Electrical Alarm Contacts
Model 821, Magnetic Snap-Action Contacts
Model 831, Inductive Alarm Sensors

Applications

- Control and regulation of industrial processes
- Monitoring of plants and switching of electric circuits
- Indication of limit values
- Inductive alarm contacts for safe switching, even in explosion hazardous areas
- Process industry applications: in machine and plant construction, chemical and petrochemical industry, power plants, mining, onshore and offshore and environmental engineering

Pressure Gauge Model 212.20.100
with Electrical Alarm Contact Model 821

Special Features

- High reliability and long service life
- Can be incorporated within all relevant pressure and temperature measuring instruments
- Up to 4 switching contacts per measuring instrument
- Also available with liquid filled case for high dynamic pressure loads and vibration applications
- Inductive alarm contact, also available in safety pattern and as electronics contact for PLC

Thermometer
with Electrical Alarm

Model 55
Contact Model 831

Description

Electrical alarm contacts make or break an electric control circuit depending on the position of the instrument's pointer. Points of contact actuation are adjustable over the full extension of the scale graduation (see DIN 16 085).
The contacts are mainly installed behind the dial, in some cases onto the dial.
The instrument pointer's (actual value pointer) deflection is not obstructed by the contact's mechanism.
Round case and square edgewise panel mounted gauges feature a hub in the window for an adjustment key.
Contacts in flat-case edgewise panel mounted gauges are adjustable with a screwdriver through the window. Alarm contacts consisting of several contacts may be set at exactly the same setpoint. Contact actuation is made when there is an upper or lower deviation of the set desired value by the instrument pointer.

Optional extras

Gauges with special approvals on inquiry, e.g.

- Pressure controllers in accordance with the VdTÜV's note of instructions on pressure 100/1
- Pressure and temperature measuring instruments with alarm contacts for intrinsically safe electrical systems (mining)
- Pressure gauges for the connection to dust explosion proof areas zone 20 or to hazardous areas zone 0

Transmitter to combine with pressure gauges see data sheet AE 08.02

Magnetic snap-action contacts model 821 [1]

Intended use
This is the universal type of contacts to provide reliable service also with liquid filled instruments.

The magnetically assisted contact features a small permanent magnet screwed to the setpoint indicator. The magnet provides for a snap-action characteristic which considerably improves contact rating and service life, and also makes this type less sensitive to vibration, reducing the effect of the spark to a minimum.
The hysteresis, however, is increased from 2 % to 5% of span. The hysteresis is the difference of the indicated values which are measured at reverse moving direction and with unaltered switch point. Signalling is made before or after mating in accordance with the movement of the instrument pointer.

1) **Sliding contacts model 811** will be used especially in temperature measurement instrumentation where the bimetal measuring systems have only minor actuating power or if there are operating conditions without vibrations. This type of contact is not suitable for liquid filled instruments.

Specifications and table of contact ratings
The contact rating values are given in consideration of many years of reliable service. Unlimited power switching may be obtained by using the instruments' contacts to trip a relay or contactor of appropriate size. WIKA relays of model no. 905.1X are found on page 5 of this data sheet.

Ratings below 24 V line voltage are to be individually established upon inquiry.

For low ratings the current to be switched should not be less than 20 mA to maintain reliability.

For lower switching powers we recommend our control relays (see page 5) or, in programmable logic controllers (PLC) for example, our electronic contact model 830 E (see page 9).

Specifications

Maximum contact rating with non-inductive (ohmic) load	Magnetic snap-action contact model 821 dry gauges	liquid filled gauges	Sliding contact model 811 dry gauges
Maximum voltage (MSR) U_{eff}	250 V	250 V	250 V
Current ratings: 1)			
Make rating	1,0 A	1.0 A	0.7 A
Break rating	1,0 A	1.0 A	0.7 A
Continous load	0,6 A	0.6 A	0.6 A
Maximum load	30 W 50 VA	20 W 20 VA	10 W 18 VA
Material of contact points	Silver-Nickel Alloy (80% Ag / 20% Ni / 10 µm gold-plated)		
Ambient operating temperature	-20 °C ... +70 °C		
Max. no. of contacts	4		

1) The values for nominal working currents shown in the above table apply to instruments with switch version S. For instruments with switch version L these values should be halved. (refer to page 3 for appropriate version)

Recommended contact ratings with ohmic and inductive load

Voltage (DIN IEC 38) DC / AC	Magnetic snap-action contact model 821 dry gauges			liquid filled gauges			Sliding contact model 811 dry gauges		
	ohmic load		inductive load	ohmic load		inductive load	ohmic load		inductive load
	DC	AC	cos φ >0.7	DC	AC	cos φ >0.7	DC	AC	cos φ >0.7
V	mA	mA	mA	mA	mA	mA	mA	mA	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

In order to ensure a high **switching reliability** of the contacts the **switching voltage should not be below 24 V**, also taking environmental influences in the long term into account.

Contact points of special material

Contacts made of special materials are available to either improve resistance against wear failure or corrosion failure in long-term service.

Optionally available are:

Silver-nickel alloy
(80% silver / 20% nickel / 10 µm gold-plated)
This is the standard material used and features:
Excellent hardness and strength.
Good resistance against formation of arcs.
Good resistance against contact welding.
Low contact resistance.

We use this alloy as our standard due to it's stable properties.

Platinum-iridium alloy
(75% platinum, 25% iridium)
This alloy is very hard with excellent resistance against formation of arcs and excellent performance in corrosive environments. It is preferred where switching of rather high current rating frequently occurs as part of regular process control.

Special features

- Separate circuits of each set of contacts
- Double throw (SPDT) function
- Switch point calibrated and immobilised
- Two contacts linked at a specified distance
- Contacts with "live zero" shunt 47 kW to monitor circuit continuity
- Self-cleaning contacts (NS 160 only)
- Contact setting mechanism with provisions to attach a lead seal
- Contact setting knob non-detachable
- Wiring by means of plug and socket instead of junction box or flying lead
- Contact points of special material platinum-iridium alloy

Switch version appropriate to gauge model and range
(in order to define limits, please refer to the table at the top of page 2 and footnote)

WIKA basic gauge model	Nominal size	Number of contacts sets	Measuring ranges	Switch version
2XX.XX	100 and 160	1	≤1 bar	L
2XX.XX	100 and 160	1	all others	S
2XX.XX	100 and 160	2	≤1.6 bar	L
2XX.XX	100 and 160	2	all others	S
2XX.XX	100	3 or 4	≤4 bar	L
2XX.XX	100	3 or 4	all others	S
2XX.XX	160	3 or 4	≤2.5 bar	L
2XX.XX	160	3 or 4	all others	S
214.11	96x96 and 144x144	1	≤1 bar	L
214.11	96x96 and 144x144	1	all others	S
214.11	96x96 and 144x144	2	≤1.6 bar	L
214.11	96x96 and 144x144	2	all others	S
214.11	96x96	3	≤4 bar	L
214.11	96x96	3	all others	S
214.11	144x144	3	≤2.5 bar	L
214.11	144x144	3	all others	S
3XX.XX	160	1 ... 4	all	L
4XX.XX	100 and 160	1 ... 4	all	L
5XX.XX	100 and 160	1 ... 4	all	L
6XX.XX	100 and 160	1 ... 4	all	L
7XX.XX	100 and 160	1 ... 4	all	L
55	100 and 160	1 ... 4	all	L
73	100 and 160	1 ... 4	all	L

Contact function index

WIKA-contacts are identified by a 4- to 7-digit type code. The 3 digits to the left of the full stop indicate the model of contacts whereas 1 or more digits to the right of the full stop indicate the contact function with rising pressure, respectively, clockwise pointer motion. The number of digits right of the full stop reflects the number of contacts incorporated. The order of indices reflects the order how the contacts are arranged in clockwise direction.

Two or more sets of contacts normally feature one mutual common. Indices separated by full stops indicate contacts with separated circuits.

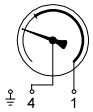
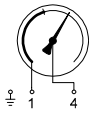
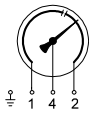
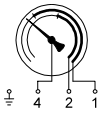
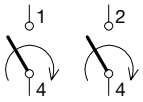
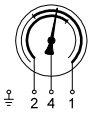
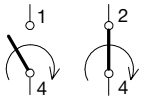
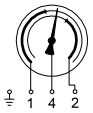
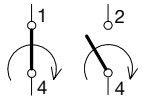
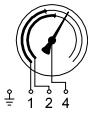
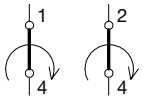
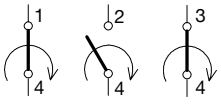
The following applies as a general rule to the contact functions of model 821 or 811 in connection with our standard settings.

Index 1 Contact **makes** when the **instruments' pointer** approaches the set point **in clockwise direction.** (NO contact)

Index 2 Contact **breaks** when the instruments' pointer approaches the set point **in clockwise direction.** (NC contact)

Index 3 Contact **breaks first and makes second circuit** when the instruments' pointer approaches the set point in clockwise direction. (SPDT contact)

Note: If the alarm contacts are to be set (adjusted) anticlockwise, the index figures in brackets have to be used in accordance with DIN 16 085. Combinations are possible.

Wiring scheme	**Clockwise** pointer motion Contact function	Model code and **function index** for magnetic snap-action contacts or sliding contacts (special version)
Single contacts		
	Contact makes when pointer reaches set point (NO - normally open) 	821.**1** or 811.**1** (.5)
	Contact breaks when pointer reaches set point (NC - normally closed) 	821.**2** or 811.**2** (.4)
	SPDT: 1 contact breaks and 1 contact makes when pointer reaches set point (change over) 	821.**3** or 811.**3** (.6)
Double contacts		
	1st and 2nd contact make when pointer reaches set point 	821.**11** or 811.**11** (.55)
	1st contact makes 2nd contact breaks when pointer reaches set point 	821.**12** or 811.**12** (.54)
	1st contact breaks 2nd contact makes when pointer reaches set point 	821.**21** or 811.**21** (.45)
	1st and 2nd contact break when pointer reaches set point 	821.**22** or 811.**22** (.44)
Triple contacts		
	1st contact breaks 2nd contact makes 3rd contact breaks when pointer reaches set point 	821.**212** or 811.**212** (.454)

Wiring terminals are identified as per above wiring schemes.
Earth (ground) lead is identified green-yellow.

Configurations feasible in consideration of individual instruments are found on pages 16/17.

Control relays

Control relays to combine with contact model 821 and 811. These relays are intended to provide higher contact rating in such a way, that the instruments' contact only energises the relay, whereas the relay switches the process control circuit.

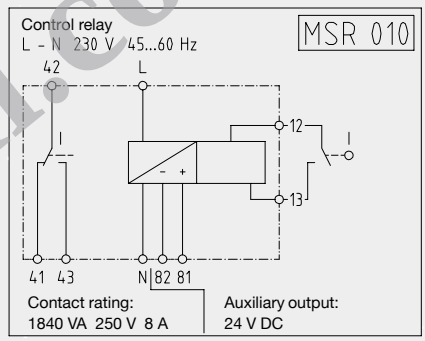
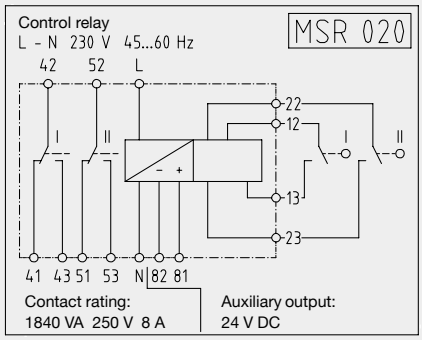
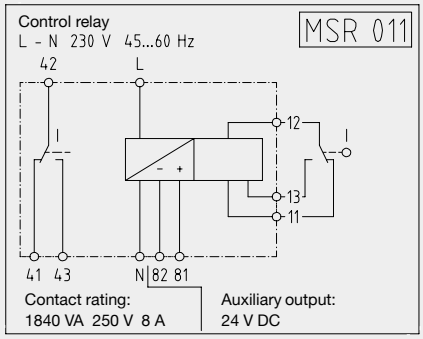
The WIKA relay "Blackbox'' is completely wired and includes a line converter of normally 230 V input voltage. Output provides one each potential free double throw contact.

The primary relay circuit is energised by means of low voltage pulsating current to provide safe operation over several million cycles.

The line converter additionally provides a 24 V/20 mA DC power source for auxiliary use.

Relay operation is particularly recommended with heavy duty liquid filled instruments. Although liquid filling considerably improves service life of the instrument itself, it inevitably also intensifies the formation of arcs.

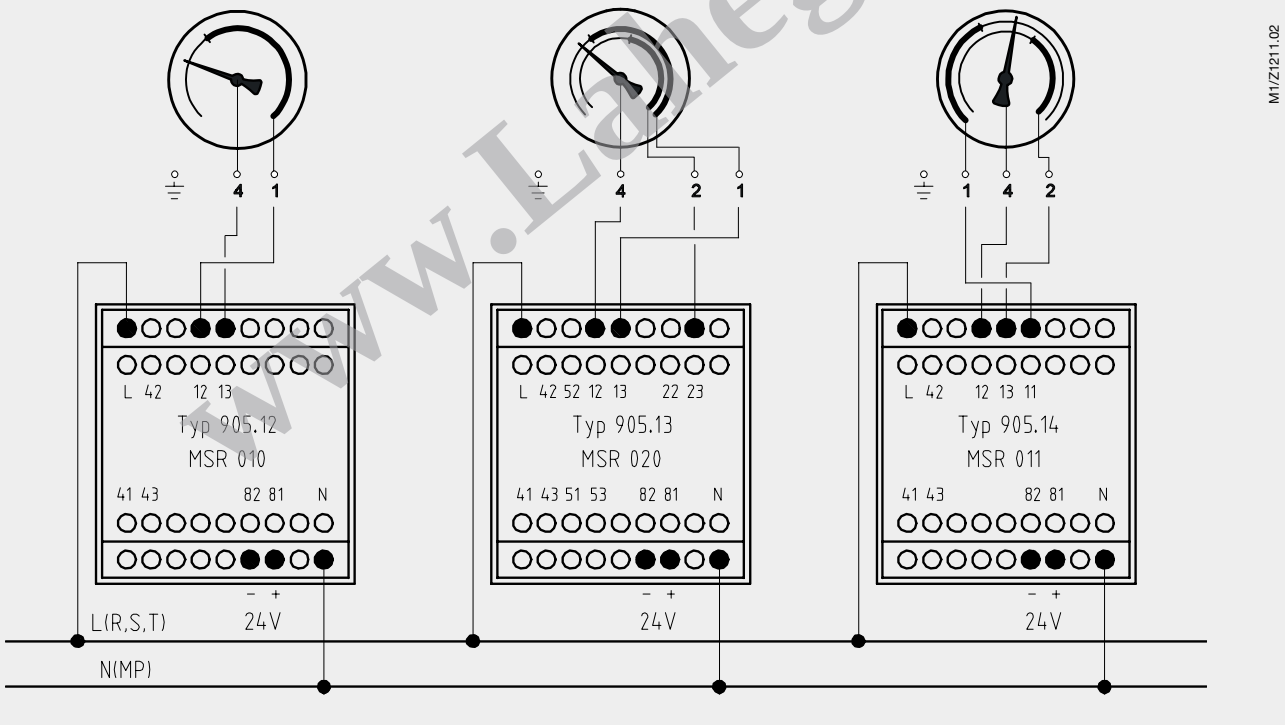
Review of available models

Model	Intended for instruments	Relay output	
905.12 **MSR 010**	with 1 contact	1 double throw contact	 1036688
905.13 **MSR 020**	with 2 contacts	2 double throw contact	 1036696
905.14 **MSR 011**	with 2 contacts (function 21 is essential)	1 double throw with flip-flop characteristic (interval switch for pump controlling)	 1036700

Control relays specifications	Model 905.12 ... 14
Line voltage	AC 230 V - 10 % / + 6 %, 45 ... 60 Hz
Consumption	ca. 2.5 VA
Pulsating current voltage	35 to 40 V
	Isolated transformer
Pulse rate	1 : 100 typically
Pulse width	250 μs typically
Relay time lag	ca. 0.5 s
Relay output	Potential free double throw or bistable flip-flop contact (see review of
	available models)
Contact rating	AC 250 V, 8 A, 1840 VA
Auxiliary output	DC 24 V
Current rating	20 mA
Wiring identification	DIN 45 410
Protection	Insulated system
Insulation class	C/250 V per VDE 0110
Enclosure size	Form C, page 11
Enclosure material	Polyamide 6.6, green
Ingress protection EN 60 529 / IEC 529	Case IP 40, Terminals IP 20
Operating temperature	0 ... +70 °C
Mounting	Snap-mounting on DIN 50 022 rail 35 x 7.5 mm
	(Surface mounting adaptor inclusive)

Control relays connection examples

Single contact Model 821	Double contact Model 821	Double contact, interval switch Model 821.21



Inductive alarm sensor contacts model 831

Service intended
WIKA inductive contacts are certified for use in hazardous areas of Zone 1 and Zone 2.
Power supply must be made by means of a power source certified intrinsically safe such as WIKA model 904.15.

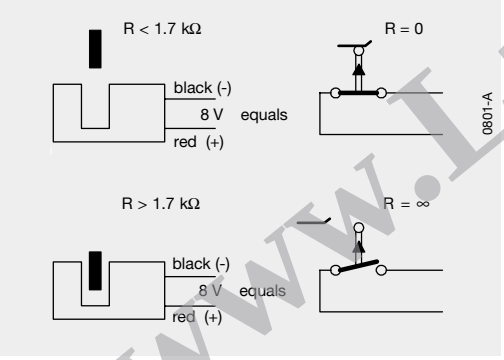
Inductive contacts are also recommended for critical non-hazardous applications where an utmost of failsafe heavy duty operation is required.

In combination with liquid filled instruments these contacts are particularly suited for process control circuits in the chemical and petroleum industry.

Operating principle
At the heart of the WIKA inductive contact system is a non-contact sensor attached to an indicating device.
Both sensor and indicator are adjustable over the full length of the scale. Contact actuation is achieved by means of a metal flag linked to the pointer of the instrument.

The metal flag affects the electric field of the sensor when the instruments' pointer overlaps with the contacts' indicator.
Contact actuation is made without any mechanical force that would affect accuracy of the instrument.

The scheme below reflects the operating principle in comparison with conventional mechanical contacts:



Dimensions of the basic instrument and provisions for contact adjustment are identical to contacts of model 821.

Operating temperature: -25 °C ... +70 °C [1)]

Used sensor (slot-type initiator):
Type SJ of the company Pepperl and Fuchs, EC-Type-Examination Certificate PTB 99 ATEX 2219 X

1) For use in hazardous areas, the upper limits for the ambient temperature mentioned in the test certificate must be complied with! These depend on voltage, current rating, power consumption and temperature class.

Advantages of the WIKA inductive system

- Long service life by means of non-contact sensor
- Very little effect on gauge accuracy
- No reduced rating with liquid filled gauges
- Fully suitable in corrosive or hazardous atmosphere (electronics resin padded)
- Ex-approved for service in hazardous area of Zone 1 or 2

Components of the WIKA inductive contact system
Operation of the inductive contact system requires an appropriate electronic power supply and control unit.

The WIKA **control unit** consists of
- Line transformer
- Amplifier circuit
- Relay to switch external circuit

The isolated line transformer provides for power supply whereas the amplifier conditions the signal of the inductive sensor to energise the output relay.

Available are two **versions of control units**
- Ex-approved **intrinsic safety**
- Standard for **non-intrinsically safe** version

The **intrinsically safe version** is offered with PTB certificate of conformity to EN 50 014 and EN 50 020 to be used with inductive contacts installed in hazardous areas of Zone 1 or Zone 2.

It may be noted that the control unit itself must be installed outside the hazardous area.

The switching characteristic of the control unit can be affected by replugging wire jumpers or sliding switches respectively. Doing so, it it possible to achieve a turnabout of the direction of action, e.g. flag matches sensor
- output relay optionally energised or de-energised.

Moreover, it is possible to add on a line break monitoring.

With **non-intrinsically safe control units**, inductive alarm contacts must not be operated in explosion hazardous areas. Their direction of action is permanently fixed. The output relay is de-energised when the flag dips into the air gap. The line break monitoring is serialised. Apart from the outputs required for the operation of the alarm contacts, there is an additional output with direct voltage 24 V (max. 20 mA). This additional output can be used, for example, to supply the operating lights.

Contact function index

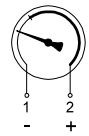
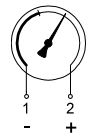
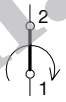
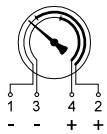
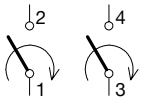
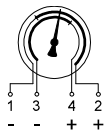
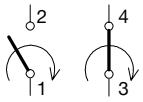
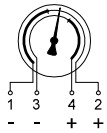
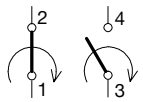
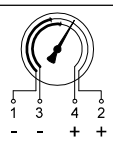
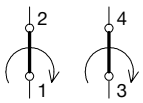
WIKA-contacts are identified by a 4- to 7-digit type code. The 3 digits to the left of the full stop indicate the model of contacts whereas 1 or more digits to the right of the full stop indicate the contact function with rising pressure, respectively, clockwise pointer motion. The number of digits right of the full stop reflects the number of contacts incorporated. The order of indices reflects the order how the contacts are arranged in clockwise direction.

The following applies as a general rule to the contact functions of model 831 in connection with our standard settings.

Index 1 Contact **makes** when the **instruments' pointer** approaches the set point **in clockwise direction**. (Flag disengages from sensor)

Index 2 Contact **breaks** when the **instruments' pointer** approaches the set point **in clockwise direction**. (Flag merges with sensor)

Note: If the alarm contacts are to be set (adjusted) anti-clockwise, the index figures in brackets have to be used in accordance with DIN 16 085. Combinations are possible.

Wiring scheme 1)	With **clockwise** pointer motion the metal flag:	Contact function (principle)	Model code and **function index** of contacts
Single contacts			
	disengages from sensor	Contact makes (NO-normally open) 	831.**1** (.5)
	merges with sensor	Contact breaks (NC-normally closed) 	831.**2** (.4)
Double contacts			
	disengages 1st and 2nd	1st and 2nd contact make 	831.**11** (.55)
	1st disengages, 2nd merges	1st contact makes, 2nd contact breaks 	831.**12** (.54)
	1st merges, 2nd disengages	1st contact breaks, 2nd contact makes 	831.**21** (.45)
	1st and 2nd merges with sensor	1st and 2nd contact breaks 	831.**22** (.44)
Triple contacts			

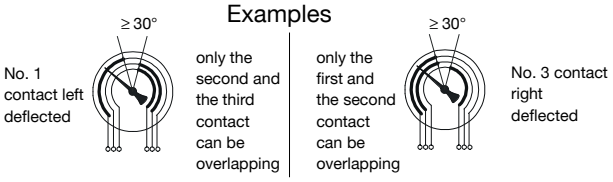
A number of instruments will also accept triple inductive contacts (see page 16/17).
Please refer to technical notes on page 9 as to feasibility of overlapping set points.
Wiring schemes and feasible characteristics are the same as above.

1) Thin line: Flag merged, circuit open.
Bold line: Rag not merged, circuit closed.

Wiring terminals are identified as per above wiring schemes.
Configurations feasible in consideration of individual instruments are found on pages 16/17.

Triple inductive contacts
With triple inductive contacts it is not feasible to set all three contacts overlapping at the same scale value. Either the left (= no. 1 contact) or the right contact (= no. 3 contact) is at an •approximate distance of 30° to the left or the right of the other two contacts, which may be set to the same value:

Examples



All feasible configurations of triple inductive contacts:

1st contact not overlapping	3rd contact not overlapping
Model	Model
831.1.11	831.11.1
831.1.12	831.11.2
831.1.21	831.12.1
831.1.22	831.12.2
831.2.11	831.21.1
831.2.12	831.21.2
831.2.21	831.22.1
831.2.22	831.22.2

Inductive contacts - Special designs

■ **Triple inductive contact NS 160, one set value for all three contacts**

If it is absolutely necessary to set all three contacts to the same value, this can be achieved with the NS 160 design using smaller control heads.
Please specify when ordering.

■ **Quadruple contacts**

The edgewise panel mounting instruments NS 144 x 72 can accept up to 4 inductive contacts (see page16).

■ **Fail safe inductive contacts models 831 SN and 831 S1N**

Safety codes require that only tested and approved parts be used in applications which play an especially important role with regard to safety.
The fail safe inductive contact models 831 SN and 831 S1N are certified for such applications. These models have to be operated together with a control unit in a safety design, for which a type test approval has also been obtained, e.g. model 904.30 KFA6-SH-Ex1 (see page 12). Fail safe inductive contacts may be used in connection with self-regulating control systems.
Furthermore, the control circuit is intrinsically safe and galvanic-isolated from supply voltage and output.
Used sensor (SN/S1N-slot-type initiator):
Type SJ of the company Pepperl and Fuchs, EC-Type-Examination Certificate PTB 00 ATEX 2049 X

Switching behaviour, model 831 SN

When the control flag is positioned within the slot initiator, the output of the series-connected control unit (0-signal) **is blocked**, i.e. the output relay **is released** / (= **alarm condition**).
Contact function indices, pointer flag behaviour and wiring schemes are identical to model 831 (see page 8).

Switching behaviour, model 831 S1N

When the control flag is positioned **outside** of the slot initiator, the output of the series-connected control unit (0-signal) **is blocked**, i.e. the output relay **is released** (= **alarm condition**).
Contact function index scheme is the same as that for model 831 SN with the following differences:

Index 1 after the contact model no. means contact **makes** when set point is reached in clockwise direction (pointer **flag retreats** into control head).
Index 2 after the contact model no. means contact **breaks** when set point is reached in clockwise direction (pointer **flag emerges** from control head).

Possible configurations as shown in the tables on pages 16/17.

■ **Electronic contact model 830 E**

Direct switching of small capacities which are usually required in connection with a PLC can be realised by this inductive alarm contact with integrated amplifier which is factory-installed into the measuring instrument.
The familiar advantages with inductive contacts, such as an especially safe contact operation, no wear at all by proximity contact operation as well as virtually no reaction on the measuring system, thus enabling the accuracy of the indication, are used in this context, too.
An additional control unit will not be necessary.
The electronic contact with 3-wire design has got a PNP output. The operating voltage is 10 ... 30 V DC. The maximum switching current is 100 mA.

Contact function index is the same as that for alarm contact model 831 with the following differences:
Index 1 after the contact model no. means **contact makes** when set point is reached in clockwise direction (pointer flag **retreats into control head**)

Index 2 after the contact model no. means **contact breaks** when set point is reached in clockwise direction (pointer flag **emerges from control head**)

Note: This operation is exactly opposite to that of model 831!
The electronic contact model 830 E is **not intrinsically safe** and therefore not suitable for applications where explosion protection is required.

See page 10 for connections, function circuit diagrams and for technical data.

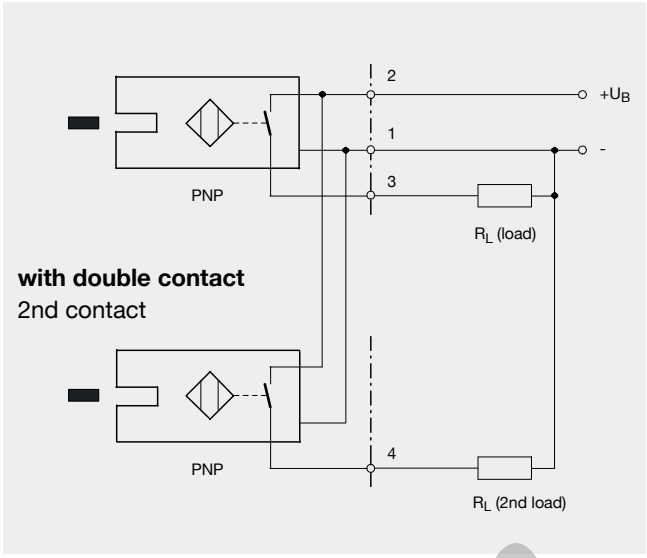
Electronic contact model 830 E

- To connect a PLC control unit or for direct switching of small capacities
- PNP transistor
  With PNP switching apparatus, the switched output is a connection towards PLUS. The load R_L between the switched output and the MINUS should be selected in a way not to exceed the maximum switching current (100 mA).
- Comments page 9

Connection and function circuit diagrams for electronic contact model 830 E
Control and switching electronics in the sensor,
electric connection via terminal box.

- Control vane emerges from slot sensor: contact breaks
  (output not active)

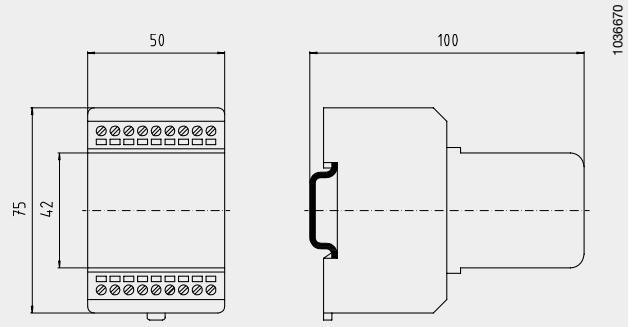
- Control vane retreats into slot sensor: contact makes
  (output active)



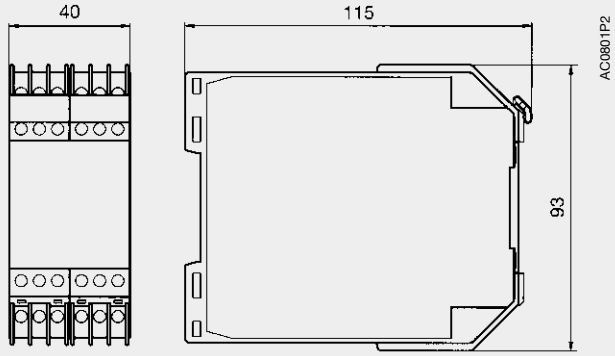
Technical data	Electronic contact Model 830 E
Range of operating voltage	DC 10 ... 30 V
Residual ripple	max. 10 %
No-load current	≤10 mA
Switching current	≤100 mA
Leakage current	≤100 µA
Function of switching element	normally open (make contact)
Type of output	PNP transistor
Voltage drop (with $I_{max.}$)	≤0.7 V
Protection against pole reversal	conditional U_B (the output 3 or 4 switch must never be set directly to minus)
Anti-inductive protection	1 kV, 0.1 ms, 1 kΩ
Oscillator frequency	approx. 1000 kHz
EMC acc.	EN 60 947-5-2
Ambient conditions	
and temperature	in accordance with measuring instrument
Installation	installed directly in the measuring instrument at the factory, maximum 2 alarm contacts

Dimensions of control units for inductive contacts

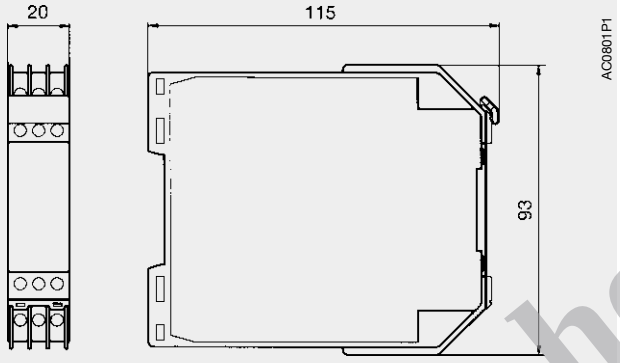
Form C



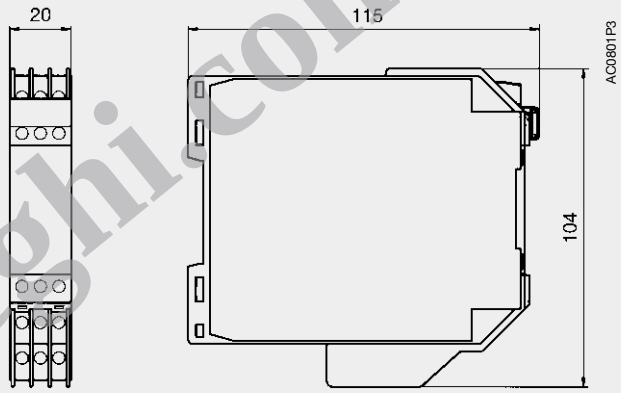
Form E



Form D



Form F

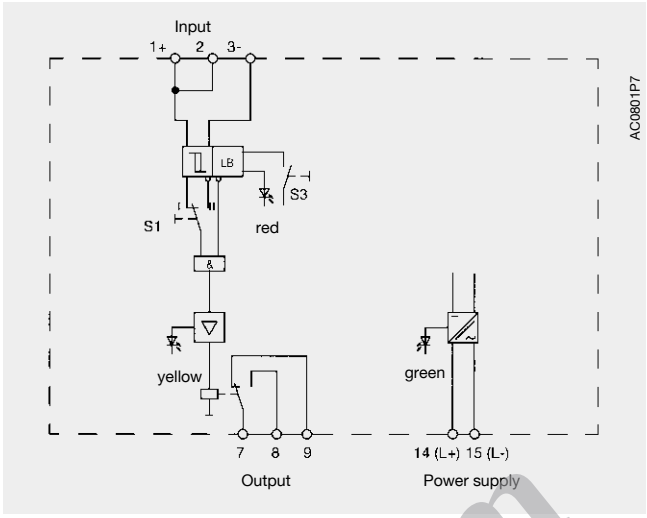


Control units for inductive contacts

Ex-certified versions (Connect. examples s. page 19)

Control unit model 904.28 KFA6-SR2-Ex1.W

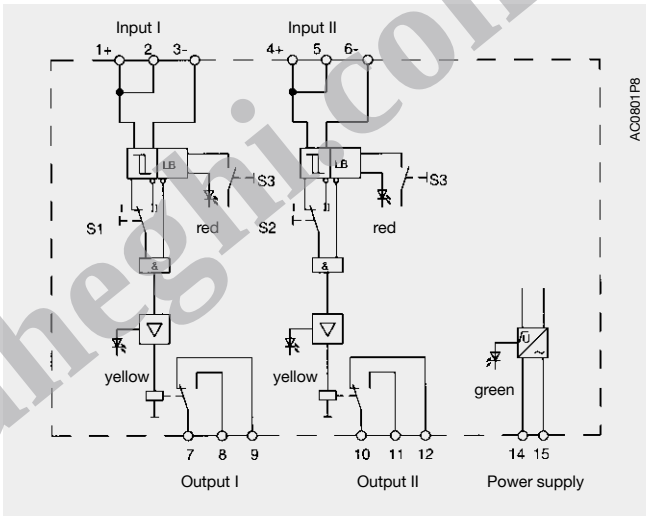
- Intended for instruments having one inductive contact incorporated
- Alarm circuit certified intrinsically safe [EEx ia] IIC to EN 50 227 and NAMUR
- Provides 1 SPDT relay output contact
- LED indicating circuit status (green), relay output (yellow) and lead breakage (red)
- Case surface-mounting type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



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 904.29 KFA6-SR2-Ex2.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



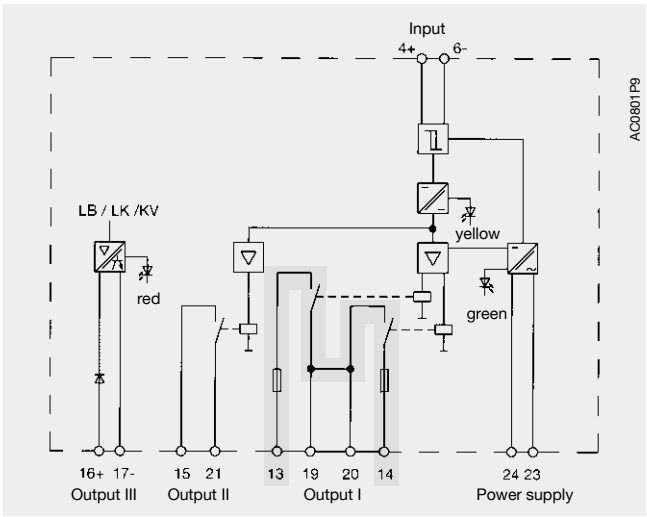
Note
Directions of action adjustable by sliding switches S1 and S2:
OPEN CIRCUIT CAUSES ALARM: switch S1 and S2 in position I
CLOSED CIRCUIT CAUSES ALARM: switch S1 and S2 in pos. II
CONTINUITY DETECTION: switch S3 in position I

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 904.30 KHA6-SH-Ex1

- 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 (yellow) and lead breakage as well as short circuit (red)
- Case surface-mounting type form E



Specifications for control units	Model 904.28 KFA6-SR2- Ex1.W	Model 904.29 KFA6-SR2- Ex2.W	Model 904.30 fail safe KHA6-SH-Ex1
Power supply			
Line voltage 1)	AC 230 V ± 0 %, 45 ... 65 Hz	AC 230 V ± 0 %, 45 ... 65 Hz	AC 85 ... 253 V, 45 ... 65 Hz
Consumption	1 VA	1.3 VA	3 VA
Input			
No. of contacts	1	2	1
Voltage (reactive)	DC 8 V	DC 8 V	DC 8.4 V
Maximum current	8 mA	8 mA	11.7 mA
Contact actuation	1.2 mA ≤I_S ≤2.1 mA	1.2 mA ≤I_S ≤2.1 mA	2.1 mA ≤I_S ≤5.9 mA
Contact hysteresis	ca. 0.2 mA	ca. 0.2 mA	
Control line impedance	100 Ohm	100 Ohm	50 Ohm
Ex-IS data (as PTB-certified)	PTB 00 ATEX 2081	PTB 00 ATEX 2081	PTB 00 ATEX 2043
Voltage	U_O ≤DC 10.6 V	U_O ≤DC 10.6 V	U_O ≤DC 9.6 V
Current	I_O ≤19.1 mA	I_O ≤19.1 mA	I_O ≤19.1 mA
Power rating	P_O ≤51 mW	P_O ≤51 mW	P_O ≤55 mW
IS-classification	[EEx ia] IIC	[EEx ia] IIC	[EEx ia] IIC
Ext. capacitance	2.9 µF	2.9 µF	650 nF
Ext. inductance	100 mH	100 mH	5 mH
Output			
Relay contacts	1 SPDT	1 ea. SPDT	1 safety directed relay output
Contact rating AC	253 V, 2 A, 500 VA, cosφ > 0.7	253 V, 2 A, 500 VA, cosφ > 0.7	250 V, 1 A, cos φ > 0.7
Contact rating DC	40 V, 2 A; ohmic	40 V, 2 A; ohmic	24 V, 1 A; ohmic
Delay making circuit	approx. 20 ms	approx. 20 ms	20 ms
Delay breaking circuit	approx. 20 ms	approx. 20 ms	20 ms
Max. ON-OFF frequency	10 Hz	10 Hz	5 Hz
Operating conditions			
Min. temperature	- 20 °C	- 20 °C	- 20 °C
Max. temperature	+ 60 °C	+ 60 °C	+ 60 °C
Max. humidity	max. 75%	max. 75%	max. 75%
Ingress protection	IP 20 (EN 60 529 / IEC529)	IP 20 (EN 60 529 / IEC529)	IP 20 (EN 60 529 / IEC529)
Enclosure			
Style	Surface mounting	Surface mounting	Surface mounting
Dimensions per drawing	Form D, page 11	Form F, page 11	Form E, page 11
Mounting	Snap-fit on 35 mm x 7.5 mm (EN 50 022) rail. Direct mounting feasible.		
Weight	approx. 0.15 kg	approx. 0.15 kg	approx. 0.28 kg
Product no.	2014505	2014521	2014548

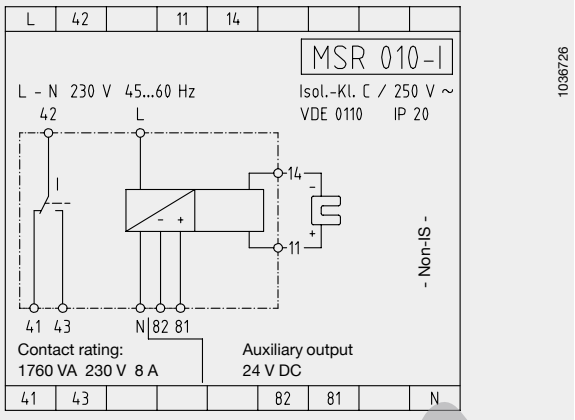
Control units for inductive contacts

Non-Ex-certified versions

(Connection examples see page 19)

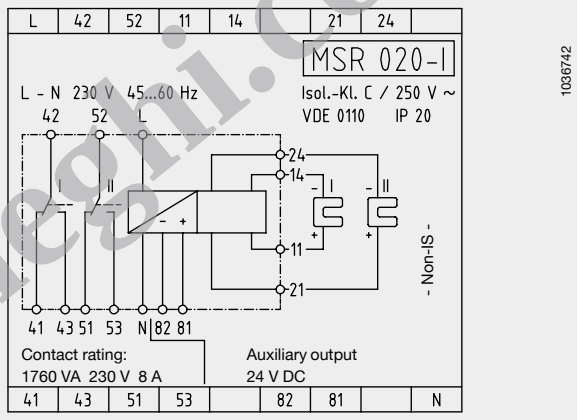
Control unit model 904.25 MSR 010-I

- Intended for instruments having one inductive contact
- Provides 1 SPDT relay output contact
- Surface mounting enclosure of form C



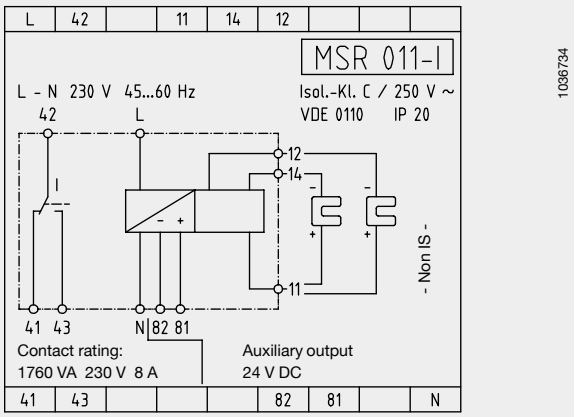
Control unit model 904.26 MSR 020-I

- 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



Control unit model 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



Specifications for control units	Model 904.25 MSR 010-I	Model 904.26 MSR 020-I	Model 904.27 MSR 011-I
Power supply			
Line voltage	AC 230 V - 10% / +6%, 45 ... 60 Hz		
Consumption 1)	approx. 2.5 VA		
Input			
No. of contacts	1	2	2
Voltage	DC 8.5 V (typical)		
Maximum current	I_K approx. 5 mA		
Contact actuation	1.5 mA typical		
Contact hysteresis	approx. 0.2 mA		
Output			
Relay contacts	1 SPDT	1 ea. SPDT	2 SPDT
Contact rating AC	AC 230 V / 8 A / 1760 VA		
Delay making circuit	approx. 10 ms		
Delay breaking circuit	approx. 10 ms		
Auxiliary output	DC 24 V max. 20 mA		
Operating conditions			
Min. temperature	0 °C		
Max. temperature	+70 °C		
Max. humidity	max. 75%		
Ingress protection	Case IP 40 / terminals IP 20 (EN 60 529 / IEC 529)		
Enclosure			
Dimensions per drawing	Form C, page 11		
Material	Polyamide 6.6, green		
Mounting	Snap-fit on 35 x 7.5 mm DIN 50 022 rail. Direct mounting feasible.		
Weight	approx. 0.24 kg	approx. 0.27 kg	approx. 0.24 kg

Incorporating contacts into pressure gauges

Number of contacts, size of instrument (NS) and minimum scale value

Pressure gauge Model	NS	Wiring	Magnetic snap-action contacts Model 821				Inductive alarm sensors Model 831			
			Number of contact sets				Number of contact sets			
			1	2	3	4 [2]	1	2	3 [3]	4
			Minimum scale value in bar				Minimum scale value in bar			
212.20	100	A	1	1.6	4	4	1	1.6	1.6	-
232.20	100	A	1	1.6	4	4	1	1.6	1.6	-
232.50	160	A	1	1.6	2.5	2.5	0.6	1	1.6	-
233.50	160	A	1	1.6	2.5	2.5	0.6	1	1.6	-
232.30	100	A	1	1.6	4	4	1	1.6	1.6	-
233.30	160	B	1	1.6	2.5	2.5	0.6	1	1.6	-
232.36	100	A	1	1.6	4	4	1	1.6	1.6	-
214.11 single system	96x96	C	1	1.6	4	-	1	1	-	-
214.11 single system	144x144	D	1	1.6	2.5	-	1	1	-	-
214.11 single system	144x72	D	1	1.6	-	-	0.6	0.6	0.6	0.6
214.11 double system	144x72	D	-	-	-	-	0.6	0.6	-	-
312.20	160	A	1 [5]	1 [5]	1.6 [5]	1.6 [5]	1	1	1.6	-
332.30	160	B	1 [5]	1 [5]	1.6 [5]	1.6 [5]	1	1	1.6	-
333.30	160	B	-	-	-	-	1	1	1.6	-
4X2.12	100	A	0.025	0.025	0.025	0.025	0.025	0.025	0.025	-
4X3.12	100	A	0.025	0.025	0.025	0.025	0.025	0.025	0.025	-
422.20 [4]	100, 160	A	0.025	0.025	0.04	0.04	0.025	0.025	0.025	-
423.20 [4]	100, 160	A	0.025	0.025	0.04	0.04	0.025	0.025	0.025	-
4X2.30 [4]	100	A	0.025	0.025	0.04	0.04	0.025	0.025	0.025	-
4X2.30 [4]	160	B	0.025	0.025	0.04	0.04	0.025	0.025	0.025	-
4X3.30 [4]	100	A	0.025	0.025	0.04	0.04	0.025	0.025	0.025	-
4X3.30 [4]	160	B	0.025	0.025	0.04	0.04	0.025	0.025	0.025	-
4X2.50 [4]	100, 160	A	0.025	0.025	0.04	0.04	0.025	0.025	0.025	-
4X3.50 [4]	100, 160	A	0.025	0.025	0.04	0.04	0.025	0.025	0.025	-
432.36 [4]	100	A	0.025	0.025	0.04	0.04	0.025	0.025	0.025	-
432.36 [4]	160	B	0.025	0.025	0.04	0.04	0.025	0.025	0.025	-
433.36 [4]	100	A	0.025	0.025	0.04	0.04	0.025	0.025	0.025	-
433.36 [4]	160	B	0.025	0.025	0.04	0.04	0.025	0.025	0.025	-
432.56 [4]	100, 160	A	0.025	0.025	0.04	0.04	0.025	0.025	0.025	-
433.56 [4]	100, 160	A	0.025	0.025	0.04	0.04	0.025	0.025	0.025	-
532.52	100, 160	A	0.04	0.04	0.04	0.04	0.04	0.04	0.04	-
532.53	100, 160	A	0.04	0.04	0.04	0.04	0.04	0.04	0.04	-
532.54	100, 160	A	0.025	0.025	0.04	0.04	0.025	0.025	0.025	-
614.11	144x72	D	-	-	-	-	0.04	0.04	-	-
632.51	100, 160	A	0.0025	0.0025	-	-	0.0025	0.0025	0.0025	-
711.11	160	A	1	1.6	4	-	1	1	-	-
711.12	100, 160	A	1	1.6	4	-	1	1	-	-
712.20 [4]	100, 160	A	0.025	0.025	0.04	0.04	0.025	0.025	0.025	-
713.20 [4]	100, 160	A	0.025	0.025	0.04	0.04	0.025	0.025	0.025	-
732.02	100	A	1	1.6	4	-	1	1	-	-
732.12	100, 160	A	0.06	0.06	0.1	0.1	0.06	0.06	0.1	-
732.14	100, 160	A	0.06	0.06	0.1	0.1	0.06	0.06	0.1	-
733.12	100, 160	A	0.06	0.06	0.1	0.1	0.06	0.06	0.1	-
733.14	100, 160	A	0.06	0.06	0.1	0.1	0.06	0.06	0.1	-
732.51 [4]	100, 160	A	0.025	0.025	0.04	0.04	0.025	0.025	0.025	-
736.51	100, 160	A	0.0025 [1]	0.0025 [1]	-	-	0.0025	0.0025	0.0025	-

1) Inquire feasibility when intended for flammable gases
2) It is not feasible to set all 4 contacts overlapping.
Either the no.1 or the no. 4 contact remains at a minimum distance of
30° with 100 mm gauges
15° with 160 mm gauges.
However, a special version of 160 mm gauges is available upon request.
3) With round case gauges it is not feasible to set all contacts overlapping.
Either the no.1 or the no.3 contact remains at a minimum distance of 30° from the other two. However, a special version of 160 mm gauges is available upon request.
See also page 9.
4) Pressure range 0 ... 0.025 bar: class 2.5
5) Without magnet

Incorporating contacts into thermometers

Number of contacts and size of instrument (NS)

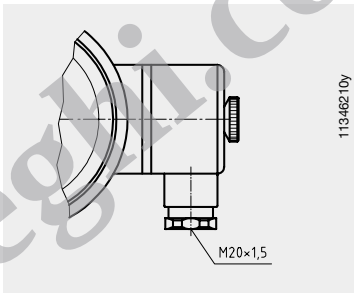
Thermometer Model	NS	Wiring	Magnetic snap-action cont. Model 821			Sliding contacts 1) Model 811			Inductive alarm sensors Model 831		
			Number of contact sets			Number of contact sets			Number of contact sets		
			1	2	3	1	2	3	1	2	3
55	100	A	on inquiry		x	x	x	x	x	x	
55	160	B	on inquiry		x	x	x	x	x	x	
73	100	E	x	x	x	x	x	x	x	x	-
73	160	E	x	x	x	x	x	x	x	x	x
73	144x144	D	x	x	on inquiry	x	x	on inquiry	x	x	on inquiry

1) Not for liquid dampened gauges

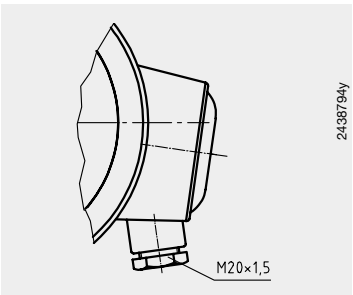
Wiring index as indicated in column "wiring"

The letter indicates the standard wiring method of pressure gauges and thermometers incorporating 1 or 2 contacts. "Left" or "right" refers to an observer facing the dial of the instrument.

A Junction box at right-hand side of the instrument.
Material: Black PA 6-Nylon
Ingress protection: IP 65
Suitable temperature: -40 °C to +80 °C
Insulation: Group C / 250 V
Approval reference: VDE 0110
Entry: M20x1.5 bottom entry cable gland with retainer clamp, 6 + PE(Earth) terminals
Wiring: 2.5 mm² to accept stranded wire



B Junction box at right-hand side of the instrument.
Material: Black PA 6-Nylon
Ingress protection: IP 65
Suitable temperature: -40 °C to +80 °C
Insulation: Group C / 250 V
Approval reference: VDE 0110
Entry: M20x1.5 bottom entry cable gland with retainer clamp, 4 + PE(Earth) terminals
Wiring: 2.5 mm² to accept stranded wire



C Block of terminals 2.5 mm² to accept stranded wire at back of case

D Block of rack-mounting terminals
DIN 41 611 / VDE 0110,
2.5 mm² insulation group C at back of case

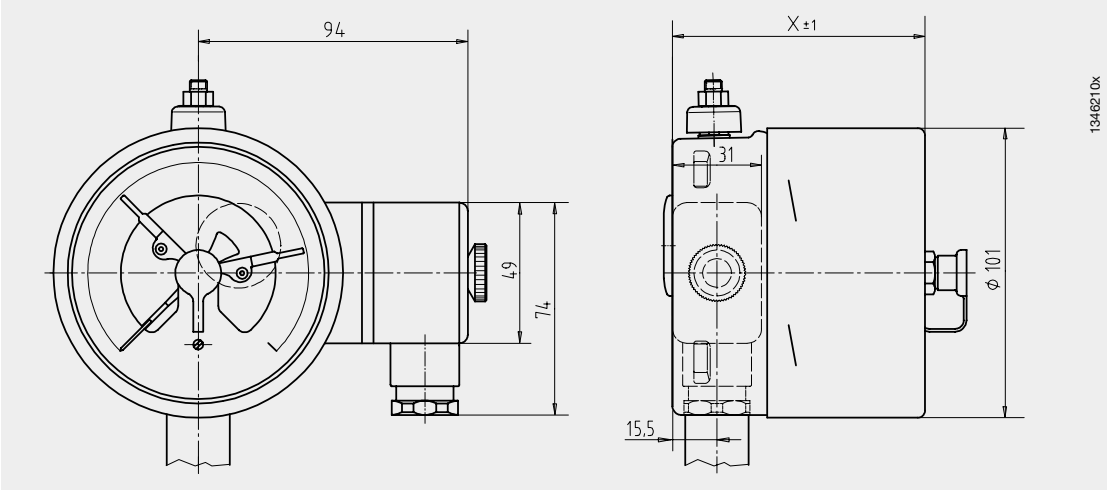
E Junction box as A, but mounted at left-hand side of case

Wiring of instruments incorporating 3 or more contacts and special versions of contacts may vary, depending on size and specifications of the instrument. Please inquire.

Optional: Plug connection (e.g. DIN 43 650, DIN 43 651) on inquiry

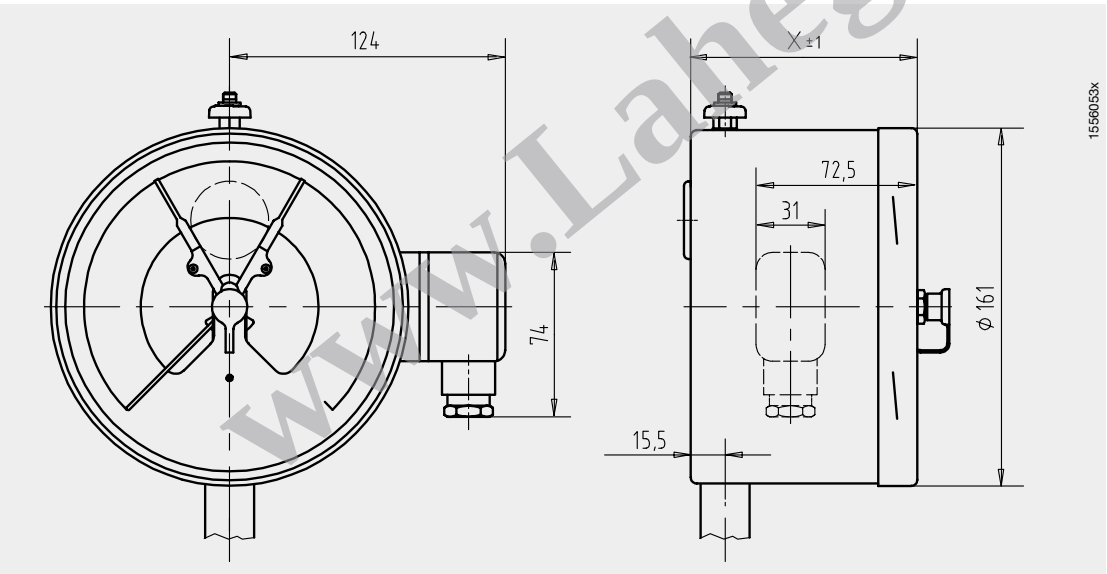
Dimensions in mm (Examples)

Gauge with contacts NS 100



Kind of contact	Dimension X in mm
Single or double contacts	88
Double contacts (change-over)	113
Triple contacts	96
Quadruple contacts	113

Gauge with contacts NS 160

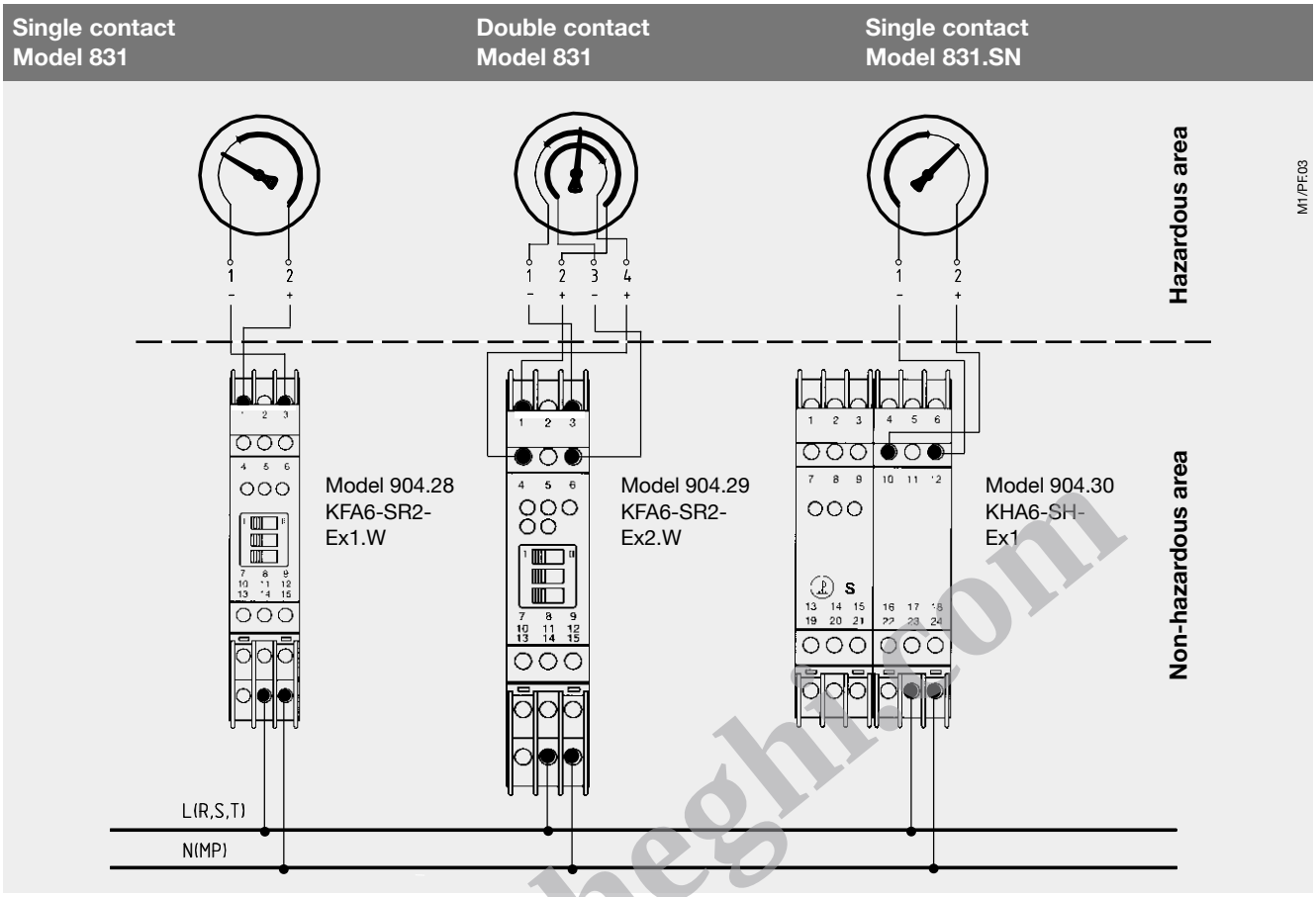


Kind of contact	Scale range	Dimension X
Single or	up to 0 ... 60 bar 1)	102 mm
double contacts	≥ 0 ... 100 bar	116 mm
Triple or	up to 0 ... 60 bar 1)	116 mm
Quadruple contacts	≥ 0 ... 100 bar	129.5 mm

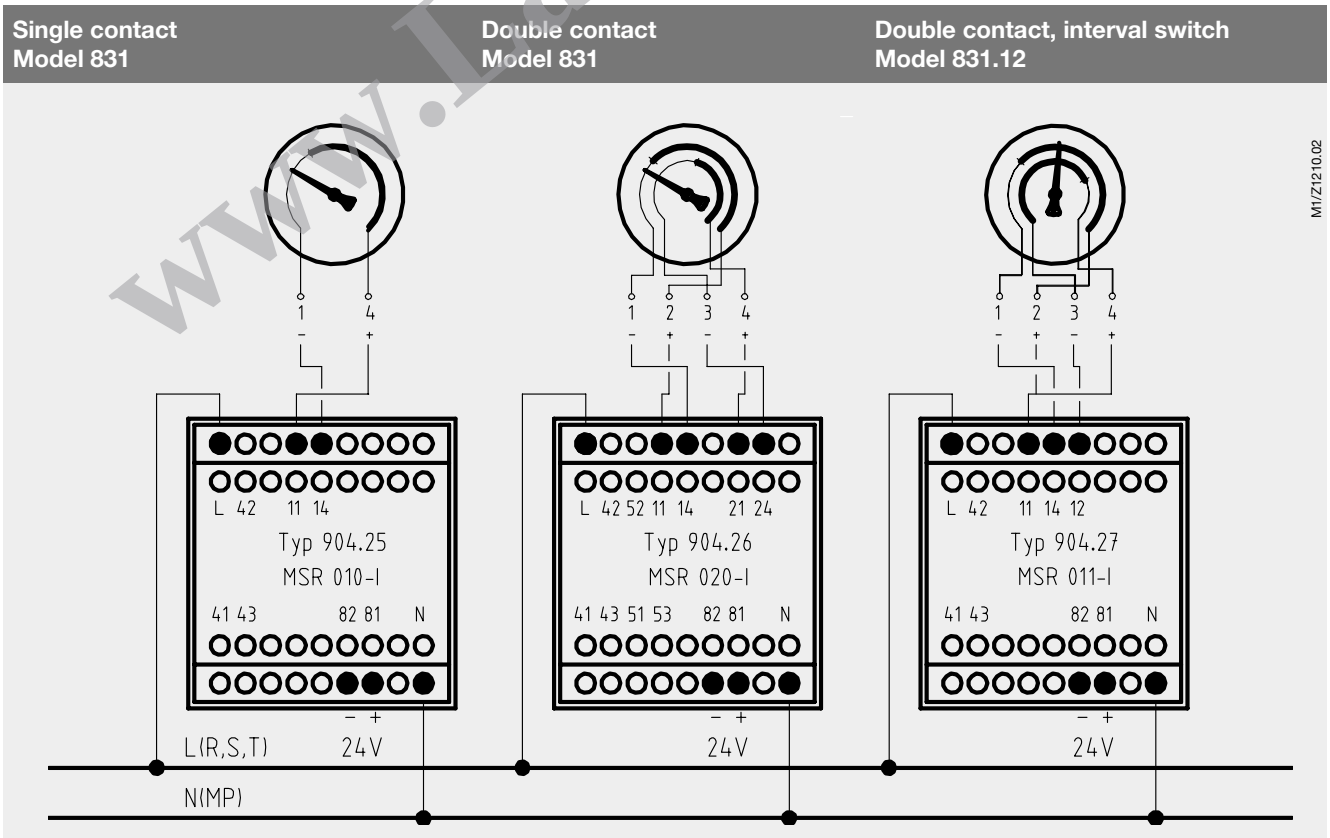
1) also for thermometers

Connection examples for inductive alarm sensors

Ex version, with control units model 904.28/29/30, K*A6-SR2(SH)-Ex



Non-Ex version, with control units model 904.2X



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