

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 suc ceed 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 ≥ 24 V, max. switching capacity see table 1.
Options	Platin-irdium - 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	Magnetic snap-action contact					
		unfilled gauges			filled gauges	
DIN IEC 38 AC or DC	Ohmi	c load	Inductive load	Ohmic	load	Inductive load
V	DC	AC	cosφ>0.7	DC	AC	cosφ>0.7
	mA	mA	mA	mA	mA	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
- 1.--- : magnetic snap-action contact
- Code number **before** the dot of the contact designation 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.

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Table 2

Magnetic snap-action contact

	single contact				
Switching operations	Clockwise pointer motion	Contact designation			
e men ing eperanene	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			
	double contact	·			
	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			
₽ 1 2 4	1st and 2nd contact opens when specified values are exceeded	1.22			
triple contact					
₽. 1 2 3 4	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

double contact					
Switching operations	Clockwise pointer motion	Contact designation			
Ownerling operations	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 exceeded1.2.2				

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 con tact 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 extern al control unit can be used in hazardous areas (zone 1 and zone 2). The following specified control units are to be installed outside of the ex-range e.g. in an instrument panel.

Control units for inductive contacts

Ex-certified versions

Control unit model: EZE01X001002 (KFA6-SR2-Ex 1.W)

- Intended for instruments having one inductive contact incorporated
- Alarm circuit certified intrinsically safe [EEx ia] IIC to EN 50 227 and NAMUR
- Provides 1 SPDT relay output contact
- LED indicating circuit status (green), relay output (yellow) and lead breakage (red)
- Case surface-mounting type form D (see p. 6)

Note

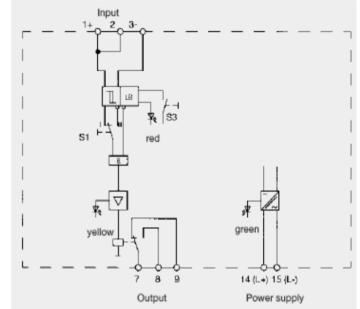
Directions of action adjustable by sliding switch S1: OPEN CIRCUIT CAUSES ALARM: switch S1 in position I CLOSED CIRCUIT CAUSES ALARM: switch S1 in position II CONTINUITY DETECTION: switch S3 in position I

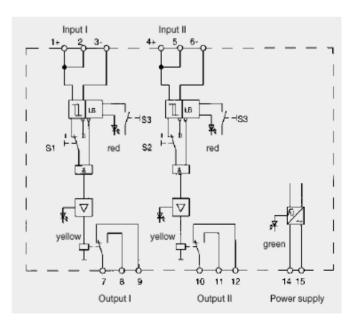
Control unit model: EZE01X002002 (KFA6-SR2-Ex 2.W)

- Intended for 1 instrument having two or two instruments having one each contact incorporated
- Alarm circuit certified intrinsically safe [EEx ia] IIC to EN 50 227 and NAMUR
- Provides 2 SPDT relay output contacts
- LED indicating circuit status (green), 2 x relay output (yellow) and 2 x lead breakage (red)
- Case surface-mounting type form F (see p. 6)

Note

Directions of action adjustable by sliding switches S1 and S2: OPEN CIRCUIT CAUSES ALARM: switch S1 and S2 in position I CLOSED CIRCUIT CAUSES ALARM: switch S1 and S2 in pos. II CONTINUITY DETECTION: switch S3 in position I





Fail safe control unit

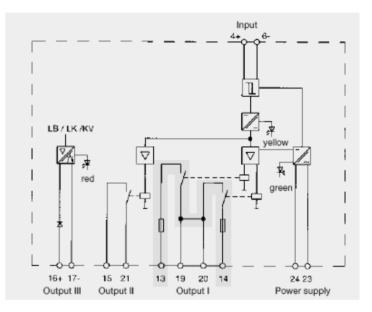
Model 831 **SN** and **S1N**, respectively, are "fail safe" model-approved versions intended for services where operational safety codes, e.g. such as issued by TÜV, require the use of specially approved components. This contact provides together with the model-approved control unit **model 904.30** a self-monitoring and fail-safe alarm circuit.

Voltage breakdown, failure of components, wire interruption

or short circuit will always de-energise the output relay.

Model EZE01X013002 (KFA6-SH-Ex 1 [EEx ia] IIC)

- Failsafe circuit control unit
- Intended for instruments having one SN- or S1N-type contact incorporated
- Alarm circuit certified intrinsically safe [EEx ia] IIC
- 1 safety directed relay output, 1 accelerating output and 1 passive transistor error message output
- LED indicating circuit status (green), relay output (yell ow) and lead breakage as well as short circuit (red)
- Case surface-mounting type form E $\,$ (see p. 6)



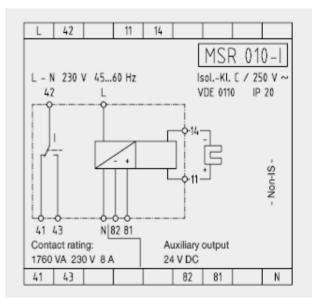
Control units for inductive contacts

Non-Ex-certified versions

(Connection examples see p. 6)

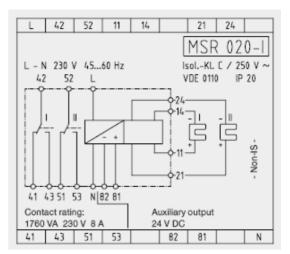
Control unit model: EZE02X001001 (Typ 904.25 MSR 010-I)

- Intended for instruments having one inductive contact
- Provides 1 SPDT relay output contact
- Surface mounting enclosure of form C (see p. 6)



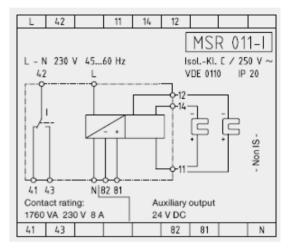
Control unit model: EZE02X002002 (Typ 904.26 MSR 020-I)

- Intended for 1 instrument having two contacts or two instruments each having one contact
- Provides 2 SPDT relay output contacts
- Surface mounting enclosure of form C (see below)



Control unit model: EZE02X002003 (Typ 904.27 MSR 011-I)

- Intended for 2-point (HI-LO) interval switch for control circuits with contacts of configuration model 831.12
- Provides 1 SPDT relay output contact
- Surface mounting enclosure of form C (see below)



Dimensions of control units for inductive contacts

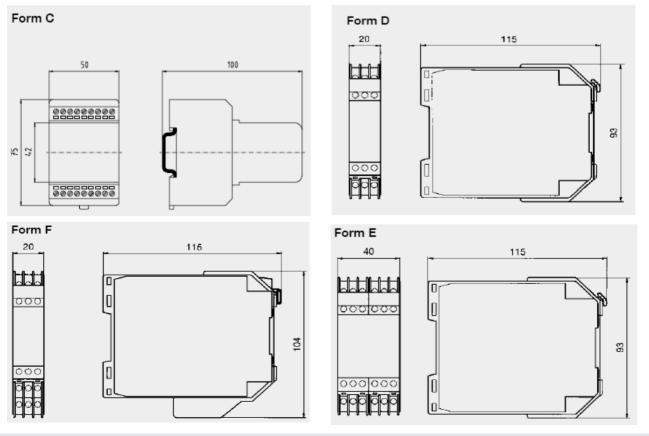


Table 4

Technical data: inductive alarm contact

i			1	
type of protection	Standard feature at	Safety feature at	Standard feature at	Safety feature at
EEx ia IIC T6	DIN EN 60947-5-6	DIN EN 60947-5-6	DIN EN 60947-5-6	DIN EN 60947-5-6
EEX la lie 10	(NAMUR)	(NAMUR)	(NAMUR)	(NAMUR)
For Normal diameter	1	00	10	60
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 m	A (active freely area)	≤ 1 mA (active area	alive)
Accuracy		approx. 0,5% of t	the full scale value	
Setting range		280°	° max.	
Ingress protection		IP	° 67	
Case		pla	astic	
	Litze "LIFYW"	Litze "LIFYW"	Litze "LIY"	Litze "LIY"
Connection type	0,5 m lg.;	0,5 m lg.;	0,5 m lg.;	0,5 m lg.;
	0,06 mm ²	0,06 mm ²	0,14 mm ²	0,14 mm ²
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	PTB 00 ATEX 2049 X	PTB 99 ATEX 2219 X	PTB 00 ATEX 2049 X
LC- type test certificate	ZELM 03 ATEX 0128X	ZELM 03 ATEX 0128X	ZELM 03 ATEX 0128X	ZELM 03 ATEX 0128X

Table 5

Inductive contact:

	single contact				
switching operations ¹)	If the pointer of measuring instrument turns clockwise, it takes the control vane when specified value is exceeded.	switching function	contact designation		
0-1-1-	disengages from sensor	Contact makes (NO-normally open)	3.1		
	merges with sensor	Contact breaks (NC-normally closed)	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:

	double contact					
044 01	1st and 2nd contacts disengages from sensor	1st and 2nd contact make	3.11			
	1st disengages from sensor 2nd merges with sensor	1st contact makes 2nd contact breaks	3.12			
	1st merges with sensor 2nd disengages from sensor	1st contact breaks 2nd contact makes	3.21			
	1st and 2nd contacts merges with sensor	1st and 2nd contact breaks	3.22			

Wiring terminals are identified as per above wiring schemes.

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 movec by the actual value pointer enters into the space or slot between the two coil s. 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 sens or - 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 superversion 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		
$\mathbf{P} = \mathbf{P} = $	disengages from sensor	Contact makes	3.1E		
$\mathbf{P} = \mathbf{P} = \mathbf{P} + \mathbf{U}_{B} +$	merges with sensor	Contact breaks	3.2E		

Tabelle 9

Electronic-contact

	double 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
$\mathbf{P} = \mathbf{P} = $	1st and 2nd contacts disengages from sensor	1st and 2nd contact make	3.11E
$\mathbf{P} = \mathbf{P} = $	1st disengages from sensor 2nd merges with sensor	1st contact makes 2nd contact breaks	3.12E
$\mathbf{P} = \mathbf{P} = $	1st merges with sensor 2nd disengages from sensor	1st contact breaks 2nd contact makes	3.21E
$\mathbf{P} = \mathbf{P} = $	1st and 2nd contacts merges with sensor	1st and 2nd contact breaks	3.22E

Wiring terminals are identified as per above wiring schemes.