450	200	190	330	130	120	170	70
24/24	400	600	250	250	450	150	200	350	100

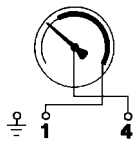
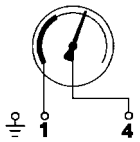
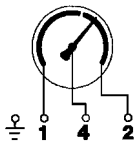
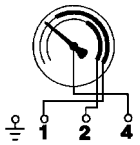
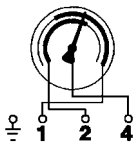
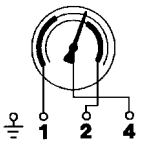
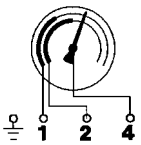
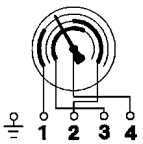
An inductive contact with switching amplifier (SVA), (example: programmable controller), should be used if switching currents are less than 20 mA. If loads are higher than stated in table 1 and for gauges with liquid filling, a relay to avoid an electrical arc must be used for magnetic snap action contacts.

IMT INDUSTRIE-MESSTECHNIK GMBH
An der Sandelmühle 13 · D-60439 Frankfurt/Main
Export Sales: Tel. int.: +49 69 5806 199 · Fax int.: +49 69 5806 177
E-Mail: info @ imt-frankfurt.de

Switching functions

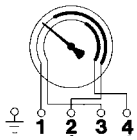
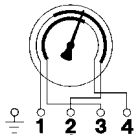
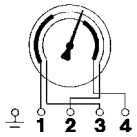
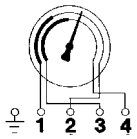
- Clockwise pointer motion: opening or closing
- Code number **before** the dot of the contact designation — **1.__: magnetic snap-action contact**; **2.__: sliding contact**
- Code number **after** the dot indicates the switching operation — **__.1: closing**; **__.2: opening**; **__.3: simultaneous opening and closing**
- The number of code numbers after the dot indicates the number of contacts, see tables 2 and 3 for examples:

Table 2 Magnetic snap-action contact and sliding contact

Switching operations	Clockwise pointer motion Switching functions	Contact designation Magnetic snap-action contact	 Sliding contact
Single contact			
	Contact closes when specified value is exceeded	1.1	2.1
	Contact opens when specified value is exceeded	1.2	2.2
	Contact switches i. e., one contact point opens, another closes simultaneously when specified value is exceeded	1.3	2.3
Double contact			
	1st and 2nd contacts close when specified values are exceeded	1.11	2.11
	1st contact closes 2nd contact opens when specified values are exceeded	1.12	2.12
	1st contact closes 2nd contact opens when specified values are exceeded	1.21	2.21
	1st and 2nd contact opens when specified values are exceeded	1.22	2.22
Triple contact			
	1st contact opens 2nd contact closes 3rd contact opens when specified values are exceeded	1.212	2.212

The connection terminals are labelled in accordance with the above table.

Table 3 Magnetic snap-action contact and sliding contact with separate circuit

Double contact			
Switching operations	Clockwise pointer motion	Contact designation	
	Switching functions	Magnetic snap-action contact	Sliding contact
	1st and 2nd contacts close when specified value is exceeded	1.1.1	2.1.1
	1st contact closes 2nd contact opens when specified value is exceeded	1.1.2	2.1.2
	1st contact opens 2nd contact closes when specified value is exceeded	1.2.1	2.2.1
	1st and 2nd contacts open when specified value is exceeded	1.2.2	2.2.2

The connection terminals are labelled in accordance with the above table.

Inductive alarm contacts to DIN 19 234 (Namur)

Inductive alarm contacts operate without physical contact and with very little effect on the mechanical pressure measuring system. They do not cause any electrical contact problems such as electric contact erosion, welding or excessive electrical contact resistance.

Inductive alarm contacts are used in applications where high reliability and a high frequency of switching operations, i. e. a long service life, are required.

Advantages of the inductive alarm contact:

- Contact making without physical contact ensures a long service life
- Little effect on the display
- Universal application, including in filled gauges
- Insensitive to aggressive atmospheres (encapsulated electronics, contact making without physical contact)
- Explosion protected, usable in zones 1 and 2

Operating principle

The inductive alarm contact basically consists of the control head (initiator) with completely encapsulated electronics fitted to the specified value pointer, and the mechanical structure with the moving control lug. The control lug is moved by the instrument pointer (actual value pointer).
The control head is supplied with DC.
As the control lug enters the gap in the control head, the internal resistance of the former increases (attenuated condition - the initiator is highly resistant). The resulting change in current intensity is the input signal for the switching amplifier of the control unit.

Explosion-protection

Pressure gauges with inductive alarm contacts and an external control unit can be used in areas with potentially explosive atmospheres **(zone 1 and 2)**. The necessary control unit (e. g. WE 77/Ex 1, model ZE 01.001.001) is to be installed outside the potentially explosive atmosphere.

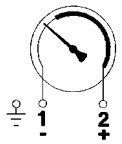
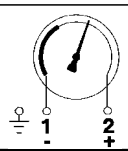
Table 4 Technical data: Inductive contact

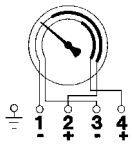
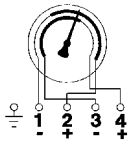
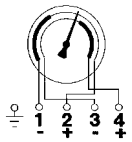
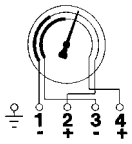
Type of protection EEx ia IIC T6 EEx ib IIC T6	Normal version to DIN 19 234 (NAMUR)	Protective circuit to DIN 19 234 (NAMUR)	Normal version to DIN 19 234 (NAMUR)	Protective circuit to DIN 19 234 (NAMUR)
For gauge size ND	100		160	
Proximity switch type	SJ 2-N	SJ 2-SN	SJ 3.5-N	SJ 3.5-SN
Operating voltage	5 . . . 25 VDC			
Gap width	2 mm		3.5 mm	
Switching frequency	5 kHz		3 kHz	
Self-capitance	20 nF			
Self-inductance	29 µH		160 µH	
Rated voltage	8 VDC			
Protection	IP 65 to DIN 40 050			
Case	Plastic			
Connection type	Mini-flat-Cable 0.5 m lg.; 2 x 0.06 mm²	litz wire „LIYV“ 0.5 m lg.; 2 x 0.14 mm²	Mini-flat-Cable 0.5 m lg.; 2 x 0.06 mm²	litz wire „LIYV“ 0.5 m lg.; 2 x 0.14 mm²
Temperature range	-25 ° C to 70 ° C			

Switching functions

- Clockwise pointer motion: opening or closing
- Code number **before** the dot of the contact designation **3.__: Inductive contact**
- Code number **after** the dot indicates the switching operation **__.1: closing**
  __.2: opening
- The number of the code numbers after the dot indicates the number of contacts, see table 5 for examples:

Table 5 Inductive contact

Single contact			
Switching operations [1])	As the gauge pointer moves clockwise it moves the control lug (when the set specified value is exceeded)	Switching function	Contact designation
	out of the control head	Control circuit closes	3.1
	into the control head	Control circuit closes	3.2

Double contact			
	of the 1st and 2nd contacts out of the control head	1st and 2nd control circuit close	3.11
	of the 1st contact out of the control head of the 2nd contact into the control head	1st control circuit closes 2nd control circuit opens	3.12
	of the 1st contact out of the control head of the 2nd contact into the control head	1st control circuit closes 2nd control circuit opens	3.21
	of the 1st and 2nd contact into the control head	1st and 2nd control circuit open	3.22

The connection terminals are labelled in accordance with the above table.

[1]) Thin line signifies: control lug in the control head, circuit open.
Thick line signifies: control lug out of the control head, circuit closed.

Inductive alarm contact with integrated switching amplifier

Non-Ex-Version

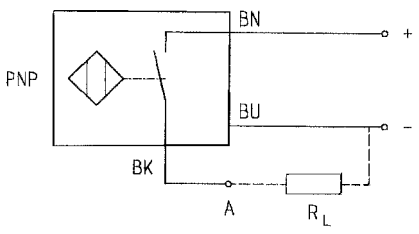
- ❍ For direct switching of low powers.
- ❍ 1 electronic output per contact.
- ❍ PNP transistor output
- ❍ Integrated in the housing of the instrument, mounted on the contact base.

slotted initiator

Vane not inserted
=
Output not activ

Because of its small size, this switching amplifier can be installed directly in the pressure gauge. The amplifier is not intrinsically safe and thus may not be used in potentially explosive atmospheres. It is suitable for switching low currents e. g. in programmable controllers (SPS). The amplifier is fitted with a PNP transistor. A control unit is not necessary.

Technical data	**Slotted initiator with amplifier**
Range of operating voltage	10 . . . 30 VDC
Type of output	PNP
No-load current	≤ 10 mA
Working current	≤ 100 mA
Switching accuracy	approx. 0.5% of full scale value
Range of adjustment	max. 280° ∠
Operating temperature	-25 . . . 70 ° C
Isolation voltage resistance	0.5 kV
Number of contacts with amplifier	per measuring device max. 3
Protection against pole reversal	conditional (Ub)
EMC	EN 60 947-5 -2 annex ZA
Protection class IP 67	DIN EN 60 529
Installation, at works	to inductive alarm contact unit



BN (brown) +
BU (blue) -
BK (black) A
R_L Load

Annotations:
With PNP switching apparatus, the switched output (BK) is a connection towards PLUS (BN). The load between (BK) and (BU) should be selected in the way not to exceed the maximum switching current (100 mA).

(No direct connection between BU and BK)

Modifications reserved