

Electrical Alarm Contacts

- Model 821, Magnetic Snap-Action Contacts
- Model 831, Inductive Alarm Sensors
- Model 830 E, Electronic Contacts

WIKA Data Sheet AC 08.01

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

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
- Electronic contact for PLC

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.



Pressure Gauge Model 212.20.100
with Electrical Alarm Contact Model 821



Thermometer
with Electrical Alarm Model 55
Contact Model 831

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

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 | | Sliding contact model 811 |
|--|---|----------------------|---------------------------|
| | dry gauges | liquid filled gauges | 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 |
| Continuous 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 | | | Sliding contact model 811 | | |
|---------------------------------|--|----------------------|----------------------|---------------------------|------------|----------------------|
| | dry gauges | | liquid filled gauges | dry gauges | | |
| | ohmic load | inductive load | ohmic load | inductive load | ohmic load | inductive load |
| | DC | AC | DC | AC | DC | AC |
| V | mA | mA | mA | mA | mA | mA |
| | | $\cos \varphi > 0.7$ | | $\cos \varphi > 0.7$ | | $\cos \varphi > 0.7$ |
| 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 |
| | | | | | 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 or 2 | ≥ 100 mbar | 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.

| Single contacts | | |
|-----------------|---|--|
| Wiring scheme | Clockwise pointer motion Contact function | Model code and function index for magnetic snap-action contacts or sliding contacts (special version) |
| | 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.

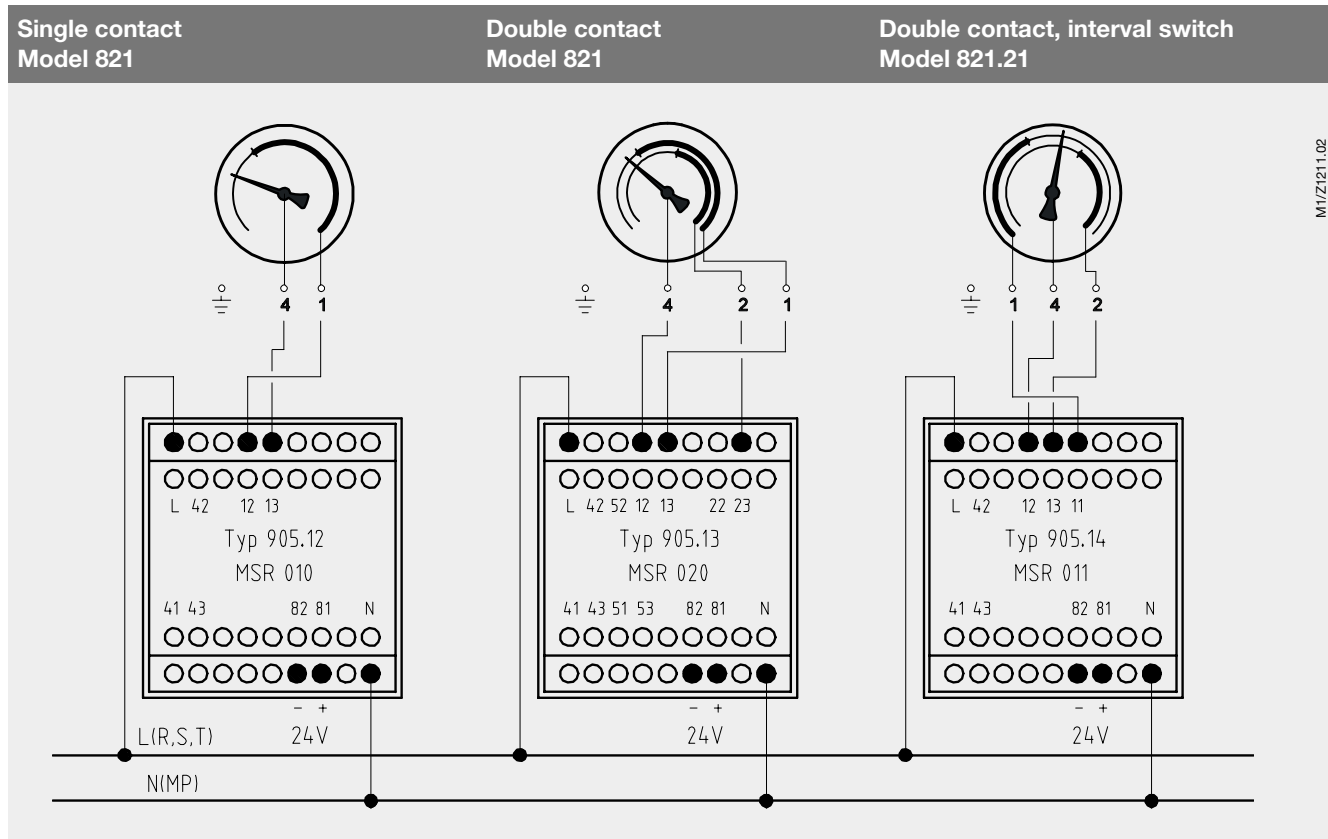
Relay operation is particularly recommended with heavy duty liquid filled instruments. Although liquid filling considerably improves service life of the instrument itself, it inevitably also intensifies the formation of arcs.

Review of available models

| Model | Intended for instruments | Relay output | |
|---------------------------------|---|--|---|
| 905.12 MSR 010 | with 1 contact | 1 double throw contact | <p>Control relay L - N 230 V 45..60 Hz</p> <p>MSR 010</p> <p>42 L</p> <p>41 43 N 82 81</p> <p>Contact rating: 1840 VA 250 V 8 A</p> <p>Auxiliary output: 24 V DC</p> |
| 905.13 MSR 020 | with 2 contacts | 2 double throw contact | <p>Control relay L - N 230 V 45..60 Hz</p> <p>MSR 020</p> <p>42 52 L</p> <p>41 43 51 53 N 82 81</p> <p>Contact rating: 1840 VA 250 V 8 A</p> <p>Auxiliary output: 24 V DC</p> |
| 905.14 MSR 011 | with 2 contacts (function 21 is essential) | 1 double throw with flip-flop characteristic (interval switch for pump controlling) | <p>Control relay L - N 230 V 45..60 Hz</p> <p>MSR 011</p> <p>42 L</p> <p>41 43 N 82 81</p> <p>Contact rating: 1840 VA 250 V 8 A</p> <p>Auxiliary output: 24 V DC</p> |

| 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 μ s 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



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.

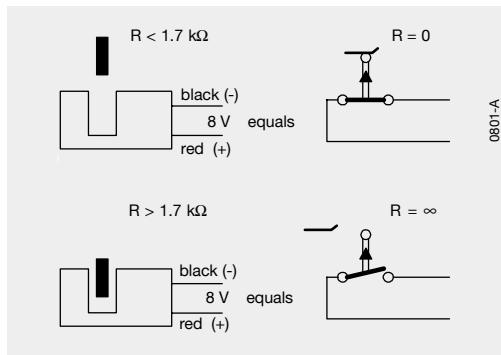
Operating principle

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: $-25 \text{ }^\circ\text{C} \dots +70 \text{ }^\circ\text{C}$ ¹⁾

Used sensor (slot-type initiator): Type SJ of the company Pepperl and Fuchs, EC-Type-Examination Certificate PTB 99 ATEX 2219 X and ZELM 03 ATEX 0128 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 is 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.

| Single contacts | | | |
|-----------------------------|--|--|--|
| Wiring scheme ¹⁾ | With clockwise pointer motion the metal flag: | Contact function (principle) | Model code and function index of 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.

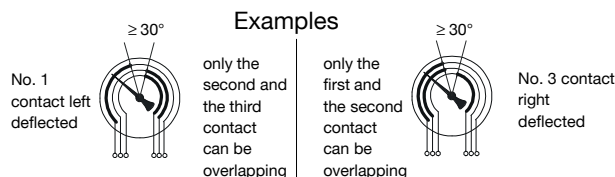
1) Thin line: Flag merged, circuit open.
Bold line: Flag not merged, circuit closed.

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:



All feasible configurations of triple inductive contacts:

| 1st contact | 3rd contact |
|-----------------|-----------------|
| not overlapping | 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

■ 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 and ZELM 03 ATEX 0128 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.

■ 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 page 16).

Electronic contact model 830 E

Description, Application

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 PNP output can be selected in either 2- or 3-wire design. The operating voltage is 10 ... 30 V DC. The maximum switching current is 100 mA.

The electronic contact model 830 E is **not intrinsically safe** and therefore not suitable for applications where explosion protection is required.

See page 11 for further technical data.

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**)

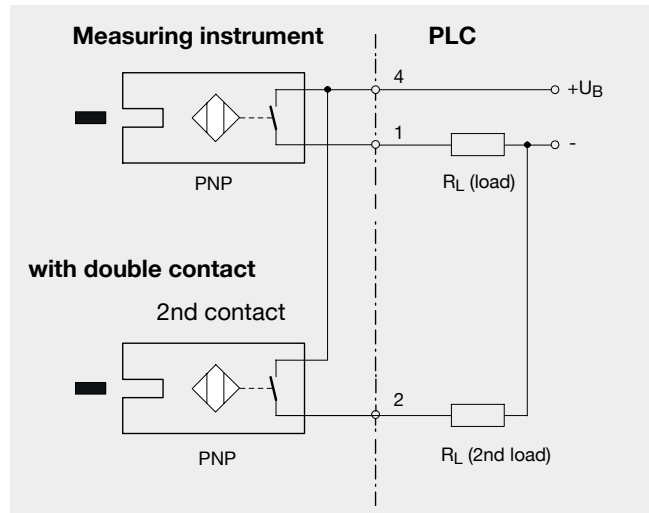
Note: This operation is exactly opposite to that of model 831!

Wiring details

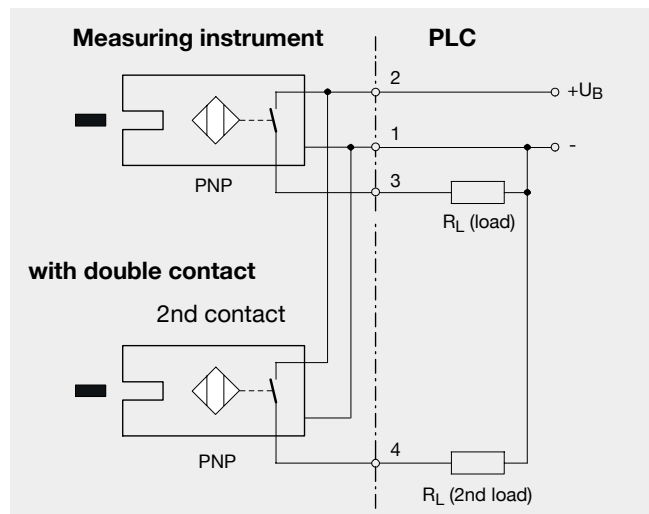
Control and switching electronics in the sensor, electric connection via terminal box.

- 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).
- Control vane emerges from slot sensor: contact breaks (output not active)
- Control vane retreats into slot sensor: contact makes (output active)

2-wire system

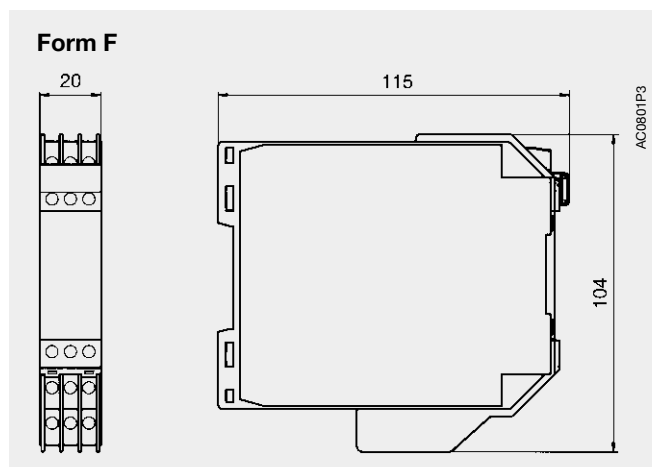
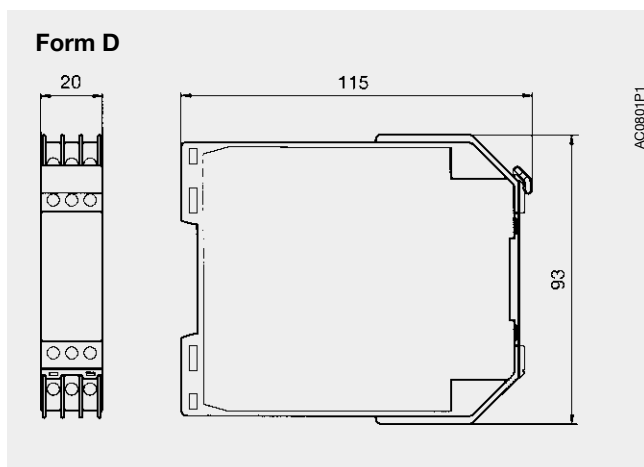
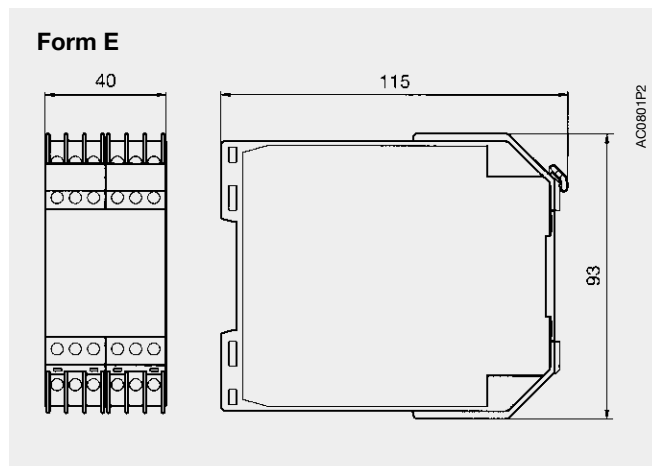
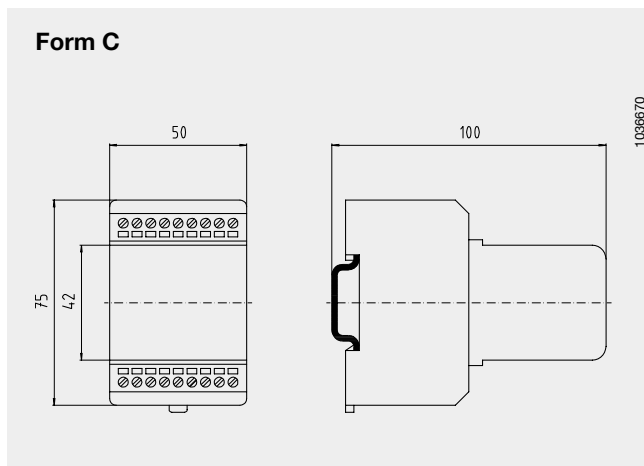


3-wire system



| 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



Control units for inductive contacts

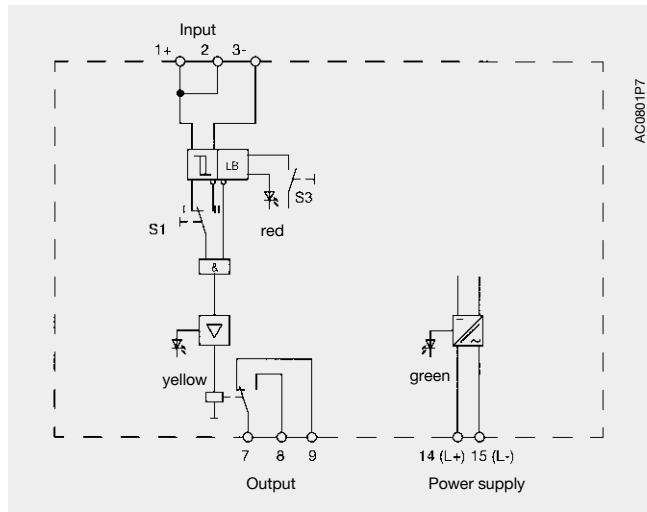
Ex-certified versions (Connect. examples s. page 19)

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

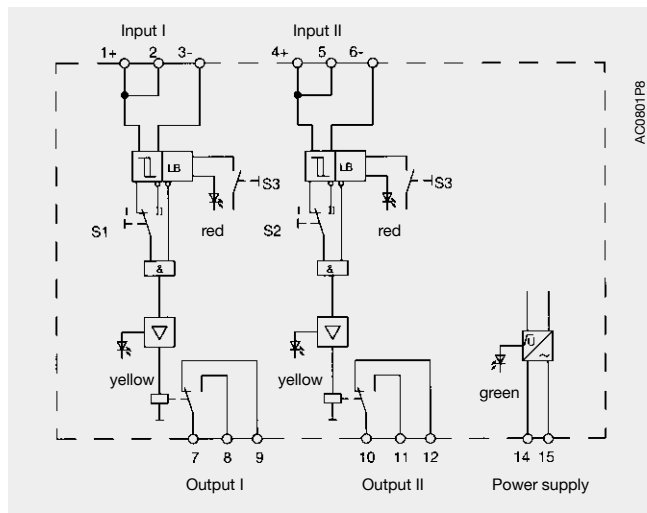


Control unit model 904.29 KFA6-SR2-Ex2.W

- 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

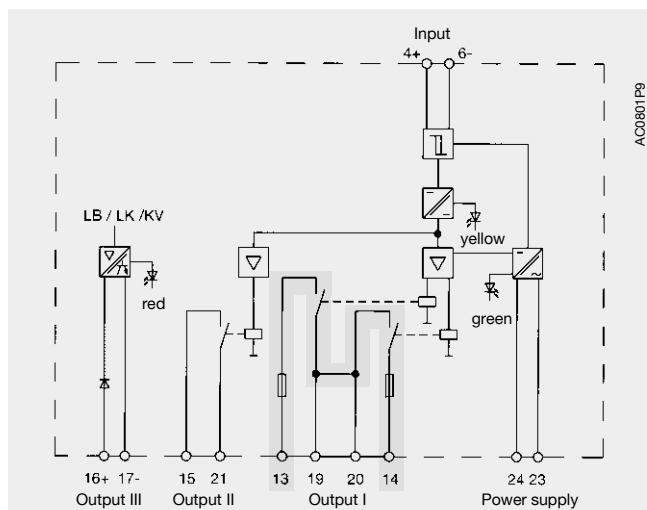


Fail safe control unit

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 \pm 0 %, 45 ... 65 Hz | AC 230 V \pm 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 \leq $I_s \leq$ 2.1 mA | 1.2 mA \leq $I_s \leq$ 2.1 mA | 2.1 mA \leq $I_s \leq$ 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 | $U_o \leq$ DC 10.6 V | $U_o \leq$ DC 10.6 V | $U_o \leq$ DC 9.6 V |
| Current | $I_o \leq$ 19.1 mA | $I_o \leq$ 19.1 mA | $I_o \leq$ 19.1 mA |
| Power rating | $P_o \leq$ 51 mW | $P_o \leq$ 51 mW | $P_o \leq$ 55 mW |
| IS-classification | [EEx ia] IIC | [EEx ia] IIC | [EEx ia] IIC |
| Ext. capacitance | 2.9 μ F | 2.9 μ F | 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, $\cos \varphi > 0.7$ | 253 V, 2 A, 500 VA, $\cos \varphi > 0.7$ | 250 V, 1 A, $\cos \varphi > 0.7$ |
| 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 |

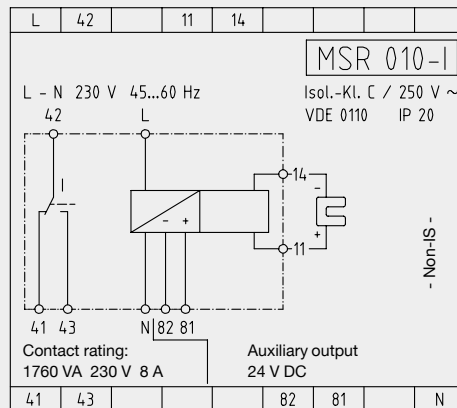
Control units for inductive contacts

Non-Ex-certified versions

(Connection examples see page 19)

Control unit model 904.25 MSR 010-I

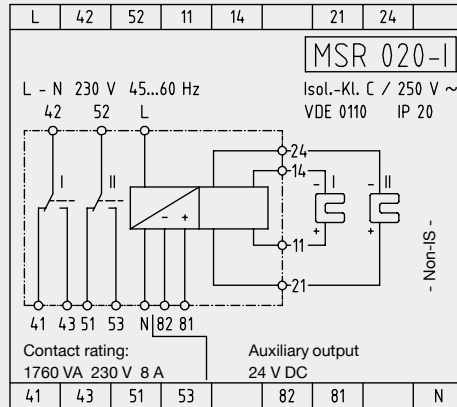
- Intended for instruments having one inductive contact
- Provides 1 SPDT relay output contact
- Surface mounting enclosure of form C



1036726

Control unit model 904.26 MSR 020-I

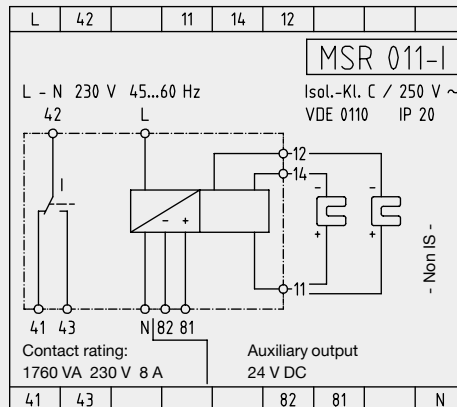
- Intended for 1 instrument having two contacts or two instruments each having one contact
- Provides 2 SPDT relay output contacts
- Surface mounting enclosure of form C



1036742

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



1036734

| 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 Electronic contact Model 830 E 1) | | | |
|----------------------|---------------|--------|---|-----------|--------|--------|---|--------|--------|-----|
| | | | 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, 160 | A | 1 | 1.6 | 4 | 4 | 1 | 1.6 | 1.6 | - |
| 232.20 | 100, 160 | A | 1 | 1.6 | 4 | 4 | 1 | 1.6 | 1.6 | - |
| 232.50 | 100, 160 | A | 1 | 1.6 | 2.5 | 2.5 | 0.6 | 1 | 1.6 | - |
| 233.50 | 100, 160 | A | 1 | 1.6 | 2.5 | 2.5 | 0.6 | 1 | 1.6 | - |
| 232.30, 233.30 | 100 | A | 1 | 1.6 | 4 | 4 | 1 | 1.6 | 1.6 | - |
| 232.30, 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, 160 | A | 0.025 | 0.025 | 0.025 | 0.025 | 0.025 | 0.025 | 0.025 | - |
| 4X3.12 | 100, 160 | 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 | 96x96, 144x72 | D | - | - | - | - | 0.04 | 0.04 | - | - |
| 61X.20 | 100 | A | - | - | - | - | 0.1 | 0.1 | - | - |
| 6XX.50 | 100 | A | - | - | - | - | 0.1 | 0.1 | - | - |
| 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 6) | 0.0025 6) | - | - | 0.0025 | 0.0025 | 0.0025 | - |

1) Electronic contact model 830 E only 1 or 2 contacts

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

6) Inquire feasibility when intended for flammable gases

Incorporating contacts into thermometers

Number of contacts and size of instrument (NS)

| Thermometer Model | NS | Wiring | Magnetic snap-action contacts Model 821 | | | Sliding contacts ¹⁾ Model 811 | | | Inductive alarm sensors Mod. 831 Electronic contact Model 830 E ²⁾ | | |
|-------------------|---------|--------|---|---|------------|--|---|------------|---|---|------------|
| | | | 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

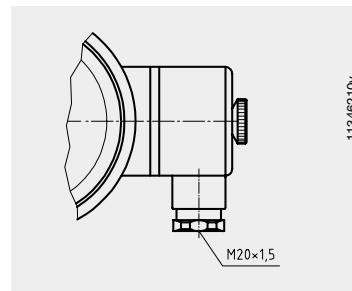
2) Electronic contact model 830 E only 1 or 2 contacts

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.

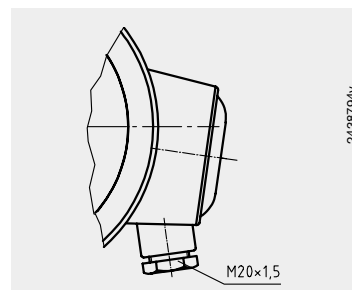
A Junction box at right-hand side of the instrument.

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

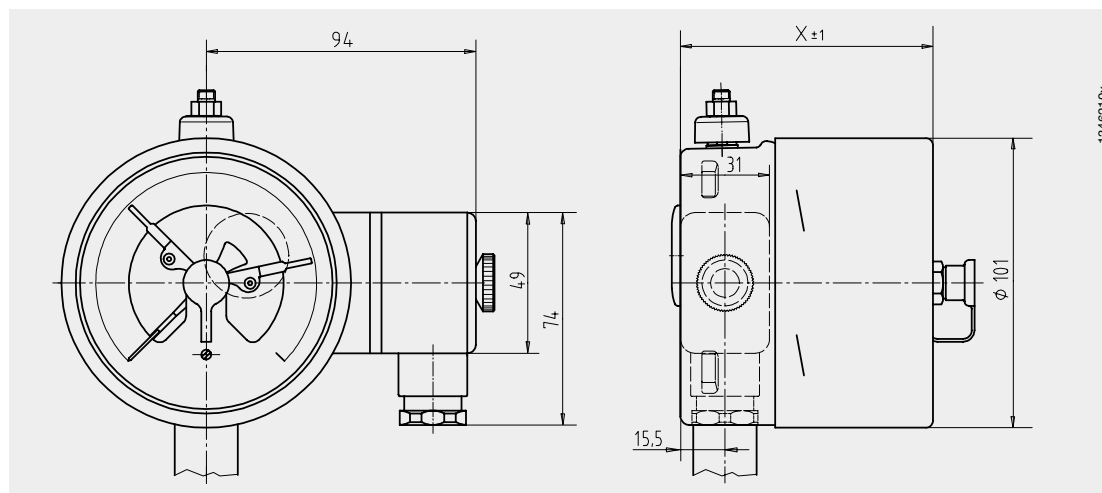
E Junction box as A, but mounted at left-hand side of case

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

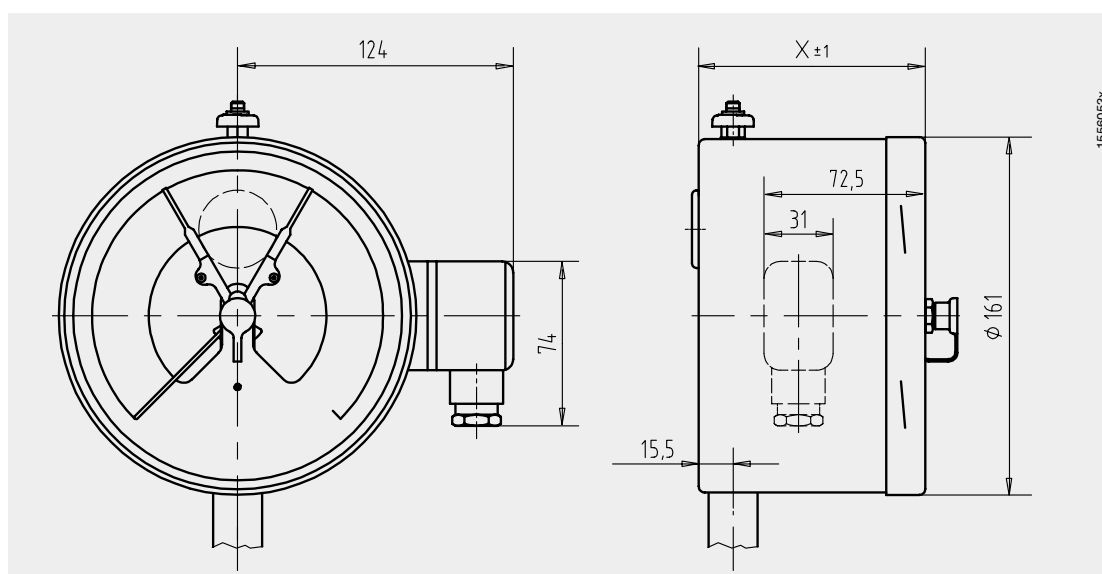
Dimensions in mm (Examples)

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

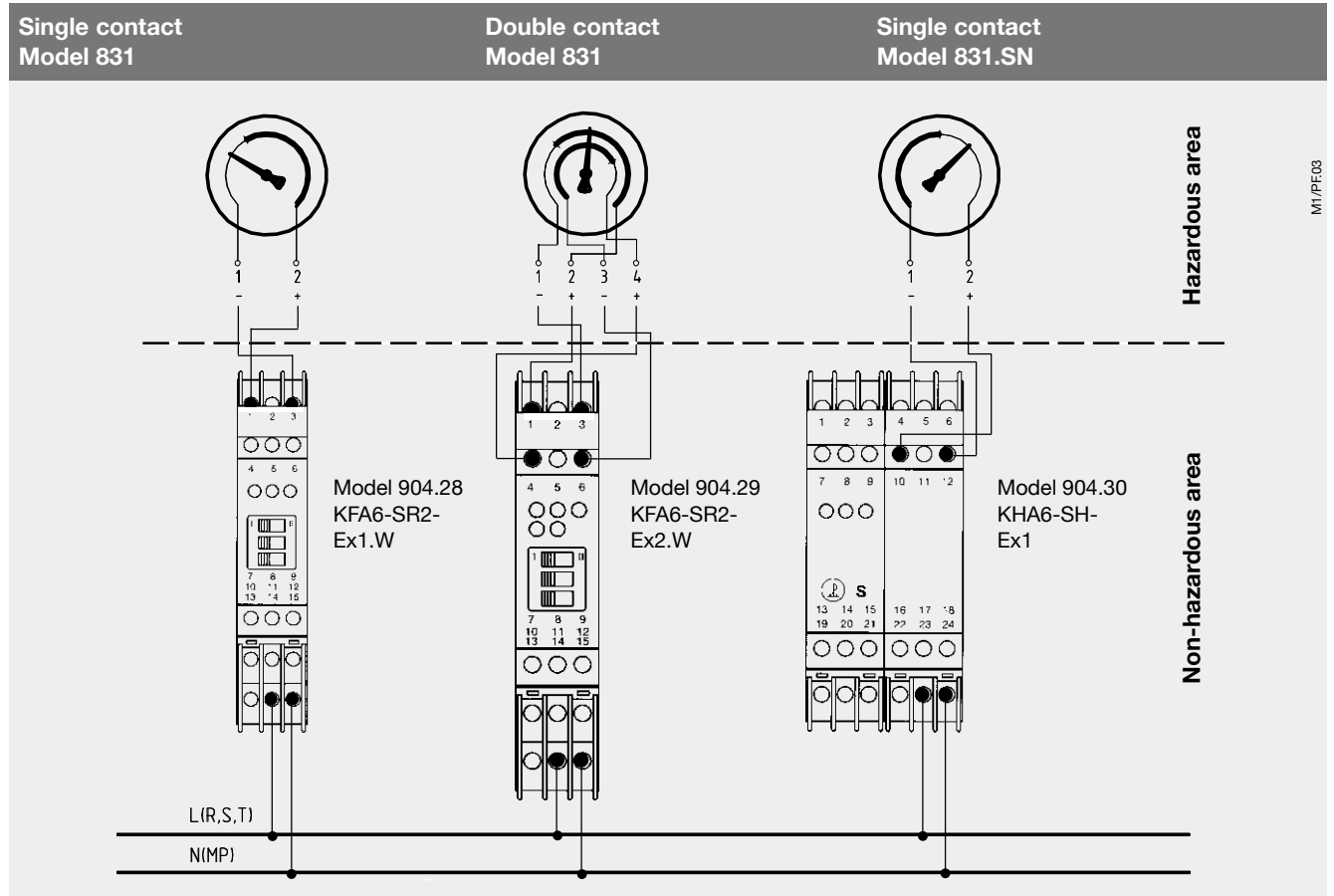


| Kind of contact | Scale range | Dimension X |
|------------------------------|----------------------------------|-------------|
| Single or double contacts | up to 0 ... 60 bar ¹⁾ | 102 mm |
| Triple or quadruple contacts | ≥ 0 ... 100 bar | 116 mm |
| Triple or quadruple contacts | up to 0 ... 60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

1) also for thermometers

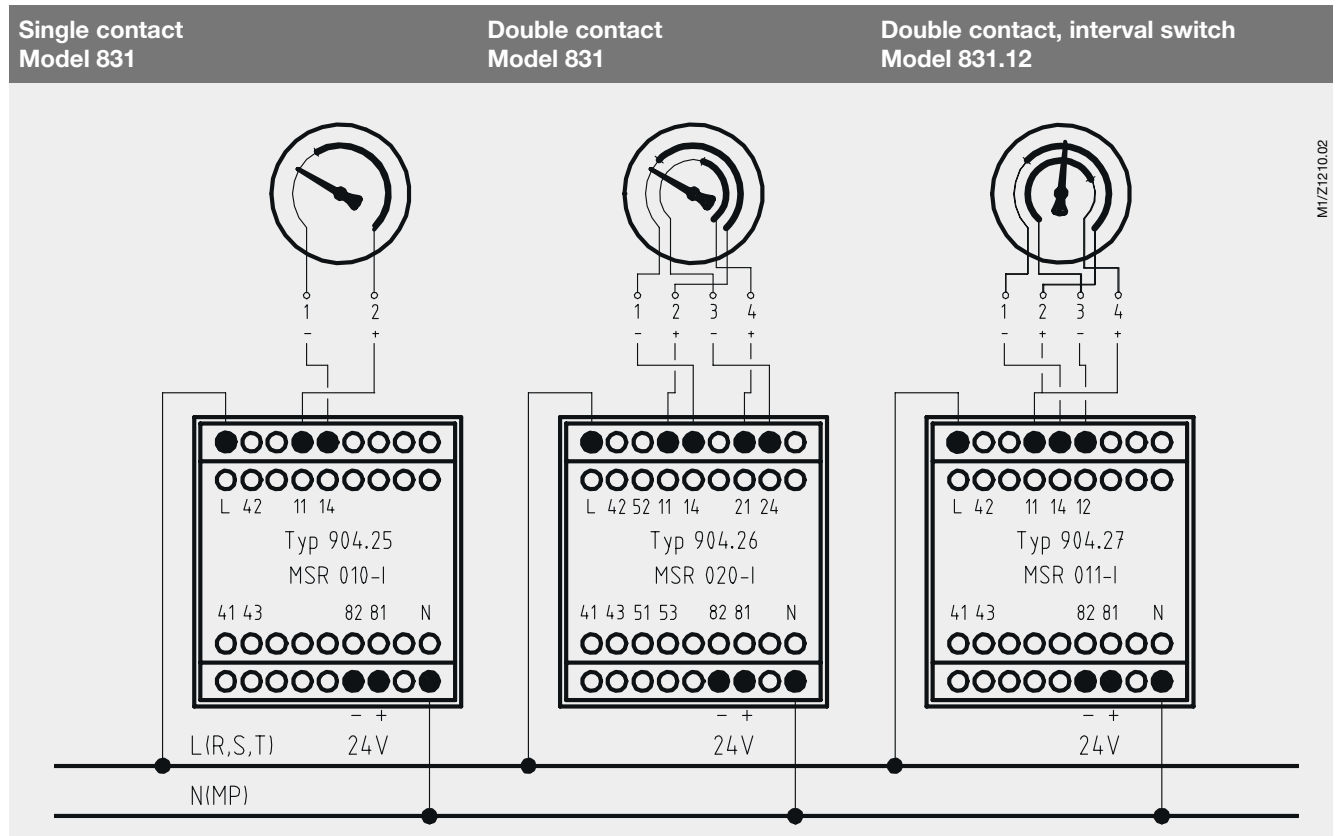
Connection examples for inductive alarm sensors

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



M1/PF03

Non-Ex version, with control units model 904.2X



M1/Z1210.02

Modifications may take place and materials specified may be replaced by others without prior notice.
Specifications and dimensions given in this leaflet represent the state of engineering at the time of printing.



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