

## Alarm contacts for pressure gauges and thermometers

### 1) Electrical alarm contacts with magnetic snap-action 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, 10 µm gold-plated)  
standard material, high resistance against electric erosion,  
low propensity to welding, satisfactory electrical contact resistance,  
minimum voltage  $\geq 24$  V, max. switching capacity see table 1.

Options **Platin-iridium** - alloy (90% Pt, 10% Ir)  
high switching capacities,  
highly resistant against  
resistant to corrosion and oxidation.

**Other special materials on request.**

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

Voltage  DIN IEC 38 AC or DC V	Magnetic snap-action contact					
	unfilled gauges			filled gauges		
	Ohmic load		Inductive load $\cos\varphi > 0.7$ mA	Ohmic load		Inductive load $\cos\varphi > 0.7$ mA
DC mA	AC mA	DC mA		AC mA		
220 / 230	100	120	65	65	90	40
110 / 110	200	240	130	130	180	85
48 / 48	300	450	200	190	330	130
24 / 24	400	600	250	250	450	150

**An electronic contact (see point 3), (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.**

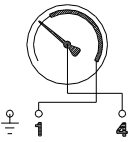
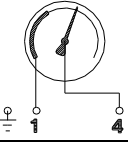
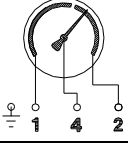
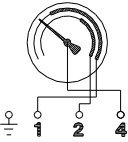
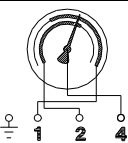
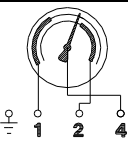
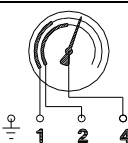
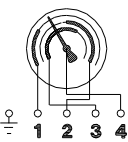
#### Switching functions

- Clockwise pointer motion: opening or closing
- Code number **before** the dot of the contact designation **1.---** : **magnetic snap-action 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.

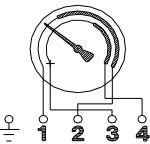
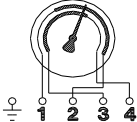
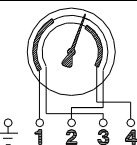
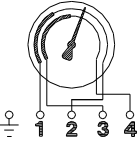
**Table 2**

**Magnetic snap-action contact**

<b>single contact</b>		
Switching operations	Clockwise pointer motion	Contact designation
	Switching functions	Magnetic snap-action contact
	Contact closes when specified value is exceeded	1.1
	Contact opens when specified value is exceeded	1.2
	Contact switches i.e., one contact point opens, another closes simultaneously when specified value is exceeded	1.3
<b>double contact</b>		
	1st and 2nd contacts close when specified values are exceeded	1.11
	1st contact closes 2nd contact opens when specified values are exceeded	1.12
	1st contact opens 2nd contact closes when specified values are exceeded	1.21
	1st and 2nd contact opens when specified values are exceeded	1.22
<b>triple contact</b>		
	1st contact opens 2nd contact closes 3rd contact opens when specified values are exceeded	1.212

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

**Table 3****Magnetic snap-action contact with separate circuit**

<b>single contact</b>		
Switching operations	Clockwise pointer motion	Contact designation
	Switching functions	Magnetic snap-action contact
	1st and 2nd contacts close when specified value is exceeded	1. 1.1
	1st contact closes 2nd contact opens when specified value is exceeded	1. 1.2
	1st contact opens 2nd contact closes when specified value is exceeded	1. 2.1
	1st and 2nd contacts open when specified value is exceeded	1. 2.2

The connection terminals are labelled in accordance with the above table

## 2) Limit value switches with inductive alarm contacts to DIN 19234 (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 external control unit can be used in hazardous areas (zone 1 and zone 2). The necessary control unit (for example WE 77/Ex 1, model EZE01X001001) must be installed out of hazardous areas.

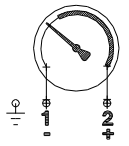
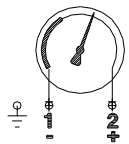
**Table 4**

**Technical data: inductive alarm contact**

type of protection EEx ia IIC T6	Standard feature at DIN EN 60947-5-6 (NAMUR)	Safety feature at DIN EN 60947-5-6 (NAMUR)	Standard feature at DIN EN 60947-5-6 (NAMUR)	Safety feature at DIN EN 60947-5-6 (NAMUR)
For Normal diameter	<b>100</b>		<b>160</b>	
Proximity sensor typ	SJ 2 - N	SJ 2 - SN	SJ 3,5 - N	SJ 3,5 - SN
Operating voltage	5 ... 25 V			
Effective gap length	2 mm	2 mm	3,5 mm	3,5 mm
Switching frequency	0 ... 5000 Hz	0 ... 5000 Hz	0 ... 3000 Hz	0 ... 3000 Hz
Self-capacitance	30 nF	30 nF	50 nF	30 nF
Self-inductance	100 µH	100 µH	250 µH	100 µH
Nominal voltage	8 VDC			
Current consumption	≥ 3 mA (active freely area)		≤ 1 mA (active area alive)	
Accuracy	approx. 0,5% of the full scale value			
Setting range	280° max.			
Ingress protection	IP 67			
Case	plastic			
Connection type	Litze „LIFYW“ 0,5 m lg.; 0,06 mm <sup>2</sup>	Litze „LIFYW“ 0,5 m lg.; 0,06 mm <sup>2</sup>	Litze „LIY“ 0,5 m lg.; 0,14 mm <sup>2</sup>	Litze „LIY“ 0,5 m lg.; 0,14 mm <sup>2</sup>
Temperatur range	-25 °C bis 100 °C	-40 °C bis 100 °C	-25 °C bis 100 °C	-40 °C bis 100 °C
EC- type test certificate	PTB 99 ATEX 2219 X ZELM 03 ATEX 0128X	PTB 00 ATEX 2049 X ZELM 03 ATEX 0128X	PTB 99 ATEX 2219 X ZELM 03 ATEX 0128X	PTB 00 ATEX 2049 X ZELM 03 ATEX 0128X

**Table 5**

**Inductive contact:**

single contact			
switching operations <sup>1)</sup>	If the pointer of measuring instrument turns clockwise, it takes the control vane when specified value is exceeded.	switching function	contact designation
	outside the control head	the control circuit closes	3.1
	inside the control head	the control circuit opens	3.2

- 1) Small line means : control vane inside control head, control circuit opens.  
Thick line means : control vane outside control head, control circuit closes

**Table 6**

**Inductive contact:**

<b>double contact</b>			
	1st and 2nd contacts outside control head	1st and 2nd control circuit close	3.11
	1st contact outside control head 2nd contact inside control head	1st control circuit closes 2nd control circuit opens	3.12
	1st contact inside control head 2nd contact outside control head	1st control circuit opens 2nd control circuit closes	3.21
	1st and 2nd contacts inside control head	1st and 2nd control circuits open	3.22

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

### 3) Limit value switches (electronic-contacts)

#### General

Electronic limit value switches in pointer-type measuring instruments are equipped with electrical distance sensors (proximity sensors).

The output signal is governed by the presence or absence of a control vane moved by the actual value pointer in the magnetic field of the proximity sensor.

#### Mode of operation

The electrical distance sensors (proximity sensors), used in our electronic contacts are simple two wire or three wire DC switches.

We use proximity sensors which are also called slot sensors due to the slot design. The electromagnetic field is concentrated between two axially opposed coils. The switch operates when the aluminium control vane moved by the actual value pointer enters into the space or slot between the two coils. The signal is transmitted without a time lag analogous to the movement of the actual value pointer.

The switching behaviour of the PNP switches used in these contacts is normally defined as a "closer", this means:

control vane outside the slot sensor – the contact is open - the output is not active

control vane inside the slot sensor – the contact is closed - the output is active

## Application

Due to their proximity type of switching, their switching accuracy and their high service life, electronic contacts may be used for almost all industrial applications, and should be given special preference for oil filled measuring instruments and for low voltages.

Electronic contacts with a PNP output are particularly suitable to switch small DC loads (10 -30 VDC, ≤ 100 mA) for instance

- for PNP signal inputs,
- to trigger opto electronic couplers
- for other electronic evaluation units

**Table 7**

**Technical data:**

Operating voltage	10 – 30 VDC
Breaking capacity	≤ 100 mA
Switching accuracy	approx. 0,5% of the full scale value
Ambient temperature	- 25 °C bis +70 °C
Adjusting range	max. 280°
Regulations	EN 60947-5-2

Quality and operating of the contacts are subject to super version within the scope of our internal inspections.

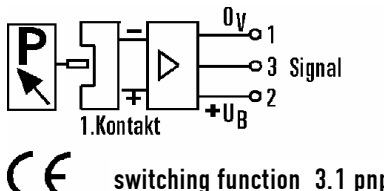
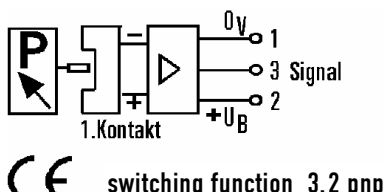
## Switching functions

- 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 code numbers after the dot indicates the number of contacts, see table 6 for examples.

**Table 8**

**Electronic-contact**

single contact			
switching operations	If the pointer of measuring instrument turns clockwise, it takes the control vane when specified value is exceeded.	switching function	contact designation
	outside the control head	the control circuit closes	3.1E
	inside the control head	the control circuit opens	3.2E

**Tabelle 9**

**Electronic-contact**

<b>double contact</b>			
switching operations	If the pointer of measuring instrument turns clockwise, it takes the control vane when specified value is exceeded.	switching function	contact designation
<p>switching function 3.11 pnp</p>	1st and 2nd contacts outside control head	1st and 2nd control circuit close	3.11E
<p>switching function 3.12 pnp</p>	1st contact outside control head 2nd contact inside control head	1st control circuit closes 2nd control circuit opens	3.12E
<p>switching function 3.21 pnp</p>	1st contact inside control head 2nd contact outside control head	1st control circuit opens 2nd control circuit closes	3.21E
<p>switching function 3.22 pnp</p>	1st and 2nd contacts inside control head	1st and 2nd control circuits open	3.22E

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