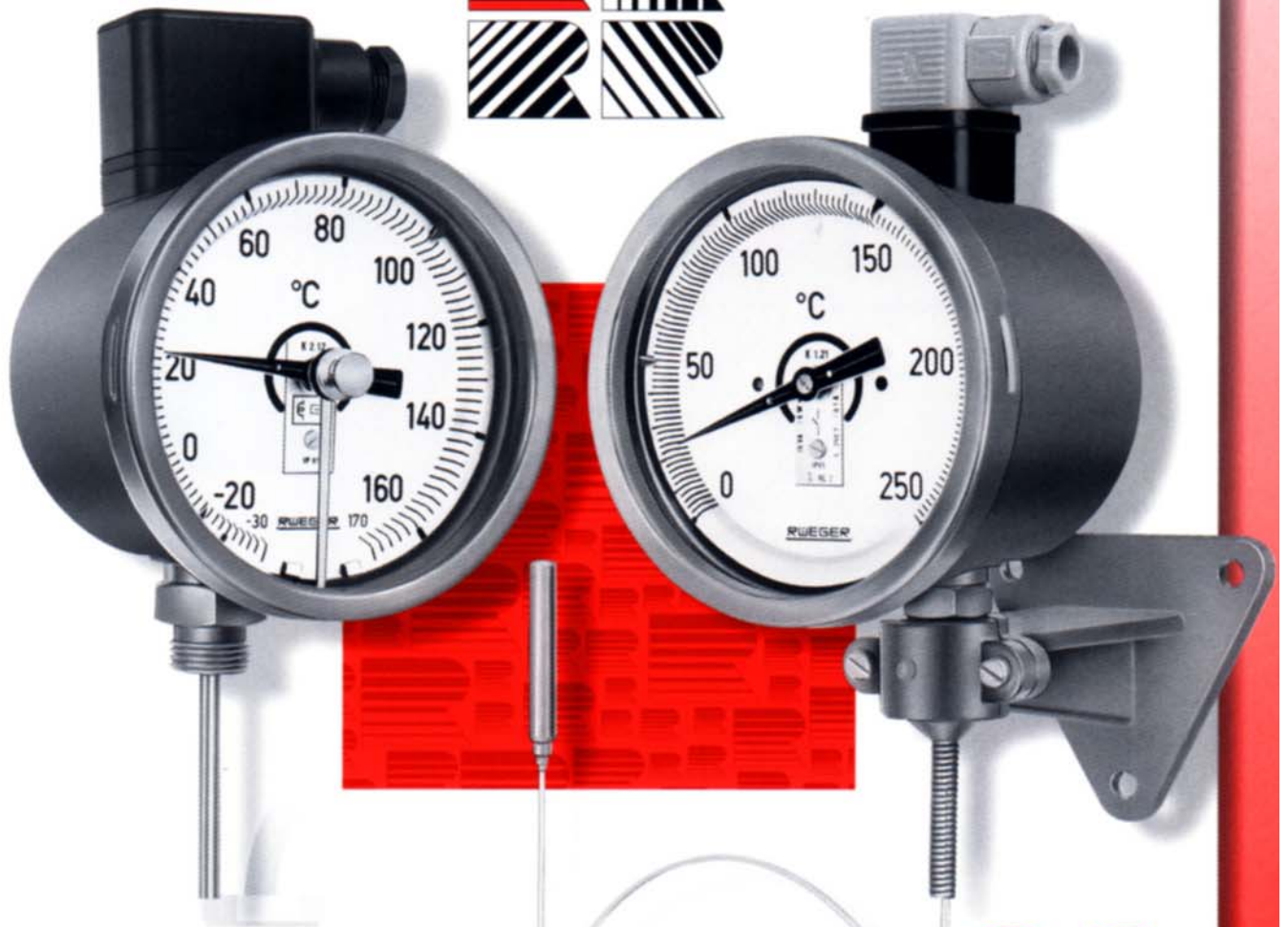


RÜEGER



THERMO-Kontakt

TK 1

**Bimetallic or gas filled thermometers
with electrical contacts
or pneumatic switches**

Temperature measurement - indication -
monitoring: for process control

Safety first!

- Local or remote reading
- Alarm or signalling
- Command or regulation
- Inherent safety
- «Ex»-proof models
- Process control

Technical specification for electrical contacts also valid for pressure gauges



Thermometers with electrical and pneumatic contacts

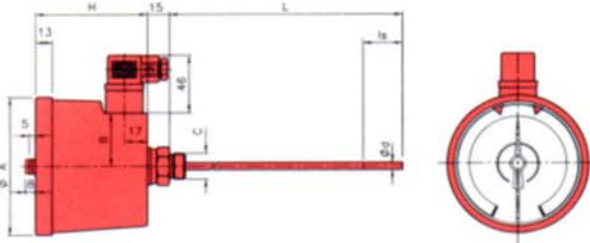


1. **Bimetallic thermometers THERMO-Modul TM....** Standard temperature ranges, stems, other technical specifications... see data sheet **TM 1**



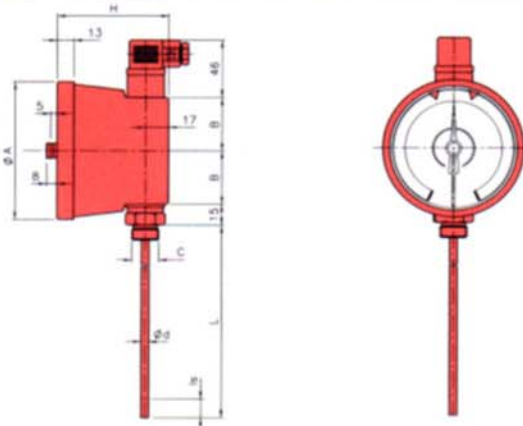
2. **Gas-filled thermometers with rigid stem THERMO-Gas TG....** Standard temperature ranges, stems, other technical specifications... see data sheet **TG 1**

Co-axial models (H)



1. TMH100S-K... / TMH130S-K...
2. TGH100SIK... / TGH130SIK...

Vertical models (V)



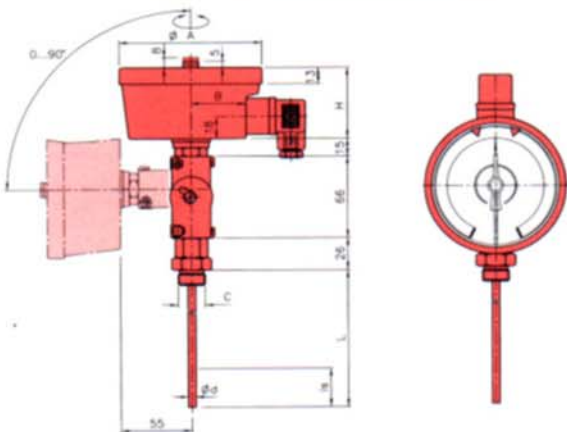
1. TMV100S-K... / TMV130S-K...
2. TGV100SIK... / TGV130SIK...



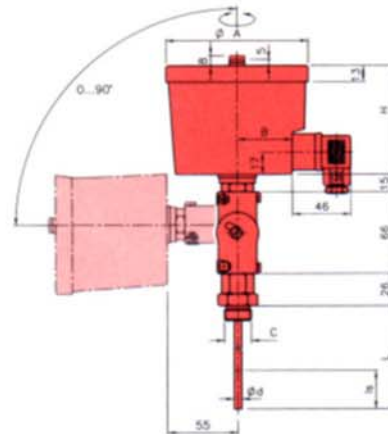
Key to drawings

| | | |
|-----------------------|------------|-----------|
| TMH / TMI | | H = 57 mm |
| TMV / TGH / TGV / TGI | | 87 mm |
| T...100 | A = 111 mm | B = 43 mm |
| T...130 | 141 mm | 58 mm |

Tilting / rotating models (I)



1. TMI100S-K... / TMI130S-K...



1. TGI100SIK... / TGI130SIK...

Thermometers with electrical and pneumatic contacts



3. **Bimetallic thermometers THERMO-Flexible TF....** Standard temperature ranges, temperature bulbs, capillary tubes, other technical specifications... see data sheet **TF 1**



Key to drawings

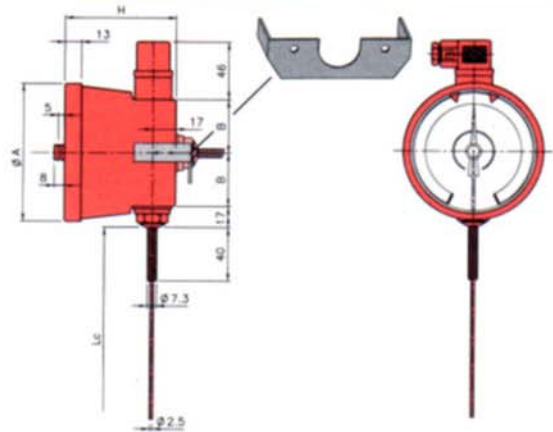
TFH... = Back capillary entry (TFH)

TFV... = Bottom capillary entry (TFV)

T...100 A = 111 mm B = 43 mm

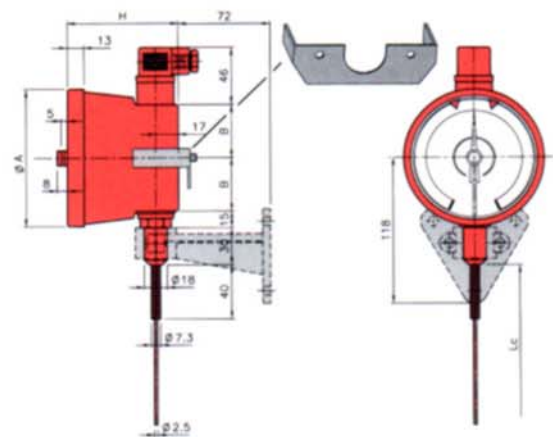
T...130 141 mm 58 mm

For panel mounting



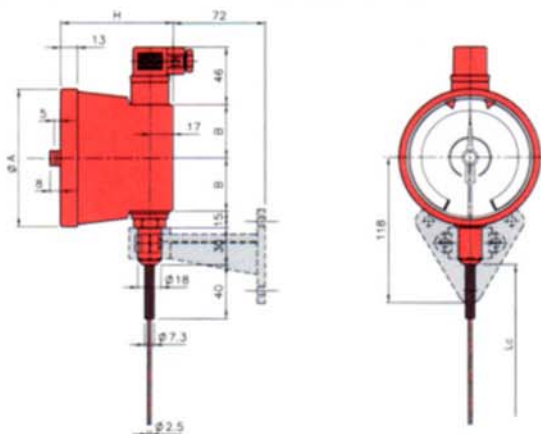
3. TFH100EIK... / TFH130EIK...
3. TFV100EIK... / TFV130EIK...

For either bracket or panel mounting



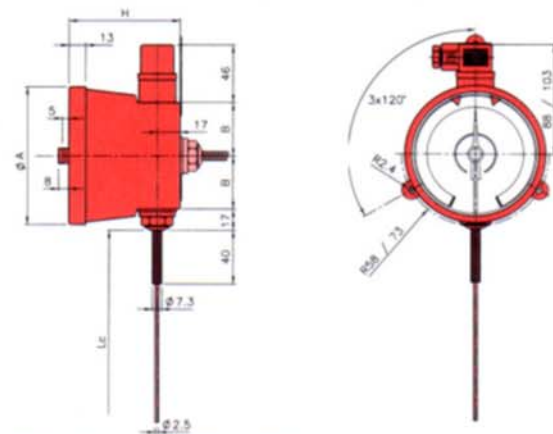
3. TFV100CIK... / TFV130CIK...

For bracket mounting







3. TFV100AIK... / TFV130AIK...

For wall mounting



3. TFH100BIK... / TFH130BIK...
3. TFV100BIK... / TFV130BIK...

Compatibility between contact types and thermometer types

| | Bimetallic thermometers | | Gas-filled thermometers | | | | |
|---|-------------------------|-------------|-------------------------|-------------|----------------|-------------|---|
| | | | with rigid stem | | with capillary | | |
| | TM(H,V,I)...K. | | TG(H,V,I)...K. | | TF(H,V)...K. | | |
| | 100 mm dia. | 130 mm dia. | 100 mm dia. | 130 mm dia. | 100 mm dia. | 130 mm dia. | |
| Kontex inductive detectors | | | | | | |  |
| K 2.1 = (1) | ● | ● | ● | ● | ● | ● | |
| K 2.2 = (4) | ● | ● | ● | ● | ● | ● | |
| K 2.11 = (11) | ● | ● | ● | ● | ● | ● | |
| K 2.12 = (14) | ● | ● | ● | ● | ● | ● | |
| K 2.21 = (41) | ● | ● | ● | ● | ● | ● | |
| K 2.22 = (44) | ● | ● | ● | ● | ● | ● | |
| Contacts with magnet pressure increase | | | | | | |  |
| K 4.1 = (5) | ● | ● | ● | ● | ● | ● | |
| K 4.2 = (2) | ● | ● | ● | ● | ● | ● | |
| K 4.11 = (55) | ● | ● | ● | ● | ● | ● | |
| K 4.12 = (52) | ● | ● | ● | ● | ● | ● | |
| K 4.21 = (25) | ● | ● | ● | ● | ● | ● | |
| K 4.22 = (55) | ● | ● | ● | ● | ● | ● | |
| Microswitches | | | | | | |  |
| K 5.3 = (3) | | | ● | ● | ● | ● | |
| Pneumatic contacts | | | | | | |  |
| K 3.1 | ▼ | | ▼ | | ▼ | | |
| K 3.2 | ▼ | | ▼ | | ▼ | | |

Fonctions (in bracket = DIN 16196 designation)

- Contacts available with electrical outputs as follows (see description on page 10):
 - with DIN 43650 connector (standard version)
 - with DIN 43651 connection case or connector (on request) *
 - with cable and gland (PG 9 thread) (on request) *
 - DIN 16196 version (for Ø 100 mm dia. only) (on request)
- * = On request, dual contacts with separate circuits (for 100 mm dia. only)

- ▼ With 1/8" - 27 NPT (see description on page 10)

Features

| | Contacts | | | | |
|--|---------------------|--|--|----------------------|----------------|
| | | electrical | | | pneumatic |
| Type of contact | Units | K 2 inductive sensor | K 4 mechanical | K 5 microswitch | K 3 |
| Economical choice | | | X | X | |
| Recommended for: | | | | | |
| - Dirty or corrosive working environment | | X | | | X |
| - Explosive atmosphere | | X | | | X |
| - Resistance to vibration and shock | | X ¹⁾ | X | X | |
| - Alarm, signalling, command | | X | X | X | X |
| - Regulation | | X | | | X |
| Contact types available | | K 2.1 K 2.11 (*) K 2.12 K 2.2 K 2.21 ²⁾ K 2.22 (*) | K 4.1 K 4.11 K 4.12 K 4.2 K 4.21 K 4.22 | K 5.3 | K 3.1 K 3.2 |
| (*) see «Spacing between switchpoints» | | | | | |
| Head diameter | mm | 100 130 | 100 130 | 100 130 | 100 -- |
| DIN 16196 head diameter | mm | 100 | 100 | 100 | -- |
| Spacing between switchpoints - dual version K 2 (*) | | 4...270° < 4...45° < | 0...270° < | | 270° |
| External switchpoint setting | | on request | on request | on request | on request |
| Max. indication error from switchpoint setting ³⁾ | %MR ²⁾ | ± 1.5 | ± 1.5 | ± 2.5 | ± 1.5 |
| Switching accuracy ³⁾ | %MR ²⁾ | ± 0.8 | ± 1 | ± 2.5 | ± 0.8 |
| Switching hysteresis | %MR ²⁾ | 1 | 2 | 5 | 1 |
| Power switching capacity | VA~ W V≅ A | ³⁾ according to DIN 19234 (NAMUR) | 50 30 250 1 | 50 30 250 3 | 0/1,4 bar |
| Recommended relay (see data sheet TK 3) | | WE 77 | MSR or WE 77 | (MSR or WE 77) | |
| Min. perm. head temperature | °C | - 25 | - 30 | - 30 | - 30 |
| Max. perm. head temperature | | + 100 ¹⁾ | + 75 | + 75 | + 75 |
| Max. perm. cable temperature | °C | + 75 | + 75 | + 75 | -- |

¹⁾ recommended liquid filling

²⁾ MR: measuring range

³⁾ not usable without relay

¹⁾ also for safety probe SJ 3.5-SN

²⁾ in addition to the measuring error of the instrument

³⁾ technical data - partially applicable

General points

Functioning: When no contact is closed, the pointer reading is subject to no effect apart from that of temperature. Beyond the switchpoints, the return springs acting on the pointer cause a slight indication error.

The contact states shown in the different diagrams depend on the positions of the switchpoint indicator:

- for single-contact sensors, the switchpoint indicator is shown at a value above the switching temperature
- for dual-contact sensors, the switchpoint indicator is shown at a value between the two switching temperatures

Switchpoint setting

Internal setting (bezel and glass removed): the red switchpoint indicator can be moved easily with the finger over the full scale; (for K 5, a setting tool is provided). On request, the thermometer can be supplied with the switchpoint indicator set to customer's specification (at no extra cost).

External setting: by special device mounted on the glass (on request, at extra cost).

K 2.. Inductive sensors - KONTEX system (to DIN 19234)

Functioning

The switching device is a proximity detector actuating a relay. The relay is essential for obtaining sufficient power for switching. The device has no effect on the measuring system of the thermometer.

Main characteristics

Very accurate switchpoint, no wear.

Permissible for explosive atmosphere, resistant to vibration and corrosive working environments.

Description

Stationary part (fixed to switchpoint indicator): gap-type inductive sensor, type SJ 3,5-N* (KONTEX system) with built-in oscillator. 2-wire system.

* Safety sensor type SJ 3,5-SN... may be fitted on option.

This sensor, when used with a suitable relay, constitutes a control system which goes to the "0" state (relay non-activated) if a fault appears in the sensor, or in the line between the sensor and the relay, or in the relay itself.

Moving part: aluminium flag, driven by temperature indication pointer.

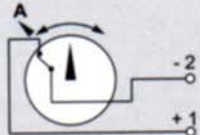
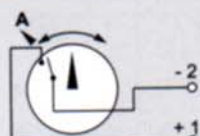
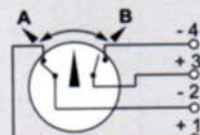
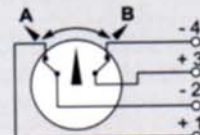
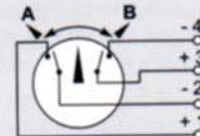
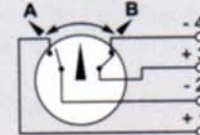
When the aluminium flag is outside the gap of the sensor or sensors, the pointer can rotate freely. When the flag enters the gap of the sensor, its presence is detected and a signal is emitted. A mechanical stop prevents the flag from travelling right through the gap.

Applications

For alarm, signalling and command systems, and temperature control.

These inductive, no-contact sensors can withstand an unlimited number of switching cycles. Specially suitable for operations in a explosive atmosphere, or where an aggressive environment could otherwise cause corrosion. The sensors are also practice-proved in applications where the instrument is subjected to vibration and shocks.

Functions (in brackets = DIN 16196 designation)

| | | |
|--------------------|---|--|
| K 2.1 (1) |  | The contact A made ($R < 3 \text{ k}\Omega$) at and beyond switchpoint (flag outside sensor gap, pointer displacement clockwise). |
| K 2.2 (4) |  | The contact A broken ($R < 7 \text{ k}\Omega$) at and beyond switchpoint (flag inside sensor gap, pointer displacement clockwise). |
| K 2.11 (11) |  | The contacts A and B made ($R < 3 \text{ k}\Omega$) at and beyond switchpoints (flag outside sensor gap, pointer displacement clockwise). |
| K 2.12 (14) |  | The contact A made ($R < 3 \text{ k}\Omega$) at and beyond switchpoint. The contact B broken ($R < 7 \text{ k}\Omega$) at and beyond switchpoint. |
| K 2.21 (41) |  | The contact A broken ($R < 7 \text{ k}\Omega$) at and beyond switchpoint. The contact B made ($R < 3 \text{ k}\Omega$) at and beyond switchpoint. |
| K 2.22 (44) |  | The contact A and B broken ($R < 7 \text{ k}\Omega$) at and beyond switchpoint. |

K 4.. Contacts with magnetic pressure increase

Functioning

Electrical contact driven directly by the temperature pointer.

The contact pressure is increased by the effect of a permanent magnet acting in a narrow zone near to the switchpoint indicator. Although switchpoint accuracy is less than that of purely mechanical contacts (K 1), and hysteresis is greater, the power switching capacity is higher and service life longer.

Main characteristics

Moderate power switching capacity, usable without relay, capable of working under vibration and shocks.

Description

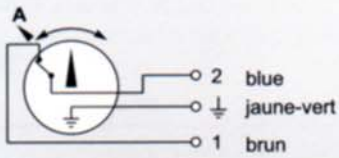
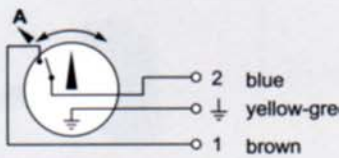
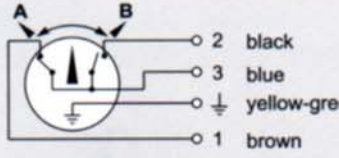
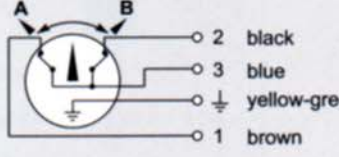
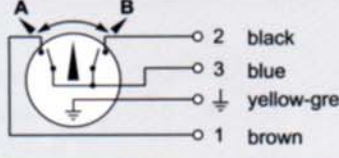
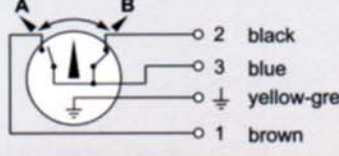
Stationary part (fixed to switchpoint indicator): Silfram W30 contact, with permanent magnet screwed on to support. The magnet causes instant contact at the switchpoint, preventing the striking of an arc and thus protecting the contact against pitting or burning. The magnet also increases the contact pressure, giving higher power switching capacity (50VA/30W DC).

Moving part: lever carrying the contact, driven by the temperature pointer.

Applications

For alarm, signalling and command systems, particularly when the instrument is subjected to vibration and shocks.

Functions (in bracket = DIN 16196 designation)

| | | |
|--------------------|---|--|
| K 4.1 (5) |  | The contact A made at and beyond switchpoint (pointer displacement clockwise). |
| K 4.2 (2) |  | The contact A broken at and beyond switchpoint (pointer displacement clockwise). |
| K 4.11 (55) |  | The contacts A and B made at and beyond switchpoints (pointer displacement clockwise). |
| K 4.12 (52) |  | The contact A made at and beyond switchpoint (pointer displacement clockwise). The contact B broken at and beyond switchpoint (pointer displacement clockwise). |
| K 4.21 (25) |  | The contact A broken at and beyond switchpoint (pointer displacement clockwise). The contact B made at and beyond switchpoint (pointer displacement clockwise). |
| K 4.22 (22) |  | The contacts A and B broken at and beyond switchpoints (pointer displacement clockwise). |

K 5.. Microswitches

Functioning

Electrical contact actuated by a cam driven by the temperature pointer. The mechanical effort needed to work the contacts is considerable, and strongly affects the measuring system. This instrument is therefore less accurate than others, with higher hysteresis.

Main characteristics

High power-switching capacity, possibility of direct connection. However, use restricted to gas pressure thermometers, which generate a high torque.

Principal uses: alarm, command, temperature control. Good resistance to vibration and shocks.

Description

Stationary part (fixed to switchpoint indicator): microswitch with changeover contacts.

Moving part: actuating lever with cam driven by the temperature pointer.

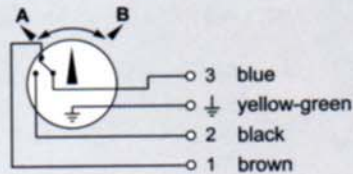
Applications

For alarm, signalling and command systems, and non-critical temperature control requirements. Microswitches possess some exclusive advantages over other types of contact:

- high power-switching capacity (up to 3 A at 250 V~), often making relays unnecessary
- sturdy contacts, giving exceptional resistance to vibration and shocks
- choice of normally open or normally closed contacts

Functions (in bracket = DIN 16196 designation)

K 5.3 (3)



1 changeover contact.
Microswitch actioned at switchpoint.

Ordering thermometers with contacts

• Choice of thermometer

- Remember that the only instruments which can be fitted with electrical contacts or pneumatic switches are the following: THERMO-Modul **TM**, THERMO-Gas **TG** and THERMO-Flexible **TF**.
- Specify the following: model (co-axial, vertical, or tilting/rotating), nominal diameter of head, temperature range, length of stem, material, etc. (refer to data sheets **TM 1**, **TG 1**, **TF 1**).

• Choice of contact

- Each type of contact has features which are specially suitable for the application. Refer to the «Table of features» (page 5) when defining the type of contact required.
- Check that the contacts are compatible with the model of thermometer chosen. Refer to the «Table compatibility between contact types and thermometer types» (page 4).

Caution : the dimensions of head for thermometers with contacts are different from those for normal models (see pages 2 and 3)

• Choice of connection

- Refer to «Electrical or pneumatic connections» on last page.
- Specify the designation of the connection chosen, and the corresponding number.

• Choice of control and safety relay (for contacts K 2 and K 4)

- Refer to data sheet Thermo-Kontakt TK 3.
- Specify the designation of the control and safety relay chosen, and the corresponding number.

K 3.. Pneumatic detector

Functioning

System based on pneumatic, no-contact proximity detector.

A built-in pneumatic amplifier transforms the detector signal into a pressure variation which can easily be utilized. No effect on the temperature measuring system.

Main characteristics

Completely non-electrical. Non-wearing. Authorized for explosive atmospheres, resists vibration and shocks, insensitive to corrosive environments.

Description

Stationary part (fixed to switchpoint indicator): a control airstream at a constant pressure of 1.4 bar crosses the gap between an air emitter nozzle and an air receiver nozzle. The receiver nozzle is connected to the input of a low-pressure (LP) amplifier mounted on the outside of the instrument. The LP amplifier consists of a preamplifier and a pneumatic micro-breaker.

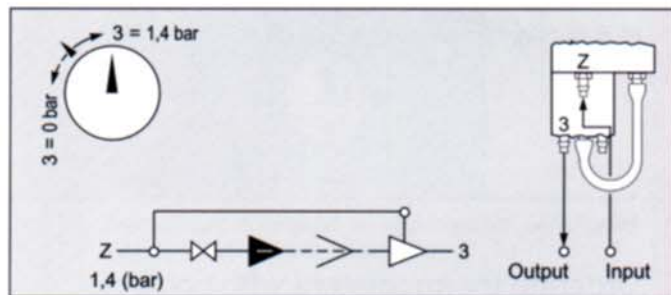
Moving part: control flag, driven by the temperature pointer. When the flag interrupts the control airstream, the amplifier output pressure falls to zero.

When the control airstream is flowing freely, the amplifier output pressure is 1.4 bar.

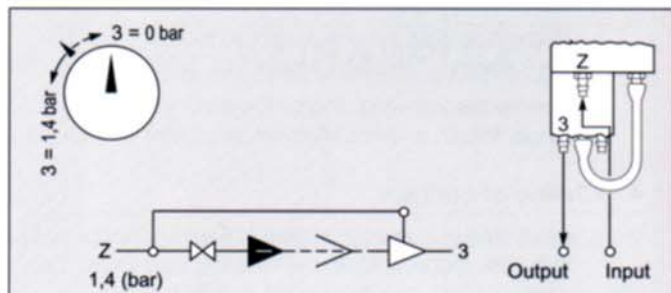
Applications

For alarm, signalling and command systems, and for temperature control. The pneumatic detector can resist an unlimited number of operating cycles, and is fully practice-proven against vibration, shocks and corrosive environments. The total absence of electrical power makes the device ideal for use in explosive atmospheres..

K 3.1 flag allows free airstream at and beyond switchpoint (pointer displacement clockwise)



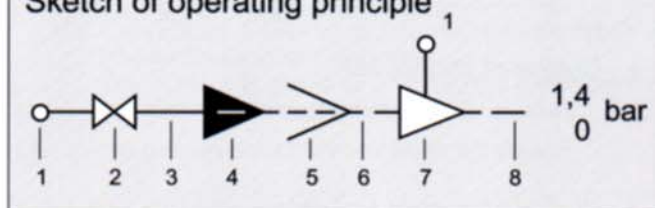
K 3.2 flag interrupts airstream at and beyond switchpoint (pointer displacement clockwise)



Key to diagrams:

- 1 Control airstream pressure: 1,4 bar \pm 0,1
- 2 Capillary stabilization
- 3 Intermediate pressure: approx. 0,1 bar
- 4 Emitter nozzle
- 5 Receiver nozzle
- 6 Output pressure: 0 / 30 mbar
- 7 Pneumatic amplifier
- 8 Amplifier output: 0 / 1,4 bar

Sketch of operating principle



Air consumption: approx. 40Nl/h.

Filtering: supply air particles greater than 0.04 mm must be filtered out.

Electrical or pneumatic connections

Shoulder with connector

Connector (DIN 43650), IP 65, for turning in 3 directions

Standard execution - for K 1, K 4, K 5 : grey socket

3 pins + earth, without cable

- with gland, Pg 9 thread

N° code 100 100T 01

- with gland, Pg 11 thread

N° code 100 100T 05

Standard execution - for K 2 : black socket

4 pins, without cable

- with gland, Pg 9 thread

N° code 100 100T 03

- with gland, Pg 11 thread

N° code 100 100T 04



Connector (DIN 43651), IP 65, for turning in 2 directions

For K 2, K 4, K 5

6 pins + earth, without cable

- with gland, Pg 13,5 thread

N° code 100 100T 08

Can also be supplied to meet DIN 16196



Cable connection box

Cable connexion box (DIN 43651), IP 65, for turning in 2 directions

For K 2, K 4, K 5

6 pins + earth, without cable

- with gland, Pg 13,5 thread

N° code 100 100T 06

Can also be supplied to meet DIN 16196



Cable and Pg 9 gland

For K 2, K 4, K 5

With 500 mm long cable

(longer on request)

Can also be supplied to meet DIN 16196

N° code 100 600T 01

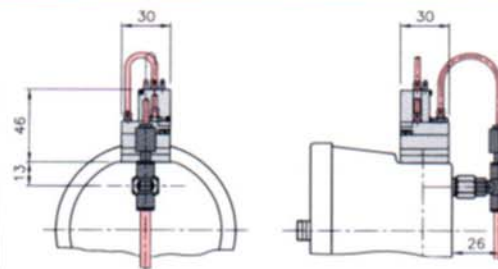


Pneumatic amplifier for K3

Connection 1/8" - 27NPT

Air supply unit for instruments with pneumatic switches

N° code 100 600T 03



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