

# Thermostats and Dial Thermometers

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|   |         |
|---|---------|
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| Series AM as surface-mounting thermostats (prices on request)     | 60.3041 |
| Series AMHs-1-80 as heating thermostat (prices on request)        | 60.3045 |
| Series AMTHF, with 2, 3 or 4 single-pole snap-action switches     | 60.3051 |
| JUMO heatTHERM-AT as surface-mounting/room thermostat             | 60.3070 |

#### Room thermostats, Protection IP54

|  |         |
|--|---------|
| Series ATHR as single or twin thermostats            | 60.4024 |
| Series AMRc  | 60.4041 |
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**Series****Data Sheet****Warm-air thermostats**

|  |         |
|--|---------|
| Series WTHc for warm-air heating systems to DIN 4794 | 60.4514 |
|--|---------|

**Ex thermostats****for application in hazardous areas**

|                |         |
|----------------|---------|
| Series ATHf-Ex | 60.5041 |
|----------------|---------|

|                 |         |
|-----------------|---------|
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|-----------------|---------|

**Electronic thermostats**

|           |         |
|-----------|---------|
| Series TE | 60.5501 |
|-----------|---------|

|                        |         |
|------------------------|---------|
| Resistance thermometer | 60.5521 |
|------------------------|---------|

**Accessories**

|  |         |
|--|---------|
| Temperature probes, screw fittings and and pockets<br>for thermostats EM, ETH, ATH, AM and heatTHERM | 60.6710 |
|--|---------|

|   |         |
|---|---------|
| Setpoint adjusters (knobs, stops and scales)<br>for panel-mounting thermostats EM and heatTHERM 602030/01 | 60.6715 |
|---|---------|

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# Rod Thermostats with microswitch STMA Series

## Brief description

Rod thermostats with microswitch operate on the principle of rod expansion. A temperature change produces a change in the length of the stem. This change is transmitted through a low-expansion rod inside the stem to a mechanism with a microswitch in the thermostat head.

Rod thermostats in the STMA series are used, for example, in HVAC applications.

Rod thermostats have the advantage that they are largely unaffected by excess temperatures, irrespective of the range (max. +345°C), have a fast response (time constant 8 sec) and negligible ambient temperature error at the thermostat head.

The thermostats have a fail-safe action (heating switches off) if the stem is damaged or bent.

## Switching function

### Temperature controller TR and temperature monitor TW

When the temperature at the probe exceeds the selected setpoint, the microswitch is operated through the mechanism and the circuit is opened or closed. When the temperature has fallen below the selected setpoint (by the switching differential), the microswitch returns to its initial position.

### Temperature limiter TB

If the temperature at the probe exceeds the set limit, the circuit is opened and the microswitch is locked out mechanically.

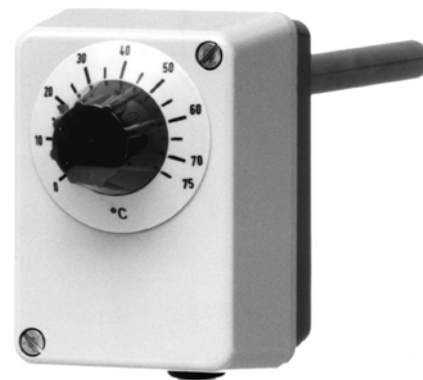
After the temperature has fallen below the safe temperature limit by about 10 % of span, the microswitch can be reset manually.

### Temperature limiter TB with Code U

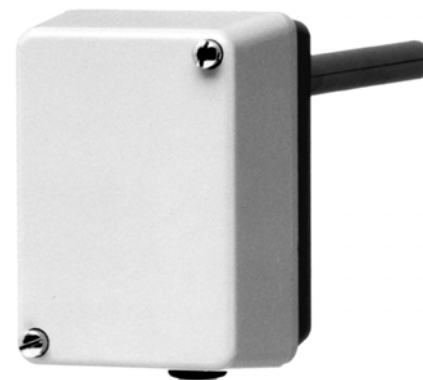
The additional make contact can be used as a signal contact.

## Types

| Types  | Switching function        |
|--------|---------------------------|
| STMA-1 | Temperature controller TR |
| STMA-2 | Temperature monitor TW    |
| STMA-7 | Temperature limiter TB    |



STMA-1



STMA-2



## Technical data

### Control ranges, switching differential and stem lengths

| Ranges °C   | Switching differential in °C | Stem length S | Active stem length |
|---|------------------------------|---------------|--------------------|
| -10 to +100<br>+ 5 to +160<br>0 to +300                             | 4 ± 1                        | 100 mm        | 100 mm             |
| 0 to + 75<br>+15 to +120<br>+ 5 to +160<br>0 to +240                | 3 ± 0.7                      | 150 mm        | 150 mm             |
| 0 to + 80<br>0 to +120<br>+20 to +200<br>+50 to +300<br>-80 to +100 | 2.5 ± 0.4                    | 200 mm        | 200 mm             |
| 0 to + 50<br>+20 to +150<br>0 to +200<br>-15 to + 50                | 1.9 ± 0.4                    | 250 mm        | 250 mm             |
| 0 to + 40<br>0 to + 80  | 1.6 ± 0.4                    | 300 mm        | 300 mm             |

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**Electrical data**

|                  |   |   |  |
|------------------|---|---|--|
| Switching device | STMA-1 / STMA-2   | STMA-7                                      | STMA-7/U   |
|                  | microswitch with changeover contact                             | microswitch with break contact and lock-out | microswitch with break contact, lock-out and additional signal contact |
| max. rating      | 10 (2) A, 230 V AC +10%, p.f. = 1 (0.6)<br>0.25A, 230 V DC +10% |   |  |

**Operating data**

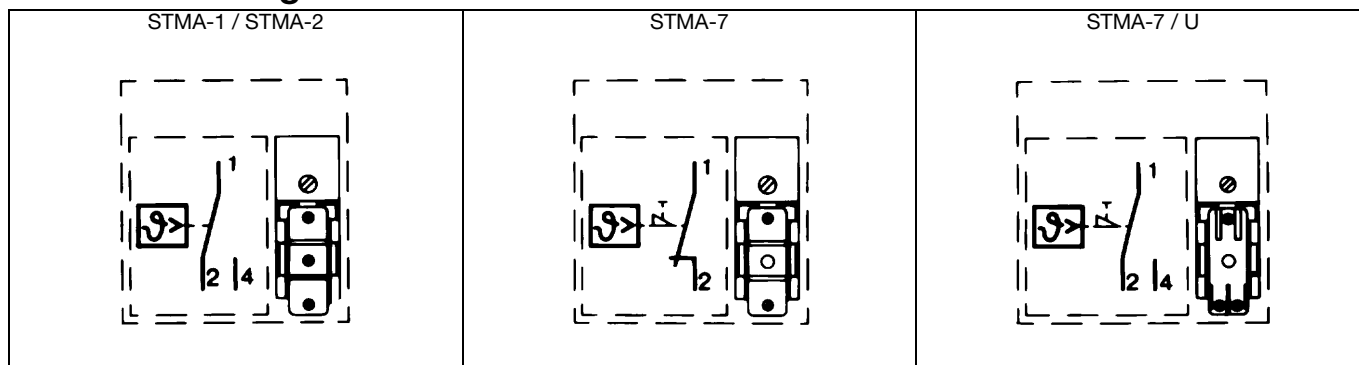
|  |   |
|--|---|
| Switching point accuracy in %                | ± 1.5% of scale span, based on the switch-off point at mid-span |
| Permissible storage temperature              | -50 to +50°C  |
| Permissible ambient temperature in operation | -40 to +80°C  |
| Nominal position (NL)                        | to DIN 16 257, NL 0 – NL 90 (other NL on request)               |

**Case**

|                     |   |   |
|---------------------|---|---|
| Case                | die-cast aluminium<br>surface with impact-resistant textured paint; cover: RAL 7032, base: RAL 7015     |   |
| Cable entry         | standard: clamping nipple M 20 x 1.5<br>at extra cost: cable gland M 20 x 1.5 to EN 50 262 CuZn (brass) |   |
| Setpoint adjustment | STMA-1  | STMA-2 / STMA-7   |
|                     | switching point adjustable from the outside by turning the knob   | switching point adjustable by screwdriver after taking off case cover |
| Protection          | EN 60 529-IP54  |   |
| Weight              | approx. 0.65 kg   |   |

| Process connection      | Version   | Material  |
|-------------------------|---|---|
| A                       | boss 19 mm dia. between case and stem<br>(process connections U, g, b can be retrofitted) | CuZn (brass)  |
| U                       | screw-in pocket, screw-in spigot Form A to DIN 3852/2 with fixing screw, stem 12 mm dia.  | up to 150°C nickel-plated brass / above 150°C St (CrNi at extra cost) |
| g                       | loose nipple M 18 x 1 with locknut  | nickel-plated brass   |
| b                       | mounting flange   | galvanized steel  |
| D                       | fixed screw thread with hexagon, 27 a/f, pipe thread G <sup>1</sup> / <sub>2</sub>        | nickel-plated brass   |
| Probe                   | diameter 9 mm   | nickel-plated brass   |
| Fitting (stem) length S | 100, 150, 200, 250 und 300 mm   |   |

**Connection diagrams**



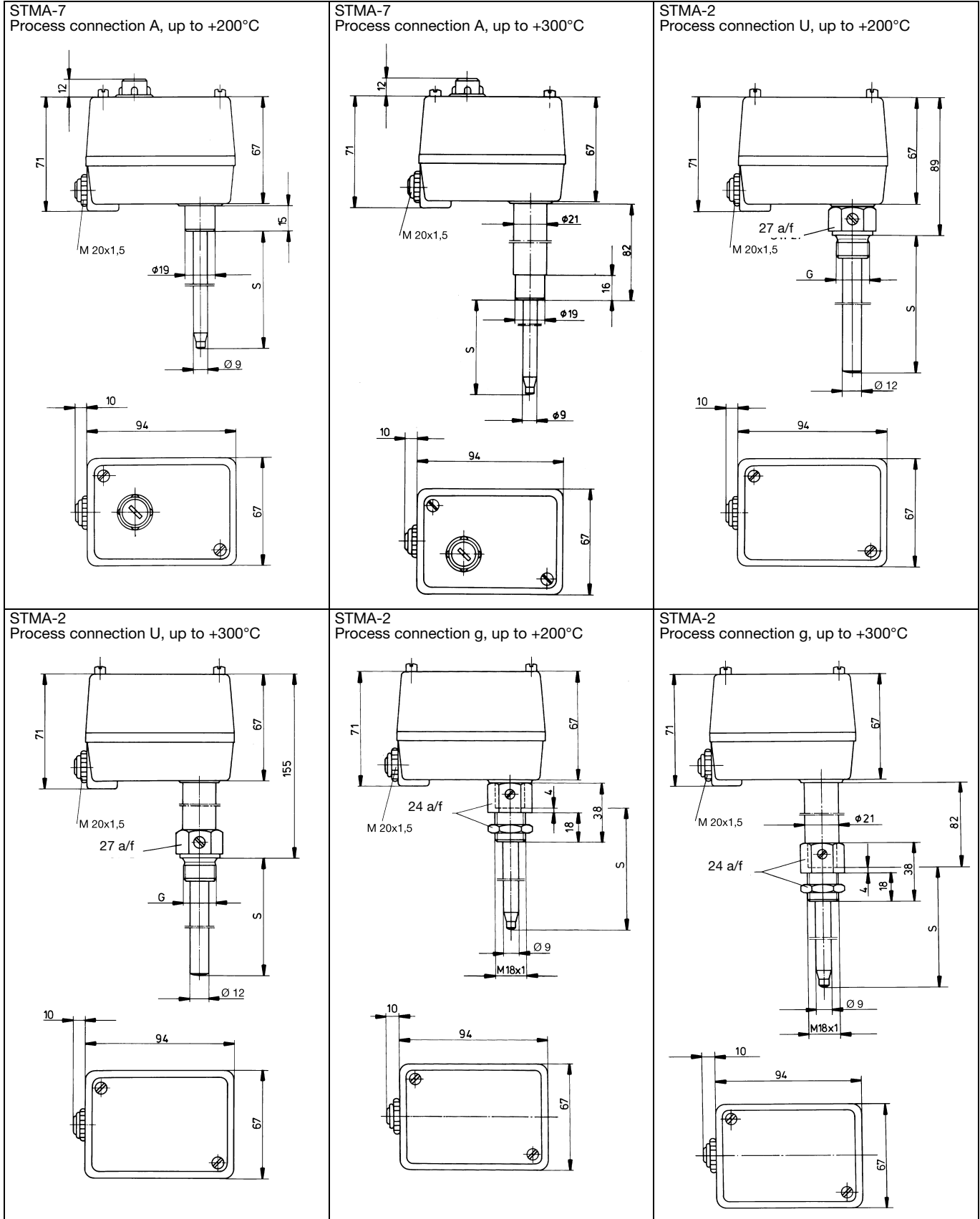
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**Dimensions**



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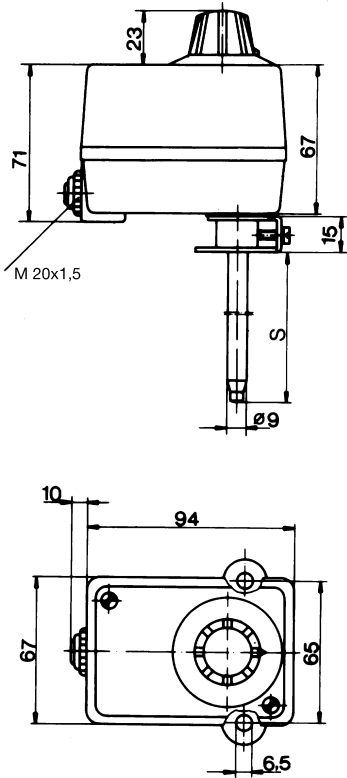
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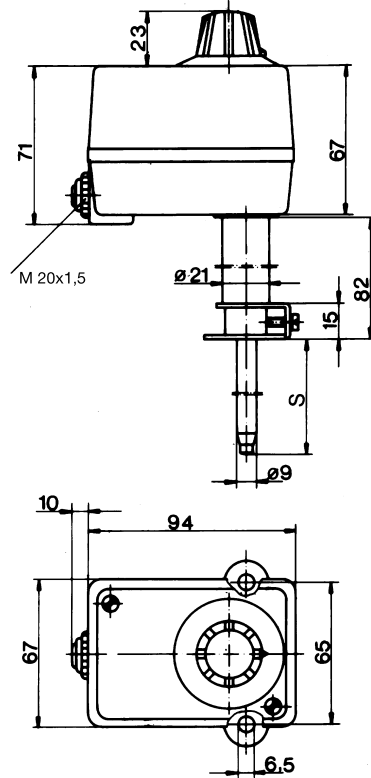


**Dimensions**

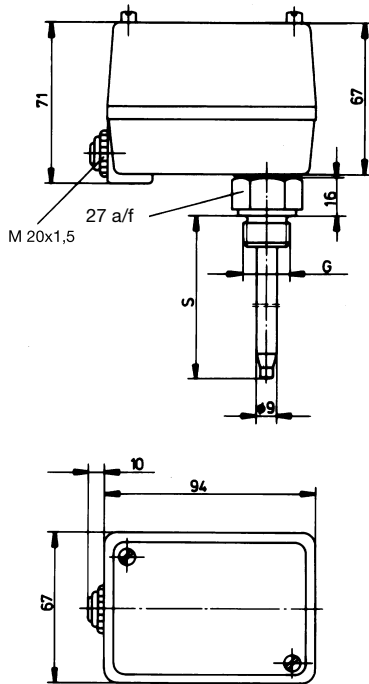
STMA-1  
 Process connection b, up to +200°C



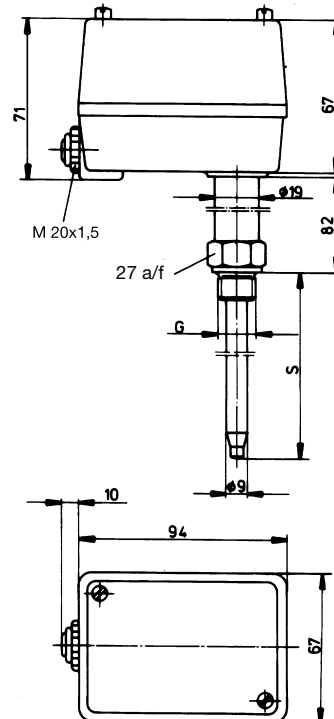
STMA-1  
 Process connection b, up to +300°C



STMA-2  
 Process connection D, up to +200°C



STMA-2  
 Process connection D, up to +300°C



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**Stock items**

delivery 3 working days after receipt of order

| Sales No.    | Type   | Control range °C | Process connection              | Stem length mm |
|--------------|--------|------------------|---------------------------------|----------------|
| 60/60000354* | STMA-1 | 0 to + 75        | U G <sup>1</sup> / <sub>2</sub> | 150            |
| 60/60000355* | STMA-1 | 0 to + 80        | U G <sup>1</sup> / <sub>2</sub> | 300            |
| 60/60000361* | STMA-1 | + 5 to +160      | U G <sup>1</sup> / <sub>2</sub> | 150            |
| 60/60000362* | STMA-1 | 0 to +200        | U G <sup>1</sup> / <sub>2</sub> | 250            |
| 60/60000371* | STMA-2 | +15 to +120      | U G <sup>1</sup> / <sub>2</sub> | 150            |
| 60/60000372* | STMA-2 | +20 to +200      | U G <sup>1</sup> / <sub>2</sub> | 200            |

\* model is being phased out





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# Flue Gas Temperature Monitor Type STM-RW-2

approved to DIN 3440, DIN Reg.No. ATW 86205

## Brief description

The flue gas temperature monitor is used for monitoring flue gas temperatures of solid-fuel boilers in dual operation with oil-heated boilers. It is also employed for the interlocking of ventilation systems that cause a vacuum in conjunction with tiled ovens and fireplaces.

The flue gas temperature monitor operates on the principle of rod expansion. The immersion tube and the metal rod mounted inside have different expansion coefficients, so that changes in temperature produce differences in length. These act through a transmission mechanism on a microswitch which is actuated above a set temperature limit. After the immersion tube has cooled down by about 10 to 30 °C, the microswitch is reset. In the event of an immersion tube break, the circuit remains permanently open.



## Technical data

### Electrical data

| Switching device                | STM-RW-2   | STM-RW-2/OS  |
|---------------------------------|--|--|
|                                 | 1-pole microswitch with changeover (SPDT) contact  | microswitch with 2 separate circuits<br>1 x break (SPST-NC) and 1 x make (SPST-NO) |
| Max. permissible contact rating | 10 (2) A, 230 V AC +10%, p.f. = 1 (0.6)<br>0.25A, 230 V DC +10%                                  |  |
| Contact reliability             | To ensure maximum switching reliability, we recommend a minimum loading of:<br>20 mA, 24 V AC/DC |  |
| Rated surge voltage             | 1500 V (via the switching contacts: 400 V)   |  |
| Overvoltage Category II         | required fusing, see max. contact rating   |  |

### Operating data

|   |  |                            |                            |
|---|--|----------------------------|----------------------------|
| Limit range   | as standard: +40°C to +120°C (factory-set to +100°C)<br>special version: +20°C to +400°C (factory-set to +120°C) |                            |                            |
| Switching differential                                | Limit range  | STM-RW-2                   | STM-RW-2/OS                |
|   | +40°C to +120°C<br>+20°C to +400°C   | 10 to 18 °C<br>10 to 22 °C | 10 to 30 °C<br>10 to 40 °C |
| Switching point accuracy referred to switch-off point | Limit range  | Scale start                | Scale end                  |
|   | +40°C to +120°C<br>+20°C to +400°C   | +0/-10 °C<br>+0/-15 °C     | +0/-10 °C<br>+0/-20 °C     |
| Time constant   | flue gas: ≤45 sec  |                            |                            |
| Mean ambient temperature error                        | switching point displacement referred to deviation from +22°C ~ 0.07 °C/°C                                       |                            |                            |
| Permissible ambient temperature                       | at probe: +700°C max.<br>at switch head: + 80°C max., -50°C min.   |                            |                            |
| Setpoint adjustment                                   | against internal scale, after removing housing cover   |                            |                            |
| Permissible storage temperature                       | +80°C max. / -50°C min.  |                            |                            |
| Nominal position (NL)                                 | to DIN 16 257, NL 0 — NL 90 (other NL on request)  |                            |                            |

### Housing

|                      |  |  |  |
|----------------------|--|--|--|
| Housing              | die-cast aluminium housing with lead-sealable screws |  |  |
| Cable entry          | as standard:   | clamping nipple M 20 x 1.5, for 8 — 10 mm cable dia. |  |
|                      | at extra cost:                                       | cable gland M 20 x 1.5 to EN 50 262 CuZn             |  |
| Enclosure protection | IP54 to EN 60 529                                    |  |  |
| Weight               | approx. 0.8 kg                                       |  |  |

### Process connection

|                    |  |  |  |
|--------------------|--|--|--|
| Connection circuit | Form DZ, G 1/2 (fixed hexagon with external thread G 1/2), material: steel |  |  |
| Immersion tube     | 15 x 150 mm, material: steel   |  |  |

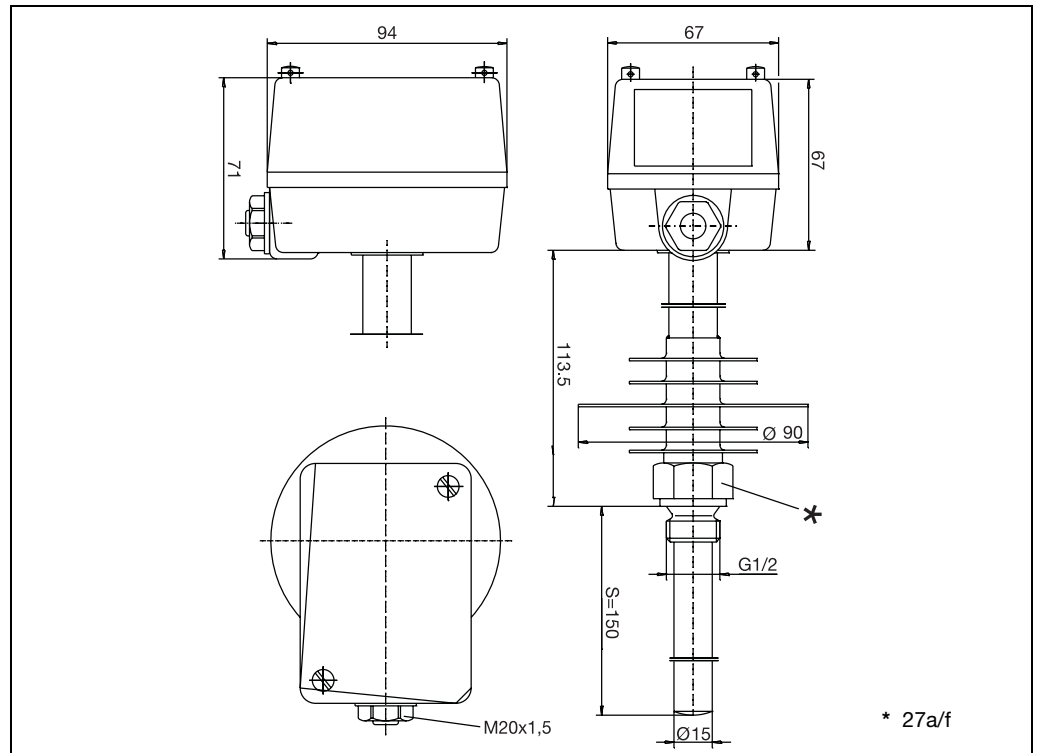
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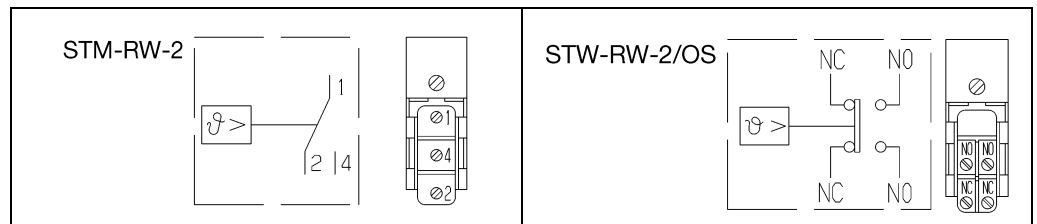
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## Dimensions



## Connection diagrams



## Stock items

(shipment: 3 working days after receipt of order)

| Sales No.   | Type        | Limit range °C                        | Switching differential °C | Connection              | Immersion tube length mm |
|-------------|-------------|---------------------------------------|---------------------------|-------------------------|--------------------------|
| 60/60000903 | STM-RW-2    | +40 to +120                           | 10-18                     | DZ G 1/2<br>(1/2" pipe) | 150                      |
| 60/60001115 | STM-RW-2    | +20 to +400<br>calibration point +120 |                           |                         |                          |
| 60/60000904 | STM-RW-2/OS | +40 to +120                           | 10-30                     |                         |                          |

## Order details

### STM-RW-2 Series

| Order code | (1) Basic type (basic version)  |
|------------|---|
| 601540     | STM-RW-2 Rod thermostat with microswitch as flue gas temperature monitor (ATW) with changeover (SPDT) contact |
|            | (2) Control/limit ranges  |
| 056        | +40 to + 120°C  |
| 045        | +20 to + 400°C  |
|            | (3) Extra code OS   |
| 000        | no extra code   |
| 729        | microswitch with 2 separate circuits, 1 x break (SPST-NC) and 1 x make (SPST-NO)                              |

### Order code

(1)  / (2)  / (3)

### Order example

/  /

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# Thermostats for panel mounting ETH Series

Version approved to DIN 3440  
and Pressure Equipment Directive 97/23/EC

## Brief description

ETH panel-mounting thermostats monitor thermal processes. The instruments can be supplied as safety temperature monitors STW (STB) and safety temperature limiters STB. In the event of a fault, the STB sets the system being monitored to a safe operational state.

Panel-mounting thermostats operate on the principle of fluid expansion, with a microswitch serving as the electrical switching element.

## Switching action

### Safety temperature monitor STW

If the temperature at the probe exceeds the set limit, the circuit is opened by a snap-action switch. If the temperature falls below the set limit (by the switching differential), the switch returns to its initial position.

### Lock-out facility on the safety temperature limiter STB

If the temperature at the probe exceeds the set limit, the circuit is opened and the microswitch is locked out mechanically.

After the temperature has fallen by about 10 % of span below the safe temperature limit (approx. 15% for limit setting > +350°C), the microswitch can be reset manually.

### Use of the safety temperature monitor STW as safety temperature limiter STB

The circuitry to which the thermostat is connected must comply with DIN 3440 and VDE 0116.

### Self-monitoring on the safety temperature limiter STB and the safety temperature monitor STW (STB)

Failure of the measuring system, i.e. a leakage of the expansion fluid, will cause the pressure under the diaphragm to drop, thus permanently opening the circuit. Resetting is no longer possible.

If the temperature at the probe cools down to below -20°C approx., the circuit will also be opened. As the temperature rises to above -20°C approx., the STB has to be reset manually. On the STW (STB), the reset is performed automatically.



You will find the Declarations of Conformity at:  
 www.jumo.net  
 ⇒ Products  
 ⇒ Data Sheet 60.2010  
 or  
 ask for them to be sent.

## Types and approvals

| Type             | Switching action | DIN Reg. No.                  | Tests  | Important note  |
|------------------|------------------|-------------------------------|--|---|
| ETH-20<br>ETH-70 | STW (STB)<br>STB | STW (STB) 79903S<br>STB 80003 | Pressure Equipment Directive 97/23/EC CE0036 | The DIN Registration No. becomes invalid if pockets are used that are not listed in our Data Sheet 60.6710. |

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## Technical data

### Control ranges and temperature probes

| Type                 | Control/<br>limit setting ranges<br>in °C | Max. permissible<br>probe temperature<br>in °C | Maximum<br>capillary length<br>in mm | Probe length "L" in mm                    |     |
|----------------------|---|--|--------------------------------------|---|-----|
|                      |   |  |                                      | Probe dia. "d" in mm, dia. "6" = standard |     |
|                      |   |  |                                      | 6   | 8   |
| <b>liquid-filled</b> |   |  |                                      |   |     |
| ETHf-20              | +30 to +110                               | 135  | 5000                                 | 108                                       | 75  |
| ETHf-70              | +60 to +130                               | 150  |                                      | 116                                       | 79  |
|                      | +20 to +150                               | 175  |                                      | 77  | 60  |
|                      | +50 to +250                               | 290  |                                      | 64  | 49  |
|                      | +50 to +300                               | 345  |                                      | 55  | --- |
| <b>gas-filled</b>    |   |  |                                      |   |     |
| ETHf-20              | +20 to +400                               | 460  | 1000                                 | 176                                       | 106 |
| ETHf-70              | +20 to +500                               | 550  | 2000                                 | 127                                       | 81  |
|                      | +20 to +500                               | 550  | 4000                                 | 202                                       | 119 |

### Capillary and temperature probe

| Type                             | End of scale                   | Capillary   | Temperature probe                                    | Note          |
|----------------------------------|--------------------------------|---|--|---------------|
| ETHf- . .                        | up to 200°C                    | copper (Cu)<br>1.5 mm dia.<br>Mat. Ref. 2.0090            | copper (Cu)<br>Mat. Ref. 2.0090<br>brazed            | -             |
|                                  | up to 350°C                    | copper (Cu)<br>1.5 mm dia.<br>Mat. Ref. 2.0090            | stainless steel (CrNi)<br>Mat. Ref. 1.4571<br>brazed | -             |
|                                  | up to 500°C                    | stainless steel (CrNi)<br>1.5 mm dia.<br>Mat. Ref. 1.4571 | stainless steel (CrNi)<br>Mat. Ref. 1.4571<br>welded | -             |
|                                  | up to 350°C                    | stainless steel (CrNi)<br>1.5 mm dia.<br>Mat. Ref. 1.4571 | stainless steel (CrNi)<br>Mat. Ref. 1.4571<br>welded | at extra cost |
| Capillary length                 | standard 1000 mm, max. 5000 mm |   |  |               |
| Min. bending radius of capillary | 5 mm                           |   |  |               |

### Electrical data

| Switching element   | ETHf-20  | ETHf-70                                     | ETHf-70/U  |
|---------------------|--|---|--|
|                     | microswitch with changeover contact  | microswitch with break contact and lock-out | microswitch with break contact, lock-out and additional signal contact |
| Max. current rating | 10 (2) A, 230 V AC +10%, p.f. = 1 (0.6)<br>0.25A, 230 V DC +10%                            |   |  |
|                     | with differential 2%<br>6 (1.2) A, 230 V AC +10%,<br>p.f. = 1 (0.6)                        | -   | -  |
|                     | gold-plated microswitch, code /au<br>0.1 A, 24 V AC / DC<br>contact resistance 2.5 – 10 mΩ |   | -  |

### Operating data

| Switching differential in % of control / limit setting range | Switching action  | with liquid-filled measuring system |                       |               |  |
|--|---|-------------------------------------|-----------------------|---------------|--|
|  |   | Nominal value                       | Possible actual value |               |  |
|  | <b>STW (STB)</b>  | 5                                   | 4 max. 6              | standard      |  |
|  |   | 9                                   | 8 max. 11             | on request    |  |
|  |   | 2                                   | 1 max. 3              | at extra cost |  |
|  |   | with gas-filled measuring system    |                       |               |  |
|  |   | 7                                   | 5 max. 12             | standard      |  |
|  |   | 9                                   | 8 max. 16             | on request    |  |
|  |   | 2                                   | 1.5 max. 3            | at extra cost |  |
| Switching point accuracy in % of limit setting range         | in upper third of scale +0/-5%, at start of scale +0/-10% |                                     |                       |               |  |

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|   |  |                 |                 |
|---|--|-----------------|-----------------|
| Ambient temperature error referred to control / limit setting range | A deviation of the ambient temperature at the thermostat head from the 22°C calibration ambient temperature produces a shift of the switching point:<br>higher ambient temperature = lower switching point<br>lower ambient temperature = higher switching point |                 |                 |
|   | Panel-mounting thermostats with end of scale   |                 |                 |
|   | < 200°C  | ≥ 200°C ≤ 350°C | > 350°C ≤ 500°C |
|   | due to thermostat head, % per °C   |                 |                 |
|   | 0.17   | 0.13            | 0.12            |
| Permissible storage temperature                                     | due to capillary, % per °C per m length  |                 |                 |
|   | 0.054  | 0.11            | 0.03            |

|  |              |
|--|--------------|
| Permissible ambient temp. in operation | +80°C max.   |
| Nom. position (NL)                     | unrestricted |

**Thermostat head**

|                    |  |
|--------------------|--|
| Chassis material   | zinc-plated steel  |
| Fixing             | 2 screws M 3, 22 mm spacing  |
| Scale span         | 250° ↯   |
| Electr. connection | screw terminals up to 2.5 mm <sup>2</sup> conductor cross-section                            |
| Limit setting      | The limit can be adjusted at the setpoint spindle prior to mounting, by using a screwdriver. |

|            |                |
|------------|----------------|
| Protection | EN 60 529-IP00 |
| Weight     | approx. 0.2 kg |

**Process connection<sup>1</sup>**

|                            |   |
|----------------------------|---|
| ETH- Series with capillary | plain cylindrical probe A (standard)  |
|                            | pocket U (on request)<br>screw-in pocket with screw-in spigot G 1/2 Form A to DIN 3852/2 and clamping clip with fixing screw for securing the probe |
| Material                   | up to +150°C: CuZn (nickel-plated) as standard<br>above +150°C: St as standard (CrNi on request)  |
| Fitting length S           | standard lengths: 100, 120, 150, 200 or 300 mm (other lengths on request)   |
| Immersion tube dia.        | D = 8 mm  |

<sup>1</sup> See data sheet 60.6710 for additional process connections and pockets.

**Note**

Physical and toxicological properties of the expansion fluid which may escape in the event of a system fracture.

| Control range with end of scale °C | Dangerous reactions | Fire and explosion hazard |                       | Water contamination | irritant | Toxicological data |       |
|------------------------------------|---------------------|---------------------------|-----------------------|---------------------|----------|--------------------|-------|
|                                    |                     | Ignition temp. °C         | Explosion limit % v/v |                     |          | danger to health   | toxic |
| < +200                             | no                  | + 355                     | 0.6 – 8               | yes                 | yes      | 1                  | no    |
| ≥ 200°C ≤ +350                     | no                  | + 490                     | - -                   | yes                 | yes      | 1                  | no    |
| > 350°C ≤ +500                     | no                  | no                        | no                    | no                  | no       | no                 | no    |

<sup>1</sup> At present there is no restrictive statement from the health authorities concerning any danger to health over short periods and at low concentrations, e.g. after a fracture of the measuring system.

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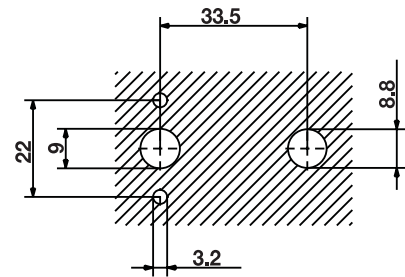
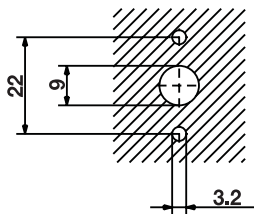
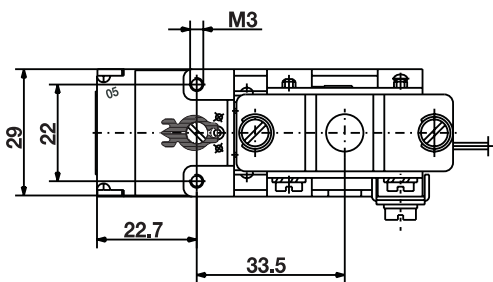
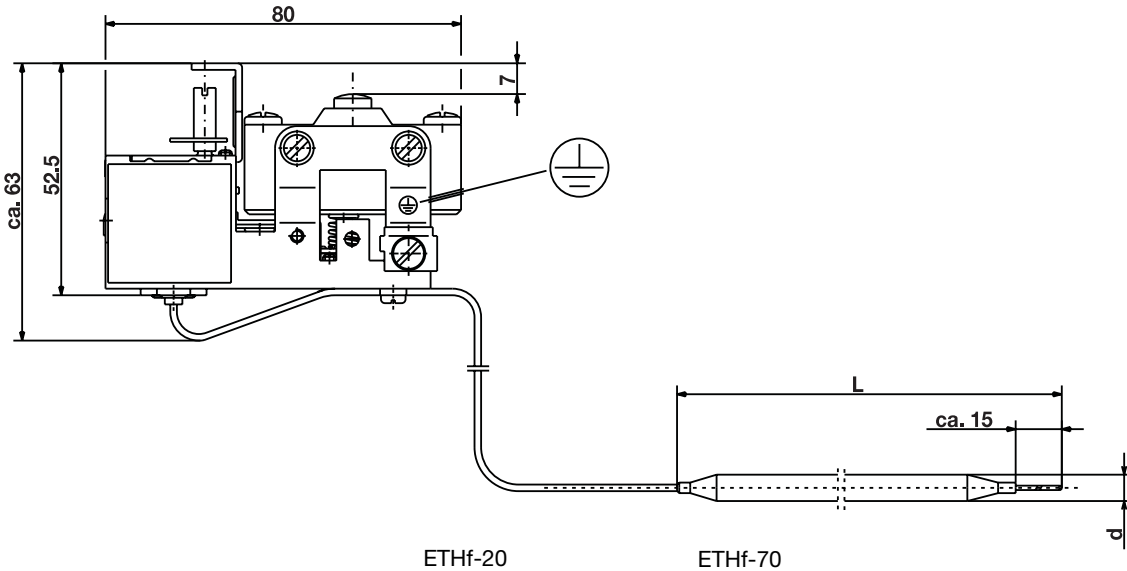
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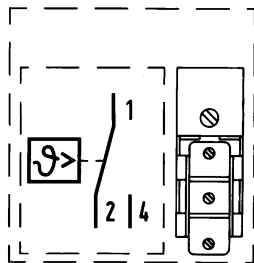
## Dimensions

ETHf-70, with plain cylindrical probe A, no pocket

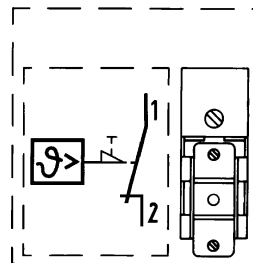


## Connection diagrams

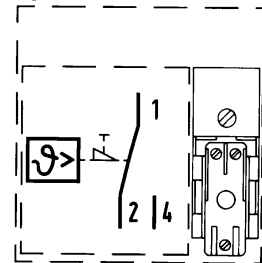
**ETHf-20**  
with changeover contact



**ETHf-70**  
with break contact and lock-out



**ETHf-70**  
with break contact, lock-out and additional signal contact



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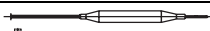

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## Order details

### ETH Series

| Order code | (1) Basic type  |
|------------|---|
| 602010     | Panel-mounting thermostat, ETH Series   |
|            | <b>(2) Basic type extensions</b>  |
| 20         | ETH-20 Safety temperature monitor STW with capillary  |
| 70         | ETH-70 Safety temperature limiter STB with capillary  |
|            | <b>(3) Control/limit ranges</b>   |
| 052        | +30 to +110   |
| 066        | +60 to +130   |
| 043        | +20 to +150   |
| 063        | +50 to +250   |
| 064        | +50 to +300   |
| 045        | +20 to +400   |
| 046        | +20 to +500   |
|            | <b>(4) Switching differential</b>   |
| 00         | no differential (ETHf-70 STB)   |
| 20         | 2% of scale span  |
| 50         | 5% of scale span  |
| 70         | 7% of scale span  |
| 90         | 9% of scale span  |
|            | <b>(5) Capillary length</b>   |
| 1000       | 1000 mm   |
| 2000       | 2000 mm   |
| 3000       | 3000 mm   |
| 4000       | 4000 mm   |
| 5000       | 5000 mm   |
| ...        | (special length, details in plain text)   |
|            | <b>(6) Material of capillary</b>  |
| 40         | Cu(copper)  |
| 20         | CrNi(stainless steel 1.4571)  |
|            | <b>(7) Process connection<sup>1</sup></b>   |
| 10         | A = plain cylindrical probe  |
| 20         | U = screw-in pocket          |
|            | <b>(8) Thread for process connection<sup>1</sup></b>  |
| 00         | no thread (process connection A)  |
| 13         | external thread G 1/2   |
|            | <b>(9) Material of process connection</b>   |
| 00         | with process connection A only  |
| 46         | CuZn (brass)  |
| 01         | St (steel)  |
| 20         | CrNi (stainless steel 1.4571)   |
|            | <b>(10) Fitting length S (immersion tube length)</b>  |
| 000        | no pocket   |
| 100        | 100mm   |
| 120        | 120mm   |
| 150        | 150mm   |
| 200        | 200mm   |
| 300        | 300mm   |
| ...        | ... special length, details in plain text   |

...continued on next page



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## Order details

### ETH Series

| Order code                    | (11) Diameter D (immersion tube dia.)                                   |
|-------------------------------|---|
| 00                            | no pocket   |
| 8                             | 8 mm  |
| 10                            | 10 mm   |
| (12) Diameter d (probe dia.)  |   |
| 6                             | 6 mm  |
| 8                             | 8 mm  |
| (13) Extra codes <sup>2</sup> |   |
| 000                           | no extra code   |
| 574                           | U STB with (n.c.) break contact, lock-out and additional signal contact |
| 702                           | au snap-action switch, gold-plated                                      |

| Order code    | (1)    | (2) | (3) | (4) | (5) | (6) | (7) | (8)  | (9)  | (10) | (11) | (12) | (13) |    |    |     |    |     |     |   |    |   |   |   |                  |
|---------------|--------|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|----|----|-----|----|-----|-----|---|----|---|---|---|------------------|
| 602010        | /      | ..  | -   | ... | -   | ..  | -   | .... | -    | ..   | -    | ..   | -    | .. | -  | ... | -  | ... |     |   |    |   |   |   |                  |
| Order example | 602010 | /   | 70  | -   | 052 | -   | 00  | -    | 1000 | -    | 40   | -    | 10   | -  | 00 | -   | 00 | -   | 000 | - | 00 | - | 8 | / | 702 <sup>2</sup> |

<sup>1</sup> See data sheet 60.6710 for other probe mountings and pockets.

<sup>2</sup> List extra codes in sequence, separated by commas.

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# Panel-mounting Thermostats EM Series

with 1, 2, 3 or 4 single-pole snap-action switches

## Brief description

Thermostats control and monitor thermal processes. EM series instruments can be supplied as temperature controllers TR, temperature monitors TW, temperature limiters TB, safety temperature monitors STW (STB) and protection temperature limiters STB. In fault condition, the STB sets the system being monitored to a safe operational state.

Panel-mounting thermostats operate on the principle of liquid expansion, with a micro-switch serving as the electrical switching device.

## Switching action

### Temperature controller TR and temperature monitor TW

When the temperature at the probe exceeds the selected setpoint, the microswitch is actuated through a mechanism and the circuit is opened or closed. When the temperature drops below the selected setpoint (by the amount of the switching differential), the micro-switch returns to its initial position.

### Lock-out facility on the temperature limiter TB and protection temperature limiter STB

When the temperature at the probe exceeds the set limit, the circuit is opened and the microswitch locked out mechanically.

After the temperature has dropped below the critical temperature by about 10 % of the scale span (approx. 15% for a limit setting above +350°C), the microswitch can be reset manually.

With limits above 120°C, the limit setting on the STB must be locked (e.g. by a seal) to prevent any shift.

### Self-monitoring facility on the protection temperature limiter STB and safety temperature monitor STW (STB)

In the case of the STB and STW (STB), any failure of the measuring system, i.e. a leakage of the expansion liquid, will cause the pressure under the diaphragm to drop, thus permanently opening the circuit. Resetting is now impossible.

When the temperature at the probe drops below -20°C (approx.), the circuit will also open, but will close again automatically when the temperature rises above -10°.

### Use of the safety temperature monitor STW as a protection temperature limiter STB

The circuitry to which the thermostat is connected must comply with DIN 3440 and VDE 0116.



## Approvals

|  |  |   |  |  |  |
|--|--|---|--|--|--|
|  |  | <p><b>DVGW</b><br/>         Gas Appliances Directive<br/>         90/396/EEC<br/>         Type EM-50 only</p> | <p>Pressure Equipment Directive<br/>         97/23/EC CE0036<br/>         only Types<br/>         EM-20<br/>         EM-30<br/>         EM-40<br/>         EM-50</p> |  | <p>only Types<br/>         EM-1<br/>         EM-2<br/>         EM-4<br/>         EM-50</p> |
|--|--|---|--|--|--|

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## Types and DIN registration numbers

| Version                            | Type  | Switching action of the individual contacts (see example 1)  | DIN Reg. No.   | Important note  |
|------------------------------------|---|--|--|---|
| 1 single-pole snap-action switch   | EM-1<br>EM-2<br>EM-3 *<br>EM-4 *<br>EM-5                                      | TR<br>TW<br>TW<br>TB<br>TB   | TR 77703<br>TW 77803<br>TW 77903<br>TB 78003<br>TB 78103                         | DIN approved up to +500°C max.<br>The DIN Reg. No. becomes invalid if pockets are used that are not listed in our Data Sheet 60.6710.<br><br>Type EM-50<br>DVGW Reg. No. CE-0085 AR 0124<br><br>*Setpoint / limit permanently set at the factory to customer requirements |
| 2 single-pole snap-action switches | EMF-13<br>EMF-23<br>EMF-33 *<br>EMF-14<br>EMF-24<br>EMF-44 *<br>EMF-54        | TR / TW<br>TW / TW<br>TW / TW<br>TR / TB<br>TW / TB<br>TB / TB<br>TB / TB                                    | TR 77703<br>TW 77803<br>TW 77903<br>TR 77703<br>TW 77803<br>TB 78003<br>TB 78103 |   |
| 3 single-pole snap-action switches | EMF-133<br>EMF-134<br>EMF-233<br>EMF-234<br>EMF-333 *<br>EMF-444 *<br>EMF-544 | TR / TW / TW<br>TR / TW / TB<br>TW / TW / TW<br>TW / TW / TB<br>TW / TW / TW<br>TB / TB / TB<br>TB / TB / TB | TR 77703<br>TR 77703<br>TW 77803<br>TW 77803<br>TW 77903<br>TB 78003<br>TB 78103 |   |
| 4 single-pole snap-action switches | EMF-1333<br>EMF-2333<br>EMF-3333 *  | TR / TW / TW / TW<br>TW / TW / TW / TW<br>TW / TW / TW / TW  | TR 77703<br>TW 77803<br>TW 77903   |   |
| Fail-safe version                  | EM-40 *<br>EM-50<br>EM-20<br>EM-30 *  | STB<br>STB<br>STW (STB)<br>STW (STB)   | STB 78203<br>STB 78303<br>STW (STB) 77503 S<br>STW (STB) 77603 S                 |   |

## Technical data

Table of control ranges and probes for TR, TW, TB — liquid-filled

| Control/limit range<br>°C | Switching differential<br>% | Max. probe temperature<br>°C | Max. switch head temperature<br>°C | Max. capillary length<br>m | Max. contact spacing<br>°C | Probe length "L" in mm, probe dia. "d" in mm, 6 mm dia. is standard |     |
|---------------------------|-----------------------------|------------------------------|------------------------------------|----------------------------|----------------------------|---|-----|
|                           |                             |                              |                                    |                            |                            | Ø 6   | Ø 8 |
| <b>-20 to + 40</b>        | 1                           | + 50                         | + 50                               | 5                          | 5                          | 245   | 145 |
|                           | 2.5                         | + 50                         | + 50                               |                            | 8                          | 245   | 145 |
|                           | 5                           | + 95                         | + 50 (80) <sup>1)</sup>            |                            | 25                         | 138   | 91  |
|                           | 7                           | +100                         | + 50 (80) <sup>1)</sup>            |                            | 50                         | 103   | 73  |
| <b>0 to + 50</b>          | 1                           | + 60                         | + 60                               | 3                          | 5                          | 283   | 165 |
|                           | 2.5                         | + 60                         | + 60                               |                            | 10                         | 283   | 165 |
|                           | 5                           | +105                         | + 60 (80) <sup>1)</sup>            |                            | 25                         | 159   | 101 |
|                           | 7                           | +110                         | + 60 (80) <sup>1)</sup>            |                            | 50                         | 117   | 80  |
| <b>+20 to + 90</b>        | 1                           | +115                         | + 80                               | 1                          | 7                          | 210   | 127 |
|                           | 2.5                         | +115                         | + 80                               |                            | 14                         | 210   | 127 |
|                           | 5                           | +140                         | +100                               |                            | 35                         | 121   | 82  |
|                           | 7                           | +175                         | +100                               |                            | 70                         | 91  | 67  |
| <b>0 to +100</b>          | 1                           | +125                         | + 80                               | 2                          | 10                         | 157   | 100 |
|                           | 2.5                         | +125                         | + 80                               |                            | 20                         | 157   | 100 |
|                           | 5                           | +165                         | +100                               |                            | 50                         | 94  | 68  |
|                           | 7                           | +200                         | +100                               |                            | 100                        | 73  | 58  |
| <b>+30 to +110</b>        | 1                           | +135                         | + 80                               | 2                          | 8                          | 188   | 116 |
|                           | 2.5                         | +135                         | + 80                               |                            | 16                         | 188   | 116 |
|                           | 5                           | +170                         | +100                               |                            | 40                         | 110   | 76  |
|                           | 7                           | +200                         | +100                               |                            | 80                         | 84  | 63  |
| <b>0 to +150</b>          | 1                           | +173                         | + 80                               | 1                          | 15                         | 113   | 78  |
|                           | 2.5                         | +173                         | +100                               |                            | 30                         | 113   | 78  |
|                           | 5                           | +200                         | +100                               |                            | 75                         | 72  | 57  |
| <b>0 to +200</b>          | 1                           | +230                         | + 80                               | 1                          | 20                         | 113   | 78  |
|                           | 2.5                         | +230                         | +100                               |                            | 40                         |   |     |
| <b>+50 to +200</b>        | 1                           | +230                         | + 80                               | 1                          | 15                         | 139   | 92  |
|                           | 2.5                         | +230                         | +100                               |                            | 30                         |   |     |
| <b>+50 to +250</b>        | 1                           | +228                         | + 80                               | 1                          | 20                         | 105   | 70  |
|                           | 2.5                         | +228                         | +100                               |                            | 40                         | 105   | 70  |
|                           | 5                           | +300                         | +100                               |                            | 100                        | 64  | 49  |
| <b>+50 to +300</b>        | 1                           | +345                         | + 80                               | 2                          | 25                         | 87  | 61  |
|                           | 2.5                         | +345                         | +100                               |                            | 50                         |   |     |

<sup>1)</sup> Values in brackets to special order only, taking into account operating conditions and capillary lengths

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## Technical data

**Table of control ranges and probes for TR, TW, TB – gas-filled**

| Control/limit range<br>°C | Switching differential<br>% | Max. probe temperature<br>°C | Max. switch head temperature<br>°C | Max. capillary length<br>m | Max. contact spacing<br>°C | Probe length "L" in mm, probe dia. "d" in mm, 6 mm dia. is standard |     |
|---------------------------|-----------------------------|------------------------------|------------------------------------|----------------------------|----------------------------|---|-----|
|                           |                             |                              |                                    |                            |                            | Ø 6   | Ø 8 |
| <b>+20 to +400</b>        | 6                           | +460                         | +100                               | 5                          | 75                         | 237   | 137 |
|                           | 10                          | +500                         | +100                               |                            | 200                        | 127   | 81  |
| <b>+20 to +500</b>        | 3 / 5                       | +530                         | + 80                               | 1                          | 48                         | 278   | 158 |
|                           | 6                           | +575                         | +100                               | 5                          | 95                         | 176   | 106 |
|                           | 10                          | +575                         | +100                               | 5                          | 250                        | 95  | 65  |

**Control ranges and temperature probes for STB and STW (STB) – liquid-filled**

| Setting range<br>°C | Scale span<br>°Δ | Max. probe temperature<br>°C | Max. switch head temperature<br>°C | Max. capillary length<br>m | Tolerance at limit<br>°C | Probe length "L" in mm, probe dia. "d" in mm, 6 mm dia. is standard |     |
|---------------------|------------------|------------------------------|------------------------------------|----------------------------|--------------------------|---|-----|
|                     |                  |                              |                                    |                            |                          | Ø 6   | Ø 8 |
| <b>+75 to +100</b>  | <b>78</b>        | +125                         | +100                               | 5                          | +0<br>-7                 | 84  | 63  |
| +85 to +110         | 78               | +135                         |                                    |                            | +0<br>-7                 |   |     |
| <b>+120 to +150</b> | <b>77</b>        | +173                         |                                    |                            | +0<br>-9                 | 80  | 57  |
| +160 to +200        | 79               | +230                         |                                    |                            | +0<br>-12                | 64  | 49  |
| +210 to +250        | 71               | +288                         |                                    |                            | +0<br>-13                | 61  | 47  |
| +250 to +300        | 79               | +345                         |                                    |                            | +0<br>-16                | 55  | –   |

**Control ranges and temperature probes for STB and STW (STB) – gas-filled**

| Setting range<br>°C | Scale span<br>°Δ | Max. probe temperature<br>°C | Max. switch head temperature<br>°C | Max. capillary length<br>m | Tolerance at limit<br>°C | Probe length "L" in mm, probe dia. "d" in mm, 6 mm dia. is standard |     |
|---------------------|------------------|------------------------------|------------------------------------|----------------------------|--------------------------|---|-----|
|                     |                  |                              |                                    |                            |                          | Ø 6   | Ø 8 |
| +300 to +400        | 70               | +460                         | +100                               | 3                          | +0<br>-23                | 148   | 92  |
| +350 to +500        | 72               | +575                         |                                    |                            | +0<br>-29                | 127   | 81  |

On thermostats with factory-set switching points, please specify the switch-off point in addition to the control range, e.g. control range +80 to +100°C, fixed at +95°C.

### Capillaries and temperature probes

| Type                             | End of scale                    | Capillary   | Temperature probe                                    | Notes         |
|----------------------------------|---------------------------------|---|--|---------------|
| EM- . .                          | up to 200°C                     | copper (Cu)<br>1.5 mm dia.<br>Mat. Ref. Cu-DHP            | copper (Cu)<br>Mat. Ref. Cu-DHP<br>brazed            | –             |
|                                  | up to 350°C                     | copper (Cu)<br>1.5 mm dia.<br>Mat. Ref. Cu-DHP            | stainless steel (CrNi)<br>Mat. Ref. 1.4571<br>brazed | –             |
|                                  | up to 500°C                     | stainless steel (CrNi)<br>1.5 mm dia.<br>Mat. Ref. 1.4571 | stainless steel (CrNi)<br>Mat. Ref. 1.4571<br>welded | –             |
|                                  | up to 350°C                     | stainless steel (CrNi)<br>1.5 mm dia.<br>Mat. Ref. 1.4571 | stainless steel (CrNi)<br>Mat. Ref. 1.4571<br>welded | at extra cost |
| Capillary length                 | standard: 1000 mm, max. 5000 mm |   |  |               |
| Min. bending radius of capillary | 5 mm                            |   |  |               |

### Note

If the maximum permissible temperature at the probe, capillary and switch head is not fully utilized, it may be possible to increase the capillary length there where it is restricted to 1, 2 or 3 m according to the control range and probe table. Please let us know the actual temperatures to which the thermostat is exposed.

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**Electrical data**

|   |  |  |  |                |   |                    |
|---|--|--|--|----------------|---|--------------------|
| Switching device:<br>1, 2, 3 or 4<br>single-pole<br>snap-action<br>switches | EM.-1...<br>EM.-2...<br>EM.-3...   | EM-20<br>EM-30   | EM.-4...<br>EM.-5...   | EM-40<br>EM-50 | EM.-4.../U<br>EM.-5.../U  | EM-40/U<br>EM-50/U |
|   | microswitch with<br>changeover contact   |  | microswitch with<br>(n.c.) break contact<br>and lock-out           |                | microswitch with (n.c.) break<br>contact, lock-out and<br>additional signal contact |                    |
| Contact rating  | switching action<br>switching differential   |  | (n.c.) break contact<br>terminal 2                                 |                | (n.o.) make contact<br>terminal 4   |                    |
|   | TR, TW, STW (STB)<br>2,5%, 5%, 6%, 7%, 10%   |  | 16 (3) A, 230 V AC +10%<br>p.f. = 1 (0.6)<br>0.25 A, 230 V DC +10% |                | 8 (1.5) A, 230 V AC +10%<br>p.f. = 1 (0.6)<br>0.25 A, 230 V DC +10%                 |                    |
|   | TB, STB  |  | 6 (2) A, 230 V AC +10%, p.f. = 1 (0.6)<br>0.25 A, 230 V DC +10%    |                | 2 (1) A, 230 V AC +10%<br>p.f. = 1 (0.6)<br>0.25 A, 230 V DC +10%                   |                    |
|   | TR, TW<br>1%, 3%   |  | microswitch, gold-plated, extra code "au"<br>0.1 A, 24 V AC/DC     |                |   |                    |
| Contact reliability   | To ensure the maximum switching reliability, we recommend a minimum load of:<br>with silver contacts:<br>AC/DC = 20 mA, 24 V |  |  |                |   |                    |
| Rated surge voltage   | with gold-plated contacts (code "au"):<br>AC/DC = 10 mA, 10 V  |  |  |                |   |                    |
| Overvoltage category  | 1500 V (400 V via the switching contacts)  |  |  |                |   |                    |
| Required fusing   | II   |  |  |                |   |                    |
| Electrical connection   | see Contact rating   |  |  |                |   |                    |
|   | standard   | faston connectors A 6.3 x 0.8 DIN 46 244   |  |                |   |                    |
|   | extra code X   | screw terminal up to 2.5 mm <sup>2</sup> conductor cross-section (at extra cost)<br>– also suitable for retrofitting – |  |                |   |                    |

**Operating data**

|   |                             |                               |                                     |   |
|---|-----------------------------|-------------------------------|-------------------------------------|---|
| Switching differential<br>in % of<br>control/limit range  | Switching action            | with liquid-filled system     |                                     |   |
|   |                             | Nominal value                 | Possible actual value               |   |
|   | TR, TW                      | 2.5                           | 2.5 max. 3.5                        | standard  |
|   |                             | 5                             | 5 max. 6                            | on request  |
|   |                             | 7                             | 7 max. 8                            | on request  |
|   |                             | 1                             | 1 max. 2                            | at extra cost   |
|   |                             | with gas-filled system        |                                     |   |
|   | 5                           | 5 max. 11                     | standard                            |   |
|   | 6                           | 6 max. 14                     | on request                          |   |
|   | 10                          | 10 max. 16                    | on request                          |   |
|   | 3                           | 2.5 max. 4                    | at extra cost                       |   |
|   | STW (STB)                   | with liquid-filled system     |                                     |   |
| 5   |                             | 5 max. 7                      | standard                            |   |
| with gas-filled system  |                             |                               |                                     |   |
| 6   | 6 max. 16                   | standard                      |                                     |   |
| Contact spacing<br>on multi-pole<br>thermostat  | with switching differential | contact spacing of scale span |                                     | switching point accuracy<br>of contact spacing of<br>scale span |
|   |                             | minimum                       | maximum                             |   |
|   | 1%                          | 1%                            | according to<br>control range table | ≤ 1%  |
|   | 2.5%                        | 1%                            |                                     | ≤ 1%  |
|   | 3%, 5%                      | 2%                            |                                     | < 2%  |
| 6%, 7%, 10%   | 3%                          |                               | < 3%                                |   |
| The contact spacing is specified in °C against the setpoint of contact I.<br>(The contact number is marked on the back of the housing.)                   |                             |                               |                                     |   |
| sign - = switching <b>before</b> the setpoint<br>sign + = switching <b>after</b> the setpoint<br>For simultaneous switching, specify contact spacing "0". |                             |                               |                                     |   |

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**Operating data**

|   |   |  |   |                                     |                               |
|---|---|--|---|-------------------------------------|-------------------------------|
| Switching point accuracy in % of control /limit range | Switching action  | Switching differential                         |   | in upper third of scale or at limit |                               |
|   |   | liquid-filled                                  | gas-filled  |                                     |                               |
|   | TR  | 1%, 2.5%<br>5%<br>7%                           | —<br>3%, 5%<br>6%, 10%                                      | ± 1.5%<br>± 3 %<br>± 4 %            |                               |
|   | TW  | 1%, 2.5%<br>5%<br>7%                           | —<br>3%, 5%<br>6%, 10%                                      | +0 / -3%<br>+0 / -6%<br>+0 / -8%    |                               |
|   | TB  | —  | —   | +0%<br>-5%                          |                               |
|   | STB, STW (STB)  | see table of control ranges and probes, page 3 |   |                                     |                               |
| Mean ambient temperature effect                       | Deviation of the ambient temperature at the switch head and/or capillary from the +22°C calibration ambient temperature produces a switching point shift:<br>higher ambient temperature = lower switching point<br>lower ambient temperature = higher switching point<br>for temperatures with end of scale/limit |  |   |                                     |                               |
|   | < 200°C   |  | ≥ 200°C ≤ 350°C   |                                     | ≥ 400°C ≤ 500°C               |
|   | TR, TW, TB  | STW<br>STB                                     | TR, TW, TB  | STW<br>STB                          | TR, TW, TB<br>STW, STB        |
|   | switching differential in %   |  |   |                                     |                               |
|   | 1 / 2.5   | 5  | 7   | 7 / - -                             | 1 / 2.5 5 7 / - - 3 / 5 6 10  |
|   | ambient temperature effect on switch head, % per °C   |  |   |                                     |                               |
|   | 0.15  | 0.26   | 0.34  | 0.43                                | 0.12 0.21 0.35 0.12 0.17 0.24 |
|   | ambient temperature effect on capillary, % per °C per m length  |  |   |                                     |                               |
| 0.05  | 0.09  | 0.04   | 0.07  | 0.05                                |                               |
| Temperature compensation* (TK)                        | * for detailed information, see diagram on page 8   |  |   |                                     |                               |
| Temperatures  | permissible storage temperature:<br>-50 to +50°C  |  | permissible ambient temperature in operation:<br>+80°C max. |                                     |                               |
| Nom. position (NL)                                    | unrestricted  |  |   |                                     |                               |

**Housing**

|                                   |   |  |
|-----------------------------------|---|--|
| Housing in galvanized steel sheet | standard fixing   | by 2 M3 screws, spaced 22 mm   |
|                                   | code b1   | by 2 M4 screws, spaced 28 mm   |
|                                   | code b2   | by 2 M3 screws, spaced 33 mm   |
|                                   | code b7   | central fixing M 10 x 1 with cap nut (on TB and STB only)              |
| Setpoint adjustment               | TR:<br>switching point externally adjustable by rotary knob   | TW, TB, STB, STW (STB):<br>switching point adjustable with screwdriver |
|                                   | Types EM-3, EM-4, EM-33, EM-44, EM-444, EM-3333, EM-30, EM-40 permanently set at the factory to customer requirements |  |
| Setpoint knob                     | see Data Sheet 60.6715  |  |
| Scale span                        | standard: 250° (for STB and STW (STB), see table of control ranges and probes, page 3)                                |  |
| Protection                        | EN 60 529-IP00  |  |
| Weight                            | approx. 0.3 kg  |  |

**Process connection\***

|                          |   |  |
|--------------------------|---|--|
| EM Series with capillary | plain cylindrical probe A (standard)  |  |
|                          | pocket U (on request)<br>screw-in pocket with screw-in spigot G 1/2 Form A to DIN 3852/2 and clamping clip with fixing screw for securing the probe |  |
| Material                 | pocket U  | up to +150°C: CuZn is standard<br>above +150°C: St is standard (CrNi on request) |
| Fitting length S         | standard lengths: 100, 120, 150, 200 or 300 mm (other lengths on request)   |  |
| Immersion tube dia.      | D = 8 mm, D = 10 mm   |  |

\*See Data Sheet 60.6710 for additional process connections and pockets.

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**Connection diagrams**

|  |  |   |  |
|--|--|---|--|
| EM-1<br>EM-2<br>EM-3   |  | EM-4<br>EM-5  |  |
| EMF-13<br>EMF-23<br>EMF-33<br><br>Setpoint: I<br>Follow-on contact: II                                       |  | EM-4/U<br>EM-5/U  |  |
| EMF-133<br>EMF-233<br>EMF-333<br><br>Setpoint: I<br>Follow-on contact: II, III                               |  | EM-40<br>EM-50<br>I = break contact<br>on system fracture<br>and T < -10°C: I<br>II = limit: II     |  |
| EMF-1333<br>EMF-2333<br>EMF-3333<br><br>Setpoint: I<br>Follow-on contact: II, III, IV                        |  | EM-40/U<br>EM-50/U<br>I = break contact<br>on system fracture<br>and T < -10°C: I<br>II = limit: II |  |
| Example: EMF-1334<br><br>For other type variants, the connection diagrams have to be appropriately combined. |  | EM-20<br>EM-30<br>I = break contact<br>on system fracture<br>and T < -10°C: I<br>II = limit: II     |  |

**Dimensions**

| EM-1<br>EM-2<br>EM-3<br>EM-4<br>EM-5 |    | <table border="1"> <thead> <tr> <th></th> <th>B</th> <th>G</th> </tr> </thead> <tbody> <tr> <td>standard</td> <td>22</td> <td>M3</td> </tr> <tr> <td>code b1</td> <td>28</td> <td>M4</td> </tr> <tr> <td>code b2</td> <td>33</td> <td>M3</td> </tr> </tbody> </table> |  | B | G | standard | 22 | M3 | code b1 | 28 | M4 | code b2 | 33 | M3 |
|--------------------------------------|----|---|--|---|---|----------|----|----|---------|----|----|---------|----|----|
|                                      | B  | G   |  |   |   |          |    |    |         |    |    |         |    |    |
| standard                             | 22 | M3  |  |   |   |          |    |    |         |    |    |         |    |    |
| code b1                              | 28 | M4  |  |   |   |          |    |    |         |    |    |         |    |    |
| code b2                              | 33 | M3  |  |   |   |          |    |    |         |    |    |         |    |    |

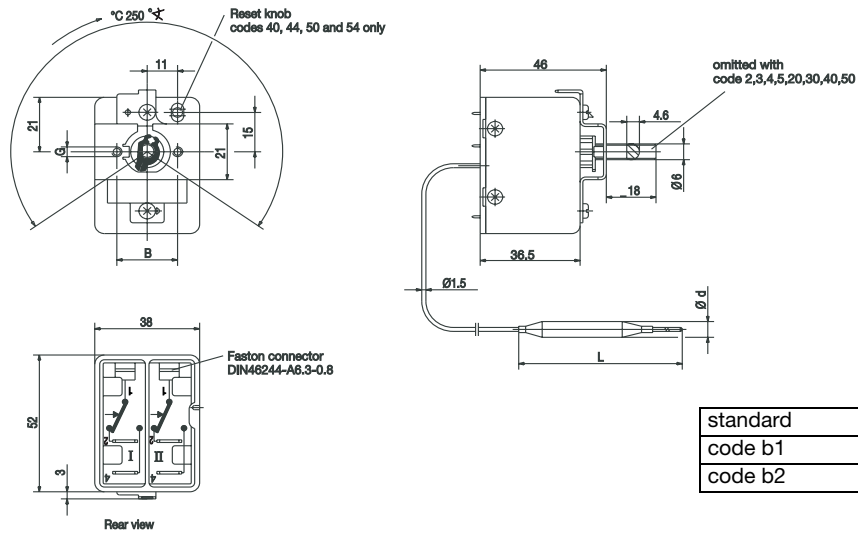
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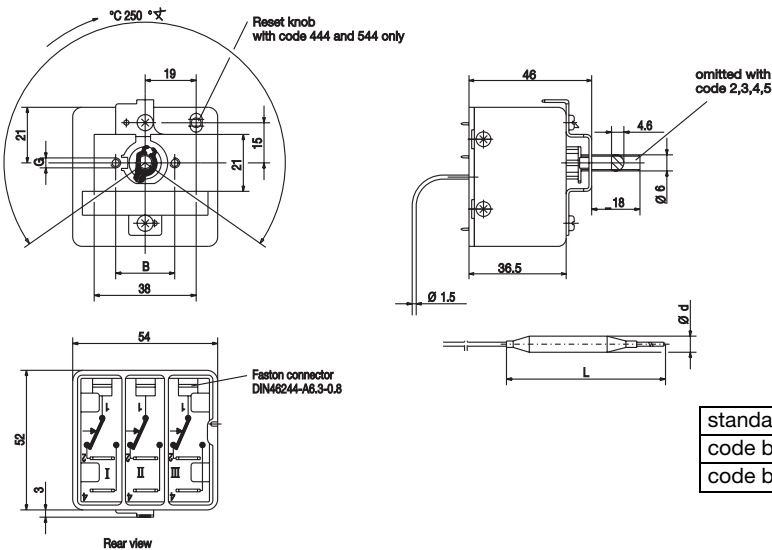


EMF-13  
 EMF-23  
 EMF-33  
 EMF-14  
 EMF-24  
 EMF-44  
 EMF-54



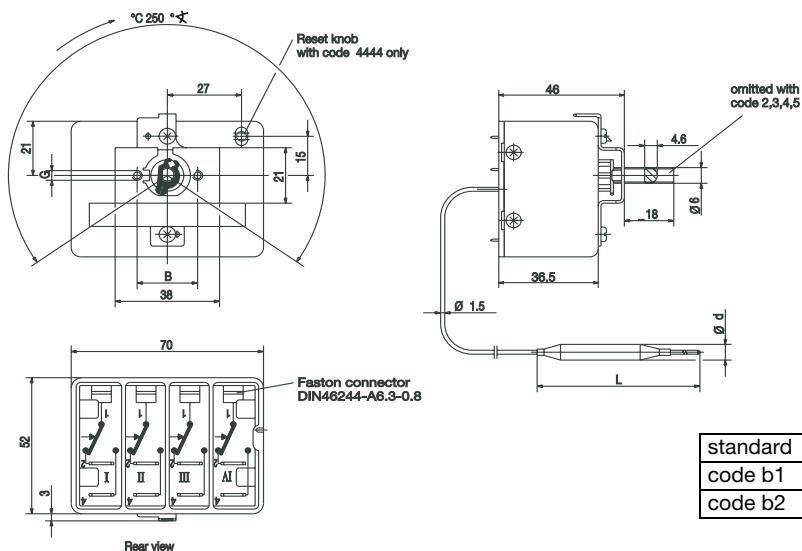
|          | B  | G  |
|----------|----|----|
| standard | 22 | M3 |
| code b1  | 28 | M4 |
| code b2  | 33 | M3 |

EMF-133  
 EMF-134  
 EMF-233  
 EMF-234  
 EMF-333  
 EMF-444  
 EMF-544



|          | B  | G  |
|----------|----|----|
| standard | 22 | M3 |
| code b1  | 28 | M4 |
| code b2  | 33 | M3 |

EMF-1333  
 EMF-2333  
 EMF-3333



|          | B  | G  |
|----------|----|----|
| standard | 22 | M3 |
| code b1  | 28 | M4 |
| code b2  | 33 | M3 |



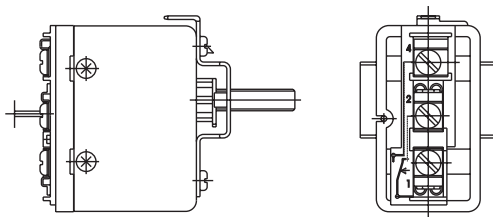
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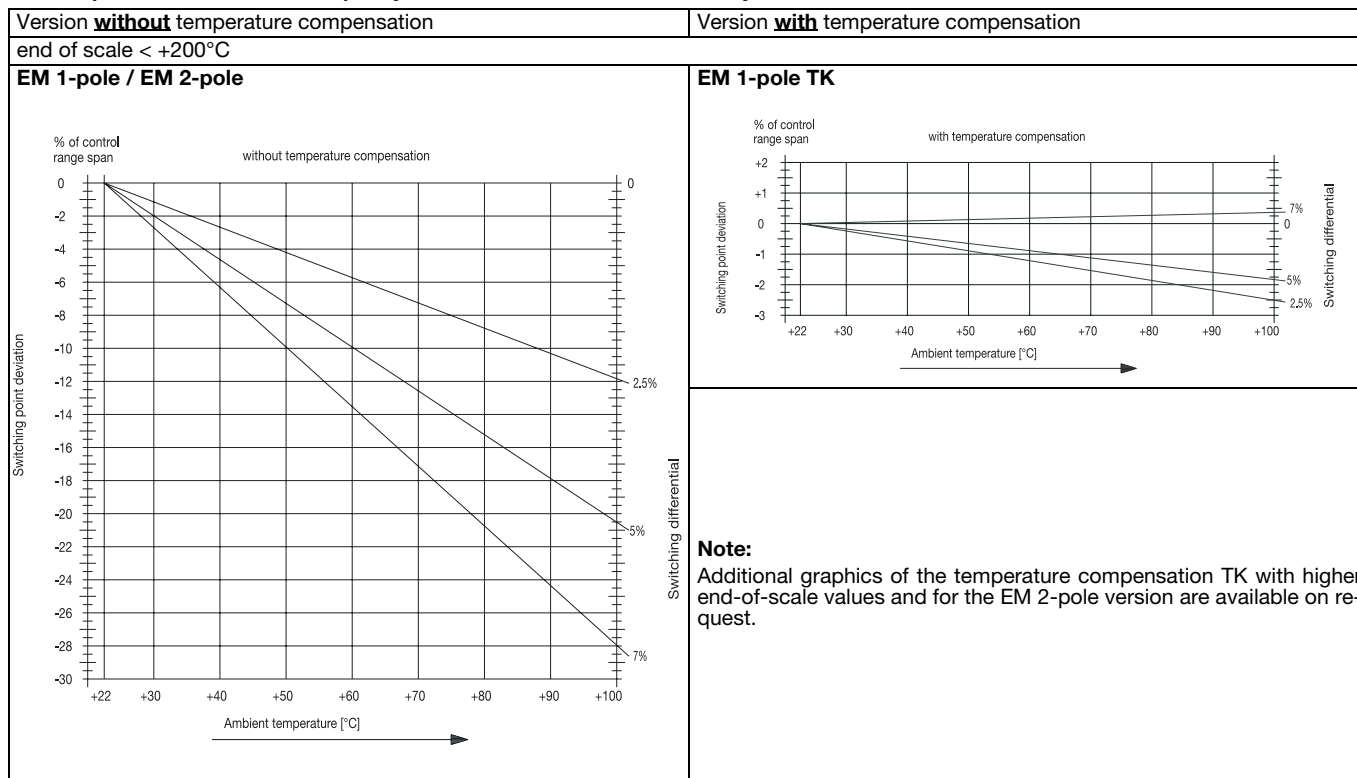
Screw connection EM-1  
 extra code X



## Temperature compensation (TK)

Any deviation of the temperature at the switch head from the +22°C calibration ambient temperature will produce a deviation of the switching point. With strongly fluctuating ambient temperatures it makes sense to use thermostats with temperature compensation (extra code TK). Switching point deviation as a function of ambient temperature at the switch head, taking into account the switching differential.

**The temperature effect on the capillary has not been allowed for and may introduce an additional error.**



**Note**

Physical and toxicological properties of the expansion media that may escape in the event of a system fracture.

| Control range with end of scale °C | Dangerous reactions | Fire/explosion hazard   |                       | Water contamination | irritant | Toxicological data |       |
|------------------------------------|---------------------|-------------------------|-----------------------|---------------------|----------|--------------------|-------|
|                                    |                     | Ignition temperature °C | Explosion limit % v/v |                     |          | danger to health   | toxic |
| < +200                             | no                  | + 355                   | 0.6 – 0.8             | yes                 | yes      | 1                  | no    |
| ≥ 200 ≤ +350                       | no                  | + 490                   | - -                   | yes                 | yes      | 1                  | no    |
| > 350 ≤ +500                       | no                  | no                      | no                    | no                  | no       | no                 | no    |

<sup>1</sup> At present there is no restrictive statement from the health authorities concerning any danger to health over short periods and at low concentration, e.g. after a fracture of the measuring system.

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## Stock items

(delivery: 3 working days after receipt of order)

| Sales No.   | Type       | Control range<br>°C | Switching<br>differential % | Capillary mm | Connection | Probe dia. x length<br>mm |
|-------------|------------|---------------------|-----------------------------|--------------|------------|---------------------------|
| 60/60001231 | EM-1       | - 20 to + 40        | 2.5                         | 2000         | A          | 6x245                     |
| 60/60000492 | EM-1       | 0 to + 50           | 2.5                         | 1000         | A          | 6x283                     |
| 60/60001142 | EM-1       | + 20 to + 90        | 2.5                         | 1000         | A          | 6x210                     |
| 60/60000493 | EM-1       | + 20 to + 90        | 7.0                         | 1000         | A          | 6x 91                     |
| 60/60000215 | EM-1       | 0 to +100           | 1.0                         | 1000         | A          | 6x157                     |
| 60/60000494 | EM-1       | 0 to +100           | 2.5                         | 1000         | A          | 6x157                     |
| 60/60000219 | EM-1       | 0 to +100           | 2.5                         | 2000         | A          | 6x157                     |
| 60/60000285 | EM-1       | + 30 to +110        | 7.0                         | 1000         | A          | 6x 84                     |
| 60/60000921 | EM-1       | 0 to +150           | 2.5                         | 1000         | A          | 6x113                     |
| 60/60000217 | EM-1       | 0 to +150           | 2.5                         | 2000         | A          | 6x113                     |
| 60/60001141 | EM-1       | 0 to +200           | 2.5                         | 1000         | A          | 6x114                     |
| 60/60000220 | EM-1       | 0 to +200           | 2.5                         | 2000         | A          | 6x114                     |
| 60/60000216 | EM-1       | + 50 to +250        | 2.5                         | 2000         | A          | 6x106                     |
| 60/60000495 | EM-1       | + 50 to +300        | 2.5                         | 1000         | A          | 6x 88                     |
| 60/60000923 | EM-1       | + 50 to +300        | 2.5                         | 2000         | A          | 6x 88                     |
| 60/60002119 | EM-1       | + 20 to +400        | 6.0                         | 1000         | A          | 8x137                     |
| 60/60002083 | EM-1       | + 20 to +500        | 5.0                         | 1000         | A          | 8x159                     |
| 60/60000214 | EM-2       | 0 to + 50           | 2.5                         | 1000         | A          | 6x286                     |
| 60/60000497 | EM-2       | 0 to +150           | 2.5                         | 1000         | A          | 6x113                     |
| 60/60000213 | EM-2       | 0 to +150           | 2.5                         | 2000         | A          | 6x113                     |
| 60/60001380 | EM-2       | + 50 to +300        | 2.5                         | 1000         | A          | 6x 88                     |
| 60/60002120 | EM-2       | + 20 to +400        | 6.0                         | 1000         | A          | 8x137                     |
| 60/60002084 | EM-2       | + 20 to +500        | 5.0                         | 1000         | A          | 8x159                     |
| 60/60002112 | EM-2       | +20 to +500         | 6.0                         | 2000         | A          | 8x159                     |
| 60/60000924 | EM-5       | 0 to +150           | 2.5                         | 1000         | A          | 6x113                     |
| 60/60000929 | EM-5       | 0 to +200           | 2.5                         | 1000         | A          | 6x114                     |
| 60/60000211 | EM-5       | + 50 to +300        | 2.5                         | 1000         | A          | 6x 88                     |
| 60/60002085 | EM-5       | + 20 to +500        | 4.0                         | 1000         | A          | 8x159                     |
| 60/60002244 | EM-50/U,b7 | +300 to +400        | — —                         | 1000         | A          | 6x148                     |
| 60/60002245 | EM-50/U,b7 | +350 to +500        | — —                         | 1000         | A          | 6x127                     |

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## Order details for non-stock items:

### Panel-mounting thermostats EM Series

| Order code               | (1) Basic type  |                                |                          |
|--------------------------|---|--------------------------------|--------------------------|
| 602021                   | EM panel-mounting thermostat with microswitch, with capillary |                                |                          |
| (2) Basic type extension |   |                                |                          |
| 0001                     | EM-1  | Temperature controller         | TR                       |
| 0002                     | EM-2  | Temperature monitor            | TW                       |
| 0003                     | EM-3 *  | Temperature monitor            | TW 1-pole                |
| 0004                     | EM-4 *  | Temperature limiter            | TB                       |
| 0005                     | EM-5  | Temperature limiter            | TB                       |
| 0013                     | EMF-13  | Temperature controller         | TR / TW                  |
| 0023                     | EMF-23  | Temperature monitor            | TW / TW                  |
| 0033                     | EMF-33 *  | Temperature monitor            | TW / TW                  |
| 0014                     | EMF-14  | Temperature controller         | TR / TB 2-pole           |
| 0024                     | EMF-24  | Temperature monitor            | TW / TB                  |
| 0044                     | EMF-44 *  | Temperature limiter            | TB / TB                  |
| 0054                     | EMF-54  | Temperature limiter            | TB / TB                  |
| 0133                     | EMF-1333  | Temperature controller         | TR / TW / TW             |
| 0134                     | EMF-134   | Temperature controller         | TR / TW / TB             |
| 0233                     | EMF-233   | Temperature monitor            | TW / TW / TW             |
| 0234                     | EMF-234   | Temperature monitor            | TW / TW / TB 3-pole      |
| 0333                     | EMF-333 *   | Temperature monitor            | TW / TW / TW             |
| 0444                     | EMF-444 *   | Temperature limiter            | TB / TB / TB             |
| 0544                     | EMF-544   | Temperature limiter            | TB / TB / TB             |
| 1333                     | EMF-1333  | Temperature controller         | TR / TW / TW / TW        |
| 2333                     | EMF-2333  | Temperature monitor            | TW / TW / TW / TW 4-pole |
| 3333                     | EMF-3333 *  | Temperature monitor            | TW / TW / TW / TW        |
| 0020                     | EM-20   | Safety temperature monitor     | STW (STB)                |
| 0030                     | EM-30 *   | Safety temperature monitor     | STW (STB)                |
| 0040                     | EM-40 *   | Protection temperature limiter | STB                      |
| 0050                     | EM-50   | Protection temperature limiter | STB                      |

\* setpoint/limit permanently set at the factory to customer requirements

| (3) Control/limit ranges |                                |
|--------------------------|--------------------------------|
| for TR, TW and TB        |                                |
| 013                      | -20 to + 40                    |
| 021                      | 0 to + 50                      |
| 041                      | + 20 to + 90                   |
| 025                      | 0 to +100                      |
| 052                      | + 30 to +110                   |
| 027                      | 0 to +150                      |
| 028                      | 0 to +200                      |
| 062                      | + 50 to +200                   |
| 063                      | + 50 to +250                   |
| 064                      | + 50 to +300                   |
| 045                      | + 20 to +400                   |
| 046                      | + 20 to +500                   |
| for STB and STW (STB)    |                                |
| 075                      | + 75 to +100                   |
| 085                      | + 85 to +110                   |
| 090                      | +120 to +150                   |
| 091                      | +160 to +200                   |
| 092                      | +210 to +250                   |
| 094                      | +250 to +300                   |
| 095                      | +300 to +400                   |
| 096                      | +350 to +500                   |
| 000                      | for limits with fixed settings |

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## Order details for non-stock items:

### Panel-mounting thermostats EM Series

| Order code                                    | (4) Limits with fixed settings  |
|---|---|
| 000   | for adjustable control/limit ranges   |
| ...   | values in °C (must be within the control/limit ranges)  |
| (5) Switching differential                    |   |
| 00  | no switching differential (-40 STB, -50 STB)  |
| 10  | 1% * of scale span  |
| 25  | 2.5% * of scale span  |
| 50  | 5% ** of scale span   |
| 70  | 7% ** of scale span   |
| 30  | 3% * of scale span  |
| 50  | 5% ** of scale span   |
| 60  | 6% * of scale span  |
| 01  | 10% * of scale span   |
|   | * on TR + TW only   |
|   | ** on TR, TW and STW only   |
| (6) Capillary length                          |   |
| 1000  | 1000 mm   |
| 2000  | 2000 mm   |
| 3000  | 3000 mm   |
| 4000  | 4000 mm   |
| 5000  | 5000 mm   |
| ....  | (special length, details in plain text)   |
| (7) Material of capillary                     |   |
| 40  | Cu (copper)   |
| 20  | CrNi (stainless steel 1.4571)   |
| (8) Process connection*                       |   |
| 10  | A = plain cylindrical probe  |
| 20  | U = screw-in pocket          |
|   | * for other probe mountings and pockets, see Data Sheet 60.6710.  |
| (9) Thread of process connection              |   |
| 00  | no thread (process connection A)  |
| 13  | male thread G <sup>1</sup> / <sub>2</sub>   |
| (10) Material of process connection           |   |
| 00  | only with process connection A  |
| 46  | CuZn (brass)  |
| 01  | St (steel)  |
| 20  | CrNi (stainless steel 1.4571)   |
| (11) Fitting length S (immersion tube length) |   |
| 000   | no pocket   |
| 100   | 100mm   |
| 150   | 150mm   |
| 200   | 200mm   |
| 300   | 300mm   |
| 400   | 400mm   |
| ....  | (special length, details in plain text)   |

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## Order details for non-stock items:

### Panel-mounting thermostats EM Series

| Order code                       | (12) Diameter D (immersion tube diameter)                                     |
|----------------------------------|---|
| 00                               | no pocket   |
| 8                                | 8 mm  |
| 10                               | 10 mm   |
| (13) Diameter d (probe diameter) |   |
| 6                                | 6 mm  |
| 8                                | 8 mm  |
| (14) Extra codes**               |   |
| 574                              | U TB/STB with (n.c.) break contact,<br>lock-out and additional signal contact |
| 702                              | ausnap-action switch contact, gold-plated<br>(only on 1- and 2-pole version)  |
| 699                              | X screw connection up to 2.5 mm <sup>2</sup> conductor cross-section          |
| 704                              | b1switch head fixing by 2 M4 screws, spaced 28 mm                             |
| 705                              | b2switch head fixing by 2 M3 screws, spaced 33 mm                             |
| 710                              | b7central fixing with cap nut (on TB and STB only)                            |
| 707                              | TKtemperature compensation (for 1- and 2-pole version only)                   |

\*\*List extra codes in sequence, separated by commas

**Contact spacing for 2-, 3- and 4-pole thermostats**  
 details in plain text (e.g. +2°C, +5°C, +8°C)

### Order code

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14)  
 602021 / ... - ... - ... - ... - ... - ... - ... - ... - ... - ... - ... - ... / ... , ... , ...

### Order example

602021 / 0005 - 052 - 000 - 00 - 2000 - 40 - 10 - 00 - 00 - 000 - 00 - 6 / 574\*\* , 710

\*\* List extra codes in sequence, separated by commas.

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# Panel-mounting Thermostats

## EM Series

- for limiting operating temperatures
- limit range up to +650°C
- with temperature compensation

EM panel-mounting thermostats monitor thermal processes. The thermostats are available as temperature monitors (TW), temperature limiters (TB) and protection temperature limiters (STB). If a fault occurs, the STB sets the system being monitored to a safe operational state.

Panel-mounting thermostats operate on the principle of liquid expansion, with a microswitch serving as the electrical switching device.



| Types | EM-2/TK                  | EM-5/TK                  | EM-50/TK                             |
|-------|--------------------------|--------------------------|--------------------------------------|
|       | Temperature monitor (TW) | Temperature limiter (TB) | Protection temperature limiter (STB) |

| Switching action | TW   | Lock-out on the TB and STB   | Self-monitoring on the STB  |
|------------------|--|--|---|
|                  | When the temperature at the probe rises above the set limit, the circuit is opened by a snap-action switch. When the temperature has fallen below the set limit (by the amount of the switching differential), the switch returns to its initial position. | When the temperature at the probe rises above the set limit, a snap-action switch is actuated and mechanically locked out.<br>When the temperature has fallen below the limit by about 100 °C, the snap-action switch can be manually reset. | When the temperature probe cools down to below -10°C, the snap-action switch will also be actuated. After the temperature has risen, the circuit will be reclosed automatically.<br>In the event of a measurement system break (leak), the snap-action switch will be permanently operated and will remain locked out mechanically. |

### Technical data

| Limit ranges | Control/limit range °C | Switching differential °C | Scale span ° $\frac{1}{4}$ |
|--------------|------------------------|---------------------------|----------------------------|
| TW and TB    | +230 to +650           | 50 – 80 (TW)              | 250                        |
| STB          | +500 to +650           | -                         | 70                         |

### Capillary and temperature probe

| Capillary         | Length                               | Diameter                | Min. bending radius                                | Material                             |
|-------------------|--------------------------------------|-------------------------|--|--------------------------------------|
|                   | standard: 1 m<br>maximum: 3 m        | 1.5 mm                  | 5 mm   | stainless steel,<br>Mat. Ref. 1.4571 |
| Temperature probe | Process connection*                  | Probe length x diameter | Material   |                                      |
|                   | plain cylindrical probe A (standard) | 115 x 8 mm              | high-temperature-resistant stainless steel, welded |                                      |

\*see Data Sheet 60.6710 for other process connections (B, C and D only).

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## Electrical data

|  |   |  |  |
|--|---|--|--|
| <b>Switching device:</b><br>single-pole<br>snap-action<br>switch | <b>EM-2/TK</b>  | <b>EM-5/TK</b><br><b>EM-50/TK</b>  | <b>EM-5/TK/U</b><br><b>EM-50-TK/U</b>  |
|  | microswitch with changeover contact   | microswitch with (n.c.) break contact and lockout  | microswitch with (n.c.) break contact, lockout and additional signal contact |
| <b>Contact rating</b>  | <b>Switching action</b>   | <b>Break contact terminal 2</b>  | <b>Make contact terminal 4</b>   |
|  | TW  | 16 (3) A, 230 V AC +10%,<br>p.f. = 1 (0.6)<br>0.25A, 230 V DC +10%   | 8 (1.5) A, 230 V AC +10%,<br>p.f. = 1 (0.6)<br>0.25A, 230 V DC +10%          |
|  | TB, STB   |  | 2 (1) A, 230 V AC +10%,<br>p.f. = 1 (0.6)<br>0.25A, 230 V DC +10%            |
| <b>Contact reliability</b>                                       | To ensure the highest possible switching reliability, we recommend a minimum loading of:<br>AC / DC = 24 V, 20 mA |  |  |
| <b>Rated surge voltage</b>                                       | 1500 V (via switching contacts: 400 V)  |  |  |
| <b>Overvoltage category</b>                                      | II  |  |  |
| <b>Fusing required</b>   | see Contact rating  |  |  |
| <b>Electrical connection</b>                                     | standard  | faston connector A 6.3 x 0.6 DIN 46244   |  |
|  | extra code X  | screw connection up to 2.5mm <sup>2</sup> conductor cross-section (at extra cost)<br>–also suitable for retrofitting – |  |

## Operating data

|   |  |  |  |
|---|--|--|--|
| <b>Switching point accuracy</b>                               | (in % of scale span, referred to setpoint or limit value at T <sub>a</sub> +22°C, with rising temperature)   |  |  |
|   | Switching action   | Type                                     | Accuracy in upper third of scale or at limit |
|   | TW   | EM-2/TK                                  | +0 °C<br>-18 °C                              |
|   | TB   | EM-5/TK, EM-5/TK/U                       | +0 °C<br>-48 °C                              |
| <b>Mean ambient temperature effect</b><br>(referred to limit) | Any deviation of the ambient temperature [Δt] at the switch head and capillary from the +22°C calibration ambient temperature will result in a shift of the switching point t <sub>v</sub> :<br>higher ambient temperature = lower switching point<br>lower ambient temperature = higher switching point |  |  |
|   | on switch head: t <sub>v</sub> = 0.06 · Δt   |  | on capillary: t <sub>v</sub> = 0.33 · Δt · m |
|   | If the operating temperature at the switch head and capillary deviates appreciably from the +22°C calibration ambient temperature, this can, on request, be taken into account during the calibration (at extra cost).   |  |  |
| <b>Permissible ambient temperature</b>                        | in operation   |  | Permissible storage temperature              |
|   | at the switch head and capillary<br>max. +100°C / min. -40°C   | at the probe<br>max. +750°C / min. -40°C |  |
| <b>Nominal position (NL)</b>                                  | unrestricted   |  |  |

## Housing

|                      |  |
|----------------------|--|
| <b>Material</b>      | galvanized steel   |
| <b>Fixing</b>        | standard: with two M3 screws, 22 mm spacing                          |
|                      | extra code b1: with two M4 screws, 28 mm spacing                     |
|                      | extra code b2: with two M3 screws, 33 mm spacing                     |
|                      | extra code b7: central fixing M10 x 1 with cap nut (TB and STB only) |
| <b>Limit setting</b> | switching point adjustable with screwdriver                          |
| <b>Protection</b>    | EN 60 529-IP00   |
| <b>Weight</b>        | approx. 0.3 kg   |

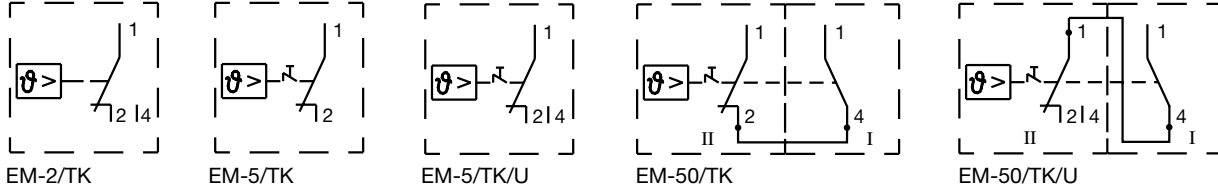
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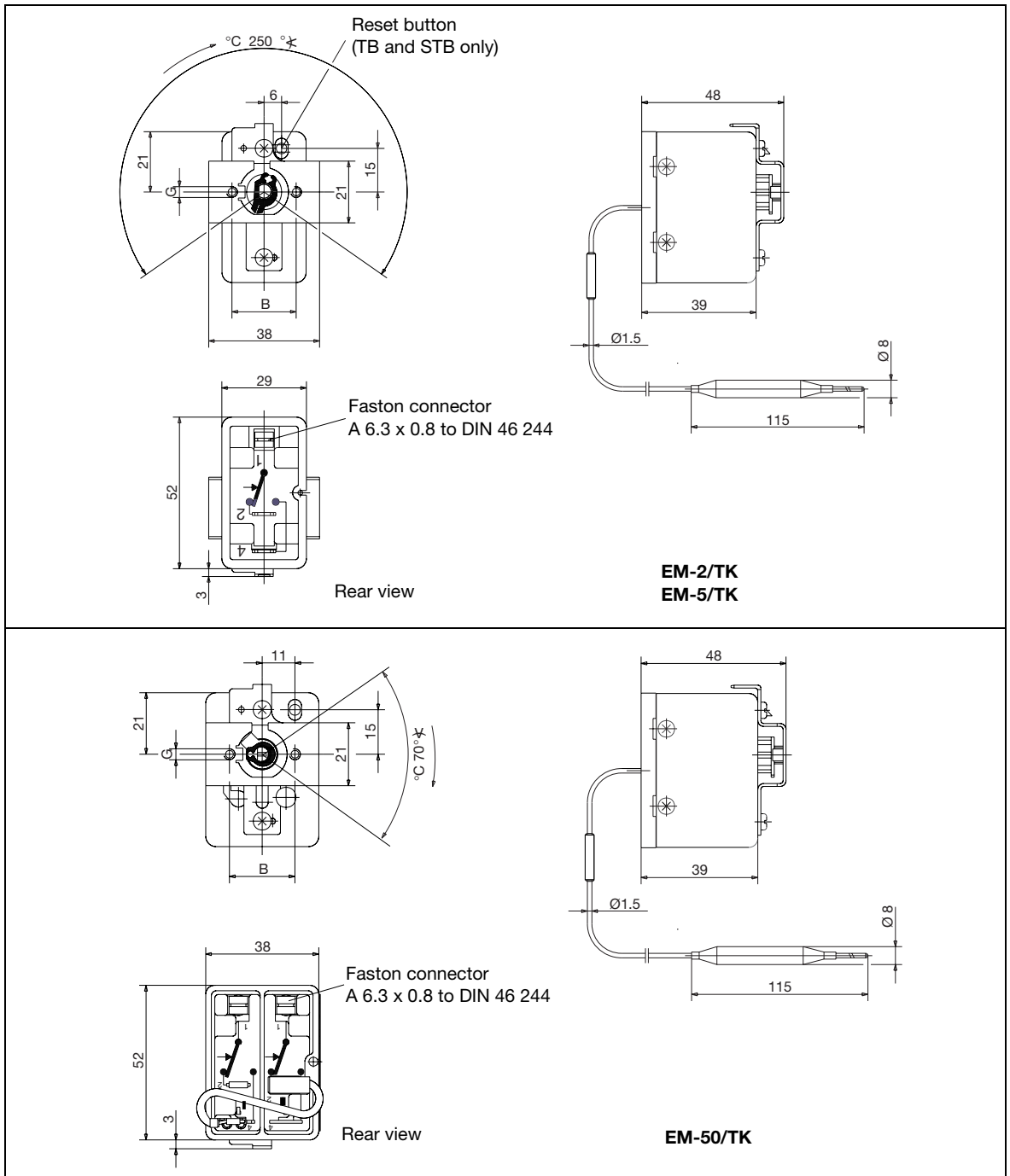
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**Connection diagrams**



**Dimensions**



| Extra code | B     | G  |
|------------|-------|----|
| standard   | 22 mm | M3 |
| b1         | 28 mm | M4 |
| b2         | 33 mm | M3 |



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## Order details for EM Series

### Stock items

delivery 3 working days after receipt of order

| Sales No.   | Type    | Limit °C     | Capillary mm | Process connection | Probe dia. x length mm |
|-------------|---------|--------------|--------------|--------------------|------------------------|
| 60/60003016 | EM-2/TK | +230 to +650 | 2000         | A                  | 8 x 115                |

### Non-stock items

Order code

**(1) Basic type**

602025 Panel-mounting thermostat, EM Series up to +650°C

**(2) Basic type extension**

0002 EM-2/TK temperature monitor  
 0005 EM-5/TK temperature limiter  
 0050 EM-50/TK protection temperatur limiter

**(3) Control / limit ranges**

093 +230 to +650°C (TW and TB only)  
 097 +500 to +650°C (STB only)

**(4) Capillary length (details in mm)**

1000 1000 mm  
 2000 2000 mm  
 3000 3000 mm  
 . . . . special length, details in mm (3000 mm max.)

**(5) Process connection \***

10 A = plain cylindrical probe  
 \* see Data Sheet 60.6710 for other process connections and pockets (B, C and D only)

**(6) Diameter d (probe diameter)**

8 8 mm

**(7) Extra codes<sup>1</sup>**

000 no extra code  
 574 **U** TB / STB with break contact, lock-out and additional signal contact  
 699 **X** screw connection up to 2.5 mm<sup>2</sup> conductor cross-section  
 704 **b1** switch head mounting by 2 M4 screws, 28 mm spacing  
 705 **b2** switch head mounting by 2 M3 screws, 33 mm spacing  
 707 **TK** temperature compensation  
 710 **b7** central fixing with cap nut (TB and STB only)

**Order code**

(1) (2) (3) (4) (5) (6) (7)  
 602025 / .. - ... - .... - .. - . / ...

**Order example**

602025 / 0050 - 097 - 1000 - 10 - 8 / 710<sup>1</sup>

<sup>1</sup> List extra codes in sequence, separated by commas

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## Panel-mounting Thermostats

EM Series as:

- Protection temperature monitor STW (STB)
- Protection temperature limiter STB
- tested to DIN 3440 and Pressure Equipment Directive 97/23/EC

### Brief description

Panel-mounting thermostats monitor thermal processes. The thermostats are available as protection temperature monitors STW (STB) and protection temperature limiters STB. In fault condition, the STB sets the system being monitored to a safe operational state.

Panel-mounting thermostats operate on the principle of liquid expansion. The electrical switching device is a microswitch.

### Switching action

#### Protection temperature monitor STW (STB)

If the temperature at the probe exceeds the selected setpoint, the microswitch is operated via the transmission mechanism and the circuit is opened or closed. If the temperature drops below the selected setpoint (by the amount of the switching differential), the microswitch returns to its initial position.

#### Lock-out facility on the protection temperature limiter STB

If the temperature at the probe exceeds the set limit, the circuit is opened and the microswitch is locked out mechanically.

After the temperature has fallen below the critical temperature by about 10 °C, the microswitch can be reset manually.

#### Self-monitoring facility on the protection temperature limiter STB and protection temperature monitor STW (STB)

If the measuring system fails, i.e. if the expansion liquid has leaked, then the pressure under the diaphragm drops and the circuit is permanently open. The thermostat can no longer be reset. If the probe cools down to a temperature below -20°C (approx.), the circuit will also open. When the temperature rises above -10°C (approx.), the reset is performed automatically.

#### Use of the protection temperature monitor STW as protection temperature limiter STB

The lock-out required by EN 14597 must be ensured by the subsequent circuit. This circuit must comply with EN 50156.



You will find the Declarations of Conformity on the Internet at:  
[www.jumo.net](http://www.jumo.net)  
 ⇒ Products  
 ⇒ Data Sheet 60.2026  
 or ask for them to be sent.

## Types and approvals

| Type    | Switching action | DIN Reg. No.       | Tests |   |   |  |
|---------|------------------|--------------------|-------|---|---|--|
| EM-80   | STB              | STB 82604          |       | Pressure Equipment Directive<br>97/23/EC CE0036 | DVGW<br>Gas Appliances Directive<br>90/396/EEC<br><b>only EM-80</b> |  |
| EM-20-E | STW (STB)        | STW (STB) 77 503 S |       |   |   |  |
| EM-30-E |                  | STW (STB) 77 603 S |       |   |   |  |

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## Technical data

### Limit range, limit setting and temperature probe

| Type    | Limit range<br>Limit setting<br>°C  | Max. permissible<br>probe temperature<br>°C | Tolerance at limit<br>°C | Probe length L<br>for probe dia. d= 6 mm<br>mm |
|---------|---|---|--------------------------|--|
| EM-20-E | + 40 to +110  | +135  | +0/-9                    | 72   |
|         | +100 to +150  | +173  | +0/-8                    | 85   |
|         | +110 to +170  | +195  | +0/-9                    | 72   |
|         | +180 to +250  | +288  | +0/-13                   | 60   |
|         | +230 to +300  | +345  | +0/-14                   | 60   |
|         | Using a screwdriver, set the limit on the limit adjuster before installation. |   |                          |  |
| EM-30-E | limit selectable between +20 and +300<br>fixed factory setting                | limit<br>+15%                               |                          |  |
| EM-80   | limit selectable between +60 and +180<br>fixed factory setting                | limit<br>+15%                               | +0/-5                    | 84   |

### Capillary and temperature probe

| Type                             | End of scale                         | Capillary   | Temperature probe                                    | Notes         |
|----------------------------------|--------------------------------------|---|--|---------------|
| EM- . .                          | up to 200°C                          | copper (Cu)<br>1.5 mm dia.<br>Mat. Ref. Cu-DHP            | copper (Cu)<br>Mat. Ref. Cu-DHP<br>brazed            | -             |
|                                  | up to 300°C                          | copper (Cu)<br>1.5 mm dia.<br>Mat. Ref. Cu-DHP            | stainless steel (CrNi)<br>Mat. Ref. 1.4571<br>brazed | -             |
|                                  | up to 300°C                          | stainless steel (CrNi)<br>1.5 mm dia.<br>Mat. Ref. 1.4571 | stainless steel (CrNi)<br>Mat. Ref. 1.4571<br>welded | at extra cost |
| Capillary length                 | standard is 1000 mm, maximum 5000 mm |   |  |               |
| Min. bending radius of capillary | 5 mm                                 |   |  |               |

## Electrical data

|  |   |  |   |
|--|---|--|---|
| Switching device:<br>single-pole<br>snap-action switch | Type EM-20-E<br>Type EM-30-E  | Type EM-80<br>standard   | Type EM-80<br>with extra code U   |
|  | microswitch with changeover contact   | microswitch with (n.c.) break contact<br>and lock-out  | microswitch with (n.c.) break contact,<br>lock-out and<br>additional signal contact |
| Contact rating   | Type  | (n.c.) break contact<br>terminal 2   | (n.o.) make contact<br>terminal 4   |
|  | EM-20-E<br>EM-30-E<br>EM-80/U   | 230 V AC +10%<br>10 (2) A, p.f. = 1 (0.6)<br>0.25 A, 230 V DC +10%   | 230 V AC +10%<br>2 (0.4) A, p.f. = 1 (0.6)<br>0.25 A, 230 V DC +10%                 |
|  | EM-80   |  | - - -   |
|  | extra code <b>au</b>  | gold-plated microswitch, 0.1 A, 24 V AC/DC   |   |
| Contact reliability                                    | To ensure maximum switching reliability, we recommend a minimum loading of:<br>with silver contacts:<br>AC/DC = 24 V, 20 mA |  |   |
|  | with gold-plated contacts (extra code <b>au</b> ):<br>AC/DC = 5 V, 5 mA   |  |   |
| Rated surge voltage                                    | 1500 V (via the switching contacts: 400 V)  |  |   |
| Overtoltage category                                   | II  |  |   |
| Required fusing  | see contact rating  |  |   |
| Electrical connection                                  | standard  | faston connectors A 6.3 x 0.8 DIN 46 244   |   |
|  | extra code X  | screw connection up to 2.5 mm <sup>2</sup> conductor cross-section (at extra cost)<br>- also suitable for retrofitting - |   |

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## Operating data

| Switching differential in % of limit range                                | Switching action   | Nominal value | Possible actual value |
|---|--|---------------|-----------------------|
|   | STW (STB)  | 7             | 7-8                   |
| Mean ambient temperature effect   | in % of scale span, referred to the limit value.<br>A deviation of the ambient temperature at the switch head and/or the capillary from the +22°C calibration ambient temperature will result in a shift of the switching point:<br>higher ambient temperature = lower switching point<br>lower ambient temperature = higher switching point<br>for temperatures with end of scale / limit value<br>< +200°C   ≥ +200°C ≤ +350°C |               |                       |
| <b>STW(STB)</b>   | switching differential in %  |               |                       |
|   | 7  |               | 7                     |
|   | ambient temperature effect due to the switch head, % per °C  |               |                       |
|   | 0.43   |               | 0.35                  |
|   | ambient temperature effect due to the capillary, % per °C per meter  |               |                       |
|   | 0.09   |               | 0.07                  |
| <b>STB</b>  | ambient temperature effect due to the switch head: 0.35 °C per °C  |               |                       |
|   | ambient temperature effect due to the capillary: 0.07 °C per °C per meter  |               |                       |
| Temperature compensation  | extra code TK<br>Please see the diagram on page 4 for details.   |               |                       |
| Permissible storage temperature   | -50 to +50 °C  |               |                       |
| Permissible ambient temperature in operation at switch head and capillary | +80°C max.<br>+18°C min. (0°C with extra code TK)  |               |                       |
| Nominal position (NL)   | unrestricted   |               |                       |

### Switch head

|                      |  |
|----------------------|--|
| Housing material     | sheet steel, zinc-plated   |
| Fixing               | extra code b1 with 2 M4 screws, 28 mm spacing<br>extra code b2 with 2 M3 screws, 33 mm spacing<br>extra code b3 with 2 M3 screws, 22 mm spacing (standard for EM-20-E and EM-30-E)<br>extra code b7, central fixing M 10 x 1 with cap nut (STB only, standard for EM-80) |
| Enclosure protection | EN 60 529 - IP00   |
| Weight               | approx. 0.3 kg   |

### Process connection\*

|                          |  |  |
|--------------------------|--|--|
| EM series with capillary | <b>plain cylindrical probe A</b> (standard)  |  |
|                          | <b>pocket U</b> (on request)<br>screw-in pocket with screw-in spigot G 1/2 Form A to DIN 3852/2 and clamping clip with fixing screw for securing the probe |  |
| Material                 | <b>pocket U</b>  | up to +150°C CuZn is standard<br>above +150°C St is standard (CrNi on request) |
| Fitting length S         | standard lengths: 100, 120, 150, 200 or 300 mm (other lengths on request)  |  |
| Immersion tube dia.      | D = 8 mm   |  |

\*See data sheet 60.6710 for additional process connections and pockets.

### Note:

Physical and toxicological properties of the expansion fluid that may escape in the event of a system fracture.

| Control range with end of scale | Dangerous reactions | Fire and explosion hazard |                 | Water contamination | Toxicological data |                  |       |
|---------------------------------|---------------------|---------------------------|-----------------|---------------------|--------------------|------------------|-------|
|                                 |                     | Ignition temperature      | Explosion limit |                     | irritant           | danger to health | toxic |
| < +200°C                        | no                  | + 355°C                   | 0.6 - 8 % v/v   | yes                 | yes                | 1                | no    |
| ≥ 200°C ≤ +350°C                | no                  | + 490°C                   | --              | yes                 | yes                | 1                | no    |

<sup>1</sup> At present, there is no restrictive statement from the health authorities concerning any danger to health over short periods and at low concentration, e.g. after a fracture of the measuring system.

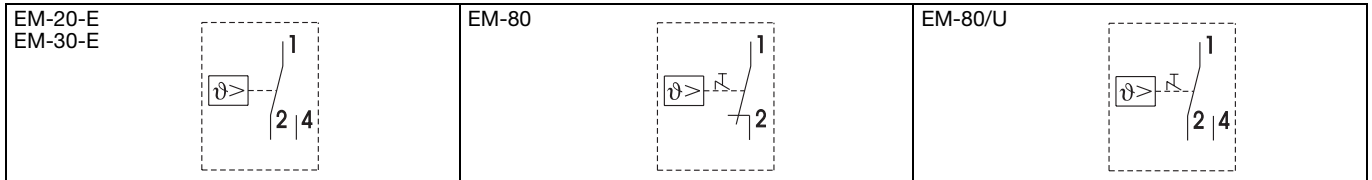
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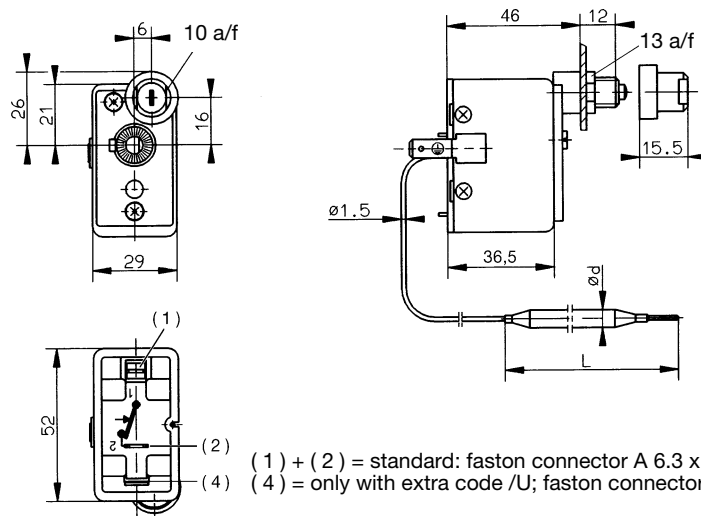


## Connection diagrams

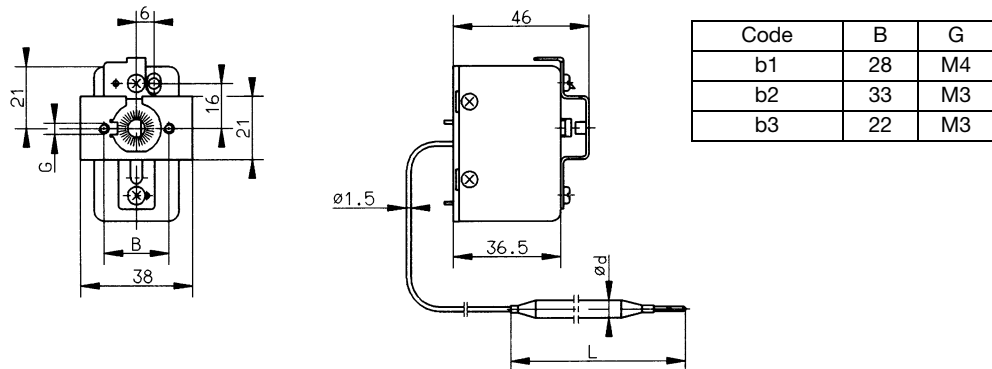


## Dimensions

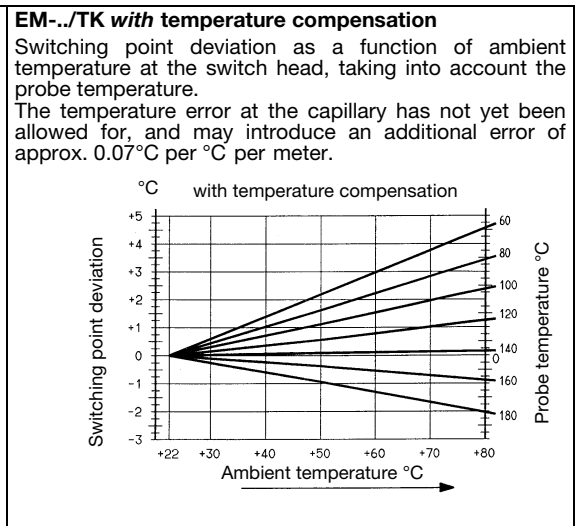
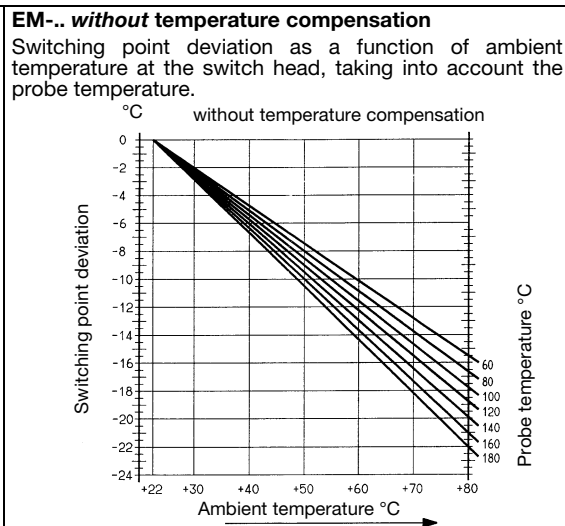
**EM-80 with central fixing (standard)**



**EM-20-E,  
 EM-30-E,  
 EM-80 with fixing bracket**



**Temperature compensation (TK)**  
 If the temperature at the switch head deviates from the +22°C ambient temperature, this will result in a displacement of the switching point.  
 With ambient temperatures that fluctuate considerably, it is advisable to use thermostats with temperature compensation (code TK).



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## Stock items

shipment: 3 working days after receipt of order

| Sales No.   | Type  | Limit °C | Capillary mm | Process connection | Probe dia. x length mm |
|-------------|-------|----------|--------------|--------------------|------------------------|
| 60/60000775 | EM-80 | + 110    | 1000         | A                  | 6 x ~ 84               |
| 60/60000753 | EM-80 | + 95     |              |                    |                        |

## Order details

### EM Series as STW (STB) and STB

|                   |   |
|-------------------|---|
| <b>Order code</b> | <b>(1) Basic type</b>   |
| 602026            | Panel-mounting thermostat, EM series  |
|                   | <b>(2) Basic type extensions</b>  |
| 20                | EM-20-E Protection temperature monitor, adjustable limit <sup>3</sup>   |
| 30                | EM-30-E Protection temperature monitor, fixed limit   |
| 80                | EM-80 Protection temperature limiter, fixed limit   |
|                   | <b>(3) Limit ranges for EM-20-E STW (STB)</b>   |
| 000               | with fixed limit (EM-30-E and EM-80)  |
| 055               | + 40 to +110°C  |
| 506               | +100 to +150°C  |
| 508               | +110 to +170°C  |
| 575               | +180 to +250°C  |
| 606               | +230 to +300°C  |
|                   | <b>(4) Fixed limits for EM-30-E and EM-80</b>   |
| 000               | with adjustable limit range   |
| ...               | details in °C   |
|                   | <b>(5) Capillary length</b>   |
| 1000              | 1000 mm   |
| 2000              | 2000 mm   |
| 3000              | 3000 mm <sup>3</sup>  |
| 4000              | 4000 mm <sup>3</sup>  |
| 5000              | 5000 mm <sup>3</sup>  |
| ...               | (special length, details in mm, 500 mm min., 5000 mm max.)  |
|                   | <b>(6) Material of capillary</b>  |
| 40                | Cu(copper)  |
| 20                | CrNi(stainless steel 1.4571) <sup>3</sup>   |
|                   | <b>(7) Process connection<sup>1</sup></b>   |
| 10                | A = plain cylindrical probe  |
| 20                | U = screw-in pocket          |
|                   | <b>(8) Thread for process connection</b>  |
| 00                | no thread (process connection A)  |
| 13                | external thread G1/2  |
|                   | <b>(9) Material of process connection</b>   |
| 00                | only with process connection A  |
| 46                | CuZn(brass)   |
| 01                | St(steel)   |
| 20                | CrNi(stainless steel 1.4571)  |
|                   | <b>(10) Fitting length S (immersion tube length)</b>  |
| 000               | no pocket   |
| 100               | 100 mm  |
| 120               | 120 mm  |
| 150               | 150 mm  |
| 200               | 200 mm  |
| 300               | 300 mm  |
| ...               | (special length, details in mm)   |

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## Order details

### EM Series as STW (STB) and STB

| Order code                       | (11) Diameter D (immersion tube dia.)  |
|----------------------------------|--|
| 00                               | no pocket  |
| 8                                | 8 mm   |
| (12) Diameter d (probe diameter) |  |
| 6                                | 6 mm   |
| (13) Extra codes <sup>2</sup>    |  |
| 000                              | no extra code  |
| 574                              | <b>U</b> STB with (n.c.) break contact, lock-out and additional signal contact |
| 702                              | <b>au</b> snap-action switch, gold-plated (cannot be combined with code U)     |
| 699                              | <b>X</b> screw connection with 2.5 mm <sup>2</sup> conductor cross-section     |
| 704                              | <b>b1</b> switch head fixing with 2 M4 screws, 28 mm spacing                   |
| 705                              | <b>b2</b> switch head fixing with 2 M3 screws, 33 mm spacing                   |
| 706                              | <b>b3</b> switch head fixing with 2 M3 screws, 22 mm spacing                   |
| 710                              | <b>b7</b> central fixing with cap nut (STB only)                               |
| 707                              | <b>TK</b> temperature compensation   |

#### Order code

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13)<sup>2</sup>  
 602026 / .. - ... - ... - .... - .. - .. - .. - .. - ... - .. - . / ...

#### Order example

602026 / 80 - 000 - 120 - 2000 - 40 - 10 - 00 - 00 - 000 - 00 - 6 / 710

<sup>1</sup> See data sheet 60.6710 for additional process connections and pockets.

<sup>2</sup> List extra codes in sequence, separated by commas.

<sup>3</sup> Special instrument → Delivery time.

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# JUMO heatTHERM

## Type 602030

- Temperature controller, as a panel-mounting thermostat
- Compensated for ambient temperature



### Brief description

Thermostats control and monitor thermal processes. The JUMO heatTHERM, Type 602030, is a temperature controller TR.

The panel-mounting thermostat operates on the principle of liquid expansion. The electrical switching device is a snap-action switch.

The panel-mounting thermostat complies with RoHS and is free from cadmium.

### Switching action




#### Temperature controller TR

If the temperature at the probe exceeds the selected setpoint, the snap-action switch is operated via the transmission mechanism and the circuit is opened or closed. If the temperature drops below the selected setpoint (by the amount of the switching differential), the snap-action switch returns to its initial position.

### Temperature compensation

A deviation of the ambient temperature at the switch head and capillary from the +22°C calibration ambient temperature will result in a shift of the switching point. The temperature compensation reduces this switching point shift to a minimum.

### Approvals

| DIN Reg. No. | Tests  |   |   |   |
|--------------|--|---|---|---|
| TR 116804    |  <sup>1</sup> |  |  | You will find the Declarations of Conformity at: <a href="http://www.jumo.net">www.jumo.net</a> , or ask for them to be sent. |

<sup>1</sup> mode of operation as per EN 60 730-2-9: Type 1 BL



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 Internet: www.jumo.us



## Technical data

|                            |  |
|----------------------------|--|
| Housing                    | sheet steel, zinc-plated   |
| Base                       | black polyester resin compound   |
| Fixing                     | 2 M4 screws, spaced 28 mm  |
| Enclosure protection       | IP00 to EN 60 529  |
| Limit temperatures         | for transport and storage: -50 to +50°C<br>in operation: +80°C max.  |
| Nominal position (NL)      | unrestricted   |
| Weight                     | approx. 0.12 kg  |
| Scale span                 | 250° $\nless$  |
| Ambient temperature effect | A deviation from the ambient temperature at the switch head and capillary from the +22°C calibration ambient temperature will result in a switching point shift of about $-0.1^{\circ}\text{C}/^{\circ}\text{C}$ <sup>1</sup> (measured for the control range +30 to +110°C and a capillary length of 3000 mm)   |
| Electrical contact         | snap-action switch with single-pole changeover contact<br><br>break contact (SPST-NC), contacts 1-2:<br>16 (2.5) A, 230 V AC +10%, p.f. = 1 (0.6)<br>0.25A, 230 V DC +10%<br><br>make contact (SPST-NO), contacts 1-4:<br>6.3 (2.5) A, 230 V AC +10%, p.f. = 1 (0.6)<br>0.25A, 230 V DC +10%<br><br>A 6.3-0.8 to DIN 46244<br><br>5 to 11% of control range<br><br>in upper third of control range: +2/-3%,<br>at the start of the control range: $\pm 5\%$ of control range<br><br>To ensure maximum switching reliability, we recommend a minimum loading of:<br>AC / DC = 24 V, 20 mA |
| Contact type               |  |
| Contact rating             |  |
| Connection                 |  |
| Switching differential     |  |
| Switching point accuracy   |  |
| Switching reliability      |  |
| Accessories                | Type W8 to data sheet 60.6715  |
| Setpoint adjuster          |  |

### Probe length L in mm

| Control range | +20 to 90°C | +30 to 110°C | +20 to 120°C | 0 to 200°C | +50 to 250°C | +50 to 300°C |
|---------------|-------------|--------------|--------------|------------|--------------|--------------|
| Probe dia.    |             |              |              |            |              |              |
| 4 mm          | 173         | 153          | 126          | 88         | 88           | 75           |
| 6 mm          | 79          | 72           | 62           | --         | --           | --           |

<sup>1</sup> (change in switching point referred to change in ambient temperature)

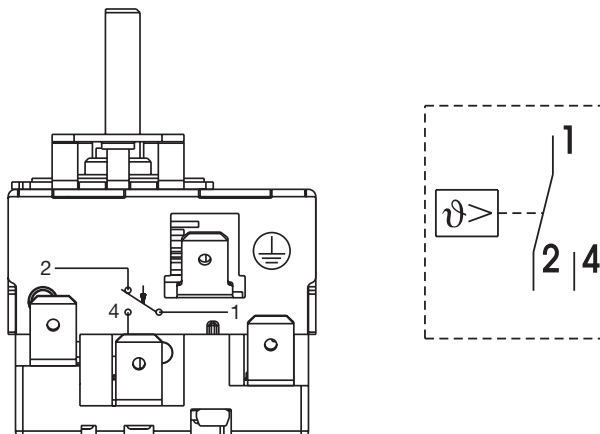
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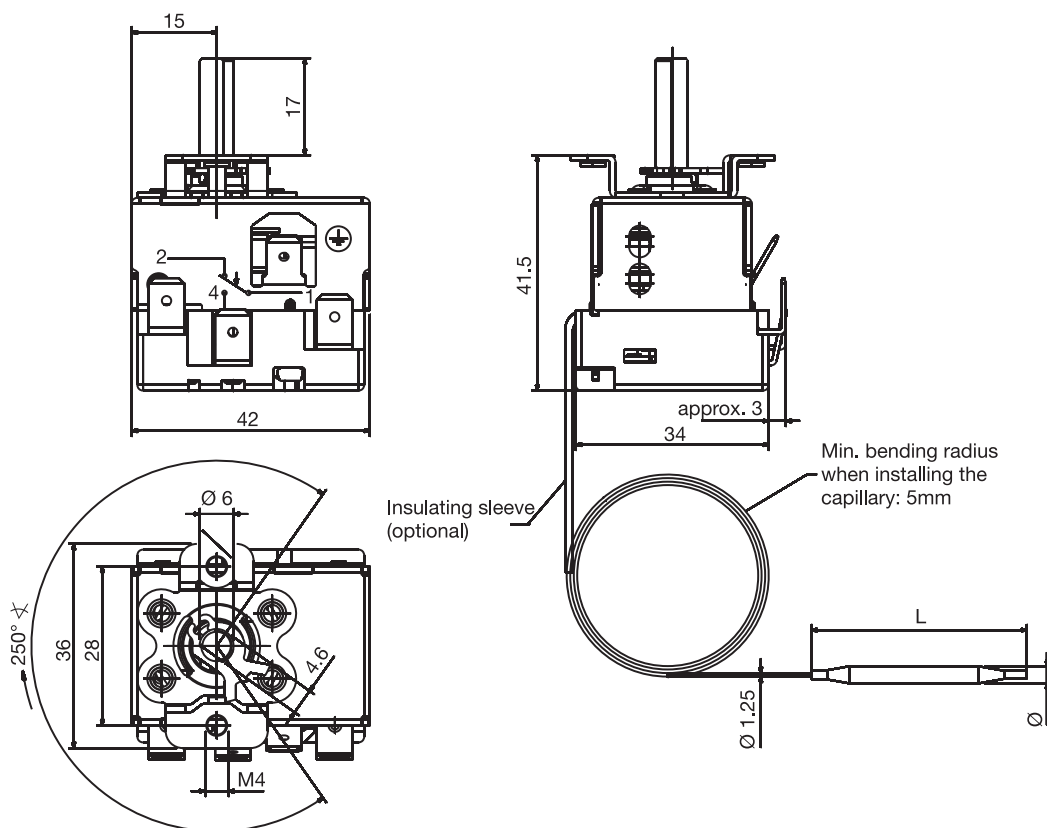
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## Connection diagram



## Dimensions



shipment: 3 working days after receipt of order

minimum order quantity: 10 items

## Stock items

| Sales No.   | Type   | Control range °C | Capillary mm | Process connection | Probe dia. x length mm |
|-------------|--------|------------------|--------------|--------------------|------------------------|
| 60/60002993 | 602030 | +20 to +90       | 2000         | A                  | 6 x 79                 |
| 60/60003134 |        | 0 to +200        |              |                    | 4 x 88                 |
| 60/60003135 |        | +50 to +300      |              |                    | 4 x 75                 |

Instrument versions that differ from the stock models are available on request, minimum order quantity: 500 items

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## Order details

### Panel-mounting thermostat JUMO heatTHERM, type 602030

|                   |   |
|-------------------|---|
| <b>Order code</b> | <b>(1) Basic type</b>   |
| 602030            | Panel-mounting thermostat JUMO heatTHERM, with single-pole snap-action switch                                   |
|                   | <b>(2) Basic type extension</b>   |
| 01                | Temperature controller (TR) with changeover contact   |
|                   | <b>(3) Control range</b>  |
| 041               | +20 to + 90°C   |
| 052               | +30 to +110°C   |
| 042               | +20 to +120°C   |
| 028               | 0 to +200°C   |
| 063               | +50 to +250°C <sup>2</sup>  |
| 064               | +50 to +300°C <sup>2</sup>  |
|                   | <b>(4) Capillary length</b>   |
| 1000              | 1000 mm   |
| 2000              | 2000 mm   |
| 2500              | 2500 mm   |
| 3000              | 3000 mm   |
| ....              | special length (specify in plain text, in 1000 mm steps, max. length: 5000 mm)                                  |
|                   | <b>(5) Material of capillary</b>  |
| 40                | Cu (copper) 1.25 mm dia.  |
|                   | <b>(6) Insulation of capillary</b>  |
| 00                | without   |
| 13                | with  |
|                   | <b>(7) Insulation length (starting from housing)</b>  |
| 0                 | without   |
| 450               | 450 mm  |
| ...               | special length (specify in plain text, in mm, max. length: 800 mm)  |
|                   | <b>(8) Process connection (PA)<sup>1</sup></b>  |
| 10                | A = plain cylindrical probe  |
| 20                | U = screw-in pocket          |
|                   | <b>(9) Thread for process connection</b>  |
| 00                | no thread (process connection A)  |
| 13                | external thread G 1/2   |
|                   | <b>(10) Material of process connection</b>  |
| 00                | only with process connection A  |
| 46                | CuZn (brass)  |
| 01                | St (steel)  |
| 20                | CrNi (stainless steel 1.4571)   |
|                   | <b>(11) Fitting length S (immersion tube length)</b>  |
| 000               | no pocket   |
| 100               | 100mm   |
| 150               | 150mm   |
| 200               | 200mm   |
| 300               | 300mm   |
| 400               | 400mm   |
| ....              | special length (specify in plain text)  |
|                   | <b>(12) Diameter D (immersion tube dia.)</b>  |
| 0                 | no pocket   |
| 8                 | 8 mm  |
|                   | <b>(13) Diameter d (probe diameter)</b>   |
| 4                 | 4 mm  |
| 6                 | 6 mm  |
|                   | <b>(14) Extra codes (TZ)</b>  |
| 000               | no extra code   |

Special versions on request!

|                      |        |     |     |     |     |     |      |     |     |      |      |      |      |      |    |   |    |   |    |   |     |   |   |   |   |   |     |
|----------------------|--------|-----|-----|-----|-----|-----|------|-----|-----|------|------|------|------|------|----|---|----|---|----|---|-----|---|---|---|---|---|-----|
| <b>Order code</b>    | (1)    | (2) | (3) | (4) | (5) | (6) | (7)  | (8) | (9) | (10) | (11) | (12) | (13) | (14) |    |   |    |   |    |   |     |   |   |   |   |   |     |
| <b>Order example</b> | 602030 | /   | 01  | -   | 052 | -   | 2000 | -   | 40  | -    | 13   | -    | 450  | -    | 10 | - | 00 | - | 00 | - | 000 | - | 0 | - | 6 | / | 000 |

<sup>1</sup> see data sheet 60.6710 for additional probe mountings

<sup>2</sup> no VDE approval

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# JUMO heatTHERM

## Type 602031

- Protection temperature limiter, as a panel-mounting thermostat
- Compensated for ambient temperature



### Brief description

Thermostats control and monitor thermal processes. The JUMO heatTHERM, type 602031, is a protection temperature limiter STB.

The panel-mounting thermostat operates on the principle of liquid expansion. The electrical switching device is a snap-action switch.

The panel-mounting thermostat complies with RoHS and is free from cadmium.

### Switching action

#### Protection temperature limiter STB with lock-out and self-monitoring facility

If the temperature at the probe exceeds the set limit, the snap-action switch is operated through a transmission mechanism, the circuit is opened and the snap-action switch is locked out mechanically.

After the temperature has fallen below the limit by about 10% of the limit value, the snap-action switch can be reset manually.




If the probe cools down to below -20°C (approx.), the circuit opens but will close again when the temperature rises.

Failure of the measuring system, i.e. a leakage of the expansion liquid, will cause the pressure under the diaphragm to drop, thus permanently opening the circuit. The thermostat can no longer be reset.

### Temperature compensation

A deviation of the ambient temperature at the switch head and capillary from the +22C calibration ambient temperature will result in a shift of the switching point. The temperature compensation reduces this switching point shift to a minimum.

### Approvals

| DIN Reg. No. | Tests  |  |                              |   |   |
|--------------|--|--|------------------------------|---|---|
| STB 116904   |  <sup>2</sup> |  <sup>1</sup> | PED <sup>1</sup><br>97/23/EC |  | You will find the Declarations of Conformity at: <a href="http://www.jumo.net">www.jumo.net</a> or ask for them to be sent. |

<sup>1</sup> limit: 180°C max.

<sup>2</sup> mode of operation as per EN 60 730-2-9: Type 2BFHKLP

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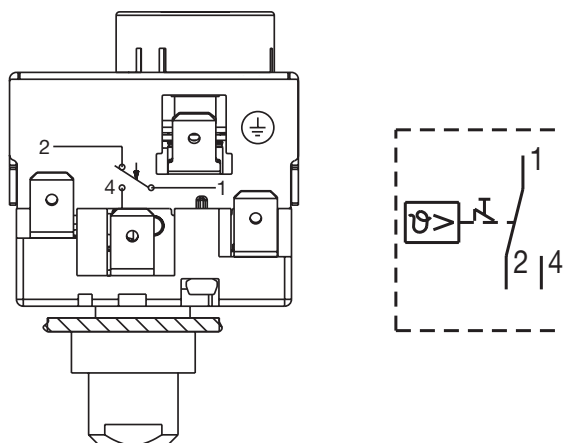
## Technical data

|                            |  |   |
|----------------------------|--|---|
| Housing                    | sheet steel, zinc-plated   |   |
| Base                       | black polyester resin compound   |   |
| Fixing                     | M 10x1, with hexagon nut and protective cap  |   |
| Enclosure protection       | IP00 to EN 60 529  |   |
| Limit temperatures         | for transport and storage: -50 to +50°C<br>in use: +80°C max.  |   |
| Nominal position (NL)      | unrestricted   |   |
| Weight                     | approx. 0.12 kg  |   |
| Ambient temperature effect | A deviation from the ambient temperature at the switch head and capillary from the +22°C calibration ambient temperature will result in a switching point shift of about $-0.1^{\circ}\text{C}/^{\circ}\text{C}^1$ (measured at +120°C limit, permanently set, and with 3000 mm capillary length)  |   |
| Electrical contact         | snap-action switch with single-pole break contact (SPST-NC), lock-out and signal contact<br><br>break contact (SPST-NC), contacts 1-2:<br>16 (2.5) A, 230 V AC +10%, p.f. = 1 (0.6)<br>0.25A, 230 V DC +10%<br><br>signal contact (contacts 1-4):<br>2 (0.4) A, 230 V AC +10%, p.f. = 1 (0.6)<br>0.25A, 230 V DC +10%<br><br>gold-plated snap-action switch, code 702:<br>AC / DC 24 V, 0.1A |   |
| Connection                 |  | A 6.3-0.8 to DIN 46244  |
| Switching point accuracy   |  | see order details, page 4   |
| Switching reliability      |  | To ensure maximum switching reliability, we recommend a minimum loading of:<br>AC/DC = 24 V, 20 mA with silver contacts<br>AC/DC = 5 V, 5 mA with gold-plated contacts (code 702) |

### Probe length L in mm

| Probe dia. | Limit value |       |       |       |       |             |             |              |              |
|------------|-------------|-------|-------|-------|-------|-------------|-------------|--------------|--------------|
|            | 95°C        | 100°C | 110°C | 120°C | 350°C | 70 to 130°C | 95 to 120°C | 120 to 150°C | 150 to 180°C |
| 4 mm       |             | 153   |       |       | 77    | 118         | 153         |              | 127          |
| 6 mm       |             | 72    |       |       | --    | 60          | 72          |              | 63           |

## Connection diagram



<sup>1</sup> (change of switching point referred to change in ambient temperature)

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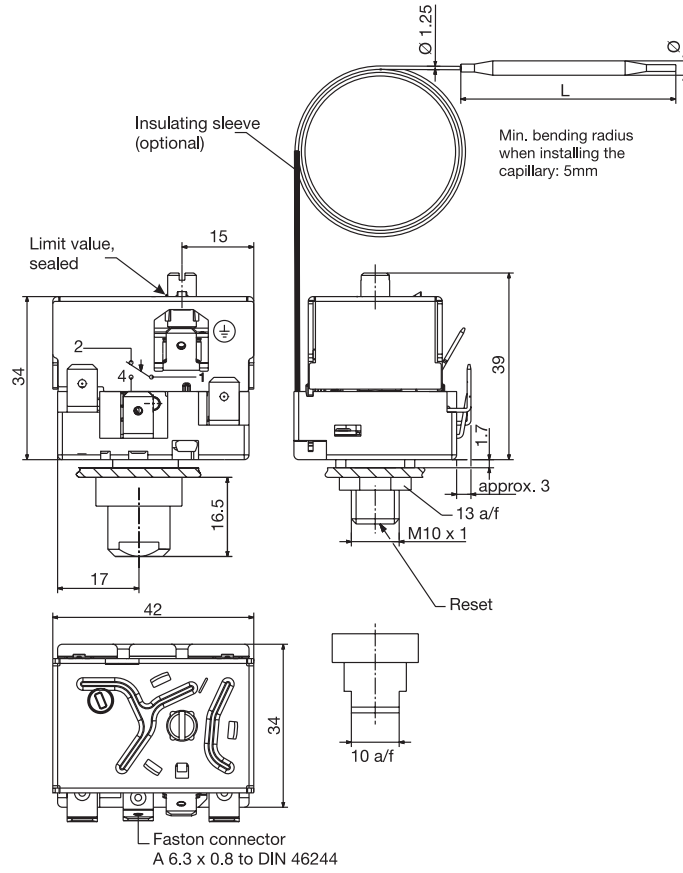
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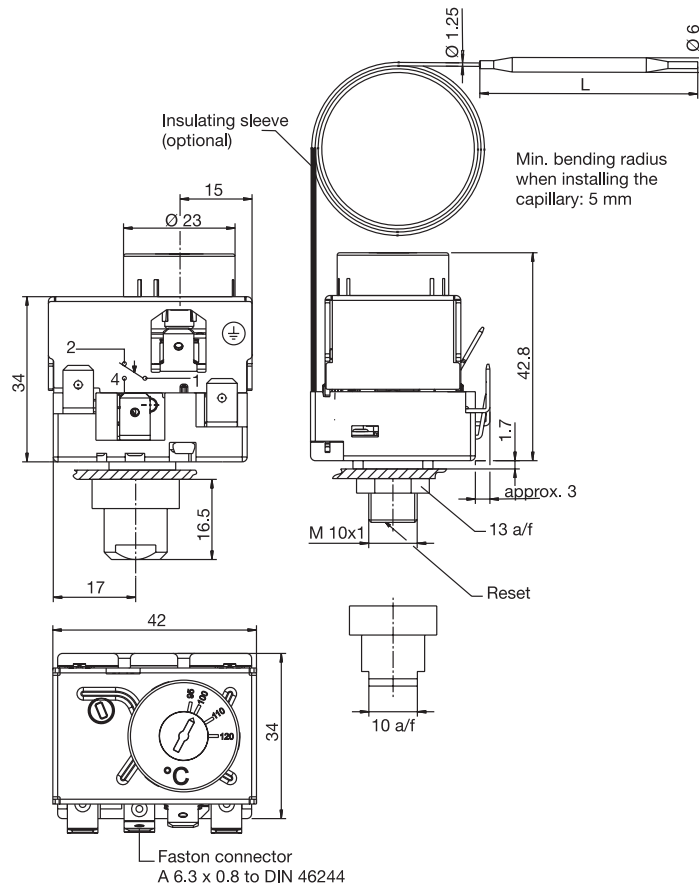


# Dimensions

Type: 602031/80



Type: 602031/81



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shipment: 3 working days after receipt of order

## Stock items

minimum order quantity: 10 items

| Sales No.   | Type      | Limit °C    | Limit setting  | Capillary mm | Process connection | Probe dia. x length mm |
|-------------|-----------|-------------|--|--------------|--------------------|------------------------|
| 60/60002994 | 602031/80 | +100        | fixed setting  | 2000         | A                  | 6 x 72                 |
| 60/60002995 | 602031/81 | +95 to +120 | adjustable, notch positions at: +95, +100, +110 and +120°C |              |                    |                        |
| 60/60003136 | 602031/81 | +70 to +130 | freely adjustable  |              |                    | 6 x 60                 |

Instrument versions that differ from the stock models are available on request, minimum order quantity: 500 items

## Order details

### Panel-mounting thermostat JUMO heatTHERM, type 602031

| Order code | (1) Basic type   |
|------------|--|
| 602031     | Panel-mounting thermostat JUMO heatTHERM, with single-pole snap-action switch                                    |
|            | <b>(2) Basic type extensions</b>   |
| 80         | Protection temperature limiter (STB), permanently set, with break contact (SPST-NC), lock-out and signal contact |
| 81         | Protection temperature limiter (STB), adjustable, with break contact (SPST-NC), lock-out and signal contact      |
|            | <b>(3) Limit value</b> Switching point accuracy      Max. probe temperature                                      |
| 000        | with fixed limit setting   |
| 671        | + 70 to +130°C      +0/-15°C      +155°C      (freely adjustable) <sup>1</sup>                                   |
| 666        | + 95 to +120°C      +0/-5°C      +145°C      (adjustable, notch positions 95, 100, 110, 120°C) <sup>1</sup>      |
| 672        | +120 to +150°C      +0/-10°C      +175°C      (freely adjustable) <sup>1</sup>                                   |
| 673        | +150 to +180°C      +0/-10°C      +210°C      (freely adjustable) <sup>1</sup>                                   |
|            | <b>(4) Fixed limit setting</b> Switching point accuracy      Max. probe temperature                              |
| 000        | with fixed limit setting   |
| 095        | + 95°C      +0/-5°C      +145°C  |
| 100        | +100°C      +0/-5°C      +145°C  |
| 110        | +110°C      +0/-5°C      +145°C  |
| 120        | +120°C      +0/-5°C      +145°C  |
| 350        | +350°C      +0/-20°C      +405°C   |
| ...        | other limit values up to 350°C, specified in °C  |
|            | <b>(5) Capillary length</b>  |
| 1000       | 1000 mm  |
| 2000       | 2000 mm  |
| 2500       | 2500 mm  |
| 3000       | 3000 mm  |
| ....       | special length (specify in plain text, in 1000 mm steps, max. length: 5000 mm)                                   |
|            | <b>(6) Material of capillary</b>   |
| 40         | Cu (copper) 1.25 mm dia.   |
|            | <b>(7) Insulation of capillary</b>   |
| 00         | without  |
| 13         | with   |

<sup>1</sup> only with basic type extension 81

<sup>2</sup> see data sheet 60.6710 for additional probe mountings

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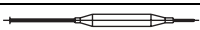

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## Order details

### Panel-mounting thermostat JUMO heatTHERM, type 602031

|                   |   |
|-------------------|---|
| <b>Order code</b> | <b>(8) Insulation length</b> (starting from housing)  |
| 0                 | none  |
| 450               | 450 mm  |
| ...               | special length (specify in plain text, in 1000 mm steps, max. length: 5000 mm)                                |
|                   | <b>(9) Process connection (PA)<sup>2</sup></b>  |
| 10                | A = plain cylindrical probe  |
| 20                | U = screw-in pocket          |
|                   | <b>(10) Thread of process connection</b>  |
| 00                | no thread (process connection A)  |
| 13                | external thread G 1/2   |
|                   | <b>(11) Material of process connection</b>  |
| 00                | only with process connection A  |
| 46                | CuZn (brass)  |
| 01                | St (steel)  |
| 20                | CrNi (stainless steel 1.4571)   |
|                   | <b>(12) Fitting length S (immersion tube length)</b>  |
| 000               | no pocket   |
| 100               | 100mm   |
| 150               | 150mm   |
| 200               | 200mm   |
| 300               | 300mm   |
| 400               | 400mm   |
| ...               | special length (specify in plain text)  |
|                   | <b>(13) Diameter D (immersion tube dia.)</b>  |
| 0                 | no pocket   |
| 8                 | 8 mm  |
|                   | <b>(14) Diameter d (probe dia.)</b>   |
| 4                 | 4 mm  |
| 6                 | 6 mm  |
|                   | <b>(15) Extra codes (TZ)</b>  |
| 000               | no extra code   |
| 702               | gold-plated snap-action switch contacts   |

Special versions on request!

|                      |        |     |     |     |     |     |     |     |      |      |      |      |      |      |      |
|----------------------|--------|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|
|                      | (1)    | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9)  | (10) | (11) | (12) | (13) | (14) | (15) |
| <b>Order code</b>    | 602031 | /   |     | -   |     | -   |     | -   |      | -    |      | -    |      | -    |      |
| <b>Order example</b> | 602031 | /   | 80  | -   | 000 | -   | 110 | -   | 2000 | -    | 40   | -    | 13   | -    | 450  |

<sup>1</sup> only with basic type extension 81

<sup>2</sup> see data sheet 60.6710 for additional probe mountings



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# Panel-mounting Thermostats KM-70 Series

## Version to DIN 3440 and Pressure Equipment Directive 97/23/EC

for stock items  
 see page 5

### Brief description

Panel-mounting thermostats monitor thermal processes. The instrument is available as protection temperature limiter STB. In fault condition, the STB sets the system being monitored to a safe operational state.

Panel-mounting thermostats operate on the principle of liquid expansion, with a microswitch serving as the electrical switching device.

### Switching action

#### Lock-out facility on the protection temperature limiter STB

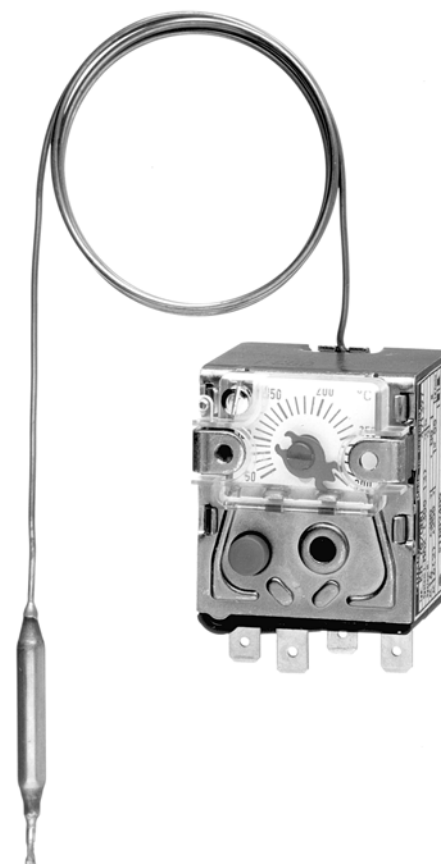
If the temperature at the probe exceeds the set limit, the circuit is opened and the microswitch locked out mechanically.

After the temperature has dropped below the danger temperature by about 10 % of the span, the microswitch can be reset manually.

#### Self-monitoring facility on the protection temperature limiter STB

Failure of the measuring system, i.e. a leakage of the expansion liquid, causes the pressure under the diaphragm of the STB to drop, thus permanently opening the circuit. A reset is now impossible.

If the probe cools down to below -20°C (approx.), the circuit is also opened. As the temperature rises above -20°C (approx.), the STB has to be reset manually, by pressing the reset button.



### Types and approvals

| Type  | Switching action | DIN Reg. No. | Tests /approvals |  |  | DVGW Reg. No.      | The Declarations of Conformity are available on the Internet at:<br><a href="http://www.jumo.net">www.jumo.net</a> ⇒ Products ⇒ Thermostats ⇒ Data Sheet 60.2045<br>or can be sent to you on request. |
|-------|------------------|--------------|------------------|--|--|--------------------|---|
| KM-70 | STB              | STB 82404    |                  | Pressure Equipment Directive 97 / 23 / EC CE0036 | <b>DVGW</b><br>Gas Appliances Directive 90/396/EEC | CE-0085<br>AR 0125 |   |

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## Technical data

### Control ranges and temperature probe

| Type  | Control / limit ranges °C | Max. permissible probe temperature °C | Maximum capillary length mm | liquid-filled                           |     |
|-------|---------------------------|---------------------------------------|-----------------------------|---|-----|
|       |                           |                                       |                             | Probe length "L" in mm                  |     |
|       |                           |                                       |                             | probe dia. "d" in mm, dia. 6 = standard |     |
|       |                           |                                       |                             | 6                                       | 8   |
| KM-70 | 0 to + 50                 | 60                                    | 5000                        | 163                                     | 104 |
|       | 0 to +100                 | 115                                   |                             | 98                                      | 70  |
|       | +30 to +110               | 130                                   |                             | 115                                     | 79  |
|       | +20 to +120               | 140                                   |                             | 97                                      | 70  |
|       | +60 to +130               | 150                                   |                             | 125                                     | 84  |
|       | +20 to +150               | 175                                   |                             | 82                                      | 62  |
|       | +50 to +200               | 230                                   |                             | 83                                      | 59  |
|       | +50 to +250*              | 290                                   |                             | 67                                      | 51  |
|       | +50 to +300*              | 345                                   |                             | 57                                      | --- |

\* Probe material stainless steel only

### Capillary and temperature probe

| Type                             | End of scale                   | Capillary   | Temperature probe                                    | Notes         |
|----------------------------------|--------------------------------|---|--|---------------|
| KM- . .                          | up to 200°C                    | copper (Cu)<br>1.5 mm dia.<br>Mat. Ref. 2.0090            | copper (Cu)<br>Mat. Ref. 2.0090<br>brazed            | -             |
|                                  | up to 350°C                    | copper (Cu)<br>1.5 mm dia.<br>Mat. Ref. 2.0090            | stainless steel (CrNi)<br>Mat. Ref. 1.4571<br>brazed | -             |
|                                  | up to 350°C                    | stainless steel (CrNi)<br>1.5 mm dia.<br>Mat. Ref. 1.4571 | stainless steel (CrNi)<br>Mat. Ref. 1.4571<br>welded | at extra cost |
| Capillary length                 | 1000 mm standard, 5000 mm max. |   |  |               |
| Min. bending radius of capillary | 5 mm                           |   |  |               |

### Electrical data

| Switching device | KM-70  | KM-70   |
|------------------|--|---|
|                  | extra code O (708)<br>microswitch with break contact<br>and lock-out                   | extra code U (574):<br>microswitch with break contact,<br>lock-out and additional signal contact  |
| Rating           | 16 A, 400 V AC +10%<br>16 (2) A, 230 V AC +10%, p.f. = 1 (0.6)<br>0.25A, 230 V DC +10% | on break contact:<br>16 A, 400 V AC +10%<br>16 (2) A, 230 V AC +10%, p.f. = 1 (0.6)<br>0.25A, 230 V DC +10%<br>on make contact:<br>2 A, 400 V AC +10%<br>2 (1) A, 230 V AC +10%, p.f. = 1 (0.6)<br>0.25A, 230 V DC +10% |

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**Operating data**

|   |  |                 |
|---|--|-----------------|
| Switching point accuracy in % of control / limit range      | in upper third of scale +0/-5%, at start of scale +0/-10%  |                 |
| Ambient temperature error referred to control / limit range | Deviation of the ambient temperature at the case from the calibration ambient temperature 22°C produces a displacement of the switching point:<br>higher ambient temperature = lower switching point<br>lower ambient temperature = higher switching point |                 |
|   | panel-mounting thermostats with end of scale   |                 |
|   | < 200°C  | ≥ 200°C ≤ 350°C |
|   | on thermostat head, % per °C   |                 |
|   | 0.17   | 0.13            |
|   | on capillary, % per °C per m length  |                 |
|   | 0.054  | 0.11            |
| Permissible storage temperature                             | -50 to +50°C   |                 |
| Permissible ambient temperature in operation                | +80°C max.   |                 |
| Nom. position (NL)  | unrestricted   |                 |

**Thermostat head**

|                       |  |
|-----------------------|--|
| Case material         | zinc-plated steel  |
| Fixing                | 2 screws M 4, spacing 28 mm  |
| Scale span            | 250° ↯   |
| Electrical connection | extra code X (699): faston connectors A 6.3 x 0.8 mm (DIN 46244),<br>Code X: screw terminals up to 2.5 mm <sup>2</sup> conductor cross-section |
| Limit setting         | The limit can be set prior to installation, using a screwdriver on the setting spindle   |
| Protection            | EN 60 529-IP00   |
| Weight                | approx. 0.3 kg   |

**Process connection<sup>1</sup>**

|                           |  |
|---------------------------|--|
| KM- Series with capillary | <b>plain cylindrical probe A</b> (as standard)   |
|                           | <b>pocket U</b> (on request)   |
|                           | screw-in pocket with screw-in spigot G 1/2 Form A to DIN 3852/2 and clamping clip with fixing screw for securing the probe |
| Material                  | up to +150°C: CuZn (nickel-plated) as standard<br>above +150°C: St as standard (CrNi on request)                           |
| Fitting length S          | standard lengths: 100, 120, 150, 200 or 300 mm<br>other lengths on request   |
| Immersion tube dia.       | D = 8 mm   |

<sup>1</sup> See data sheet 60.6710 for additional process connections and pockets.

**Note:**

Physical and toxicological properties of the expansion media that may escape in the event of a system fracture.

| Control range with end of scale | Dangerous reactions | Fire/explosion hazard |                 | Water contamination | Toxicological data |                  |       |
|---------------------------------|---------------------|-----------------------|-----------------|---------------------|--------------------|------------------|-------|
|                                 |                     | Ignition temperature  | Explosion limit |                     | irritant           | danger to health | toxic |
| < +200°C                        | no                  | + 355°C               | 0.6 — 8 % v/v   | yes                 | yes                | <sup>2</sup>     | no    |
| ≥ 200°C ≤ 350°C                 | no                  | + 490°C               | - -             | yes                 | yes                | <sup>2</sup>     | no    |

<sup>2</sup> At present there is no restrictive statement from the health authorities concerning any danger to health over short periods and at low concentrations, e.g. after a fracture of the measuring system.

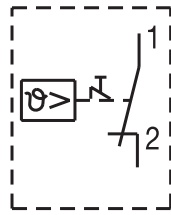
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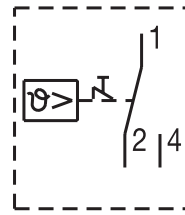
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## Connection diagrams



KM-70  
Code O

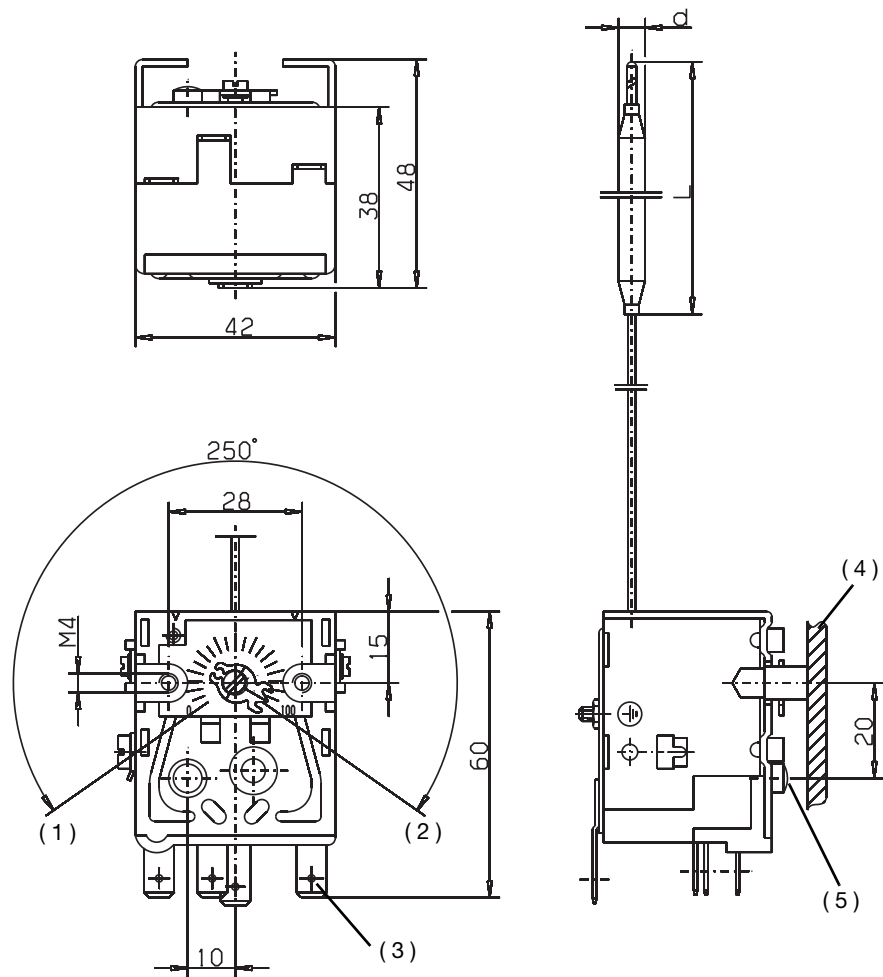


KM-70  
Code U

## Dimensions

### Type

KM-70



- (1) Start of scale
- (2) End of scale
- (3) Faston connectors, A 6.3 x 0.6, DIN 46244
- (4) Panel
- (5) Reset knob

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## Stock items

(shipment: 3 working days after receipt of order)

| Sales No.   | Type    | Control/limit range | Capillary mm | Process connection | Probe dia. x length mm |
|-------------|---------|---------------------|--------------|--------------------|------------------------|
| 60/60001545 | KM-70/U | +20 to +150°C       | 1000         | A                  | 6 x 82                 |
| 60/60001544 | KM-70/U | +50 to +300°C       | 1000         | A                  | 6 x 57                 |

## Order details

### Panel-mounting thermostat KM-70 Series

|              |   |
|--------------|---|
| <b>Order</b> | <b>(1) Basic type</b>   |
| 602045       | Panel-mounting thermostat, KM Series  |
|              | <b>(2) Basic type extension</b>   |
| 70           | KM-70 Protection temperature limiter STB with break (SPST-NC) contact and capillary                             |
|              | <b>(3) Control / limit ranges</b>   |
| 021          | 0 to + 50°C   |
| 025          | 0 to +100°C   |
| 052          | +30 to +110°C   |
| 042          | +20 to +120°C   |
| 066          | +60 to +130°C   |
| 043          | +20 to +150°C   |
| 062          | +50 to +200°C   |
| 063          | +50 to +250°C   |
| 064          | +50 to +300°C   |
|              | <b>(4) Capillary length (mm)</b>  |
| 1000         | 1000 mm   |
| 2000         | 2000 mm   |
| 3000         | 3000 mm   |
| 4000         | 4000 mm   |
| 5000         | 5000 mm   |
| ....         | (special length, details in plain text)   |
|              | <b>(5) Material of capillary</b>  |
| 40           | Cu (copper)   |
| 20           | CrNi (stainless steel 1.4571)   |
|              | <b>(6) Process connection PA<sup>1</sup></b>  |
| 10           | A = plain cylindrical probe  |
| 20           | U = screw-in pocket          |
|              | <b>(7) Thread for process connection<sup>1</sup></b>  |
| 00           | no thread (process connection A)  |
| 13           | external thread G 1/2   |
|              | <b>(8) Material of process connection</b>   |
| 00           | only for process connection A   |
| 46           | CuZn (brass)  |
| 01           | St (steel)  |
| 20           | CrNi (stainless steel 1.4571)   |
|              | <b>(9) Fitting length S (immersion tube length)</b>   |
| 000          | no pocket   |
| 100          | 100mm   |
| 120          | 120mm   |
| 150          | 150mm   |
| 200          | 200mm   |
| 300          | 300mm   |
| ....         | .... special length, details in plain text  |

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## Order details

### Panel-mounting thermostat KM-70 Series

| Order | (10) Diameter D (immersion tube dia.)                                     |
|-------|---|
| 00    | no pocket   |
| 8     | 8 mm  |
| 10    | 10 mm   |
|       | (11) Diameter d (probe dia.)  |
| 6     | 6 mm  |
| 8     | 8 mm  |
|       | (12) Extra codes <sup>2</sup>   |
| 000   | no extra code   |
| 574   | „U“ STB with (n.c.) break contact, lock-out and additional signal contact |
| 699   | „X“ screw connection up to 2.5 mm <sup>2</sup> conductor cross-section    |

Order code      (1)      (2)      (3)      (4)      (5)      (6)      (7)      (8)      (9)      (10)      (11)      (12)

Order example      602045 / [ .. ] - [ ... ] - [ .... ] - [ .. ] - [ .. ] - [ .. ] - [ .. ] - [ .. ] - [ .. ] - [ .. ] - [ .. ] - [ .. ] / [ ... ] , ...

Order example      602045 / 70 - 052 - 1000 - 40 - 10 - 00 - 00 - 000 - 00 - 6 / 574<sup>2</sup>

<sup>1</sup> See data sheet 60.6710 for additional probe mountings and pockets.

<sup>2</sup> List extra codes in sequence, separated by commas.

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# Surface-mounting Thermostats ATH Series

## Series IP54

### Brief description

Thermostats control and monitor thermal processes. Thermostats in the ATH series can be supplied as temperature controllers TR, operating temperature monitors TW, protection temperature monitors STW (STB) and protection temperature limiters STB. In the event of a fault, the STB sets the system being monitored to a safe operational state.

Surface-mounting thermostats operate on the principle of liquid expansion, with a microswitch serving as the electrical switching device.

### Switching function

#### Temperature controller TR and operating temperature monitor TW

When the temperature at the probe exceeds the set limit, the microswitch is operated through the mechanism and the circuit is opened or closed. When the temperature has fallen below the set limit (by the switching differential), the microswitch returns to its initial position.

#### Lock-out facility on the protection temperature limiter STB

When the temperature at the probe exceeds the set limit, the circuit is opened and the microswitch is locked out mechanically.

After the temperature has dropped below the safe temperature limit by about 10 % of span (about 15% for limit setting > +350°C), the microswitch can be reset manually.

#### Use of the protection temperature monitor STW as protection temperature limiter STB

The circuitry to which the thermostat is connected must comply with DIN 3440 and VDE 0116.

#### Self-monitoring on the protection temperature limiter STB and protection temperature monitor STW (STB)

In the case of the STB and STW (STB), failure of the measuring system, i.e. a leakage of the expansion fluid, will cause the pressure under the diaphragm to drop, thus permanently opening the circuit. A reset is now impossible.

If the temperature at the probe cools down to below -20°C, the circuit will also be opened. As the temperature rises to above -20°C, the STB has to be reset manually, by pressing the reset button. On the STW (STB), the reset is performed automatically.

for stock items  
see pages 7-9



ATHs-1



ATHf-70/g

## Types and approvals

| Types           |                | Switching function | DIN Reg. No.       | Tests  |  |
|-----------------|----------------|--------------------|--------------------|--|--|
| with rigid stem | with capillary |                    |                    |  |  |
| ATHs-1          | ATHf-1         | TR                 | TR 89 101          | <br>- DIN 3440<br>- Pressure Equipment Directive 97/23/EC (ATH.-20 and ATH.-70 only) | You will find the Declarations of Conformity on the Internet at:<br>www.jumo.net<br>⇒ Products<br>⇒ Thermostats<br>⇒ Data Sheet 60.3021<br><b>or</b> they can be sent to you on request. |
| ATHs-2          | ATHf-2         | TW                 | TW 89 201          |  |  |
| ATHs-20         | ATHf-20        | STW (STB)          | STW (STB) 89 401 S |  |  |
| ATHs-70         | ATHf-70        | STB                | STB 89 501         |  |  |

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## Technical data

### Control ranges and temperature probes

| liquid-filled |                                    |  |                                      |   |       |
|---------------|------------------------------------|--|--------------------------------------|---|-------|
| Type          | Control /<br>limit ranges<br>in °C | Max. permissible<br>probe temperature<br>in °C | Maximum<br>capillary length<br>in mm | Probe length "L" in mm                        |       |
|               |                                    |  |                                      | probe dia. "d" in mm, dia. 6 is standard<br>6 | 8     |
| ATH.-1        | -20 to + 50                        | 60   | 5000                                 | 141   | 92    |
| ATH.-2        | -10 to + 40                        | 50   |                                      | 185   | 115   |
|               | 0 to + 50                          | 60   |                                      | 185   | 115   |
|               | 0 to + 70                          | 80   |                                      | 138   | 91    |
|               | 0 to +100                          | 125  |                                      | 107   | 75    |
|               | +20 to + 90                        | 115  |                                      | 138   | 91    |
|               | +30 to +110                        | 135  |                                      | 125   | 84    |
|               | +20 to +120                        | 140  |                                      | 106   | 75    |
|               | +60 to +130                        | 150  |                                      | 135   | 90    |
|               | +20 to +150                        | 175  |                                      | 88  | 65    |
|               | +50 to +200                        | 230  |                                      | 101   | 72    |
|               | +50 to +250                        | 290  |                                      | 73  | 54    |
|               | +50 to +300                        | 345  |                                      | 63  | 49    |
|               | +50 to +350                        | 405  |                                      | 53  | - - - |
| ATH.-20       | +30 to +110                        | 135  | 5000                                 | 108   | 75    |
| ATH.-70       | +60 to +130                        | 150  |                                      | 116   | 79    |
|               | +20 to +150                        | 175  |                                      | 77  | 60    |
|               | +50 to +250                        | 290  |                                      | 64  | 49    |
|               | +50 to +300                        | 345  |                                      | 55  | - - - |
| gas-filled    |                                    |  |                                      |   |       |
| ATH.-1        | +20 to +400                        | 460  | 1000                                 | 278   | 158   |
| ATH.-2        | +20 to +500                        | 550  | 2000                                 | 148   | 92    |
|               | +20 to +500                        | 550  | 4000                                 | 202   | 119   |
| ATH.-20       | +20 to +400                        | 460  | 1000                                 | 176   | 106   |
| ATH.-70       | +20 to +500                        | 550  | 2000                                 | 127   | 81    |
|               | +20 to +500                        | 550  | 4000                                 | 202   | 119   |

### Capillaries and temperature probes

| Type                             | End of scale                       | Capillary   | Temperature probe                                    | Note            |
|----------------------------------|------------------------------------|---|--|-----------------|
| ATH.- . .                        | up to 200°C                        | copper (Cu)<br>1.5 mm dia.<br>Mat. Ref. Cu-DHP            | copper (Cu)<br>Mat. Ref. Cu-DHP<br>brazed            | -               |
|                                  | up to 350°C                        | copper (Cu)<br>1.5 mm dia.<br>Mat. Ref. Cu-DHP            | stainless steel (CrNi)<br>Mat. Ref. 1.4571<br>brazed | -               |
|                                  | up to 500°C                        | stainless steel (CrNi)<br>1.5 mm dia.<br>Mat. Ref. 1.4571 | stainless steel (CrNi)<br>Mat. Ref. 1.4571<br>welded | -               |
|                                  | up to 350°C                        | stainless steel (CrNi)<br>1.5 mm<br>Mat. Ref. 1.4571      | stainless steel (CrNi)<br>Mat. Ref. 1.4571<br>welded | at extra charge |
| Capillary length                 | standard is: 1000 mm, max. 5000 mm |   |  |                 |
| Min. bending radius of capillary | 5 mm                               |   |  |                 |



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**Electrical data**

|                  |   |   |  |
|------------------|---|---|--|
| Switching device | ATH.-1<br>ATH.-2<br>ATH.-20   | ATH.-70                                     | ATH.-70/U  |
|                  | microswitch with changeover contact   | microswitch with break contact and lock-out | microswitch with break contact, lock-out and additional signal contact |
| Max. rating      | 10 (2) A, 230 V AC +10%, p.f. = 1 (0.6)<br>0.25A, 230 V DC +10%   |   |  |
|                  | with differential 1.5% und 2%<br>6 (1.2) A, 230 V AC +10%, p.f. = 1 (0.6)   | -   | -  |
|                  | microswitch gold-plated, code /au*<br>(*only with switching differential 3%, 5%, 7%)<br>0.1 A, 24 V AC / DC +10%,<br>contact resistance 2.5 – 10 mΩ | -   | -  |

**Operating data**

|  |                    |                                |                       |                 |
|--|--------------------|--------------------------------|-----------------------|-----------------|
| Switching differential in % of control / limit range   | Switching function | liquid-filled measuring system |                       |                 |
|  |                    | Nominal value                  | Possible actual value |                 |
|  | TR, TW             | 3                              | 3 max. 4              | standard        |
|  |                    | 6                              | 6 max. 8              | on request      |
|  |                    | 1.5                            | 1 max. 2              | at extra charge |
|  |                    | gas-filled measuring system    |                       |                 |
|  |                    | 5                              | 4 max. 8              | standard        |
|  |                    | 9                              | 8 max. 12             | on request      |
|  | STW (STB)          | 2                              | 1.5 max. 2.5          | at extra charge |
|  |                    | liquid-filled measuring system |                       |                 |
|  |                    | 5                              | 4 max. 6              | standard        |
|  |                    | 9                              | 8 max. 11             | on request      |
|  |                    | 2                              | 1 max. 3              | at extra charge |
|  |                    | gas-filled measuring system    |                       |                 |
| Switching point accuracy in % of control / limit range | 7                  | 5 max. 12                      | standard              |                 |
|  | 9                  | 8 max. 16                      | on request            |                 |
|  | 2                  | 1.5 max. 3                     | at extra charge       |                 |

TR: in upper third of scale ± 1.5%, at start of scale ± 6%  
 TW, STB, STW (STB): in upper third of scale +0/-5%, at start of scale +0/-10%

|   |   |               |                 |               |                 |               |
|---|---|---------------|-----------------|---------------|-----------------|---------------|
| Ambient temperature error referred to control / limit range | A deviation of the ambient temperature at the housing from the 22° calibration ambient temperature produces a shift in the switching point:<br>higher ambient temperature = lower switching point<br>lower ambient temperature = higher switching point |               |                 |               |                 |               |
|   | Surface-mounting thermostats with end-of-scale value  |               |                 |               |                 |               |
|   | < 200°C   |               | ≥ 200°C ≤ 350°C |               | > 350°C ≤ 500°C |               |
|   | TR / TW   | STB/STW (STB) | TR / TW         | STB/STW (STB) | TR / TW         | STB/STW (STB) |
|   | due to thermostat head  |               |                 |               |                 |               |
|   | 0.08%/°C  | 0.17%/°C      | 0.06%/°C        | 0.13%/°C      | 0.14%/°C        | 0.12%/°C      |
|   | due to capillary per meter length   |               |                 |               |                 |               |
| 0.047%/°C   | 0.054%/°C   | 0.09%/°C      | 0.11%/°C        | 0.04%/°C      | 0.03%/°C        |               |
| Permissible storage temperature                             | -50 to +50°C  |               |                 |               |                 |               |

|  |   |
|--|---|
| Permissible ambient temperature in operation | +80°C max.  |
| Nominal position (NL)                        | to DIN 16 257, NL 0 – NL 90 (other NL on request) |

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**Housing**

|                            |   |   |
|----------------------------|---|---|
| <b>Standard</b>            | cover: polycarbonate, impact-resistant<br>base: die-cast aluminium, painted | color: pebble gray RAL 7032<br>color: anthracite gray RAL 7015  |
| <b>Code a</b>              | cover: die-cast aluminium, painted  | color: pebble gray RAL 7032   |
| <b>Setpoint adjustment</b> | ATH-1:<br>switching point adjustable from the outside by turning the knob   | ATH-2, ATH-20, ATH-7, ATH-70:<br>switching point adjustable by screwdriver after taking off the housing cover |
| <b>Protection</b>          | EN 60 529-IP54  |   |
| <b>Cable entry</b>         | as standard: clamping gland M20 x 1.5, for 8 – 10 mm cable diameter         |   |
| <b>Weight</b>              | approx. 0.5 kg  |   |

|   |                 |   |
|---|-----------------|---|
| <b>Thermostat mounting, Series ATHf- . . with capillary</b> | <b>Standard</b> | thread M 18 x 1 with locknut on housing spigot, capillary exit at spigot                          |
|   | <b>Code</b>     |   |
|   | <b>r</b>        | by 2 screws through base of housing, capillary exit on side of housing, cover and base in plastic |
|   | <b>b</b>        | mounting flange in steel, capillary exit at housing spigot  |
|   | <b>k</b>        | wall bracket  |

**Process connection\***

|                                     |   |   |
|-------------------------------------|---|---|
| <b>Series ATHs- with rigid stem</b> | <b>End of scale up to 150°C</b><br><b>Pocket U</b>  | <b>End of scale above 150°C</b><br><b>Pocket UZ</b>   |
|                                     | screw-in pocket with screw-in spigot G 1/2 Form A to DIN 3852/2   | screw-in pocket with screw-in spigot G 1/2 Form A to DIN 3852/2 and extension, in order not to exceed the max. permissible ambient temperature +80°C at the housing |
| <b>Series ATHf- with capillary</b>  | <b>plain cylindrical probe A (standard)</b>   |   |
|                                     | <b>pocket U (on request)</b><br>screw-in pocket with screw-in spigot G 1/2 Form A to DIN 3852/2 and clip with fixing screw for securing the probe |   |
| <b>Material</b>                     | <b>Pocket U</b><br>up to +150°C CuZn (brass) as standard<br>above +150°C St (steel) as standard<br>(CrNi on request)                              | <b>Pocket UZ</b><br>above +150°C St (steel) as standard<br>(CrNi on request)  |
|                                     | <b>Fitting length S</b><br>standard lengths: 100, 120, 150, 200 or 300 mm<br>other lengths on request   |   |
| <b>Immersion tube dia.</b>          | D = 8 mm, D = 10 mm   |   |

\*other process connections and pockets, see Data Sheet 60.6710.

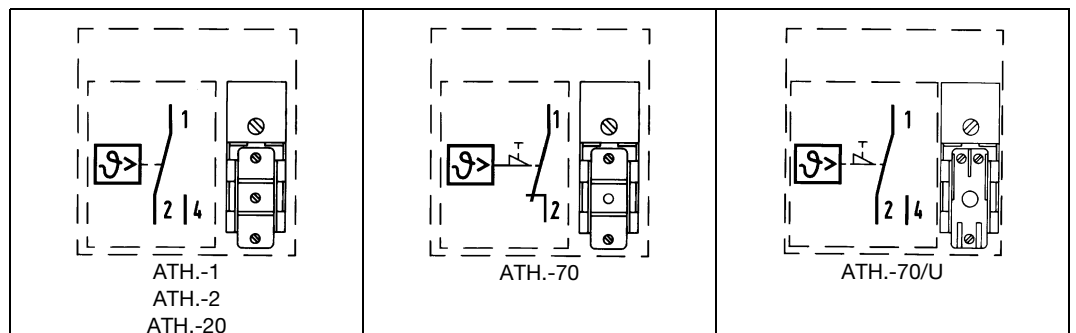
**Note:**

Physical and toxicological properties of the expansion media which may escape in the event of a system fracture.

| Control range with end of scale | Dangerous reactions | Fire/explosion hazard |                       | Water contamination | irritant | Toxicological data |       |
|---------------------------------|---------------------|-----------------------|-----------------------|---------------------|----------|--------------------|-------|
|                                 |                     | ignition temperature  | explosion limit % v/v |                     |          | danger to health   | toxic |
| < +200°C                        | no                  | + 355°C               | 0.6 – 8               | yes                 | yes      | 1)                 | no    |
| ≥ 200°C ≤ +350°C                | no                  | + 490°C               | --                    | yes                 | yes      | 1)                 | no    |
| > 350°C ≤ +500°C                | no                  | no                    | no                    | no                  | no       | no                 | no    |

1) At present there is no restrictive statement from the health authorities concerning any danger to health over short periods and at low concentrations, for example after a fracture of the measuring system.

**Connection diagrams**



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## Dimensions

|  |  |
|--|--|
| <p><b>ATHs-1,<br/>with pocket U</b></p>              |  |
| <p><b>ATHs-2,<br/>ATHs-20<br/>with pocket UZ</b></p> |  |
| <p><b>ATHf-70,<br/>with pocket U</b></p>             |  |

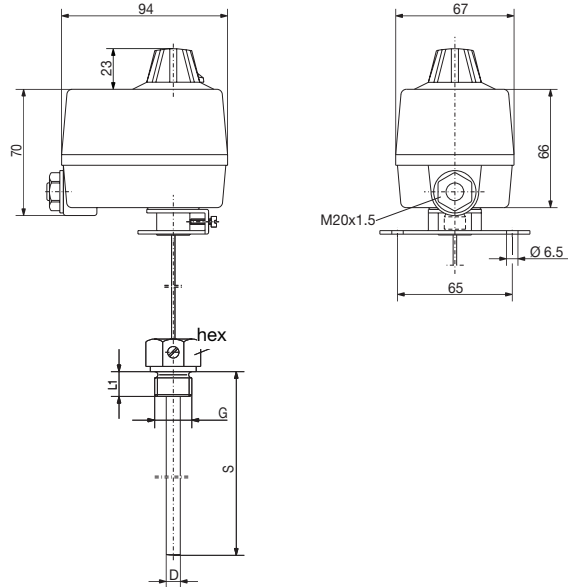
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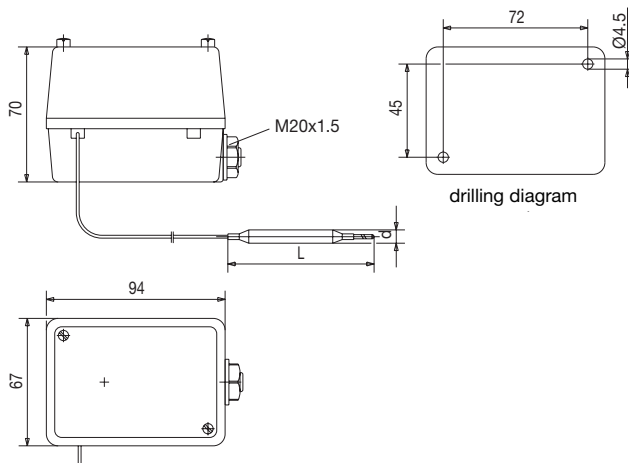
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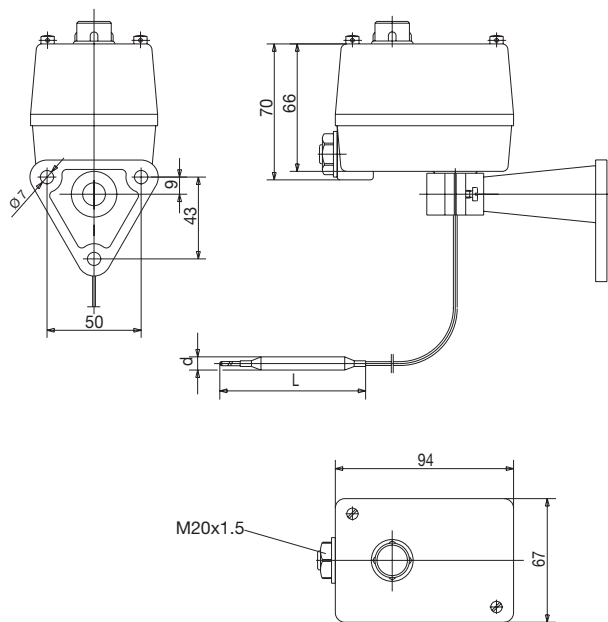
**ATHf-1/b,  
 with pocket U**



**ATHf-2/r,  
 ATHf-20/r with  
 plain cylindrical probe A,  
 no pocket**



**ATHf-70/k, with  
 plain cylindrical probe A,  
 no pocket**



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## Stock items with rigid stem Temperature controller (TR)

(delivery 3 working days after receipt of order)

| Sales No.   | Type   | Control/limit range<br>°C | Differential % | Process<br>connection            | Immersion tube dia. x length<br>mm |
|-------------|--------|---------------------------|----------------|----------------------------------|------------------------------------|
| 60/60001517 | ATHs-1 | -10 to + 40               | 3-4            | U G <sup>1</sup> / <sub>2</sub>  | 8x200                              |
| 60/60000139 | ATHs-1 | 0 to + 50                 | 1.5            | U G <sup>1</sup> / <sub>2</sub>  | 15x100                             |
| 60/60000634 | ATHs-1 | 0 to + 50                 | 1.5            | U G <sup>1</sup> / <sub>2</sub>  | 15x100 CrNi                        |
| 60/60000479 | ATHs-1 | 0 to + 50                 | 3-4            | U G <sup>1</sup> / <sub>2</sub>  | 8x200                              |
| 60/60000141 | ATHs-1 | +20 to + 90               | 6-8            | U G <sup>1</sup> / <sub>2</sub>  | 15x100                             |
| 60/60000171 | ATHs-1 | +20 to + 90               | 3-4            | U G <sup>1</sup> / <sub>2</sub>  | 8x150                              |
| 60/60000173 | ATHs-1 | 0 to +100                 | 1.5            | U G <sup>1</sup> / <sub>2</sub>  | 8x120                              |
| 60/60000332 | ATHs-1 | 0 to +100                 | 3-4            | U G <sup>1</sup> / <sub>2</sub>  | 8x120                              |
| 60/60001548 | ATHs-1 | 0 to +100                 | 3-4            | U G <sup>1</sup> / <sub>2</sub>  | 8x120 CrNi                         |
| 60/60001125 | ATHs-1 | 0 to +100                 | 3-4            | U G <sup>1</sup> / <sub>2</sub>  | 8x150                              |
| 60/60000174 | ATHs-1 | 0 to +100                 | 1.5            | U G <sup>1</sup> / <sub>2</sub>  | 8x200                              |
| 60/60001126 | ATHs-1 | 0 to +100                 | 3-4            | U G <sup>1</sup> / <sub>2</sub>  | 8x200                              |
| 60/60000175 | ATHs-1 | 0 to +100                 | 3-4            | U G <sup>1</sup> / <sub>2</sub>  | 8x300                              |
| 60/60001034 | ATHs-1 | +20 to +120               | 3-4            | U G <sup>1</sup> / <sub>2</sub>  | 8x150                              |
| 60/60000481 | ATHs-1 | +20 to +150               | 3-4            | U G <sup>1</sup> / <sub>2</sub>  | 8x100                              |
| 60/60001547 | ATHs-1 | +20 to +150               | 3-4            | U G <sup>1</sup> / <sub>2</sub>  | 8x100 CrNi                         |
| 60/60001035 | ATHs-1 | +20 to +150               | 3-4            | U G <sup>1</sup> / <sub>2</sub>  | 8x200                              |
| 60/60001127 | ATHs-1 | +20 to +150               | 3-4            | U G <sup>1</sup> / <sub>2</sub>  | 8x300                              |
| 60/60001037 | ATHs-1 | +50 to +200               | 3-4            | UZ G <sup>1</sup> / <sub>2</sub> | 8x200                              |
| 60/60001036 | ATHs-1 | +50 to +300               | 3-4            | UZ G <sup>1</sup> / <sub>2</sub> | 8x150                              |
| 60/60002123 | ATHs-1 | +20 to +500               | 5              | UZ G <sup>1</sup> / <sub>2</sub> | 8x200                              |

## Operating temperature monitor (TW)

(delivery 3 working days after receipt of order)

| Sales No.   | Type   | Control/limit range<br>°C | Differential % | Process<br>connection            | Immersion tube dia. x length<br>mm |
|-------------|--------|---------------------------|----------------|----------------------------------|------------------------------------|
| 60/60001135 | ATHs-2 | -10 to + 40               | 3-4            | U G <sup>1</sup> / <sub>2</sub>  | 8x200                              |
| 60/60000960 | ATHs-2 | 0 to + 50                 | 1.5            | U G <sup>1</sup> / <sub>2</sub>  | 15x100                             |
| 60/60001549 | ATHs-2 | 0 to + 50                 | 1.5            | U G <sup>1</sup> / <sub>2</sub>  | 15x100 CrNi                        |
| 60/60001128 | ATHs-2 | 0 to + 50                 | 3-4            | U G <sup>1</sup> / <sub>2</sub>  | 8x200                              |
| 60/60000177 | ATHs-2 | +20 to + 90               | 1.5            | U G <sup>1</sup> / <sub>2</sub>  | 15x100                             |
| 60/60000959 | ATHs-2 | +20 to + 90               | 6-8            | U G <sup>1</sup> / <sub>2</sub>  | 15x100                             |
| 60/60001129 | ATHs-2 | +20 to + 90               | 3-4            | U G <sup>1</sup> / <sub>2</sub>  | 8x150                              |
| 60/60000178 | ATHs-2 | +20 to + 90               | 3-4            | U G <sup>1</sup> / <sub>2</sub>  | 8x200                              |
| 60/60000331 | ATHs-2 | 0 to +100                 | 3-4            | U G <sup>1</sup> / <sub>2</sub>  | 8x120                              |
| 60/60001552 | ATHs-2 | 0 to +100                 | 3-4            | U G <sup>1</sup> / <sub>2</sub>  | 8x120 CrNi                         |
| 60/60000179 | ATHs-2 | 0 to +100                 | 3-4            | U G <sup>1</sup> / <sub>2</sub>  | 8x150                              |
| 60/60001039 | ATHs-2 | 0 to +100                 | 3-4            | U G <sup>1</sup> / <sub>2</sub>  | 8x200                              |
| 60/60001130 | ATHs-2 | 0 to +100                 | 3-4            | U G <sup>1</sup> / <sub>2</sub>  | 8x300                              |
| 60/60001124 | ATHs-2 | +20 to +150               | 1.5            | U G <sup>1</sup> / <sub>2</sub>  | 8x100                              |
| 60/60000483 | ATHs-2 | +20 to +150               | 3-4            | U G <sup>1</sup> / <sub>2</sub>  | 8x100                              |
| 60/60001551 | ATHs-2 | +20 to +150               | 3-4            | U G <sup>1</sup> / <sub>2</sub>  | 8x100 CrNi                         |
| 60/60000485 | ATHs-2 | +20 to +150               | 3-4            | U G <sup>1</sup> / <sub>2</sub>  | 8x200                              |
| 60/60001554 | ATHs-2 | +20 to +150               | 3-4            | U G <sup>1</sup> / <sub>2</sub>  | 8x200 CrNi                         |
| 60/60000182 | ATHs-2 | +20 to +150               | 3-4            | U G <sup>1</sup> / <sub>2</sub>  | 8x300                              |
| 60/60000186 | ATHs-2 | +50 to +200               | 3-4            | UZ G <sup>1</sup> / <sub>2</sub> | 8x120                              |
| 60/60001131 | ATHs-2 | +50 to +200               | 3-4            | UZ G <sup>1</sup> / <sub>2</sub> | 8x200                              |
| 60/60001105 | ATHs-2 | +50 to +300               | 3-4            | UZ G <sup>1</sup> / <sub>2</sub> | 8x150                              |
| 60/60001556 | ATHs-2 | +50 to +300               | 3-4            | UZ G <sup>1</sup> / <sub>2</sub> | 8x150 CrNi                         |
| 60/60002124 | ATHs-2 | +20 to +500               | 5              | UZ G <sup>1</sup> / <sub>2</sub> | 8x200                              |

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## Stock items with rigid stem

### Protection temperature monitor STW (STB)

(delivery 3 working days after receipt of order)

| Sales No.   | Type    | Control/limit range °C | Differential % | Process connection                | Immersion tube dia. x length mm |
|-------------|---------|------------------------|----------------|-----------------------------------|---------------------------------|
| 60/60001478 | ATHs-20 | +20 to +150            | 4-6            | U G <sup>1</sup> / <sub>2</sub>   | 8x150                           |
| 60/60000188 | ATHs-20 | +50 to +300            | 4-6            | UZ G <sup>1</sup> / <sub>2</sub>  | 8x200                           |
| 60/60002217 | ATHs-20 | +50 to +350            | 4-6            | EZS G <sup>3</sup> / <sub>4</sub> | 170                             |
| 60/60000885 | ATHs-20 | +20 to +500            | 7              | UZO G <sup>1</sup> / <sub>2</sub> | 200                             |

### Protection temperature limiter (STB)

(delivery 3 working days after receipt of order)

| Sales No.   | Type      | Control/limit range °C | Differential % | Process connection                | Immersion tube dia. x length mm |
|-------------|-----------|------------------------|----------------|-----------------------------------|---------------------------------|
| 60/60000982 | ATHs-70   | + 30 to +110           | --             | U G <sup>1</sup> / <sub>2</sub>   | 8x150                           |
| 60/60001043 | ATHs-70   | + 30 to +110           | --             | U G <sup>1</sup> / <sub>2</sub>   | 8x200                           |
| 60/60000189 | ATHs-70   | + 30 to +110           | --             | U G <sup>1</sup> / <sub>2</sub>   | 8x300                           |
| 60/60001044 | ATHs-70   | + 60 to +130           | --             | U G <sup>1</sup> / <sub>2</sub>   | 8x150                           |
| 60/60000190 | ATHs-70   | + 60 to +130           | --             | U G <sup>1</sup> / <sub>2</sub>   | 8x200                           |
| 60/60001020 | ATHs-70   | + 20 to +150           | --             | U G <sup>1</sup> / <sub>2</sub>   | 8x200                           |
| 60/60000120 | ATHs-70   | +130 to +200           | --             | UZ G <sup>1</sup> / <sub>2</sub>  | 8x150                           |
| 60/60001042 | ATHs-70   | +130 to +200           | --             | UZ G <sup>1</sup> / <sub>2</sub>  | 8x300                           |
| 60/60001132 | ATHs-70   | + 50 to +300           | --             | UZ G <sup>1</sup> / <sub>2</sub>  | 8x200                           |
| 60/60001524 | ATHs-70/U | + 30 to +110           | --             | U G <sup>1</sup> / <sub>2</sub>   | 8x150                           |
| 60/60001522 | ATHs-70/U | + 20 to +150           | --             | U G <sup>1</sup> / <sub>2</sub>   | 8x200                           |
| 60/60001523 | ATHs-70/U | + 50 to +300           | --             | UZ G <sup>1</sup> / <sub>2</sub>  | 8x200                           |
| 60/60002218 | ATHs-70/U | + 50 to +350           | --             | EZS G <sup>3</sup> / <sub>4</sub> | 170                             |
| 60/60000884 | ATHs-70/U | + 20 to +500           | --             | UZO G <sup>1</sup> / <sub>2</sub> | 200                             |
| 60/60002121 | ATHs-70/U | + 20 to +500           | --             | UZ G <sup>1</sup> / <sub>2</sub>  | 8x200                           |

## Stock items with capillary

### Temperature controller (TR)

(delivery 3 working days after receipt of order)

| Sales No.   | Type   | Control/limit range °C | Differential % | Capillary mm | Process connection | Probe dia. x length mm |
|-------------|--------|------------------------|----------------|--------------|--------------------|------------------------|
| 60/60001134 | ATHf-1 | -10 to + 40            | 3-4            | 1000         | A                  | 6x185                  |
| 60/60000477 | ATHf-1 | 0 to + 50              | 3-4            | 1000         | A                  | 6x185                  |
| 60/60001193 | ATHf-1 | +20 to + 90            | 3-4            | 1000         | A                  | 6x138                  |
| 60/60001004 | ATHf-1 | 0 to +100              | 3-4            | 1000         | A                  | 6x107                  |
| 60/60000955 | ATHf-1 | +20 to +150            | 3-4            | 1000         | A                  | 6x 88                  |
| 60/60001133 | ATHf-1 | +50 to +300            | 3-4            | 1000         | A                  | 6x 63                  |
| 60/60002113 | ATHf-1 | +20 to +500            | 5              | 1000         | A                  | 6x148                  |

### Operating temperature monitor (TW)

(delivery 3 working days after receipt of order)

| Sales No.   | Type   | Control/limit range °C | Differential % | Capillary mm | Process connection | Probe dia. x length mm |
|-------------|--------|------------------------|----------------|--------------|--------------------|------------------------|
| 60/60000482 | ATHf-2 | 0 to + 50              | 3-4            | 1000         | A                  | 6x185                  |
| 60/60001192 | ATHf-2 | 0 to + 50              | 3-4            | 2000         | A                  | 6x185                  |
| 60/60000965 | ATHf-2 | +20 to + 90            | 3-4            | 1000         | A                  | 6x138                  |
| 60/60000962 | ATHf-2 | 0 to +100              | 3-4            | 1000         | A                  | 6x107                  |
| 60/60001212 | ATHf-2 | 0 to +100              | 3-4            | 2000         | A                  | 6x107                  |
| 60/60000963 | ATHf-2 | +20 to +150            | 3-4            | 1000         | A                  | 6x 88                  |
| 60/60001210 | ATHf-2 | +20 to +150            | 3-4            | 2000         | A                  | 6x 88                  |
| 60/60000187 | ATHf-2 | +50 to +200            | 3-4            | 1000         | A                  | 6x101                  |
| 60/60001209 | ATHf-2 | +50 to +200            | 3-4            | 2000         | A                  | 6x101                  |
| 60/60001038 | ATHf-2 | +50 to +300            | 3-4            | 1000         | A                  | 6x 63                  |
| 60/60001208 | ATHf-2 | +50 to +300            | 3-4            | 2000         | A                  | 6x 63                  |
| 60/60002122 | ATHf-2 | +20 to +500            | 5              | 1000         | A                  | 6x148                  |
| 60/60002114 | ATHf-2 | +20 to +500            | 5              | 2000         | A                  | 6x148                  |

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## Stock items with capillary Protection temperature limiter (STB)

(delivery 3 working days after receipt of order)

| Sales No.   | Type        | Control/limit range °C | Differential % | Capillary mm | Process connection               | Probe dia. x length mm |
|-------------|-------------|------------------------|----------------|--------------|----------------------------------|------------------------|
| 60/60002261 | ATHf-20/r   | + 20 to +500           | 7              | 4000         | ES G <sup>3</sup> / <sub>4</sub> | 200                    |
| 60/60001136 | ATHf-70     | + 30 to +110           | --             | 1000         | A                                | 6x108                  |
| 60/60001206 | ATHf-70     | + 30 to +110           | --             | 2000         | A                                | 6x108                  |
| 60/60001097 | ATHf-70     | + 60 to +130           | --             | 1000         | A                                | 6x116                  |
| 60/60001041 | ATHf-70     | + 20 to +150           | --             | 1000         | A                                | 6x 77                  |
| 60/60001205 | ATHf-70     | + 20 to +150           | --             | 2000         | A                                | 6x 77                  |
| 60/60001525 | ATHf-70/U   | + 20 to +150           | --             | 1000         | A                                | 6x 77                  |
| 60/60001204 | ATHf-70     | + 50 to +200           | --             | 2000         | A                                | 6x 85                  |
| 60/60001290 | ATHf-70/U   | + 50 to +200           | --             | 1000         | A                                | 6x 85                  |
| 60/60001002 | ATHf-70     | +130 to +200           | --             | 1000         | A                                | 6x114                  |
| 60/60001040 | ATHf-70     | + 50 to +300           | --             | 1000         | A                                | 6x 55                  |
| 60/60001191 | ATHf-70     | + 50 to +300           | --             | 2000         | A                                | 6x 55                  |
| 60/60001528 | ATHf-70/U   | + 50 to +300           | --             | 1000         | A                                | 6x 55                  |
| 60/60002086 | ATHf-70     | + 20 to +500           | --             | 1000         | A                                | 6x127                  |
| 60/60002088 | ATHf-70/U   | + 20 to +500           | --             | 1000         | A                                | 6x127                  |
| 60/60002099 | ATHf-70/U   | + 20 to +500           | --             | 2000         | A                                | 6x127                  |
| 60/60002262 | ATHf-70/U/r | + 20 to +500           | --             | 4000         | ES G <sup>3</sup> / <sub>4</sub> | 200                    |

## Order details

### Surface-mounting thermostat, ATH series

| Order code                    | (1) Basic type                                  |
|-------------------------------|---|
| 603021                        | Surface-mounting thermostat, ATH series         |
| (2) Basic type extension      |   |
| 01                            | ATH-1 Temperature controller TR                 |
| 02                            | ATH-2 Operating temperature monitor TW          |
| 20                            | ATH-20 Protection temperature monitor STW (STB) |
| 70                            | ATH-70 Protection temperature limiter STB       |
| (3) Style                     |   |
| 1                             | ATHs with rigid stem                            |
| 2                             | ATHf with capillary                             |
| (4) Control / limit ranges °C |   |
| 014                           | -20 to + 50 *                                   |
| 016                           | -10 to + 40 *                                   |
| 021                           | 0 to + 50                                       |
| 022                           | 0 to + 70                                       |
| 025                           | 0 to +100                                       |
| 041                           | +20 to + 90                                     |
| 052                           | +30 to +110                                     |
| 042                           | +20 to +120                                     |
| 066                           | +60 to +130                                     |
| 043                           | +20 to +150                                     |
| 062                           | +50 to +200                                     |
| 063                           | +50 to +250                                     |
| 064                           | +50 to +300                                     |
| 045                           | +20 to +400                                     |
| 046                           | +20 to +500                                     |
|                               | * on TR and TW only                             |
| (5) Switching differential    |   |
| 00                            | no differential (-70 STB)                       |
| 15                            | 1.5% of scale span (on TR + TW only)            |
| 20                            | 2% of scale span (on STW (STB) only)            |
| 30                            | 3% of scale span (on TR + TW only)              |
| 50                            | 5% of scale span (on TR + TW + STW (STB) only)  |
| 60                            | 6% of scale span (on TR + TW only)              |
| 70                            | 7% of scale span (on STW (STB) only)            |
| 90                            | 9% of scale span (on STW (STB) only)            |

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## Order details

### Surface-mounting thermostat, ATH series

| Order details                                  | (6) Capillary length   |
|--|--|
| 0  | ATHs no capillary  |
| 1000   | 1000 mm  |
| 2000   | 2000 mm  |
| 3000   | 3000 mm  |
| 4000   | 4000 mm  |
| 5000   | 5000 mm  |
| ....   | (special length, details in plain text)  |
| (7) Material of capillary                      |  |
| 00   | ATHs no capillary  |
| 40   | Cu (copper)  |
| 20   | CrNi (stainless steel 1.4571)  |
| (8) Process connection (PA) <sup>1</sup>       |  |
| 10   | A = plain cylindrical probe (on ATHf only)  |
| 20   | U = screw-in pocket                         |
| 30   | UZ = screw-in pocket with extension         |
| (9) Thread for process connection <sup>1</sup> |  |
| 00   | no thread (process connection A)   |
| 13   | external thread G 1/2  |
| (10) Material of process connection            |  |
| 00   | with process connection A only   |
| 46   | CuZn (brass)   |
| 01   | St (steel)   |
| 20   | CrNi (stainless steel 1.4571)  |
| (11) Fitting length S (immersion tube length)  |  |
| 000  | ATHf no pocket   |
| 100  | 100mm  |
| 120  | 120mm  |
| 150  | 150mm  |
| 200  | 200mm  |
| 300  | 300mm  |
| 400  | 400mm  |
| ....   | .... special length, details in plain text   |
| (12) Diameter D (immersion tube diameter)      |  |
| 00   | ATHf no pocket   |
| 8  | 8 mm   |
| 10   | 10 mm  |
| (13) Diameter d (probe diameter)               |  |
| 6  | 6 mm   |
| 8  | 8 mm   |
| (14) Extra codes <sup>2</sup>                  |  |
| 000  | no extra code  |
| 574  | U STB with break (SPST-NC) contact, lock-out and additional signal contact (-70 STB)   |
| 702  | au gold-plated switch contacts (only with 3%, 5%, and 7% switching differential and STB with break (SPST-NC) contact)        |
| 701  | a housing cover in die-cast aluminium (not with extra code r)  |
| 711  | r thermostat head mounting by 2 screws through base of housing, capillary exit on side of housing, cover and base in plastic |
| 764  | b mounting flange in sheet steel, capillary exit at housing spigot   |
| 248  | k wall bracket   |

#### Order code

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14)  
 603021 / .. - . - ... - .. - ..... - .. - .. - .. - .. - ... - .. - . / ... , ... , ...

#### Order example

603021 / 70 - 1 - 043 - 00 - 0 - 00 - 20 - 13 - 20 - 100 - 8 - 6 / 574<sup>2</sup>

<sup>1</sup> See data sheet 60.6710 for additional probe mountings and pockets.

<sup>2</sup> List extra codes in sequence, separated by commas.



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# Surface-mounting Thermostats ATH Series

## Protection IP54

### Brief description

Thermostats control and monitor thermal processes. Surface-mounting twin thermostats, ATH series, consist of two separate measuring and switching systems.

The instruments are available as temperature controllers TR, temperature monitors TW, safety temperature monitors STW (STB) and safety temperature limiters STB. In the event of a fault, the STB sets the system being monitored to a safe operational state.

Surface-mounting twin thermostats operate on the principle of liquid expansion, with a micro-switch serving as the electrical switching device.

### Switching action

#### Temperature controller TR and temperature monitor TW

When the temperature at the probe exceeds the selected setpoint, the microswitch is operated through a mechanism and the circuit is opened or closed. When the temperature falls below the setpoint (by the switching differential), the microswitch returns to its initial position.

#### Lock-out facility on the safety temperature limiter STB

When the temperature at the probe exceeds the set limit, the circuit is opened and the micro-switch locked out mechanically.

After the temperature has dropped by about 10 % of span below the danger temperature (about 15% with limit setting > +350°C), the microswitch can be reset manually.

#### Use of the safety temperature monitor STW as safety temperature limiter STB

The circuitry to which the thermostat is connected must comply with DIN 3440 and VDE 0116.

#### Self-monitoring on the safety temperature limiter STB and safety temperature monitor STW (STB)

Failure of the measuring system on the STB and STW (STB) i.e. a leakage of the expansion fluid, will cause the pressure under the diaphragm to drop, thus permanently opening the circuit. A reset is now impossible.

When the temperature at the probe cools down to below about -20°C, the circuit will also be opened. As the temperature rises to above -20°C (approx.), the STB has to be reset manually, by pressing the reset button. On the STW (STB), the reset is performed automatically.

for stock items  
see page 7



ATHs-12



ATHf-170

You will find the Declarations of Conformity on the Internet at:  
[www.jumo.net](http://www.jumo.net)  
 ⇒ Products  
 or they can be sent to you on request.

## Types and approvals

| Type            |                | Switching action      | DIN Reg. No.            | Test  |
|-----------------|----------------|-----------------------|-------------------------|---|
| with rigid stem | with capillary |                       |                         |   |
| ATHs-11         | ATHf-11        | TR / TR               | TR / TR 89601           | <br>- DIN 3440  |
| ATHs-12         | ATHf-12        | TR / TW               | TR / TW 89701           |   |
| ATHs-22         | ATHf-22        | TW / TW               | TW / TW 90101           |   |
| ATHs-120        | ATHf-120       | TR / STW (STB)        | TR / STW (STB) 89901 S  | <br>- DIN 3440<br>- Pressure Equipment Directive 97/23/EC |
| ATHs-220        | ATHf-220       | TW / STW (STB)        | TW / STW (STB) 90301 S  |   |
| ATHs-170        | ATHf-170       | TR / STB              | TR / STB 90001          |   |
| ATHs-270        | ATHf-270       | TW / STB              | TW / STB 90401          |   |
| ATHs-2020       | ATHf-2020      | STW (STB) / STW (STB) | 2 x STW (STB) 90501 S   |   |
| ATHs-2070       | ATHf-2070      | STW (STB) / STB       | STW (STB) / STB 90601 S |   |
| ATHs-7070       | ATHf-7070      | STB / STB             | STB / STB 90701         |   |

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## Technical data

### Control ranges and temperature probes

| liquid-filled    |                         |                                       |                             |   |
|------------------|-------------------------|---------------------------------------|-----------------------------|---|
| Switching action | Control/limit ranges °C | Max. permissible probe temperature °C | Maximum capillary length mm | Probe length L in mm<br>probe dia. d = 6 mm is standard |
| TR and TW        | -20 to + 50             | 60                                    | 5000                        | 141   |
|                  | -10 to + 40             | 50                                    |                             | 185   |
|                  | 0 to + 50               | 60                                    |                             | 185   |
|                  | 0 to + 70               | 80                                    |                             | 138   |
|                  | 0 to +100               | 125                                   |                             | 107   |
|                  | +20 to + 90             | 115                                   |                             | 138   |
|                  | +30 to +110             | 135                                   |                             | 125   |
|                  | +20 to +120             | 140                                   |                             | 106   |
|                  | +60 to +130             | 150                                   |                             | 135   |
|                  | +20 to +150             | 175                                   |                             | 88  |
|                  | +50 to +200             | 230                                   |                             | 101   |
|                  | +50 to +250             | 290                                   |                             | 73  |
|                  | +50 to +300             | 345                                   |                             | 63  |
|                  | +50 to +350             | 405                                   |                             | 53  |
| STW and STB      | +30 to +110             | 135                                   | 5000                        | 108   |
|                  | +60 to +130             | 150                                   |                             | 116   |
|                  | +20 to +150             | 175                                   |                             | 77  |
|                  | +50 to +250             | 290                                   |                             | 64  |
|                  | +50 to +300             | 345                                   |                             | 55  |
| gas-filled       |                         |                                       |                             |   |
| TR and TW        | +20 to +400             | 460                                   | 1000                        | 278   |
|                  | +20 to +500             | 550                                   | 2000                        | 148   |
|                  | +20 to +500             | 550                                   | 4000                        | 202   |
| STW and STB      | +20 to +400             | 460                                   | 1000                        | 176   |
|                  | +20 to +500             | 550                                   | 2000                        | 127   |
|                  | +20 to +500             | 550                                   | 4000                        | 202   |

### Capillary and temperature probe

| Type                             | End of scale                        | Capillary   | Temperature probe                                    | Notes         |
|----------------------------------|-------------------------------------|---|--|---------------|
| ATH-. .                          | up to 200°C                         | copper (Cu)<br>1.5 mm dia.<br>Mat. Ref. Cu-DHP            | copper (Cu)<br>Mat. Ref. Cu-DHP<br>brazed            | -             |
|                                  | up to 350°C                         | copper (Cu)<br>1.5 mm dia.<br>Mat. Ref. Cu-DHP            | stainless steel (CrNi)<br>Mat. Ref. 1.4571<br>brazed | -             |
|                                  | up to 500°C                         | stainless steel (CrNi)<br>1.5 mm dia.<br>Mat. Ref. 1.4571 | stainless steel (CrNi)<br>Mat. Ref. 1.4571<br>welded | -             |
|                                  | up to 350°C                         | stainless steel (CrNi)<br>1.5 mm dia.<br>Mat. Ref. 1.4571 | stainless steel (CrNi)<br>Mat. Ref. 1.4571<br>welded | at extra cost |
| Capillary length                 | standard: 1000 mm, maximum: 5000 mm |   |  |               |
| Min. bending radius of capillary | 5 mm                                |   |  |               |

### Electrical data

| Switching device | TR, TW, STW (STB)   | STB (-70)                                   | STB (-70/U)  |
|------------------|---|---|--|
|                  | microswitch with changeover contact   | microswitch with break contact and lock-out | microswitch with break contact, lock-out and additional signal contact |
| Rating           | 10 (2) A, 230 V AC +10%, p.f. = 1 (0.6)<br>0.25 A, 230 V DC +10%  |   |  |
|                  | with switching differential 1.5% and 2%<br>6 (1.2) A, 230 V AC +10%, p.f. = 1 (0.6)   | -   | -  |
|                  | microswitch gold-plated, extra code /au*<br>(*only with switching differential 3%, 5%, 7%)<br>0.1 A, 24 V AC/DC<br>contact resistance 2.5 – 10 mΩ |   | -  |

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**Operating data**

|  |   |   |                              |  |               |
|--|---|---|------------------------------|--|---------------|
| Switching differential in % of control / limit range   | Switching action  | with liquid-filled measuring system             |                              |  |               |
|  |   | <b>Nominal value</b>                            | <b>Possible actual value</b> |  |               |
|  | <b>TR, TW</b>   | 3   | 3 max. 4                     |  | standard      |
|  |   | 6   | 6 max. 8                     |  | on request    |
|  |   | 1.5   | 1 max. 2                     |  | at extra cost |
|  |   | with gas-filled measuring system                |                              |  |               |
|  |   | 5   | 4 max. 8                     |  | standard      |
|  |   | 9   | 8 max. 12                    |  | on request    |
|  | <b>STW (STB)</b>  | 2   | 1.5 max. 2.5                 |  | at extra cost |
|  |   | with liquid-filled measuring system             |                              |  |               |
|  |   | 5   | 4 max. 6                     |  | standard      |
|  |   | 9   | 8 max. 11                    |  | on request    |
|  |   | 2   | 1 max. 3                     |  | at extra cost |
|  |   | with gas-filled measuring system                |                              |  |               |
|  | 7   | 5 max. 12                                       |                              | standard                                     |               |
|  | 9   | 8 max. 16                                       |                              | on request                                   |               |
|  | 2   | 1.5 max. 3                                      |                              | at extra cost                                |               |
|  | Switching point accuracy in % of control / limit range  |   |                              |  |               |
|  | TR: in upper third of scale $\pm 1.5\%$ , at start of scale $\pm 6\%$<br>TW, STB, STW (STB): in upper third of scale $+0/-5\%$ , at start of scale $+0/-10\%$ |   |                              |  |               |
|  | Ambient temperature error referred to control / limit range   |   |                              |  |               |
| A deviation of the ambient temperature at the case from the calibration ambient temperature of 22°C produces a shift of the switching point:<br>higher ambient temperature = lower switching point<br>lower ambient temperature = higher switching point |   |   |                              |  |               |
| Surface-mounting thermostats with end of scale   |   |   |                              |  |               |
| < 200°C  |   | $\geq 200^\circ\text{C} \leq 350^\circ\text{C}$ |                              | $> 350^\circ\text{C} \leq 500^\circ\text{C}$ |               |
| TR / TW  | STB/STW (STB)   | TR / TW   | STB/STW (STB)                | TR / TW                                      | STB/STW (STB) |
| due to thermostat head, % per °C   |   |   |                              |  |               |
| 0.08   | 0.17  | 0.06  | 0.13                         | 0.14   | 0.12          |
| due to capillary, % per °C per m length  |   |   |                              |  |               |
| 0.047  | 0.054   | 0.09  | 0.11                         | 0.04   | 0.03          |
| Permissible storage temperature  | -50 to +50°C  |   |                              |  |               |
| Permissible ambient temperature in operation   | max. +80°C  |   |                              |  |               |
| Nominal position (NL)  | to DIN 16 257, NL 0 – NL 90 (other NL on request)   |   |                              |  |               |

**Case**

|   |   |   |
|---|---|---|
| <b>Standard</b>                                     | case cover: polycarbonate, impact resistant<br>case base: die-cast aluminium, painted | color: pebble gray RAL 7032<br>color: anthracite RAL 7015   |
| <b>Code a</b>                                       | cover: die-cast aluminium, painted  | color: pebble gray RAL 7032   |
| Setpoint adjustment                                 | TR:<br>switching point adjustable from the outside by turning the knob                | TW, TB, STB, STW (STB):<br>switching point adjustable with screwdriver, after removing case cover |
| Protection  | EN 60 529-IP54  |   |
| Cable entry   | standard: clamping nipple M 20 x 1.5, for 8 – 10 mm cable diameter                    |   |
| Weight  | approx. 0.8 kg  |   |
| Thermostat mounting on type ATHf-... with capillary | <b>standard</b>   | thread M 18 x 1 with locknut at case spigot, capillary exit at spigot                             |
|   | <b>Code</b>   |   |
|   | <b>r</b>  | by 2 screws through base of case, capillary exit on side of case, cover and base in plastic       |
|   | <b>b</b>  | mounting flange in sheet steel, capillary exit at case spigot                                     |
|   | <b>k</b>  | wall bracket  |

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**Process connection\***

|                                    |  |   |
|------------------------------------|--|---|
| Series<br>ATHs-<br>with rigid stem | End of scale <u>up to</u> 150°C<br><b>pocket U</b>   | End of scale <u>above</u> 150°C<br><b>pocket UZ</b>   |
|                                    | screw-in pocket with screw-in spigot G 1/2<br>Form A to DIN 3852/2   | screw-in pocket with screw-in spigot G 1/2<br>Form A to DIN 3852/2<br>and extension,<br>in order not to exceed the max. permissible ambient tem-<br>perature of +80°C at the case |
| Series<br>ATHf-<br>with capillary  | <b>plain cylindrical probe A</b> (standard)  |   |
|                                    | <b>pocket U</b> (on request)   |   |
|                                    | screw-in pocket with screw-in spigot G 1/2 Form A to DIN 3852/2<br>and clip with fixing screw for securing the probe |   |
| Material                           | <b>pocket U</b>  | <b>pocket UZ</b>  |
|                                    | up to +150°C CuZn (brass) is standard<br>above +150°C St (steel) is standard<br>(CrNi on request)                    | above +150°C St (steel) is standard<br>(CrNi on request)  |
| Fitting length S                   | standard lengths: 100, 120, 150, 200 or 300 mm<br>other lengths on request   |   |
| Immersion tube dia.                | D = 15 mm  |   |

\* For other process connections and pockets, see Data Sheet 60.6710.

**Note:**

Physical and toxicological properties of the expansion media which may escape in the event of a system fracture.

| Control range<br>with end of scale<br>°C | Dangerous<br>reactions | Fire/explosion hazard         |                             | Water<br>contamination | Toxicological data |                     |       |
|--|------------------------|-------------------------------|-----------------------------|------------------------|--------------------|---------------------|-------|
|  |                        | Ignition<br>temperature<br>°C | Explosion<br>limit<br>% v/v |                        | irritant           | danger to<br>health | toxic |
| < +200                                   | no                     | + 355                         | 0.6 – 8                     | yes                    | yes                | 1)                  | no    |
| ≥ 200°C ≤+ 350                           | no                     | + 490                         | - -                         | yes                    | yes                | 1)                  | no    |
| > 350°C ≤+ 500                           | no                     | no                            | no                          | no                     | no                 | no                  | no    |

1) At present there is no restrictive statement from the health authorities concerning any danger to health over short periods and at low concentrations, e.g. after a fracture of the measuring system.

**Connection diagrams**

|  |  |  |
|--|--|--|
|  |  |  |
| <p>System I: with changeover (SPDT) contact<br/>Switching action: TR, TW, STW</p> <p>System II: with break (SPST-NC) contact<br/>and lock-out<br/>Switching action: STB</p>      | <p>System I and II: with changeover (SPDT)<br/>contact<br/>Switching action: TR, TW, STW</p> | <p>System I and II: with break (SPST-NC)<br/>contact and lock-out<br/>Switching action: STB</p>                                |
|  |  |  |
| <p>System I: with changeover (SPDT) contact<br/>Switching action: TR, TW, STW</p> <p>System II: with break (SPST-NC) contact,<br/>lock-out and<br/>additional signal contact</p> |  | <p>System I and II: with break (SPST-NC)<br/>contact, lock-out and<br/>additional signal contact<br/>Switching action: STB</p> |

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## Dimensions

|   |  |
|---|--|
| <p><b>ATHs-12,<br/>ATHs-120</b><br/>with pocket U</p>   |  |
| <p><b>ATHs-170</b><br/>with pocket UZ</p>   |  |
| <p><b>ATHf-11</b><br/>Thermostat mounting<br/>as standard<br/>with plain cylindrical<br/>probe A, no pocket</p> |  |

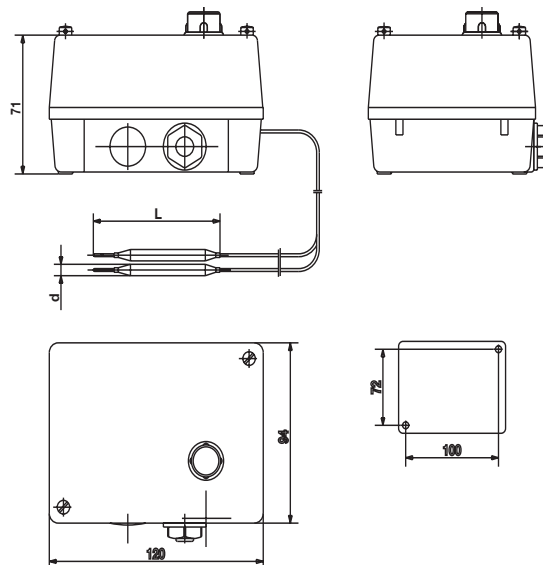
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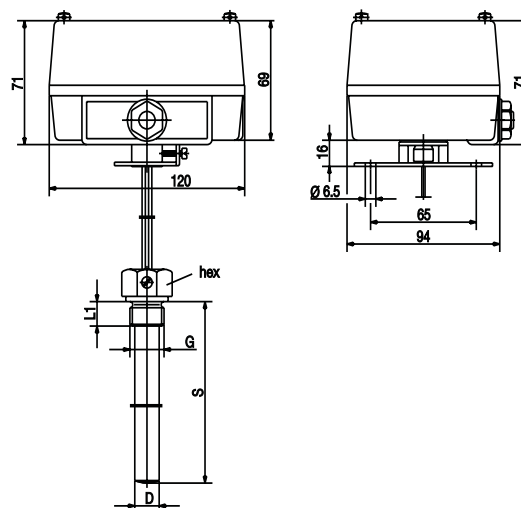
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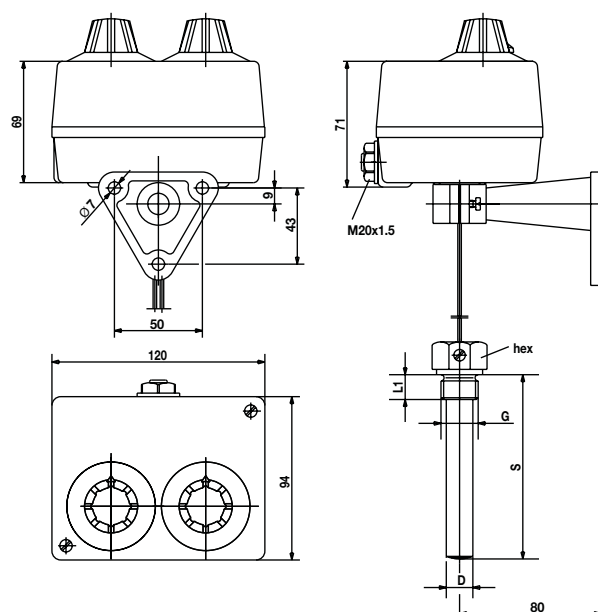
**ATHf-270/r,**  
**ATHf-2070/r**  
 with plain cylindrical  
 probe A, no pocket



**ATHf-22/b,**  
**ATHf-220/b,**  
**ATHf-2020/b**  
 with pocket U



**ATHf-11/k**  
 with pocket U



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## Order details

### Stock items with rigid stem

(delivery 3 working days after receipt of order)

| Sales No.     | Type     | Control / limit range °C | Switching differential % | Process connection              | Immersion tube dia. x length mm |
|---------------|----------|--------------------------|--------------------------|---------------------------------|---------------------------------|
| 60/60000210 * | ATHs-11  | 0 to + 50                | 3-4                      | U G <sup>1</sup> / <sub>2</sub> | 15 x 200                        |
| 60/60001137 * | ATHs-11  | +20 to + 90              | 3-4                      | U G <sup>1</sup> / <sub>2</sub> | 15 x 150                        |
| 60/60000486   | ATHs-11  | 0 to +100                | 3-4                      | U G <sup>1</sup> / <sub>2</sub> | 15 x 120                        |
| 60/60000209 * | ATHs-11  | 0 to +100                | 3-4                      | U G <sup>1</sup> / <sub>2</sub> | 15 x 300                        |
| 60/60000208   | ATHs-12  | 0 to +100                | 3-4                      | U G <sup>1</sup> / <sub>2</sub> | 15 x 120                        |
| 60/60001045   | ATHs-12  | +20 to +120              | 3-4                      | U G <sup>1</sup> / <sub>2</sub> | 15 x 150                        |
| 60/60000491   | ATHs-22  | 0 to + 50                | 3-4                      | U G <sup>1</sup> / <sub>2</sub> | 15 x 200                        |
| 60/60000490   | ATHs-22  | +20 to + 90              | 3-4                      | U G <sup>1</sup> / <sub>2</sub> | 15 x 150                        |
| 60/60000206   | ATHs-22  | 0 to +100                | 1,5                      | U G <sup>1</sup> / <sub>2</sub> | 15 x 120                        |
| 60/60001047   | ATHs-22  | 0 to +100                | 3-4                      | U G <sup>1</sup> / <sub>2</sub> | 15 x 120                        |
| 60/60001555   | ATHs-22  | 0 to +100                | 1,5                      | U G <sup>1</sup> / <sub>2</sub> | 15 x 120 CrNi                   |
| 60/60000205   | ATHs-22  | 0 to +100                | 3-4                      | U G <sup>1</sup> / <sub>2</sub> | 15 x 150                        |
| 60/60000988   | ATHs-22  | 0 to +100                | 3-4                      | U G <sup>1</sup> / <sub>2</sub> | 15 x 200                        |
| 60/60000204   | ATHs-22  | 0 to +100                | 3-4                      | U G <sup>1</sup> / <sub>2</sub> | 15 x 300                        |
| 60/60000489   | ATHs-22  | +20 to +150              | 3-4                      | U G <sup>1</sup> / <sub>2</sub> | 15 x 100                        |
| 60/60000203   | ATHs-22  | +20 to +150              | 3-4                      | U G <sup>1</sup> / <sub>2</sub> | 15 x 200                        |
| 60/60000198   | ATHs-22  | +50 to +300              | 3-4                      | UZG <sup>1</sup> / <sub>2</sub> | 15 x 150                        |
| 60/60002125   | ATHs-22  | +20 to +500              | 5                        | UZG <sup>1</sup> / <sub>2</sub> | 15 x 200                        |
| 60/60001479   | ATHs-120 | +20 to +150              | 3-4                      | U G <sup>1</sup> / <sub>2</sub> | 15 x 150                        |
| 60/60001932   | ATHs-120 | +20 to +120              | 3-4                      | U G <sup>1</sup> / <sub>2</sub> | 15 x 150                        |
| 60/60002009   | ATHs-120 | +60 to +130              | 3-4                      | U G <sup>1</sup> / <sub>2</sub> | 15 x 150                        |
| 60/60002008   | ATHs-120 | +30 to +110              | 3-4                      | U G <sup>1</sup> / <sub>2</sub> | 15 x 150                        |
| 60/60000195   | ATHs-170 | +30 to +110              | 3-4                      | U G <sup>1</sup> / <sub>2</sub> | 15 x 150                        |
| 60/60000196   | ATHs-170 | +30 to +110              | 3-4                      | U G <sup>1</sup> / <sub>2</sub> | 15 x 200                        |
| 60/60001048   | ATHs-170 | +20 to +120              | 3-4                      | U G <sup>1</sup> / <sub>2</sub> | 15 x 150                        |
| 60/60000989   | ATHs-170 | +20 to +150              | 3-4                      | U G <sup>1</sup> / <sub>2</sub> | 15 x 150                        |
| 60/60000194   | ATHs-270 | +20 to +150              | 3-4                      | U G <sup>1</sup> / <sub>2</sub> | 15 x 200                        |

\* model is being phased out

### Stock items with capillary

(delivery 3 working days after receipt of order)

| Sales No.   | Type     | Control / limit range °C | Switching differential % | Capillary | Process connection | Probe dia. x length mm |
|-------------|----------|--------------------------|--------------------------|-----------|--------------------|------------------------|
| 60/60000986 | ATHf-11  | 0 to +100                | 3-4                      | 1000 mm   | A                  | 6 x 107                |
| 60/60001046 | ATHf-22  | 0 to +100                |                          |           |                    | 6 x 107                |
| 60/60000987 | ATHf-22  | +20 to +150              |                          |           |                    | 6 x 88                 |
| 60/60001876 | ATHf-170 | +30 to +110              |                          |           |                    | 6 x 125                |

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## Order details for non-stock items ATH Series

| Order code | (1) Basic type                               |
|------------|--|
| 603026     | Surface-mounting twin thermostat, ATH series |
|            | <b>(2) Basic type extension</b>              |
| 0101       | ATH.-11 TR/TR                                |
| 0102       | ATH.-12 TR/TW                                |
| 0202       | ATH.-22 TW/TW                                |
| 0120       | ATH.-120 TR/STW (STB)                        |
| 0220       | ATH.-220 TW/STW (STB)                        |
| 0170       | ATH.-170 TR/STB                              |
| 0270       | ATH.-270 TW/STB                              |
| 2020       | ATH.-2020 STW (STB)/STW (STB)                |
| 2070       | ATH.-2070 STW (STB)/STB                      |
| 7070       | ATH.-7070 STB/STB                            |
|            | <b>(3) Style</b>                             |
| 1          | ATHs with rigid stem                         |
| 2          | ATHf with capillary                          |
|            | <b>(4) Control / limit ranges °C</b>         |
| 014        | -20 to + 50*                                 |
| 016        | -10 to + 40*                                 |
| 021        | 0 to + 50                                    |
| 022        | 0 to + 70                                    |
| 025        | 0 to +100                                    |
| 041        | +20 to + 90                                  |
| 052        | +30 to +110                                  |
| 042        | +20 to +120                                  |
| 066        | +60 to +130                                  |
| 043        | +20 to +150                                  |
| 062        | +50 to +200                                  |
| 063        | +50 to +250                                  |
| 064        | +50 to +300                                  |
| 045        | +20 to +400                                  |
| 046        | +20 to +500                                  |
|            | * TR and TW only                             |
|            | <b>(5) Switching differential</b>            |
| 00         | without switching differential (-70 STB)     |
| 15         | 1.5% of scale span (TR + TW only)            |
| 20         | 2% of scale span (STW (STB) only)            |
| 30         | 3% of scale span (TR + TW only)              |
| 50         | 5% of scale span (TR + TW + STW (STB) only)  |
| 60         | 6% of scale span (TR + TW only)              |
| 70         | 7% of scale span (STW (STB) only)            |
| 90         | 9% of scale span (STW (STB) only)            |
|            | <b>(6) Capillary length (details in mm)</b>  |
| 0          | ATHs without capillary                       |
| 1000       | 1000 mm                                      |
| 2000       | 2000 mm                                      |
| 3000       | 3000 mm                                      |
| 4000       | 4000 mm                                      |
| 5000       | 5000 mm                                      |
| ....       | (special length, details in plain text)      |
|            | <b>(7) Material of capillary</b>             |
| 00         | ATHs without capillary                       |
| 40         | Cu (copper)                                  |
| 20         | CrNi (stainless steel 1.4571)                |





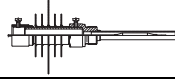
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## Order details for non-stock items ATH Series

|                   |   |   |
|-------------------|---|---|
| <b>Order code</b> | <b>(8) Process connection <sup>1</sup></b>  |   |
| 10                | A = plain cylindrical probe   |  |
| 20                | U = screw-in pocket   |  |
| 30                | UZ = screw-in pocket with extension   |  |
|                   | <b>(9) Thread for process connection <sup>1</sup></b>   |   |
| 00                | no thread (process connection A)  |   |
| 13                | male thread G 1/2   |   |
|                   | <b>(10) Material of process connection</b>  |   |
| 00                | only with process connection A  |   |
| 46                | CuZn (brass)  |   |
| 01                | St (steel)  |   |
| 20                | CrNi (stainless steel 1.4571)   |   |
|                   | <b>(11) Fitting length S (immersion tube length)</b>  |   |
| 000               | ATHf without pocket   |   |
| 100               | 100 mm  |   |
| 120               | 120 mm  |   |
| 150               | 150 mm  |   |
| 200               | 200 mm  |   |
| 300               | 300 mm  |   |
| 400               | 400 mm  |   |
| ...               | (special length, details in plain text)   |   |
|                   | <b>(12) Diameter D (immersion tube diameter)</b>  |   |
| 00                | ATHf- without pocket  |   |
| 15                | 15 mm   |   |
|                   | <b>(13) Diameter d (probe diameter)</b>   |   |
| 6                 | 6 mm  |   |
|                   | <b>(14) Extra codes <sup>2</sup></b>  |   |
| 000               | no extra code   |   |
| 702               | au snap-action switch contact, gold-plated<br>(only with differentials 3%, 5%, and 7% and STB with break (SPST-NC) contact) |   |
| 574               | U STB with break (SPST-NC) contact, lock-out and additional<br>signal contact (basic type -70 STB only)                     |   |
| 701               | a housing cover in die-cast aluminium<br>(not with extra code "r")  |   |
| 711               | r switch head mounting by 2 screws through base of housing,<br>capillary exit at housing side, cover and base in plastic    |   |
| 764               | b mounting flange in steel sheet,<br>capillary exit on housing spigot   |   |
| 248               | k wall bracket  |   |

<sup>1</sup> See Data Sheet 60.6710 for additional probe mountings and pockets.

<sup>2</sup> List extra codes in sequence, separated by commas.

### Order code

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14)  
 603026 / ... - . - .. - .. - .... - .. - .. - .. - .. - ... - .. / . / ... / ... / ...

### Order example

603026 / 0202 - 2 - 043 - 30 - 2000 - 20 - 10 - 00 - 00 - 000 - 00 / 6 / 248<sup>2</sup>

<sup>2</sup> List extra codes in sequence, separated by commas.

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# Surface-mounting Thermostats ATH.-SE Series

for monitoring installations on  
seagoing ships

## Brief description

Thermostats control and monitor thermal processes. ATH.-SE series instruments are available as temperature monitors TW, safety temperature monitors STW (STB) and safety temperature limiters STB. In the event of a fault, the STB sets the installation being monitored to a safe operational state.

Surface-mounting thermostats operate on the principle of fluid expansion, with a microswitch serving as the electrical switching element.

## Switching action

### Temperature monitor TW and safety temperature monitor STW

When the temperature at the probe exceeds the set limit, the circuit is opened by a snap-action switch. After the temperature has fallen below the set limit (by the switching differential), the switch returns to its initial position.

### Lock-out facility on the safety temperature limiter STB

When the temperature at the probe exceeds the set limit, the circuit is opened and locked out mechanically.

After the temperature has dropped below the set limit by about 10% of the span, the switch can be reset mechanically.

### Use of the safety temperature monitor STW as a safety temperature limiter STB

The circuitry to which the thermostat is connected must comply with DIN 3440 and VDE 0116.

### Self-monitoring on the safety temperature limiter STB and the safety temperature monitor STW (STB)

Failure of the measuring system on an STB or STW (STB), i.e. a leakage of the expansion liquid, will cause the pressure under the diaphragm to drop, thus permanently opening the circuit. A reset is now impossible.

If the temperature of the probe cools down to below -20°C, the circuit will also be opened. As the temperature rises to above -20°C, the STB has to be reset manually, by pressing the reset button. On the STW (STB), the reset is performed automatically.



ATHs-SE-70



ATHf-SE..

You will find the Declarations of Conformity on the Internet at:  
[www.jumo.net](http://www.jumo.net)  
 ⇨ Products  
 ⇨ Data Sheet 60.3031  
 or ask for them to be sent.

## Types and approvals

| Type                     | Switching action | Switching differential | Type No.                       | Test/approval  |
|--------------------------|------------------|------------------------|--------------------------------|--|
| ATHs-SE-2<br>ATHf-SE-2   | TW               | 3%                     | 68.262-F03-S1<br>68.262-F04-S1 | Det Norske Veritas<br>Germanische Lloyd<br>DIN 3440 (not for the ATH.-SE-70)<br>Bureau Veritas.<br>Pressure Equipment Directive<br>97/23/EC CE0036<br>(ATH.-SE-20 and ATH.-SE-70 only) |
| ATHs-SE-2<br>ATHf-SE-2   |                  | 6%                     | 68.262-F03-S2<br>68.262-F04-S2 |  |
| ATHs-SE-2<br>ATHf-SE-2   |                  | 1.5%                   | 68.262-F03-S3<br>68.262-F04-S3 |  |
| ATHs-SE-20<br>ATHf-SE-20 | STW (STB)        | 3%                     | 68.261-F03-S1<br>68.261-F04-S1 |  |
| ATHs-SE-20<br>ATHf-SE-20 |                  | 6%                     | 68.261-F03-S2<br>68.261-F04-S2 |  |
| ATHs-SE-20<br>ATHf-SE-20 |                  | 1.5%                   | 68.261-F03-S3<br>68.261-F04-S3 |  |
| ATHs-SE-70<br>ATHf-SE-70 | STB              | -                      | 68.266-F03<br>68.266-F04       |  |

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## Technical data

### Control ranges and temperature probes

| Type       | Control/<br>limit setting range<br>°C | Max. permissible<br>temperature at<br>the probe °C | Length of temperature probes in mm |        |                        |        |
|------------|---------------------------------------|--|------------------------------------|--------|------------------------|--------|
|            |                                       |  | Copper (Cu)                        |        | Stainless steel (CrNi) |        |
|            |                                       |  | dia. 6                             | dia. 8 | dia. 6                 | dia. 8 |
| ATH.-SE-2  | 0 – 100                               | 125  | 107                                | 75     | 99                     | 67     |
|            | 20 – 90                               | 125  | 138                                | 91     | 130                    | 83     |
|            | 30 – 110                              | 135  | 125                                | 84     | 117                    | 76     |
|            | 20 – 120                              | 140  | 107                                | 75     | 99                     | 67     |
|            | 60 – 140                              | 165  | 123                                | 83     | 117                    | 76     |
|            | 20 – 150                              | 175  | 88                                 | 65     | 80                     | 57     |
|            | 50 – 200                              | 230  | 101                                | 72     | 93                     | 64     |
|            | 50 – 250                              | 290  | -                                  | -      | 73                     | 54     |
|            | 50 – 300                              | 345  | -                                  | -      | 63                     | 49     |
| ATH.-SE-20 | 30 – 110                              | 135  | 112                                | 78     | 104                    | 70     |
| ATH.-SE-70 | 60 – 140                              | 165  | 110                                | 77     | 102                    | 68     |
|            | 20 – 150                              | 175  | 80                                 | 61     | 72                     | 53     |
|            | 50 – 250                              | 290  | -                                  | -      | 66                     | 50     |
|            | 50 – 300                              | 345  | -                                  | -      | 58                     | -      |

### Capillary and temperature probe

| Type                                  | End of scale                   | Capillary  | Temperature probe                                    | Notes         |
|---------------------------------------|--------------------------------|--|--|---------------|
| ATH.-SE-2<br>ATH.-SE-20<br>ATH.-SE-70 | ≤200 °C                        | copper (Cu)<br>1.5mm dia.<br>Mat. Ref. 2.0090            | copper (Cu)<br>Mat. Ref. 2.0090<br>brazed            | -             |
|                                       | >200 °C                        | copper (Cu)<br>1.5mm dia.<br>Mat. Ref. 2.0090            | stainless steel (CrNi)<br>Mat. Ref. 1.4571<br>brazed | -             |
|                                       | all ranges                     | stainless steel (CrNi)<br>1.5mm dia.<br>Mat. Ref. 1.4571 | stainless steel (CrNi)<br>Mat. Ref. 1.4571<br>welded | at extra cost |
| Capillary length                      | normally 1000 mm, 2000 mm max. |  |  |               |
| Min. bending radius of capillary      | 5 mm                           |  |  |               |

### Electrical data

| Switching element   | ATH.-SE-2<br>ATH.-SE-20  | ATH.-SE-70   | ATH.-SE-70/U  |
|---------------------|--|--|---|
|                     | microswitch<br>with changeover contact   | microswitch<br>with break (n.c.) contact<br>and lock-out | microswitch with break (n.c.)<br>contact, lock-out and<br>additional signal contact |
| Max. contact rating | 10(2) A, 230 V AC +10%, p.f. = 1(0,6)<br>0.25A, 230 V DC +10%                  |  |   |
|                     | with switching differential 1.5%:<br>6(1,2) A, 230 V AC +10%, p.f. =<br>1(0,6) |  |   |

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**Operating data**

|   |  |  |                          |                          |                         |  |
|---|--|--|--------------------------|--------------------------|-------------------------|--|
| Switching differential in % of control / limit setting range        | Nominal value  |  | Possible actual value    |                          | Designation             |  |
|   | 3  |  | 3-4                      |                          | S1                      |  |
|   | 6  |  | 6-8                      |                          | S2                      |  |
|   | 1.5  |  | 1-2                      |                          | S3                      |  |
| Switching point accuracy in % of control / limit setting range      | TW: in upper third of scale $\pm 1.5\%$<br>STB, STW (STB): in upper third of scale $+0/-5\%$   |  |                          |                          |                         |  |
| Ambient temperature error referred to control / limit setting range | A deviation of the ambient temperature at the case from the calibration ambient temperature of $+22^\circ\text{C}$ produces a shift of the switching point.<br>higher ambient temperature = lower switching point<br>lower ambient temperature = higher switching point<br>for instruments with end-of-scale value |  |                          |                          |                         |  |
|   | $< 200^\circ\text{C}$  |  |                          | $\geq 200^\circ\text{C}$ |                         |  |
|   | ATH.-SE-2  |  | ATH.-SE-20<br>ATH.-SE-70 |                          | ATH.-SE-2<br>ATH.-SE-70 |  |
|   | due to the case  |  |                          |                          |                         |  |
|   | 0.08%/°C   |  | 0.17%/°C                 |                          | 0.06%/°C<br>0.13%/°C    |  |
|   | due to the capillary per m   |  |                          |                          |                         |  |
|   | 0.047%/°C  |  | 0.054%/°C                |                          | 0.09%/°C<br>0.11%/°C    |  |
| Permissible storage temperature                                     | -50 to $50^\circ\text{C}$  |  |                          |                          |                         |  |
| Permissible ambient temperature in use                              | $+80^\circ\text{C}$ max.   |  |                          |                          |                         |  |
| Nominal position (NL)   | to DIN 16 257, nom. position 0 — $90^\circ$ (other nom. positions on request)  |  |                          |                          |                         |  |

**Case**

|                     |   |
|---------------------|---|
| Case                | aluminium die-casting<br>surface in impact-resistant textured paint:<br>cover: RAL 7032, base: RAL7015              |
| Setpoint adjustment | switching point adjustable using a screwdriver, after removing case cover   |
| Protection          | EN 60 529-IP 54   |
| Weight              | ATHf-SE-...approx. 0.70 kg<br>ATHs-SE-...approx. 0.65 kg with pocket U<br>ATHs-SE-...approx. 0.85 kg with pocket UZ |

**Process connection**

|   |  |  |
|---|--|--|
| Series<br>ATHs-SE-..<br>with rigid stem | end-of-scale value <u>up to</u> $150^\circ\text{C}$<br><b>Pocket U</b>   | end-of-scale value <u>above</u> $150^\circ\text{C}$<br><b>Pocket UZ</b>  |
|   | screw-in pocket with screw-in spigot 1/2" pipe<br>Form A to DIN 3852/2   | screw-in pocket with screw-in spigot 1/2" pipe<br>Form A to DIN 3852/2<br>with extension,<br>in order not to exceed the max. permissible ambient<br>temperature of $+80^\circ\text{C}$ at the case |
| Series<br>ATHf-SE-..<br>with capillary  | <b>plain cylindrical probe A</b> (standard)  |  |
|   | <b>pocket U</b> (on request)   |  |
| Material                                | screw-in pocket with screw-in spigot 1/2" pipe Form A to DIN 3852/2<br>and clip with fixing screw for securing the probe             |  |
|   | <b>Pocket U</b><br>up to $+150^\circ\text{C}$ brass as standard<br>above $+150^\circ\text{C}$ steel as standard<br>(CrNi on request) | <b>Pocket UZ</b><br>above $+150^\circ\text{C}$ steel as standard<br>(CrNi on request)  |
| Fitting length S (max. 200 mm)          | standard lengths: 100, 120, 150 (material: brass, steel, CrNi)<br>with 200 mm, only in brass or steel                                |  |
| Immersion tube dia.                     | $D = 8\text{ mm}$ , $D = 10\text{ mm}$   |  |

**Note:**

Physical and toxicological properties of the expansion media which may escape in the event of a system fracture.

| Control range with end-of-scale value °C | Dangerous reactions | Fire/explosion hazard |                       | Water contamination | Toxicological data |                  |       |
|--|---------------------|-----------------------|-----------------------|---------------------|--------------------|------------------|-------|
|  |                     | Ignition temp. °C     | Explosion limit % v/v |                     | irritant           | danger to health | toxic |
| $< +200$                                 | no                  | + 355                 | 0.6 — 8               | yes                 | yes                | 1                | no    |
| $\geq 200^\circ\text{C} \leq +300$       | no                  | + 490                 | - -                   | yes                 | yes                | 1                | no    |

At present there is no restrictive statement from the health authorities concerning any danger to health over short periods and at low concentrations, for example after a fracture of the measuring system.

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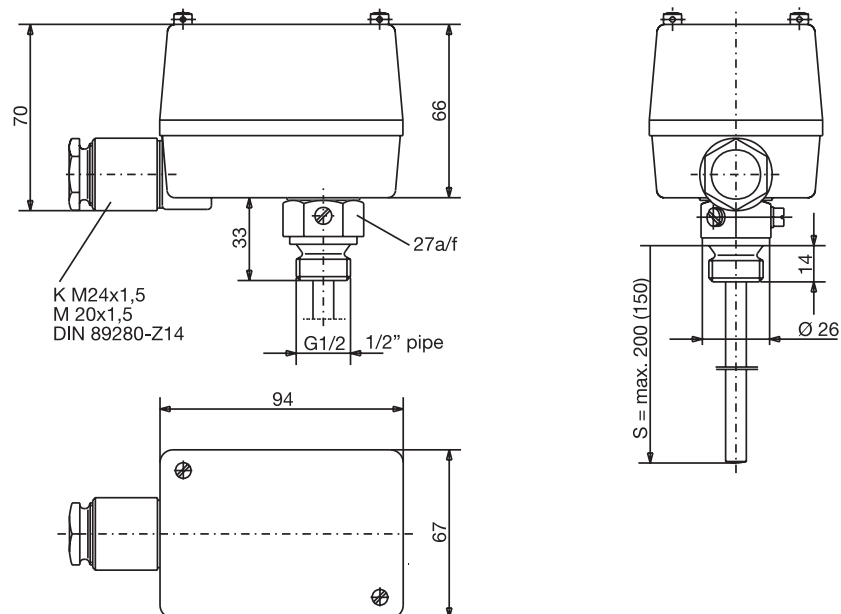
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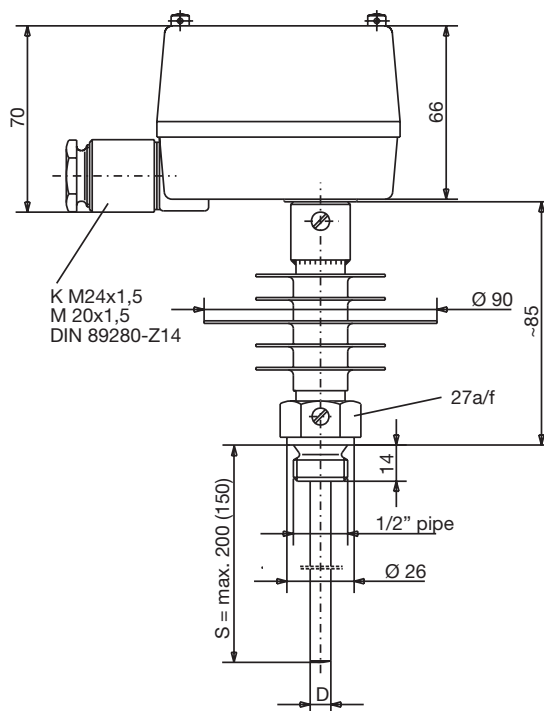


## Dimensions

**ATHs-SE-... 2 and 20**  
 with pocket U  
 up to 150°C



**ATHs-SE-... 70**  
 with pocket UZ  
 up to 300°C





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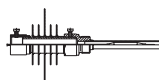
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## Order details

### ATH.-SE Series for application on seagoing ships

|                   |  |  |
|-------------------|--|--|
| <b>Order code</b> | <b>(5) Switching differential</b>  |  |
| 00                | no switching differential (-70 STB)  |  |
| 30                | 3% of scale span S1  |  |
| 60                | 6% of scale span S2  |  |
| 15                | 1.5% of scale span S3  |  |
|                   | <b>(6) Capillary length</b>  |  |
| 0                 | ATHs-SE without capillary  |  |
| 1000              | 1000 mm  |  |
| 2000              | 2000 mm  |  |
| ...               | (special length, details in plain text)                                      |  |
|                   | <b>(7) Material of capillary</b>   |  |
| 00                | ATHs-SE without capillary  |  |
| 40                | Cu (copper)  |  |
| 20                | CrNi (stainless steel 1.4571)  |  |
|                   | <b>(8) Process connection</b>  |  |
| 10                | A = plain cylindrical probe (for ATHf-SE only)                               |   |
| 20                | U = screw-in pocket  |   |
| 30                | UZ = screw-in pocket with extension  |  |
|                   | <b>(9) Thread for process connection</b>                                     |  |
| 00                | no thread (process connection A)   |  |
| 13                | external thread G 1/2  |  |
|                   | <b>(10) Material of process connection</b>                                   |  |
| 00                | for process connection A only  |  |
| 46                | CuZn (brass)   |  |
| 01                | St (steel)   |  |
| 20                | CrNi (stainless steel 1.4571)  |  |
|                   | <b>(11) Fitting length S (immersion tube length)</b>                         |  |
| 000               | ATHf-SE without pocket   |  |
| 100               | 100 mm   |  |
| 120               | 120 mm   |  |
| 150               | 150 mm   |  |
| 200               | 200 mm (not CrNi)  |  |
|                   | <b>(12) Diameter D (immersion tube diameter)</b>                             |  |
| 00                | ATHf-SE without pocket   |  |
| 8                 | 8 mm   |  |
| 10                | 10 mm  |  |
|                   | <b>(13) Diameter d (probe diameter)</b>                                      |  |
| 6                 | 6 mm   |  |
| 8                 | 8 mm   |  |
|                   | <b>(14) Extra codes</b>  |  |
| 000               | no extra code  |  |
| 574               | U= STB with break contact,<br>lock-out + additional signal contact (-70 STB) |  |

#### Order code

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14)  
 603031 / .. - . - ... - .. - ..... - .. - .. - .. - .. - ... - .. - . / ...

#### Order example

603031 / 20 - 1 - 025 - 15 - 0 - 00 - 20 - 13 - 46 - 150 - 8 - 6 / 000

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# Surface-mounting Thermostats Series ATH-SW

Protection IP65  
 Single or twin thermostat

## Brief description

Thermostats control and monitor thermal processes. Surface-mounting thermostats in the ATH-SW series consist of one or two separate measuring and switching systems.

The instruments can be supplied as temperature monitors TW, safety temperature monitors STW (STB) and safety temperature limiters STB. In fault condition, the STB sets the system being monitored to a safe operational state.

Surface-mounting thermostats operate on the principle of liquid expansion, with a microswitch serving as the electrical switching device.

## Switching action

### Temperature monitor TW

When the temperature at the probe exceeds the setpoint, the microswitch is operated via the transmission mechanism and the circuit is opened or closed. When the temperature drops below the setpoint (by the amount of the switching differential), the microswitch returns to its initial position.

### Lock-out facility on the safety temperature limiter STB

When the temperature at the probe exceeds the set limit, the circuit is opened and the microswitch is locked out mechanically.

After the temperature has dropped below the critical temperature by about 10 % of the scale span (approx. 15% for limit setting > +350°C), the microswitch can be reset manually.

### Use of the safety temperature monitor STW as safety temperature limiter STB

The circuitry to which the thermostat is connected must comply with DIN 3440 and VDE 0116.

### Self-monitoring on the safety temperature limiter STB and the safety temperature monitor STW (STB)


Failure of the measuring system, i.e. a leakage of the expansion fluid, will cause the pressure under the diaphragm to drop (STB and STW (STB)), thus permanently opening the circuit. A reset is now no longer possible.

When the temperature at the probe cools down to below approx. -20°C, the circuit will also open. As the temperature rises to above approx. -20°C, the STB has to be reset manually. On the STW (STB), the reset is performed automatically.



The Declarations of Conformity can be found on the Internet at: [www.jumo.net](http://www.jumo.net)  
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## Types and approvals

| Single thermostats |                | Switching action      | DIN Reg. No.            | Test/approval  |
|--------------------|----------------|-----------------------|-------------------------|--|
| with rigid stem    | with capillary |                       |                         |  |
| ATHs-SW-2 *        | ATHf-SW-2 *    | TW                    | TW 89201                | <br>- DIN 3440<br>- Pressure Equipment Directive 97/23/EC<br>* tested to DIN only |
| ATHs-SW-20         | ATHf-SW-20     | STW (STB)             | STW (STB) 89401 S       |  |
| ATHs-SW-70         | ATHf-SW-70     | STB                   | STB 89501               |  |
| Twin thermostats   |                | Switching action      | DIN Reg. No.            |  |
| with rigid stem    | with capillary |                       |                         |  |
| ATHs-SW-22 *       | ATHf-SW-22 *   | TW / TW               | TW / TW 90101           |  |
| ATHs-SW-220        | ATHf-SW-220    | TW / STW (STB)        | TW / STW (STB) 90301 S  |  |
| ATHs-SW-270        | ATHf-SW-270    | TW / STB              | TW / STB 90401          |  |
| ATHs-SW-2020       | ATHf-SW-2020   | STW (STB) / STW (STB) | 2 x STW (STB) 90501 S   |  |
| ATHs-SW-2070       | ATHf-SW-2070   | STW (STB) / STB       | STW (STB) / STB 90601 S |  |
| ATHs-SW-7070       | ATHf-SW-7070   | STB / STB             | STB / STB 90701         |  |



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## Technical data

### Control ranges and temperature probes

| liquid-filled    |                          |                                       |                             |   |
|------------------|--------------------------|---------------------------------------|-----------------------------|---|
| Switching action | Control /limit ranges °C | Max. permissible probe temperature °C | Maximum capillary length mm | Probe length L in mm for probe dia. d = 6 mm (standard) |
| TW               | -20 to + 50              | 60                                    | 5000                        | 141   |
|                  | -10 to + 40              | 50                                    |                             | 185   |
|                  | 0 to + 50                | 60                                    |                             | 185   |
|                  | 0 to + 70                | 80                                    |                             | 138   |
|                  | 0 to +100                | 125                                   |                             | 107   |
|                  | +20 to + 90              | 115                                   |                             | 138   |
|                  | +30 to +110              | 135                                   |                             | 125   |
|                  | +20 to +120              | 140                                   |                             | 106   |
|                  | +60 to +130              | 150                                   |                             | 135   |
|                  | +20 to +150              | 175                                   |                             | 88  |
|                  | +50 to +200              | 230                                   |                             | 101   |
|                  | +50 to +250              | 290                                   |                             | 73  |
|                  | +50 to +300              | 345                                   |                             | 63  |
|                  | +50 to +350              | 405                                   |                             | 53  |
| STW and STB      | +30 to +110              | 135                                   | 5000                        | 108   |
|                  | +60 to +130              | 150                                   |                             | 116   |
|                  | +20 to +150              | 175                                   |                             | 77  |
|                  | +50 to +250              | 290                                   |                             | 64  |
|                  | +50 to +300              | 345                                   |                             | 55  |
| gas-filled       |                          |                                       |                             |   |
| TW               | +20 to +400              | 460                                   | 1000                        | 278   |
|                  | +20 to +500              | 550                                   | 2000                        | 148   |
|                  | +20 to +500              | 550                                   | 4000                        | 202   |
| STW and STB      | +20 to +400              | 460                                   | 1000                        | 176   |
|                  | +20 to +500              | 550                                   | 2000                        | 127   |
|                  | +20 to +500              | 550                                   | 4000                        | 202   |

### Capillary and temperature probe

| Type                             | End of scale                       | Capillary   | Temperature probe                                    | Notes         |
|----------------------------------|------------------------------------|---|--|---------------|
| ATH.-SW- . .                     | up to 200°C                        | copper (Cu)<br>1.5 mm dia.<br>Mat. Ref. 2.0090            | copper (Cu)<br>Mat. Ref. 2.0090<br>brazed            | -             |
|                                  | up to 350°C                        | copper (Cu)<br>1.5 mm dia.<br>Mat. Ref. 2.0090            | stainless steel (CrNi)<br>Mat. Ref. 1.4571<br>brazed | -             |
|                                  | up to 500°C                        | stainless steel (CrNi)<br>1.5 mm dia.<br>Mat. Ref. 1.4571 | stainless steel (CrNi)<br>Mat. Ref. 1.4571<br>welded | -             |
|                                  | up to 350°C                        | stainless steel (CrNi)<br>1.5 mm dia.<br>Mat. Ref. 1.4571 | stainless steel (CrNi)<br>Mat. Ref. 1.4571<br>welded | at extra cost |
| Capillary length                 | 1000 mm is standard, up to 5000 mm |   |  |               |
| Min. bending radius of capillary | 5 mm                               |   |  |               |

### Electrical data

| Switching device | TW, STW (STB)  |  | STB   |
|------------------|--|--|---|
|                  | microswitch with changeover (SPDT) contact   |  | microswitch with break (SPST-NC) contact and lock-out |
| Contact rating   | 10 (2) A, 230 V AC +10%, p.f. = 1 (0.6)<br>0.25A, 230 V DC +10%                                |  |   |
|                  | with switching differentials 1.5% and 2%<br>6 (1.2) A, 230 V AC +10%, p.f. = 1 (0.6)           |  | -   |
|                  | microswitch gold-plated, extra code /au<br>0.1 A, 24 V AC/DC<br>contact resistance 2.5 – 10 mΩ |  |   |

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**Operating data**

|   |  |       |                                     |            |                              |  |
|---|--|-------|-------------------------------------|------------|------------------------------|--|
| Switching differential in % of control / limit range        | Switching action   |       | with liquid-filled measuring system |            |                              |  |
|   |  |       | <b>Nominal value</b>                |            | <b>Possible actual value</b> |  |
|   | <b>TW</b>  |       | 3                                   |            | 3 max. 4                     |  |
|   |  |       | 6                                   |            | 6 max. 8                     |  |
|   |  |       | 1.5                                 |            | 1 max. 2                     |  |
|   |  |       | with gas-filled measuring system    |            |                              |  |
|   | <b>TW</b>  |       | 5                                   |            | 4 max. 8                     |  |
|   |  |       | 9                                   |            | 8 max. 12                    |  |
|   |  |       | 2                                   |            | 1.5 max. 2.5                 |  |
|   |  |       | with liquid-filled measuring system |            |                              |  |
|   | <b>STW (STB)</b>   |       | 5                                   |            | 4 max. 6                     |  |
|   |  |       | 9                                   |            | 8 max. 11                    |  |
|   |  |       | 2                                   |            | 1 max. 3                     |  |
|   |  |       | with gas-filled measuring system    |            |                              |  |
| <b>STW (STB)</b>  |  | 7     |                                     | 5 max. 12  |                              |  |
|   |  | 9     |                                     | 8 max. 16  |                              |  |
|   |  | 2     |                                     | 1.5 max. 3 |                              |  |
| Switching point accuracy in % of control / limit range      | in upper third of scale +0/-5%, at scale start +0/-10%   |       |                                     |            |                              |  |
| Ambient temperature error referred to control / limit range | A deviation of the ambient temperature at the housing from the 22°C calibration ambient temperature produces a shift in the switching point:<br>higher ambient temperature = lower switching point<br>lower ambient temperature = higher switching point |       |                                     |            |                              |  |
|   | Surface-mounting thermostats with end of scale   |       |                                     |            |                              |  |
|   | < 200°C  |       | ≥ 200°C ≤ 350°C                     |            | > 350°C ≤ 500°C              |  |
|   | TW   |       | STB/STW (STB)                       |            | TW                           |  |
|   | STB/STW (STB)  |       | TW                                  |            | STB/STW (STB)                |  |
|   | due to thermostat head, % per °C   |       |                                     |            |                              |  |
| 0.08  |  | 0.17  |                                     | 0.12       |                              |  |
| due to capillary, % per °C per meter length                 |  |       |                                     |            |                              |  |
| 0.047   |  | 0.054 |                                     | 0.03       |                              |  |
| Permissible storage temperature                             | -50 to +50°C   |       |                                     |            |                              |  |
| Permissible ambient temperature in operation                | max. +80°C   |       |                                     |            |                              |  |
| Nom. position (NL)  | unrestricted   |       |                                     |            |                              |  |

**Housing**

|   |   |
|---|---|
| <b>as standard</b>                                      | die-cast aluminium, painted   |
| Setpoint adjustment                                     | switching point adjustable with screwdriver, after removal of housing cover               |
| Enclosure protection                                    | EN 60 529-IP65  |
| Cable entry   | cable gland M 20 x 1.5, for 6 – 12 mm cable diameter                                      |
| Weight  | approx. 1.0 kg  |
| Thermostat mounting<br>Series ATHf-SW<br>with capillary | by 2 screws through base of housing (wall mounting),<br>capillary exit at side of housing |

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**Process connection\***

|                                      |  |   |
|--------------------------------------|--|---|
| Series<br>ATHs-SW<br>with rigid stem | end of scale <u>up to</u> 150°C<br><b>pocket U</b>   | end of scale <u>above</u> 150°C<br><b>pocket UZ</b>   |
|                                      | screw-in pocket with screw-in spigot G 1/2<br>Form A to DIN 3852/2   | screw-in pocket with screw-in spigot G 1/2<br>Form A to DIN 3852/2<br>and extension,<br>in order not to exceed the maximum permissible<br>ambient temperature of +80°C at the housing |
| Series<br>ATHf-SW<br>with capillary  | <b>plain cylindrical probe A</b> (standard)  |   |
|                                      | <b>pocket U</b> (on request)   |   |
|                                      | screw-in pocket with screw-in spigot G 1/2 Form A to DIN 3852/2<br>and clip with fixing screw for securing the probe |   |
| Material                             | <b>pocket U</b>  | <b>pocket UZ</b>  |
|                                      | up to +150°C: CuZn as standard<br>above +150°C: St as standard<br>(CrNi on request)                                  | above +150°C: St as standard<br><br>(CrNi on request)   |
| Fitting length S                     | standard lengths: 100, 120, 150, 200 or 300 mm<br>other lengths on request   |   |
| Immersion tube dia.                  | single thermostat D = 8 mm   | twin thermostat D = 15 mm   |

\*see Data Sheet 60.6710 for other process connections and pockets.

**Note**

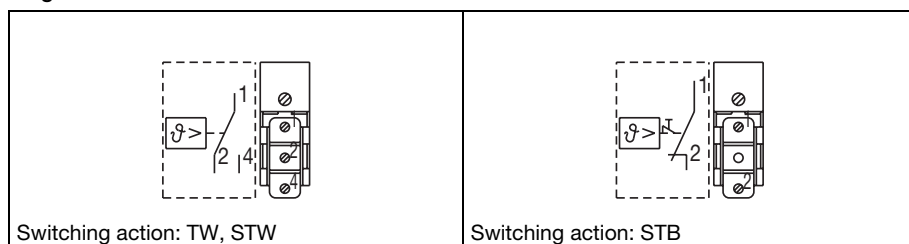
Physical and toxicological properties of the expansion fluid which may escape in the event of a system fracture.

| Control range<br>with end of scale<br>°C | Dangerous<br>reactions | Fire/explosion hazard |                          | Water<br>contamination | irritant | Toxicological data  |       |
|--|------------------------|-----------------------|--------------------------|------------------------|----------|---------------------|-------|
|  |                        | Ignition<br>temp. °C  | Explosion limit<br>% v/v |                        |          | danger to<br>health | toxic |
| < +200                                   | no                     | + 355                 | 0.6 – 8                  | yes                    | yes      | 1                   | no    |
| ≥ 200 ≤ +350                             | no                     | + 490                 | - -                      | yes                    | yes      | 1                   | no    |
| > 350 ≤ +500                             | no                     | no                    | no                       | no                     | no       | no                  | no    |

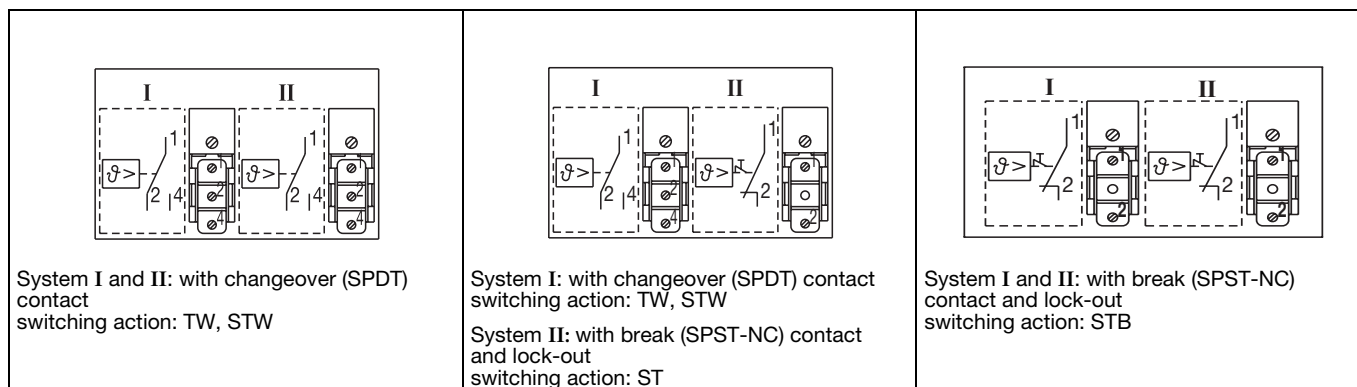
1 At present there is no restrictive statement from the health authorities concerning any danger to health over short periods and at low concentrations, e.g. after a fracture of the measuring system.

**Connection diagrams**

**Single thermostats**



**Twin thermostats**



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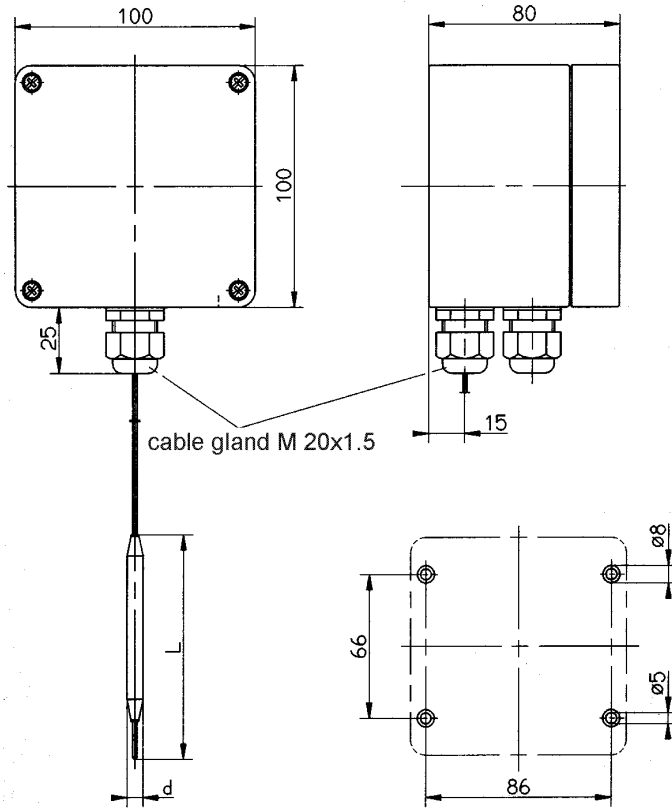
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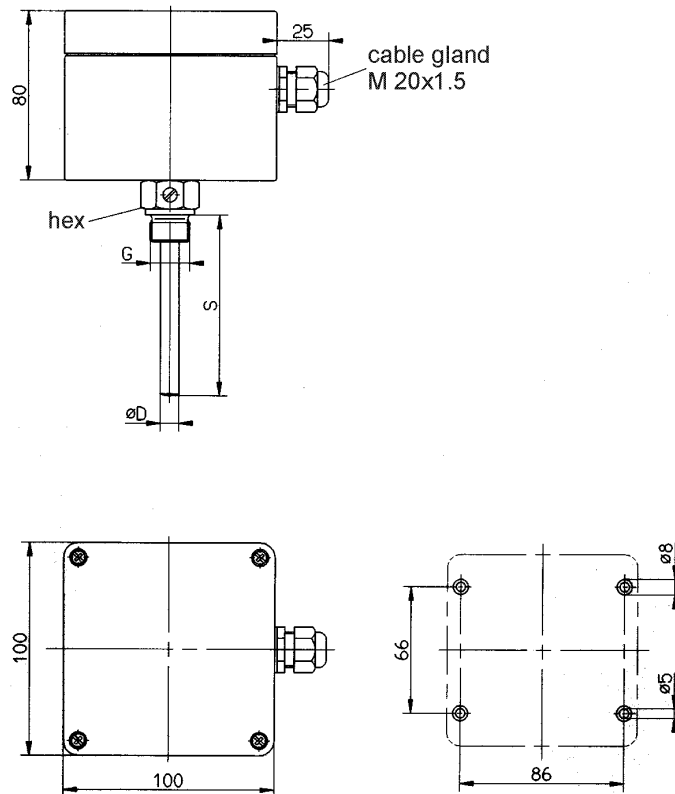


## Dimensions

**ATHf-SW-..**  
 with capillary



**ATHs-SW-..**  
 with rigid stem



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## Order details for non-stock items ATH Series

| Order code | (1) Basic type                              |                                      |                    |
|------------|---|--------------------------------------|--------------------|
| 603035     | Surface-mounting thermostat, ATH.-SW Series |                                      |                    |
|            | <b>(2) Basic type extension</b>             |                                      |                    |
| 0002       | ATH.-SW-2                                   | Temperature monitor TW               |                    |
| 0020       | ATH.-SW-20                                  | Safety temperature monitor STW (STB) | single thermostats |
| 0070       | ATH.-SW-70                                  | Safety temperature limiter STB       |                    |
| 0202       | ATH.-SW-22                                  | TW/TW                                |                    |
| 0220       | ATH.-SW-220                                 | TW/STW (STB)                         |                    |
| 0270       | ATH.-SW-270                                 | TW/STB                               |                    |
| 2020       | ATH.-SW-2020                                | STW (STB)/STW (STB)                  | twin thermostats   |
| 2070       | ATH.-SW-2070                                | STW (STB) / STB                      |                    |
| 7070       | ATH.-SW-7070                                | STB/STB                              |                    |
|            | <b>(3) Style</b>                            |                                      |                    |
| 1          | ATHs-SW-....                                | with rigid stem                      |                    |
| 2          | ATHf-SW-....                                | with capillary                       |                    |
|            | <b>(4) Control / limit ranges °C</b>        |                                      |                    |
| 014        | -20 to + 50 *                               |                                      |                    |
| 016        | -10 to + 40 *                               |                                      |                    |
| 021        | 0 to + 50                                   |                                      |                    |
| 022        | 0 to + 70                                   |                                      |                    |
| 025        | 0 to +100                                   |                                      |                    |
| 041        | +20 to + 90                                 |                                      |                    |
| 052        | +30 to +110                                 |                                      |                    |
| 042        | +20 to +120                                 |                                      |                    |
| 066        | +60 to +130                                 |                                      |                    |
| 043        | +20 to +150                                 |                                      |                    |
| 062        | +50 to +200                                 |                                      |                    |
| 063        | +50 to +250                                 |                                      |                    |
| 064        | +50 to +300                                 |                                      |                    |
| 045        | +20 to +400                                 |                                      |                    |
| 046        | +20 to +500                                 |                                      |                    |
|            | * TW only                                   |                                      |                    |
|            | <b>(5) Switching differential</b>           |                                      |                    |
| 00         | without switching differential (-70 STB)    |                                      |                    |
| 15         | 1.5% of scale span                          | (TW only)                            |                    |
| 20         | 2% of scale span                            | (STW (STB) only)                     |                    |
| 30         | 3% of scale span                            | (TW only)                            |                    |
| 50         | 5% of scale span                            | (TW + STW (STB) only)                |                    |
| 60         | 6% of scale span                            | (TW only)                            |                    |
| 70         | 7% of scale span                            | (STW (STB) only)                     |                    |
| 90         | 9% of scale span                            | (STW (STB) only)                     |                    |
|            | <b>(6) Capillary length</b>                 |                                      |                    |
| 0          | ATHs-SW without capillary                   |                                      |                    |
| 1000       | 1000 mm                                     |                                      |                    |
| 2000       | 2000 mm                                     |                                      |                    |
| 3000       | 3000 mm                                     |                                      |                    |
| 4000       | 4000 mm                                     |                                      |                    |
| 5000       | 5000 mm                                     |                                      |                    |
| ...        | (special length, details in plain text)     |                                      |                    |
|            | <b>(7) Material of capillary</b>            |                                      |                    |
| 00         | ATHs-SW without capillary                   |                                      |                    |
| 40         | Cu (copper)                                 |                                      |                    |
| 20         | CrNi (stainless steel 1.4571)               |                                      |                    |

\* see Data Sheet 60.6710 for additional probe mountings and pockets



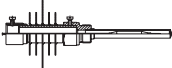
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## Order details for non-stock items ATH Series

|                   |  |   |
|-------------------|--|---|
| <b>Order code</b> | <b>(8) Process connection *</b>                      |   |
| 10                | A = plain cylindrical probe                          |  |
| 20                | U = screw-in pocket                                  |  |
| 30                | UZ = screw-in pocket with extension                  |  |
|                   | <b>(9) Thread for process connection *</b>           |   |
| 00                | no thread (process connection A)                     |   |
| 13                | male thread G 1/2                                    |   |
|                   | <b>(10) Material of process connection</b>           |   |
| 00                | only with process connection A                       |   |
| 46                | CuZn (brass)   |   |
| 01                | St (steel)   |   |
| 20                | CrNi (stainless steel 1.4571)                        |   |
|                   | <b>(11) Fitting length S (immersion tube length)</b> |   |
| 000               | ATHf-SW without pocket                               |   |
| 100               | 100 mm   |   |
| 120               | 120 mm   |   |
| 150               | 150 mm   |   |
| 200               | 200 mm   |   |
| 300               | 300 mm   |   |
| 400               | 400 mm   |   |
| ...               | (special length, details in plain text)              |   |
|                   | <b>(12) Diameter D (immersion tube diameter)</b>     |   |
| 00                | ATHf-SW without pocket                               |   |
| 8                 | 8 mm with single thermostats                         |   |
| 15                | 15 mm with twin thermostats                          |   |
|                   | <b>(13) Diameter d (probe diameter)</b>              |   |
| 6                 | 6 mm   |   |
|                   | <b>(14) Extra codes</b>                              |   |
| 000               | no extra code  |   |
| 702               | au snap-action switch contact, gold-plated           |   |

\* see Data Sheet 60.6710 for additional probe mountings and pockets

**Order code**

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14)  
 603035 / .... - . - ... - .. - .... - .. - 00 - .. - .. - ... - .. - . / ...

**Order example**

603035 / 0202 - 2 - 043 - 30 - 2000 - 20 - 10 - 00 - 00 - 000 - 00 - 6 / 000

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# Surface-mounting Thermostats AM Series

- with 1 or 2 single-pole snap-action switches
- IP40 protection

## Brief description

Surface-mounting thermostats control and monitor thermal processes. Thermostats in the AM series are available with 1 or 2 single-pole snap-action switches as temperature controllers (TR) and temperature monitors (TW). On thermostats with 2 single-pole snap-action switches, the contact spacing (in °C) is factory-set according to customer requirements. Surface-mounting thermostats operate on the principle of liquid expansion, with a microswitch serving as the electrical switching device.

## Switching action

### Temperature controller TR and temperature monitor TW

When the temperature at the probe exceeds the selected setpoint, the microswitch is actuated via a transmission mechanism and the circuit is opened or closed. When the temperature drops below the selected setpoint (by the amount of the switching differential), the microswitch returns to its initial position.



## Types and approvals

| Type            |                | Switching action | Contact |
|-----------------|----------------|------------------|---------|
| with rigid stem | with capillary |                  |         |
| AMs-1           | AMf-1          | TR               | 1       |
| AMs-2           | AMf-2          | TW               |         |
| AMFs-13         | AMFf-13        | TR               | 2       |
| AMFs-23         | AMFf-23        | TW               |         |

## Technical data

### Control ranges and probe table

| Control range<br>°C | Switching differential<br>% | Max. probe temperature<br>°C | Capillary lengths up to<br>[ m ] | Max. switch head temperature<br>°C | Max. contact spacing<br>°C | Probe length in mm with 6 mm probe diameter |
|---------------------|-----------------------------|------------------------------|----------------------------------|------------------------------------|----------------------------|---|
| -20 to + 40         | 2.5                         | + 50                         | 2                                | + 50                               | 8                          | 245   |
| 0 to + 50           | 2.5                         | + 60                         | 2                                | + 60                               | 10                         | 283   |
| +20 to + 90         | 2.5<br>7                    | +115<br>+175                 | 1<br>2                           | + 80                               | 14<br>70                   | 210<br>91                                   |
| 0 to +100           | 2.5                         | +125                         | 2                                |                                    | 20                         | 157   |
| +30 to +110         | 2.5<br>7                    | +135<br>+200                 | 2                                |                                    | 16<br>80                   | 188<br>84                                   |
| 0 to +150           | 2.5                         | +173                         | 1                                |                                    | 30                         | 113   |
| +50 to +200*        | 2.5                         | +230                         | 1                                |                                    |                            | 139   |

\* Type AMs is supplied with probe mounting UZ to Data Sheet 60.6710, and not as shown in the outline drawing.





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**Housing**

|  |  |   |  |
|--|--|---|--|
| <b>as standard</b>                         | material: polycarbonate, impact-resistant,                                   |   | color: similar to RAL 9002   |
| Setpoint adjustment                        | AM . -1, AMF . -13<br>switching point adjustable from outside by rotary knob |   | AM . -2, AMF . -23<br>switching point adjustable with setpoint scale<br>after removing a cover |
| Protection                                 | EN 60 529-IP40   |   |  |
| Cable entry                                | push-in gland  |   |  |
| Weight                                     | approx. 0.4 kg   |   |  |
| Switch head<br>mounting<br>Series AMf- . . | <b>standard</b>  | by 2 screws through back of housing   |  |
|  | extra code   |   |  |
|  | <b>b</b>   | steel mounting flange, capillary exit on housing spigot                           |  |
|  | <b>k</b>   | wall bracket  |  |
|  | <b>g</b>   | M 18x1 thread with locknut on housing spigot,<br>capillary exit on housing spigot |  |

**Process connection\***

|                                  |   |  |
|----------------------------------|---|--|
| Series AMs-<br>with rigid stem   | end of scale <u>up to</u> 150°C<br><b>pocket U</b>  | end of scale <u>above</u> 150°C<br><b>pocket UZ</b>  |
|                                  | screw-in pocket with screw-in spigot G 1/2<br>Form A to DIN 3852/2  | screw-in pocket with screw-in spigot G 1/2<br>Form A to DIN 3852/2<br>and extension,<br>so that the max. permissible ambient temperature +80°C<br>at the housing is not exceeded |
| Series<br>AMf-<br>with capillary | <b>plain cylindrical probe A (standard)</b>   |  |
|                                  | <b>pocket U (on request)</b>  |  |
|                                  | screw-in pocket with screw-in spigot G 1/2 Form A to DIN 3852/2<br>and clamping clip with fixing screw for securing the probe |  |
| Material                         | <b>pocket U</b>   | <b>pocket UZ</b>   |
|                                  | up to +150°C: CuZn is standard<br>above +150°C: St is standard<br>(CrNi on request)   | above +150°C: St is standard<br>(CrNi on request)  |
| Fitting length S                 | standard lengths: 100, 120, 150, 200 or 300 mm<br>other lengths on request  |  |
| Immersion tube dia.              | D = 8 mm  |  |

\* see Data Sheet 60.6710 for other process connections and pockets

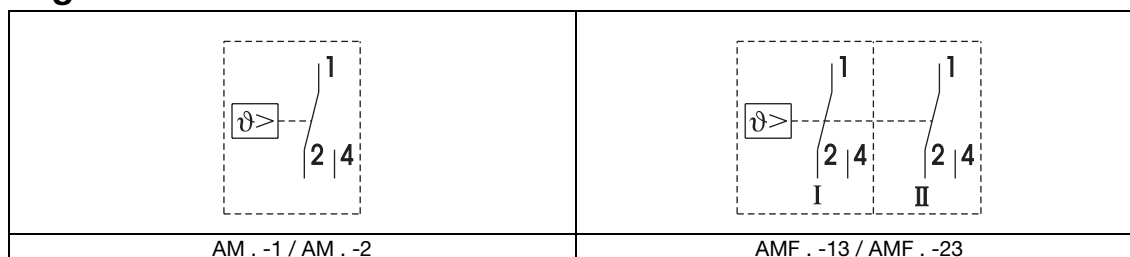
**Note**

Physical and toxicological properties of the expansion media that may escape in the event of a system fracture.

| Control range<br>with end of scale<br>°C | Dangerous<br>reactions | Fire/explosion hazard |                          | Water<br>contamination | irritant | Toxicological data  |       |
|--|------------------------|-----------------------|--------------------------|------------------------|----------|---------------------|-------|
|  |                        | Ignition temp.<br>°C  | Explosion limit<br>% v/v |                        |          | danger to<br>health | toxic |
| < +200                                   | no                     | + 355                 | 0.6 — 8                  | yes                    | yes      | 1)                  | no    |
| ≥ 200 ≤ +350                             | no                     | + 490                 | --                       | yes                    | yes      | 1)                  | no    |

1) At present there is no restrictive statement from the health authorities concerning any danger to health over short periods and at low concentrations, e.g. after a fracture of the measuring system.

**Connection diagrams**



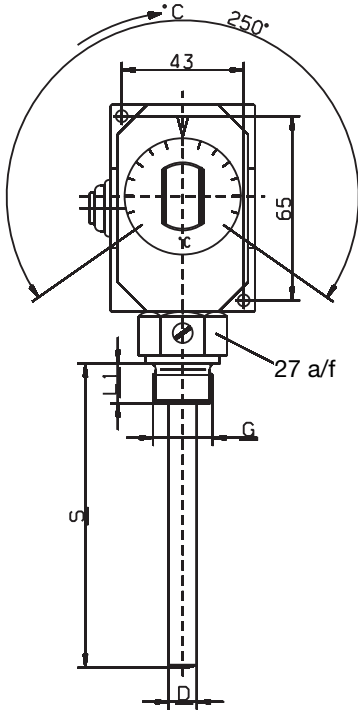
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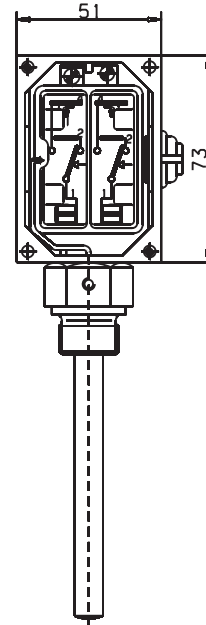
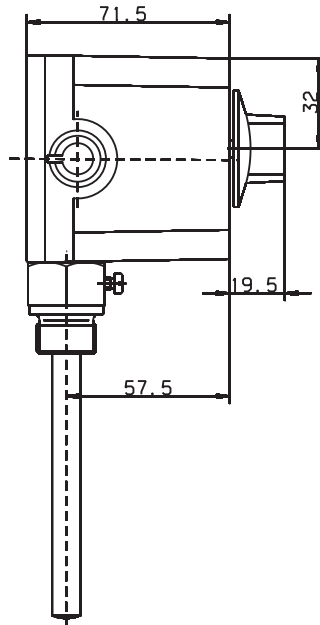
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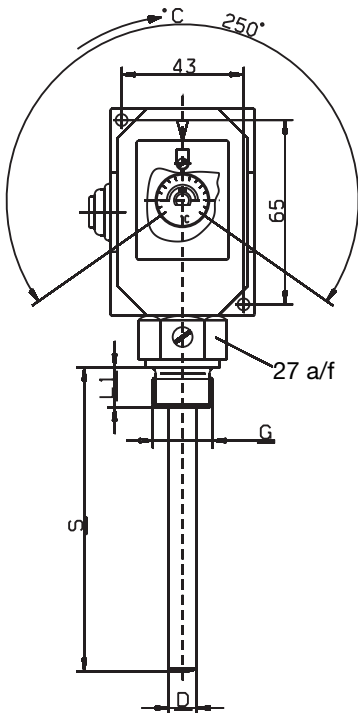
## Dimensions



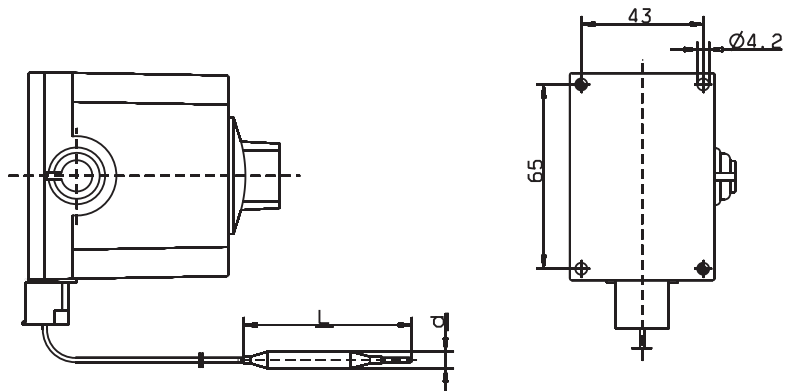
AMs-1 / AMFs-13



shown without terminal cover



AMs-2 / AMFs-23



AMf-1 (standard), fixing by 2 screws through back of housing, with plain cylindrical probe A, no pocket

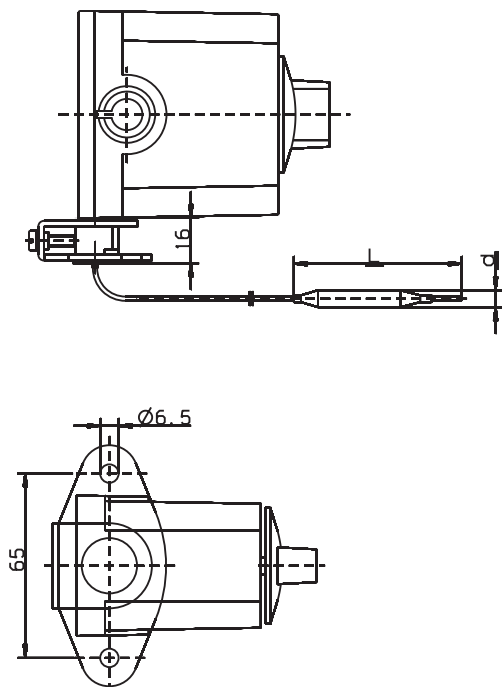
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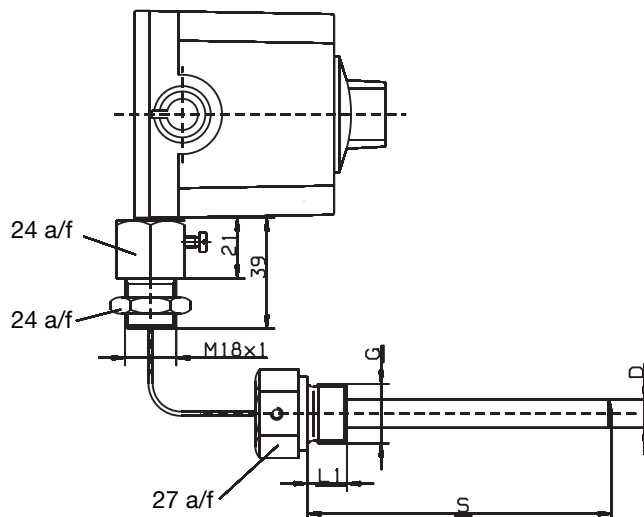
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## Dimensions



AMf-1 / b  
 flange mounting,  
 with plain cylindrical probe A,  
 no pocket



AMf-1 / g  
 mounting with M 18x1 thread,  
 with pocket U

## Order details Stock items

(delivery 3 working days after receipt of order)

| Sales No.    | Type  | Control range<br>°C | Switching differential<br>% | Process connection              | Immersion tube dia. x length<br>mm |
|--------------|-------|---------------------|-----------------------------|---------------------------------|------------------------------------|
| 60/60000675* | AMs-1 | 0 to +100           | 2.5                         | U G <sup>1</sup> / <sub>2</sub> | 8x200                              |
| 60/60000679* | AMs-1 | 0 to +150           |                             |                                 | 8x150                              |
| 60/60000703* | AMs-1 | +20 to + 90         | 7                           |                                 | 8x120                              |
| 60/60000674* | AMs-1 | +30 to +110         |                             |                                 | 8x100                              |

| Sales No.    | Type  | Control range<br>°C | Switching differential<br>% | Capillary<br>mm | Process connection | Probe dia. x length<br>mm |
|--------------|-------|---------------------|-----------------------------|-----------------|--------------------|---------------------------|
| 60/60000677* | AMf-1 | 0 to +100           | 2.5                         | 2000            | A                  | 6x157                     |
| 60/60000680* | AMf-1 | 0 to +150           |                             | 1000            |                    | 6x113                     |
| 60/60000681* | AMf-1 | +50 to +200         |                             | 1000            |                    | 6x135                     |

\* model is being phased out

Different models on request - minimum ordering quantity: 50 units

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**Order details for non-stock items**

AM Series

Minimum ordering quantity: 50 units

| Order code | (1) Basic type  |
|------------|---|
| 603041     | Surface-mounting thermostat, AM series  |
|            | <b>(2) Basic type extension</b>   |
| 01         | AM-1 1-pole temperature controller TR   |
| 02         | AM-2 1-pole temperature monitor TW  |
| 13         | AMF-13 temperature controller TR  |
| 23         | AMF-23 temperature monitor TW   |
|            | <b>(3) Style</b>  |
| 1          | AM.s with rigid stem  |
| 2          | AM.f with capillary   |
|            | <b>(4) Control / limit ranges °C</b>  |
| 013        | -20 to + 40   |
| 021        | 0 to + 50   |
| 041        | +20 to + 90   |
| 025        | 0 to +100   |
| 052        | +30 to +110   |
| 027        | 0 to +150   |
| 062        | +50 to +200   |
|            | <b>(5) Switching differential</b>   |
| 25         | 2.5 % of scale span   |
| 70         | 7 % of scale span   |
|            | <b>(6) Capillary length</b>   |
| 0          | AMs without capillary   |
| 1000       | 1000 mm   |
| 2000       | 2000 mm   |
|            | <b>(7) Process connection</b>   |
| 10         | A = plain cylindrical probe (for AM.f only)  |
| 20         | U = screw-in pocket                          |
| 30         | UZ = screw-in pocket with extension          |
|            | <b>(8) Thread for process connection</b>  |
| 00         | no thread (process connection A)  |
| 13         | external thread G 1/2   |
|            | <b>(9) Material of process connection</b>   |
| 00         | with process connection A only  |
| 46         | CuZn (brass)  |
| 01         | St (steel)  |
| 20         | CrNi (stainless steel 1.4571)   |
|            | <b>(10) Fitting length S (immersion tube length)</b>  |
| 000        | AMf without pocket  |
| 100        | 100mm   |
| 120        | 120mm   |
| 150        | 150mm   |
| 200        | 200mm   |
| 300        | 300mm   |
|            | <b>(11) Extra codes <sup>1</sup></b>  |
| 000        | no extra code   |
| 764        | b steel mounting flange, capillary exit on housing spigot   |
| 715        | g M 18x1 thread with locknut  |
| 248        | k wall bracket  |
| 699        | x screw connection up to 2.5mm <sup>2</sup> conductor cross-section   |

Contact spacing for 2-pole thermostats: details in plain text (e.g. +2K or -5K)

**Order code**

(1) / (2) - (3) - (4) - (5) - (6) - (7) - (8) - (9) - (10) - (11)  
 603041 / .. - . - ... - .. - .... - .. - .. - .. - ... / ...

**Order example**

603041 / 01 - 1 - 013 - 25 - 0000 - 20 - 13 - 46 - 300 / 000<sup>1</sup>

<sup>1</sup> List extra codes in sequence, separated by commas.

Contact spacing: \_\_\_\_\_

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# Heating Thermostat AMHs-1-80 Series

Version approved to DIN 3440  
and Pressure Equipment Directive 97/23/EC

## Brief description

Heating thermostats with a microswitch are used to monitor and control thermal processes, mainly in heating installations. The instrument in the AMHs-1-80 series consists of two independent measurement and switching systems.

The thermostats operate on the principle of liquid expansion, with a microswitch serving as the electrical switching device.

## Switching action

### Temperature controller (TR)

If the temperature at the probe goes above the selected setpoint, the electrical circuit is opened by a microswitch. If the temperature falls below the setpoint (by the amount of the switching differential) the microswitch returns to its initial position.

### Lock-out function for the safety temperature limiter (STB)

If the temperature at the probe goes above the selected setpoint, the electrical circuit is opened and remains mechanically locked out.

When the temperature has fallen to about 10% of the span below the set limit, the microswitch can be reset manually.


### Self-monitoring function for the safety temperature limiter (STB)

If the measuring system fails, i.e. if the expansion liquid has leaked, then the pressure under the diaphragm of the STB drops and the electrical circuit is permanently open. It is no longer possible to reset the system.

If the temperature at the probe falls below approx. -20°C the circuit is also opened, but will close again if the temperature rises above -20°C (approx.).



## Type and approvals

| Type      | Switching action | DIN Reg. No.   | Tests  |
|-----------|------------------|----------------|--|
| AMHs-1-80 | TR / STB         | TR / STB 97803 |  Pressure Equipment Directive 97/23/EC CE0036 |

You will find the Declarations of Conformity on our website at:  
[www.jumo.net](http://www.jumo.net)  
 ⇨ Products  
 ⇨ Data Sheet 60.3045  
 or ask for them to be sent.

## Technical data

| Electrical data  | TR  | STB  |
|------------------|---|--|
| Switching device | Microswitch with changeover contact                             | Microswitch with changeover contact and lock-out |
| Contact rating   | 10 (2) A, 230 V AC +10%, p.f. = 1 (0.6)<br>0.25A, 230 V DC +10% |  |

| Operating data                               | TR (externally adjustable)                        | STB (fixed setting in factory) |
|--|---|--------------------------------|
| Control range, limits                        | +30 to + 90°C                                     | +100°C                         |
|  | +30 to +100°C                                     | +110°C                         |
|  | +40 to +110°C                                     | +120°C                         |
| Switching differential                       | approx. 6 °C                                      | —                              |
| Switching point accuracy                     | ± 3 °C in upper third of scale                    | +0/-5 °C                       |
| Permissible ambient temperature in operation | +18 to 80°C                                       |                                |
| Permissible storage temperature              | -50 to +50°C                                      |                                |
| Max. permissible probe temperature           | +140°C  |                                |
| Nominal position (NL)                        | to DIN 16 257, NL 0 — NL 90 (other NL on request) |                                |

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**Case**

|                      |   |
|----------------------|---|
| Housing              | Plastic housing in impact-resistant polycarbonate<br>Color: cover pebble gray RAL 7032, base anthracite gray RAL 7016 |
| Enclosure protection | EN 60 529-IP40  |
| Cable entry          | 2 clamping glands M16x1.5   |
| Weight               | approx. 0.45 kg   |

**Process connection**

|           |  |
|-----------|--|
| Pocket UH | Screw-in pocket with fixing screw, without shoulder for hemp sealing, material brass, thread: G1/2, fitting length 120 mm, support tube 15 mm diameter |
|-----------|--|

**Note:**

Physical and toxicological properties of the expansion fluid that might escape in the event of a system fracture.

| Control range with end of scale | Dangerous reactions | Fire and explosion hazard |                 | Water contamination | Toxicological data |                  |       |
|---------------------------------|---------------------|---------------------------|-----------------|---------------------|--------------------|------------------|-------|
|                                 |                     | Ignition temperature      | Explosion limit |                     | irritant           | danger to health | toxic |
| < +200°C                        | no                  | + 355°C                   | 0.6 - 8% v/v    | yes                 | yes                | 1)               | no    |

1) At present, there is no restrictive statement from the health authorities concerning any danger to health over short periods, and at low concentration, e.g. after a fracture of the measuring system.

**Connection diagram**

**Dimensions**

**Order details: Type AMHs-1-80**

|                   |  |
|-------------------|--|
| <b>Order code</b> | <b>(1) Basic type (basic version)</b>  |
| 603045-0180       | AMHs-1-80, heating thermostat with microswitch and rigid stem screw-in pocket UH G1/2, CuZn stem 15 x 120 mm, CuZn |
|                   | <b>(2) Control ranges / limits</b>   |
| 050               | + 30 to + 90°C / +100°C  |
| 051               | +30 to +100°C / +110°C   |
| 055               | +40 to +110°C / +120°C   |

**Order code**

(1) 603045-0180 / (2) ...

**Order example**

603045-0180 / 051 = Heating thermostat with control range/limit TR +30 to +100°C / STB +110°C

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## Surface-mounting Thermostats AMTHF Series with 2, 3 or 4 single-pole snap-action switches



Type AMTHFs-13



Type AMTHFf-13



### Brief description

Surface-mounting thermostats control and monitor thermal processes. The instruments in the AMTHF series are available with 2, 3 or 4 switching stages as temperature controllers (TR) and temperature monitors (TW). The contact spacing of the individual switching stages (in °C) is factory-set according to customer requirements. Surface-mounting thermostats operate on the principle of liquid expansion, with a microswitch serving as the electrical switching device.

### Switching action

#### Temperature controller (TR) and temperature monitor (TW)

When the temperature at the probe exceeds the selected setpoint, the microswitch is actuated via a transmission mechanism and the circuit is opened or closed. When the temperature drops below the selected setpoint (by the amount of the switching differential), the microswitch returns to its initial position.

### Types

| Type            |                | Switching action | Switching stage |
|-----------------|----------------|------------------|-----------------|
| with rigid stem | with capillary |                  |                 |
| AMTHFs-13       | AMTHFf-13      | TR               | 2               |
| AMTHFs-133      | AMTHFf-133     | TR               | 3               |
| AMTHFs-1333     | AMTHFf-1333    | TR               | 4               |
| AMTHFs-23       | AMTHFf-23      | TW               | 2               |
| AMTHFs-233      | AMTHFf-233     | TW               | 3               |
| AMTHFs-2333     | AMTHFf-2333    | TW               | 4               |

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## Technical data

### Control range and probe table — liquid-filled

| Control/limit range<br>°C | Switching differential<br>% | Max. probe temperature<br>°C | Max. switch head temperature<br>°C | Capillary length<br>m | Max. contact spacing<br>°C | Probe length L in mm, probe dia. d in mm dia. 6 = standard |     |
|---------------------------|-----------------------------|------------------------------|------------------------------------|-----------------------|----------------------------|--|-----|
|                           |                             |                              |                                    |                       |                            | ø 6  | ø 8 |
| -20 to + 40               | 1                           | + 50                         | + 50                               | 5                     | 5                          | 245  | 145 |
|                           | 2,5                         | + 50                         | + 50                               |                       | 8                          | 245  | 145 |
|                           | 5                           | + 95                         | + 50 (80) <sup>1</sup>             |                       | 25                         | 138  | 91  |
|                           | 7                           | + 100                        | + 50 (80) <sup>1</sup>             |                       | 50                         | 103  | 73  |
| 0 to + 50                 | 1                           | + 60                         | + 60                               | 3                     | 5                          | 283  | 165 |
|                           | 2,5                         | + 60                         | + 60                               |                       | 10                         | 283  | 165 |
|                           | 5                           | + 105                        | + 60 (80) <sup>1</sup>             |                       | 25                         | 159  | 101 |
|                           | 7                           | + 110                        | + 60 (80) <sup>1</sup>             |                       | 50                         | 117  | 80  |
| +20 to + 90               | 1                           | + 115                        | + 80                               | 1                     | 7                          | 210  | 127 |
|                           | 2,5                         | + 115                        | + 80                               |                       | 14                         | 210  | 127 |
|                           | 5                           | + 140                        | + 80                               |                       | 35                         | 121  | 82  |
|                           | 7                           | + 175                        | + 80                               |                       | 70                         | 91   | 67  |
| 0 to +100                 | 1                           | + 125                        | + 80                               | 2                     | 10                         | 157  | 100 |
|                           | 2,5                         | + 125                        | + 80                               |                       | 20                         | 157  | 100 |
|                           | 5                           | + 165                        | + 80                               |                       | 50                         | 94   | 68  |
|                           | 7                           | + 200                        | + 80                               |                       | 100                        | 73   | 58  |
| +30 to +110               | 1                           | + 135                        | + 80                               | 2                     | 8                          | 188  | 116 |
|                           | 2,5                         | + 135                        | + 80                               |                       | 16                         | 188  | 116 |
|                           | 5                           | + 170                        | + 80                               |                       | 40                         | 110  | 76  |
|                           | 7                           | + 200                        | + 80                               |                       | 80                         | 84   | 63  |
| 0 to +150                 | 1                           | + 173                        | + 80                               | 1                     | 15                         | 113  | 78  |
|                           | 2,5                         | + 173                        | + 80                               |                       | 30                         | 113  | 78  |
|                           | 5                           | + 200                        | + 80                               |                       | 75                         | 72   | 57  |
| 0 to +200                 | 1                           | + 230                        | + 80                               | 1                     | 20                         | 113  | 78  |
|                           | 2,5                         |                              |                                    |                       | 40                         |  |     |
| +50 to +200               | 1                           | + 230                        | + 80                               | 1                     | 15                         | 139  | 92  |
|                           | 2,5                         |                              |                                    |                       | 30                         |  |     |
| +50 to +250               | 1                           | + 228                        | + 80                               | 1                     | 20                         | 105  | 70  |
|                           | 2,5                         | + 228                        | + 80                               |                       | 40                         | 105  | 70  |
|                           | 5                           | + 300                        | + 80                               |                       | 100                        | 64   | 49  |
| +50 to +300               | 1                           | + 345                        | + 80                               | 2                     | 25                         | 87   | 61  |
|                           | 2,5                         | + 345                        | + 80                               |                       | 50                         |  |     |

<sup>1</sup> Values in brackets on request only, taking into account the operating states and required capillary length !

### Control range and probe table — gas-filled

| Control /limit range<br>°C | Switching differential<br>% | Max. probe temperature<br>°C | Max. switch head temperature<br>°C | Capillary length<br>m | Max. contact spacing<br>°C | Probe length L in mm, probe dia. d in mm dia. 6 = standard |     |
|----------------------------|-----------------------------|------------------------------|------------------------------------|-----------------------|----------------------------|--|-----|
|                            |                             |                              |                                    |                       |                            | ø 6  | ø 8 |
| +20 to +400                | 6                           | + 460                        | + 80                               | 5                     | 75                         | 237  | 137 |
|                            | 10                          | + 500                        | + 80                               |                       | 200                        | 127  | 81  |
| +20 to +500                | 3 / 5                       | + 530                        | + 80                               | 1                     | 48                         | 278  | 158 |
|                            | 6                           | + 575                        | + 80                               |                       | 95                         | 176  | 106 |
|                            | 10                          | + 575                        | + 80                               |                       | 250                        | 95   | 65  |

### Capillaries and temperature probes

| Type                             | End of scale                      | Capillary  | Temperature probe                            | Note          |
|----------------------------------|-----------------------------------|--|--|---------------|
| AMTHF                            | up to 200 °C                      | copper (Cu), 1.5mm dia.<br>Mat. Ref. Cu-DHP      | copper (Cu), Mat. Ref. Cu-DHP<br>brazed      | -             |
|                                  | up to 350 °C                      | copper (Cu), 1.5mm dia.<br>Mat. Ref. Cu-DHP      | st. steel (CrNi), Mat. Ref. 1.4571<br>brazed | -             |
|                                  | up to 500 °C                      | st. steel (CrNi), 1.5mm dia.<br>Mat. Ref. 1.4571 | st. steel (CrNi), Mat. Ref. 1.4571<br>welded | -             |
|                                  | up to 350 °C                      | st. steel (CrNi), 1.5mm dia.<br>Mat. Ref. 1.4571 | st. steel (CrNi), Mat. Ref. 1.4571<br>welded | at extra cost |
| Capillary length                 | standard is 1000 mm, max. 5000 mm |  |  |               |
| Min. bending radius of capillary | 5 mm                              |  |  |               |

**Note:** If the max. permissible temperature at the probe, capillary and switch head is not fully utilized, it may be possible to increase the capillary length where it is restricted to 1, 2 or 3 m according to the control range and probe table.  
 Please contact us, specifying the actual temperature to which the thermostat is exposed.



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**Electrical data**

|                       |   |   |   |
|-----------------------|---|---|---|
| Switching device      | 2, 3 or 4 single-pole snap-action switches<br>microswitch with changeover contact                                 |   |   |
| Contact rating        | Switching action<br>Switching differential  | (n.c.) break contact<br>terminal 2                                | (n.o.) make contact<br>terminal 4                                 |
|                       | TR, TW<br>2,5%, 5%, 6%, 7%, 10%   | 16 (3) A, 230 V AC +10%,<br>p.f. = 1(0.6)<br>0.25A, 230 V DC +10% | 8 (1.5) A, 230 V AC +10%<br>p.f. = 1(0.6)<br>0.25A, 230 V DC +10% |
|                       | TR, TW<br>1%, 3%  | 6 (2) A, 230 V AC +10%, p.f. = 1(0.6)<br>0.25A, 230 V DC +10%     |   |
| Contact reliability   | To ensure the highest possible switching reliability, we recommend a minimum loading of:<br>AC / DC = 24 V, 20 mA |   |   |
| Rated surge voltage   | 1500 V (via switching contacts 400 V)   |   |   |
| Overtoltage category  | II  |   |   |
| Fusing required       | see Contact rating  |   |   |
| Electrical connection | screw terminals up to 2.5 mm <sup>2</sup> conductor cross-section   |   |   |

**Operating data**

|   |   |                                     |                                     |  |      |                    |      |      |
|---|---|-------------------------------------|-------------------------------------|--|------|--------------------|------|------|
| Switching differential<br>in % of control /limit range  | Switching action  | with liquid-filled measuring system |                                     |  |      |                    |      |      |
|   |   | Nominal value                       | Possible actual value               |  |      |                    |      |      |
|   | TR, TW  | 2.5                                 | 2.5 max. 3.5                        | standard   |      |                    |      |      |
|   |   | 5                                   | 5 max. 6                            | on request   |      |                    |      |      |
|   |   | 7                                   | 7 max. 8                            | on request   |      |                    |      |      |
|   |   | 1                                   | 1 max. 2                            | at extra cost  |      |                    |      |      |
|   | with gas-filled measuring system  |                                     |                                     |  |      |                    |      |      |
|   |   | 5                                   | 5 max. 11                           | standard   |      |                    |      |      |
|   |   | 6                                   | 6 max. 14                           | on request   |      |                    |      |      |
|   |   | 10                                  | 10 max. 16                          | on request   |      |                    |      |      |
|   | 3   | 2.5 max. 4                          | at extra cost                       |  |      |                    |      |      |
| Contact spacing<br>on multi-pole<br>thermostats   | with switching differential   | Contact spacing of scale span       |                                     | Switching point<br>accuracy of<br>contact spacing, % of span |      |                    |      |      |
|   |   | minimum                             | maximum                             |  |      |                    |      |      |
|   | 1%<br>2.5%<br>3%, 5%<br>6%, 7%, 10%   | 1%<br>1%<br>2%<br>3%                | according to<br>control range table | ≤1%<br>≤1%<br>< 2%<br>< 3%                                   |      |                    |      |      |
|   | The contact spacing is specified in °C against setpoint of contact I.<br>sign - = switching <b>before</b> setpoint<br>sign + = switching <b>after</b> setpoint<br>For simultaneous switching, specify contact spacing "0".  |                                     |                                     |  |      |                    |      |      |
| Switching point accuracy<br>in % of control /limit range  | Switching action  | Switching differential              |                                     | in upper third of scale or<br>at limit                       |      |                    |      |      |
|   |   | liquid-filled                       | gas-filled                          |  |      |                    |      |      |
|   | TR  | 1%, 2.5%<br>5%<br>7%                | --<br>3%, 5%,<br>6%, 10%            | ± 1.5%<br>± 3.0%<br>± 4.0%                                   |      |                    |      |      |
| TW  | 1%, 2.5%<br>5%<br>7%  | --<br>3%, 5%,<br>6%, 10%            | +0 / -3%<br>+0 / -6%<br>+0 / -8%    |  |      |                    |      |      |
| Mean ambient<br>temperature effect  | Deviation of the ambient temperature at the switch head and / or capillary<br>from the +22°C calibration ambient temperature will result in a shift of the switching point:<br>higher ambient temperature = lower switching point<br>lower ambient temperature = higher switching point |                                     |                                     |  |      |                    |      |      |
|   | for temperatures with end of scale / limit value  |                                     |                                     |  |      |                    |      |      |
|   | < 200 °C  |                                     | ≥ 200 °C ≤ +350 °C                  |  |      | ≥ 400 °C ≤ +500 °C |      |      |
|   | TR, TW  |                                     | TR, TW                              |  |      | TR, TW             |      |      |
|   | switching differential in %   |                                     |                                     |  |      |                    |      |      |
|   | 1 / 2.5   | 5                                   | 7                                   | 1 / 2.5  | 5    | 3 / 5              | 6    | 10   |
|   | ambient temperature effect on switch head, % per °C   |                                     |                                     |  |      |                    |      |      |
|   | 0.15  | 0.26                                | 0.34                                | 0.12   | 0.21 | 0.12               | 0.17 | 0.24 |
|   | ambient temperature effect on capillary, % per °C per m   |                                     |                                     |  |      |                    |      |      |
|   | 0.05  |                                     | 0.09                                |  | 0.04 |                    | 0.05 |      |
| If the operating temperature at the switch head deviates appreciably from the +22°C calibration ambient<br>temperature, this can be taken into account in the calibration, at extra charge. |   |                                     |                                     |  |      |                    |      |      |

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**Operating data**

|  |   |
|--|---|
| Permissible storage temp.                    | -50 to 50 °C                                    |
| Permissible ambient temperature in operation | 80 °C max.                                      |
| Nominal position (NL)                        | to DIN 16257, NL 0 – NL90 (other NL on request) |

**Housing**

|  |   |  |
|--|---|--|
| as standard  | housing cover: polycarbonate, impact-resistant<br>housing base: die-cast aluminium, painted | color: pebble gray RAL 7032<br>color: anthracite gray RAL 7015                                 |
| Setpoint adjustment                                | AMTHF.-1...<br>switching point adjustable from outside by rotary knob                       | AMTHF.-2...<br>switching point adjustable with screwdriver, after removing housing cover       |
| Protection   | EN 60 529-IP54  |  |
| Cable entry  | standard: clamping gland M20x1.5, for 8 – 10 mm cable diameter                              |  |
| Weight   | approx. 0.8 kg  |  |
| Switch head fixing for AMTHF Series with capillary | standard  | M18x1 thread with locknut on housing spigot, capillary exit at housing spigot                  |
|  | extra code  |  |
|  | r   | by 2 screws through housing base, capillary exit at side of housing, cover and base in plastic |
|  | b   | steel mounting flange, capillary exit at housing spigot  |
|  | k   | wall bracket   |

**Process connection\***

|                               |  |   |
|-------------------------------|--|---|
| AMTHFs Series with rigid stem | end of scale <u>up to</u> 150 °C<br><b>pocket U</b>  | end of scale <u>above</u> 150 °C<br><b>pocket UZ</b>  |
|                               | screw-in pocket with screw-in spigot G 1/2 Form A to DIN 3852/2  | screw-in pocket with screw-in spigot G 1/2 Form A to DIN 3852/2 and extension, so that the max. permissible ambient temperature +80 °C at the housing is not exceeded |
| AMTHFf Series with capillary  | <b>plain cylindrical probe A</b> (standard)  |   |
|                               | <b>pocket U</b> (on request)   |   |
|                               | screw-in pocket with screw-in spigot G 1/2 Form A to DIN 3852/2 and clamping clip with fixing screw for securing the probe |   |
| Material                      | <b>pocket U</b>  | <b>pocket UZ</b>  |
|                               | up to +150 °C: CuZn is standard<br>above +150 °C: St is standard<br>(CrNi on request)                                      | above +150 °C: St is standard<br>(CrNi on request)  |
| Fitting length S              | standard lengths: 100, 120, 150, 200 or 300; other lengths on request  |   |
| Immersion tube dia.           | D = 8 mm, D = 10 mm  |   |

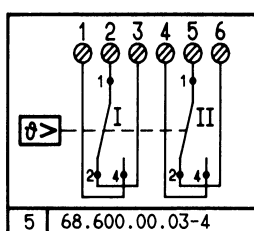
**Note:**

Physical and toxicological properties of the expansion media that may escape in the event of a system fracture

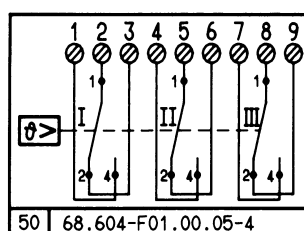
| Control range with end of scale °C | Dangerous reactions | Fire/explosion hazard |                       | Water contamination | irritant | Toxicological data |       |
|------------------------------------|---------------------|-----------------------|-----------------------|---------------------|----------|--------------------|-------|
|                                    |                     | Ignition temp. °C     | Explosion limit % v/v |                     |          | danger to health   | toxic |
| < +200                             | no                  | + 355                 | 0.6 – 8               | yes                 | yes      | 1                  | no    |
| ≥ 200 ≤ +300                       | no                  | + 490                 | - -                   | yes                 | yes      | 1                  | no    |
| > 350 ≤ +500                       | no                  | no                    | no                    | no                  | no       | no                 | no    |

<sup>1</sup> At present there is no restrictive statement from the health authorities concerning any danger to health over short periods and at low concentrations, e.g. after a fracture of the measuring system.

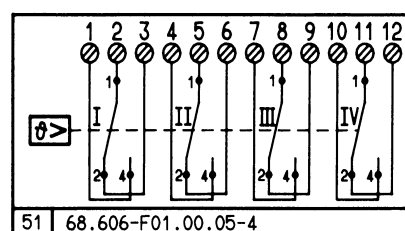
**Connection diagrams**



AMTHF-13  
AMTHF-23



AMTHF-133  
AMTHF-233



AMTHF-1333  
AMTHF-2333

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## Dimensions

|   |  |
|---|--|
| <p>AMTHFs-1...<br/>with pocket U</p>  |  |
| <p>AMTHFs-2...<br/>with pocket UZ</p>   |  |
| <p>AMTHFf-1...<br/>Switch head mounting<br/>with plain cylindrical<br/>probe A as standard,<br/>no pocket</p> |  |

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## Dimensions

|   |  |
|---|--|
| <p>AMTHFf-2.../r<br/>         Capillary exit<br/>         at side of housing,<br/>         with plain cylindrical<br/>         probe A, no pocket</p> |  |
| <p>AMTHFf-2.../b<br/>         with mounting flange<br/>         and pocket U</p>  |  |
| <p>AMTHFf-1...<br/>         with wall bracket<br/>         and pocket U</p>   |  |

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## Order details

### AMTHF Series

| Order code                        | (1) Basic type   |                                     |
|-----------------------------------|--|-------------------------------------|
| 603051                            | Surface-mounting thermostat , AMTHF series with 2, 3 or 4 single-pole snap-action switches |                                     |
| (2) Basic type extension (action) |  |                                     |
| 0013                              | AMTHF.-13 temperature controller, 2-pole   |                                     |
| 0023                              | AMTHF.-23 temperature monitor, 2-pole  |                                     |
| 0133                              | AMTHF.-133 temperature controller, 3-pole  |                                     |
| 0233                              | AMTHF.-233 temperature monitor, 3-pole   |                                     |
| 1333                              | AMTHF.-1333 temperature controller, 4-pole   |                                     |
| 2333                              | AMTHF.-2333 temperature monitor, 4-pole  |                                     |
| (3) Style                         |  |                                     |
| 1                                 | AMTHFswith rigid stem  |                                     |
| 2                                 | AMTHFfwith capillary   |                                     |
| (4) Control / limit ranges        |  |                                     |
| 013                               | -20 to + 40°C  |                                     |
| 021                               | 0 to + 50°C  |                                     |
| 041                               | +20 to + 90°C  |                                     |
| 025                               | 0 to +100°C  |                                     |
| 052                               | +30 to +110°C  |                                     |
| 027                               | 0 to +150°C  |                                     |
| 028                               | 0 to +200°C  |                                     |
| 062                               | +50 to +200°C  |                                     |
| 063                               | +50 to +250°C  |                                     |
| 064                               | +50 to +300°C  |                                     |
| 045                               | +20 to +400°C  |                                     |
| 046                               | +20 to +500°C  |                                     |
| (5) Switching differential        |  |                                     |
| 10                                | 1%   |                                     |
| 25                                | 2.5%   |                                     |
| 50                                | 5% of scale span   | for liquid-filled measuring systems |
| 70                                | 7%   |                                     |
| 30                                | 3%   |                                     |
| 50                                | 5%   |                                     |
| 60                                | 6% of scale span   | for gas-filled measuring systems    |
| 01                                | 10%  |                                     |
| (6) Capillary length (in mm)      |  |                                     |
| 0                                 | AMTHFs without capillary   |                                     |
| 1000                              | 1000 mm  |                                     |
| 2000                              | 2000 mm  |                                     |
| 3000                              | 3000 mm  |                                     |
| 4000                              | 4000 mm  |                                     |
| 5000                              | 5000 mm  |                                     |
| ...                               | (special length, details in plain text)  |                                     |
| (7) Material of capillary         |  |                                     |
| 00                                | AMTHFs without capillary   |                                     |
| 40                                | Cu (copper)  |                                     |
| 20                                | CrNi (stainless steel 1.4571)  |                                     |

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## Order details

### AMTHF Series

|                   |   |   |
|-------------------|---|---|
| <b>Order code</b> | <b>(8) Process connection*</b>  |   |
| 10                | A = plain cylindrical probe (for AM.f only)   |  |
| 20                | U = screw-in pocket   |  |
| 30                | UZ = screw-in pocket with extension   |  |
|                   | <b>(9) Thread for process connection*</b>   |   |
| 00                | no thread (process connection A)  |   |
| 13                | external thread G 1/2   |   |
|                   | <b>(10) Material of process connection</b>  |   |
| 00                | for process connection A only   |   |
| 46                | CuZn (brass)  |   |
| 01                | St (steel)  |   |
| 20                | CrNi (stainless steel 1.4571)   |   |
|                   | <b>(11) Fitting length S (immersion tube length)</b>  |   |
| 000               | AMTHFf without pocket   |   |
| 100               | 100mm   |   |
| 120               | 120mm   |   |
| 150               | 150mm   |   |
| 200               | 200mm   |   |
| 300               | 300mm   |   |
| 400               | 400mm   |   |
| ...               | (special length, details in plain text)   |   |
|                   | <b>(12) Diameter D (immersion tube diameter)</b>  |   |
| 00                | AMTHFf without pocket   |   |
| 8                 | 8 mm  |   |
| 10                | 10 mm   |   |
|                   | <b>(13) Diameter d (probe diameter)</b>   |   |
| 6                 | 6 mm  |   |
| 8                 | 8 mm  |   |
|                   | <b>(14) Extra codes</b>   |   |
| 000               | no extra code   |   |
| 711               | r switch head mounting by 2 screws through housing base, capillary exit at side of housing, cover and base in plastic |   |
| 764               | b steel mounting flange, capillary exit at housing spigot   |   |
| 248               | k wall bracket  |   |

\* for other connections and pockets, see Data Sheet 60.6710.

**Contact spacing for 2-, 3- and 4-pole thermostats:** details in plain text (e.g. +2°C, +5°C, +8°C)

|                       |            |            |            |            |            |            |            |            |            |             |             |             |             |             |    |   |    |   |    |   |     |   |    |   |    |   |     |
|-----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|-------------|----|---|----|---|----|---|-----|---|----|---|----|---|-----|
| <b>Order code</b>     | <b>(1)</b> | <b>(2)</b> | <b>(3)</b> | <b>(4)</b> | <b>(5)</b> | <b>(6)</b> | <b>(7)</b> | <b>(8)</b> | <b>(9)</b> | <b>(10)</b> | <b>(11)</b> | <b>(12)</b> | <b>(13)</b> | <b>(14)</b> |    |   |    |   |    |   |     |   |    |   |    |   |     |
|                       | 603051     | /          | ....       | -          | .          | -          | ...        | -          | ..         | -           | ....        | -           | ..          | -           | .. | - | .. | - | .. | - | ... | - | .. | - | .. | / | ... |
| <b>Order example:</b> | 603051     | /          | 0133       | -          | 2          | -          | 025        | -          | 25         | -           | 2000        | -           | 40          | -           | 10 | - | 00 | - | 00 | - | 000 | - | 00 | - | 6  | / | 248 |

Contact spacing: \_\_\_\_\_

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# JUMO heatTHERM-AT

## Type 603070

- Surface-mounting / Room thermostat
- **PUSH IN** connection system
- IP54 protection max.

### Brief description

Thermostats control and monitor thermal processes. The JUMO heatTHERM-AT is available as a single or twin thermostat, as a surface-mounting or room thermostat, according to choice.

The mounting options provided for the surface-mounting model are, in general: protection tube, wall or pipe surface.

The instruments can be supplied as temperature controllers TR, temperature monitors TW, safety temperature monitors STW or safety temperature limiters STB.

The JUMO heatTHERM-AT operates on the principle of liquid expansion. The electrical switching device is a snap-action switch.

### Switching action

#### Temperature controller TR and temperature monitor TW

If the temperature at the probe exceeds the selected setpoint, the snap-action switch is operated via the transmission mechanism and the circuit is opened or closed. If the temperature drops below the selected setpoint (by the amount of the switching differential), the snap-action switch returns to its initial position.

#### Safety temperature monitor STW

If the temperature at the probe exceeds the selected limit, the snap-action switch is operated and the circuit is opened or closed. If the temperature drops below the selected setpoint (by the amount of the switching differential), the snap-action switch returns to its initial position.

Failure of the measuring system, i.e. a leakage of the expansion liquid, will cause the pressure under the diaphragm to drop, thus permanently opening the circuit.

If the probe cools down to below -20°C (approx.), the same circuit will open, but will close automatically when the temperature rises.

#### Safety temperature limiter STB

If the temperature at the probe exceeds the set limit, the snap-action switch is operated, the circuit is opened or closed and the snap-action switch is locked out mechanically.

After the temperature has fallen below the limit temperature by about 8 °C, the snap-action switch can be reset manually.

Failure of the measuring system, i.e. a leakage of the expansion liquid, will cause the pressure under the diaphragm to drop, thus permanently opening the circuit. The thermostat can no longer be reset.

If the probe cools down to below -20°C (approx.), the same circuit will open, but will close automatically when the temperature rises.

### Temperature compensation

If the ambient temperature deviates from the +22°C calibration ambient temperature, this will result in a shift of the switching point. Thanks to the temperature compensation (standard on the STW and STB, optional on the TR and TW), the switching point shift is reduced to a minimum.



Type 603070/0170



Type 603070/0001  
Process connection H



Type 603070/0020



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## Types and approvals

| Type          | Switching action | DIN Reg. No. <sup>1</sup> | Approvals   |
|---------------|------------------|---------------------------|---|
| 603070 / 0001 | TR               | TR                        | <br><br>PED <sup>1,2</sup><br>97 / 23 / EC<br><br><br><br>You will find the<br>Declarations of Conformity<br>at: <a href="http://www.jumo.net">www.jumo.net</a><br>or ask for them to be sent. |
| 603070 / 0002 | TW               | TW                        |   |
| 603070 / 0020 | STW              | STW (STB)                 |   |
| 603070 / 0070 | STB              | STB                       |   |
| 603070 / 0101 | TR / TR          | TR<br>TR                  |   |
| 603070 / 0102 | TR / TW          | TR<br>TW                  |   |
| 603070 / 0120 | TR / STW         | TR<br>STW (STB)           |   |
| 603070 / 0170 | TR / STB         | TR<br>STB                 |   |
| 603070 / 0202 | TW / TW          | TW<br>TW                  |   |
| 603070 / 0220 | TW / STW         | TW<br>STW (STB)           |   |
| 603070 / 0270 | TW / STB         | TW<br>STB                 |   |
| 603070 / 2020 | STW / STW        | STW (STB)<br>STW (STB)    |   |
| 603070 / 2070 | STW / STB        | STW (STB)<br>STB          |   |
| 603070 / 7070 | STB / STB        | STB<br>STB                |   |

<sup>1</sup> applied for

<sup>2</sup> STW and STB only

## Technical data

### Control range and probe table for TR, TW

| Control range<br>°C | Switching differential<br>% | Max. probe temperature<br>°C | Probe length L, probe dia. d = 6 mm<br>mm |
|---------------------|-----------------------------|------------------------------|---|
| -10 to +40          | 2.5                         | 50                           | 175                                       |
|                     | 7                           | 50                           | 99  |
| 0 to +50            | 2.5                         | 60                           | 175                                       |
|                     | 7                           | 60                           | 99  |
| 0 to +100           | 2.5                         | 125                          | 100                                       |
|                     | 7                           | 125                          | 62  |
| +20 to +120         | 2.5                         | 145                          | 100                                       |
|                     | 7                           | 145                          | 62  |
| 0 to +200           | 2.5                         | 230                          | 74  |
|                     | 7                           | 230                          | --  |

### Control range and probe table for STW, STB

| Settable value / range<br>°C | Scale span<br>° Δ | Max. probe temperature<br>°C | Probe length L, probe dia. d = 6 mm<br>mm |
|------------------------------|-------------------|------------------------------|---|
| +95                          | fixed             | 145                          | 72  |
| +100                         | fixed             |                              |   |
| +110                         | fixed             |                              |   |
| +120                         | fixed             |                              |   |
| +95 to +120                  | 78                |                              |   |
| +70 to +130                  | 142               | 155                          | 60  |



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## Technical data

|  |  |
|--|--|
| <b>Housing</b>                                   | housing base: PA (reinforced)<br>color: silver gray RAL 7001<br>housing cover: ABS, with viewing window (PMMA)<br>color: cobalt blue RAL 5013  |
| <b>Setpoint adjustment</b><br>TR<br>TW, STW, STB | switching point adjustable from the outside, using the rotary knob<br>switching point adjustable with screwdriver, after removing housing cover;<br>check of the switching point that was set by means of the viewing window |
| <b>Enclosure protection</b>                      | IP40 as per EN 60529 (IP54 with extra code 402)  |
| <b>Cable entry</b>                               | M20 x 1.5 cable gland, for 6 – 12 mm cable dia.  |
| <b>Housing mounting</b>                          | • pipe mounting, with tightening strap • protection tube mounting • wall mounting  |
| <b>Weight</b>                                    | approx. 0.2 kg   |

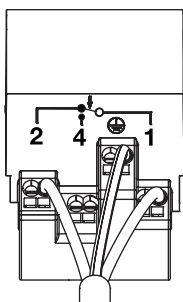
## Electrical data

|                                |  |  |
|--------------------------------|--|--|
| <b>Contact type</b>            | snap-action switch with single-pole changeover (SPDT) contact  |  |
| <b>Contact rating</b>          | TR, TW, STW  | STB  |
|                                | break (SPST-NC) contact (contacts 1-2):<br>16 (2.5) A, 230 V AC +10%, p.f. = 1(0.6)<br>0.25 A, 230 V DC +10%<br>make (SPST-NO) contact (contacts 1-4):<br>6.3 (2.5) A, 230 V AC +10%, p.f. = 1(0.6)<br>0.25 A, 230 V DC +10% | break (SPST-NC) contact (contacts 1-2):<br>16 (2.5) A, 230 V AC +10%, p.f. = 1(0.6)<br>0.25 A, 230 V DC +10%<br>signal contact (contacts 1-4):<br>2 (0.4) A, 230 V AC +10%, p.f. = 1(0.6)<br>0.25 A, 230 V DC +10% |
| <b>Connection</b>              | PUSH IN <sup>®</sup> contact (push-in terminal)  |  |
| <b>Conductor cross-section</b> | 0.75 – 4 mm <sup>2</sup> solid wire<br>0.75 – 2.5 mm <sup>2</sup> stranded wire<br>0.75 – 2.5 mm <sup>2</sup> stranded wire with core-end ferrule  |  |
| <b>Switching reliability</b>   | To ensure maximum switching reliability, we recommend a minimum loading of:<br>AC / DC = 24 V, 20 mA, for silver contacts  |  |

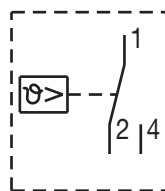
## Operating data

|                                  |  |   |                                       |
|----------------------------------|--|---|---------------------------------------|
| <b>Switching point accuracy</b>  | TR, TW   |   | STW, STB                              |
|                                  | switching differential 2.5%  | switching differential 7%                                     | +0 / -6%                              |
|                                  | in upper third of scale<br>± 1.5%,<br>at start of scale<br>± 6%  | in upper third of scale<br>± 4%,<br>at start of scale<br>± 6% |                                       |
| <b>Ambient temperature error</b> | without ambient temperature compensation<br>(optional with extra code 707)   |   | with ambient temperature compensation |
|                                  | A deviation from the ambient temperature at the switch head and capillary from the +22°C calibration ambient temperature will result in a switching point shift of about -0.1°C/°C <sup>1</sup> (measured at +120°C limit, permanently set, and with a 2000 mm capillary length) |   |                                       |
| <b>Limit temperatures</b>        | for transport and storage: -50 to +50°C<br>in operation: +80°C max.<br>for pipe mounting: +120°C max. pipe temperature   |   |                                       |
| <b>Nominal position (NL)</b>     | to DIN 16257, NL 0 – NL 90 (other NL on request)   |   |                                       |

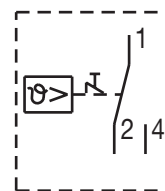
## Connection diagram



TR, TW, STW:



STB:



<sup>1</sup> Change in switching point referred to change in ambient temperature

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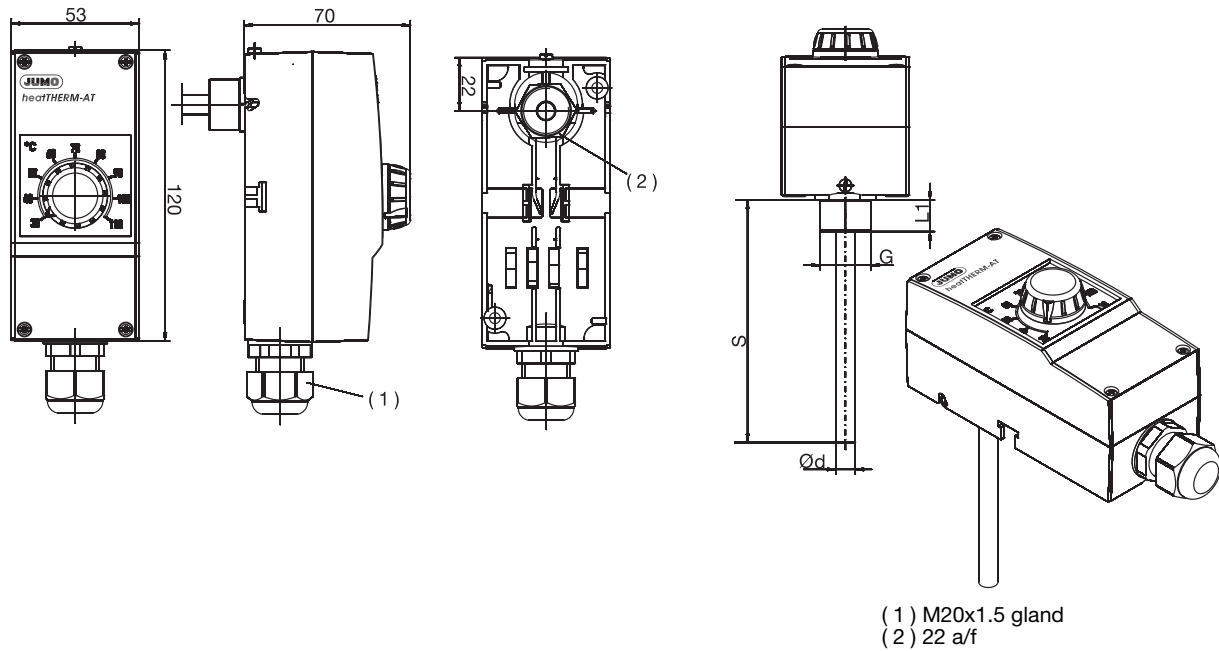
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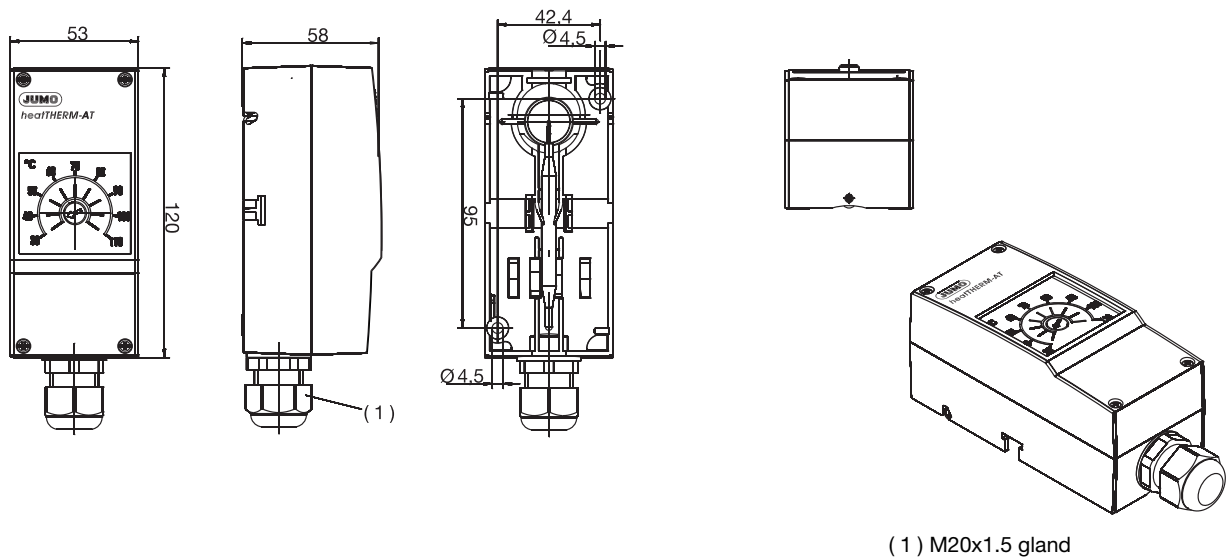


## Dimensions

Type 603070 / 0001



Type 603070 / 0002



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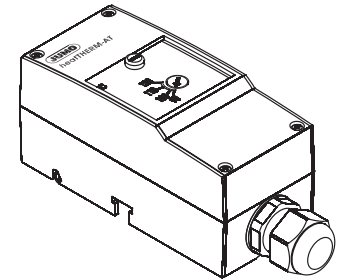
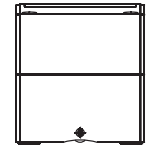
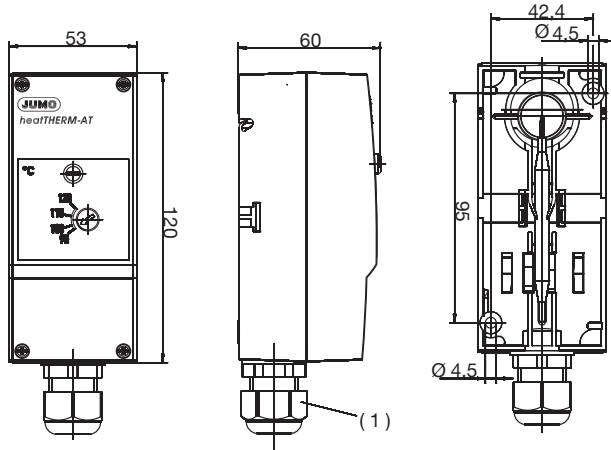
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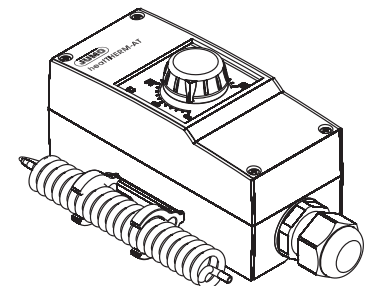
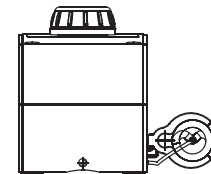
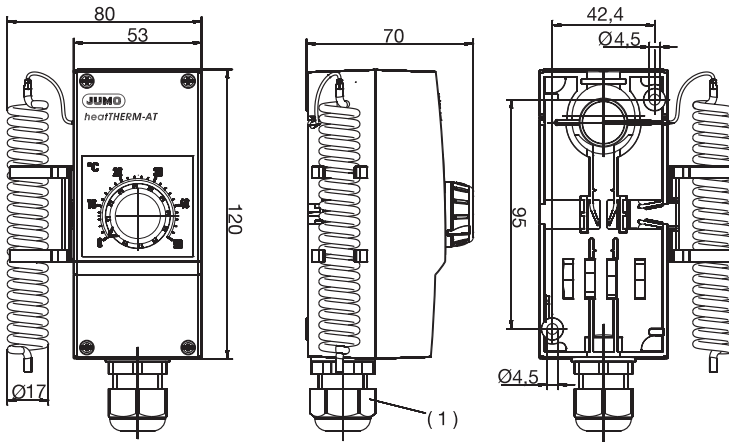
## Dimensions

Type 603070 / 0070



( 1 ) M20x1.5 gland

Type 603070 / 0001  
 Process connection H



( 1 ) M20x1.5 gland

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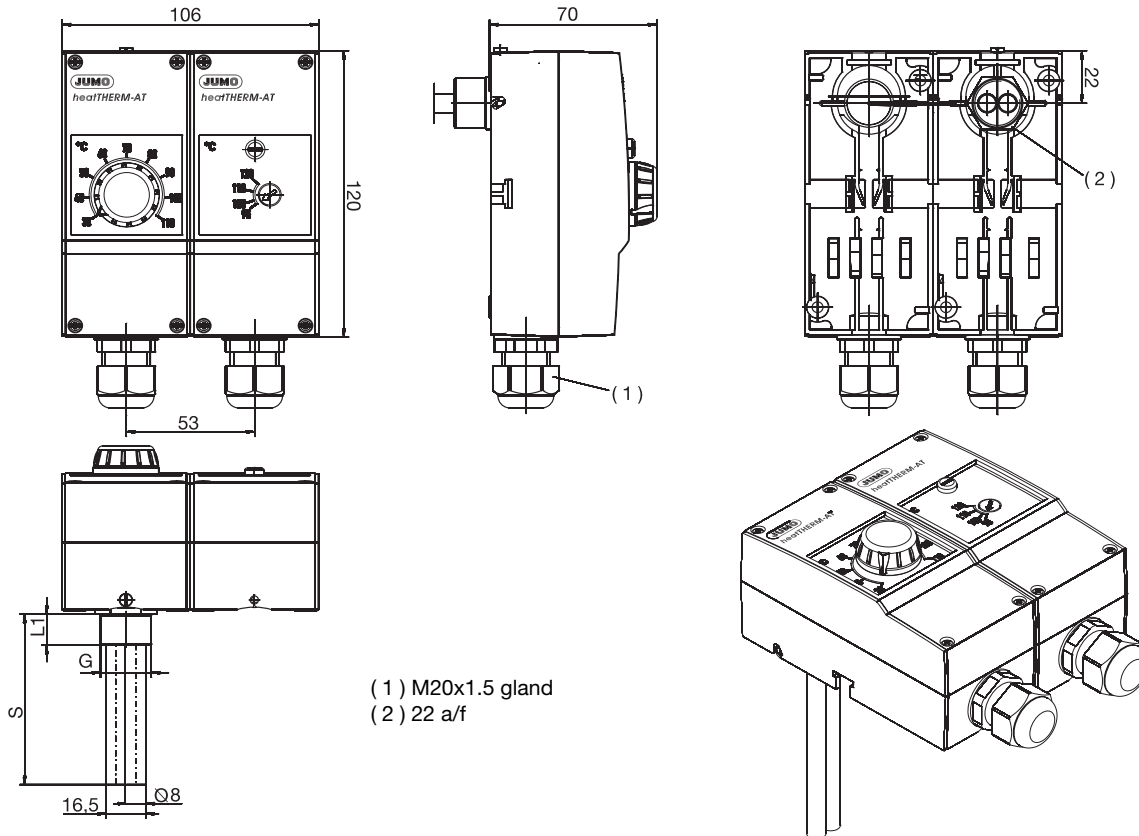
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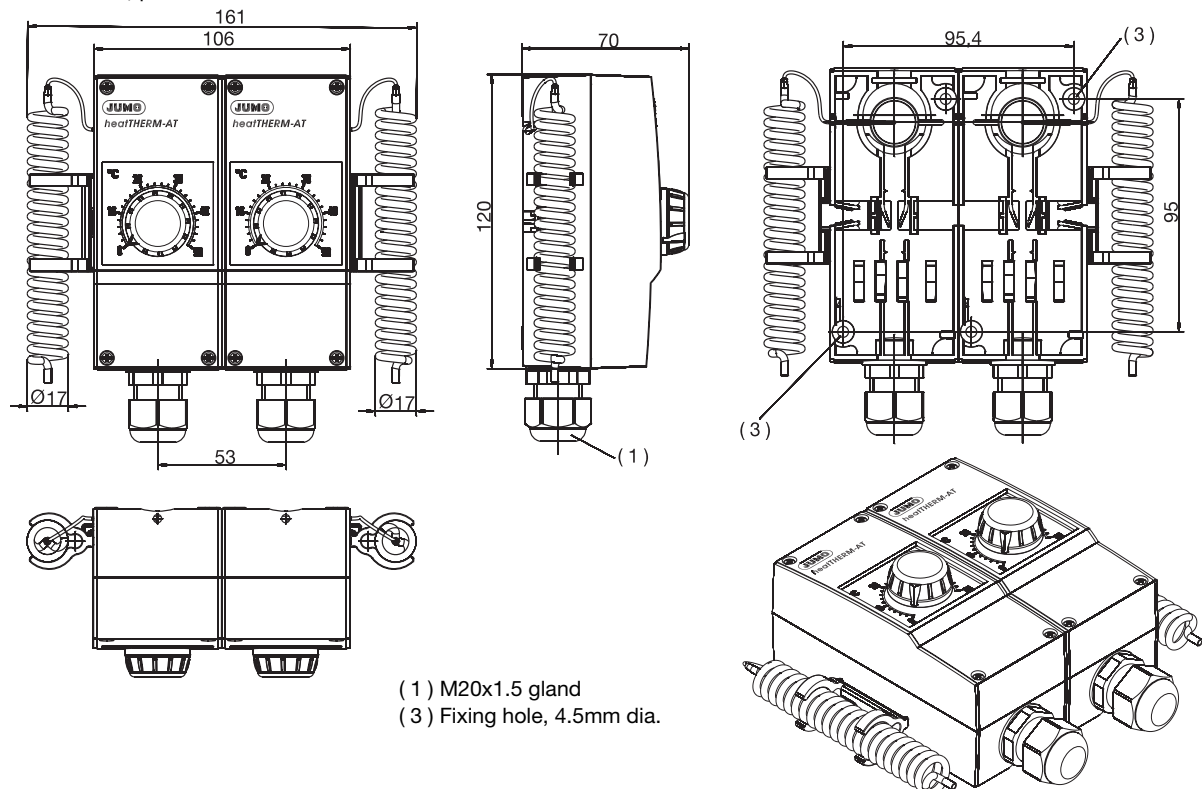


## Dimensions

Type 603070 / 0170



Type 603070 / 0101, process connection H



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## Order details

### Surface-mounting thermostat, type 603070

| Order code                | (1) Basic type  |
|---------------------------|---|
| 603070                    | heatTHERM-AT, with single-pole snap-action switches   |
| (2) Basic type extensions |   |
| 0001                      |  Temperature controller (TR)   |
| 0002                      |  Temperature monitor (TW)  |
| 0020                      |  Safety temperature monitor (STW)                                      |
| 0070                      |  Safety temperature limiter (STB)                                      |
| 0101                      |  Temperature controller / Temperature controller (TR / TR)             |
| 0102                      |  Temperature controller / Temperature monitor (TR / TW)               |
| 0120                      |  Temperature controller / Safety temperature monitor (TR / STW)      |
| 0170                      |  Temperature controller / Safety temperature limiter (TR / STB)      |
| 0202                      |  Temperature monitor / Temperature monitor (TW / TW)                 |
| 0220                      |  Temperature monitor / Safety temperature monitor (TW / STW)         |
| 0270                      |  Temperature monitor / Safety temperature limiter (TW / STB)         |
| 2020                      |  Safety temperature monitor / Safety temperature monitor (STW / STW) |
| 2070                      |  Safety temperature monitor / Safety temperature limiter (STW / STB) |
| 7070                      |  Safety temperature limiter / Safety temperature limiter (STB / STB) |
| (3) Style                 |   |
| 5                         | Surface-mounting thermostat,<br>with protection tube, capillary, or as a surface probe (single thermostat)  |
| 6                         | Room thermostat<br>with coiled probe or plain cylindrical probe   |

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## Order details

### Surface-mounting thermostat, type 603070

| Order code | (4) Control/ limit range 1                              |
|------------|---|
| 016        | -10 to + 40°C (TR, TW)                                  |
| 021        | 0 to + 50°C (TR, TW)                                    |
| 025        | 0 to +100°C (TR, TW)                                    |
| 042        | +20 to +120°C (TR, TW)                                  |
| 028        | 0 to +200°C (TR, TW)                                    |
| 095        | +95°C (STW, STB)  |
| 100        | +100°C (STW, STB)                                       |
| 110        | +110°C (STW, STB)                                       |
| 120        | +120°C (STW, STB)                                       |
| 666        | +95 to +120°C adjustable (STW, STB)                     |
| 671        | +70 to +130°C adjustable (STW, STB)                     |
|            | additional control/limit ranges on request              |
|            | (5) Control/ limit range 2                              |
| 000        | none (for single thermostat)                            |
| 016        | -10 to + 40°C (TR, TW)                                  |
| 021        | 0 to + 50°C (TR, TW)                                    |
| 025        | 0 to +100°C (TR, TW)                                    |
| 042        | +20 to +120°C (TR, TW)                                  |
| 028        | 0 to +200°C (TR, TW)                                    |
| 095        | +95°C (STW, STB)  |
| 100        | +100°C (STW, STB)                                       |
| 110        | +110°C (STW, STB)                                       |
| 120        | +120°C (STW, STB)                                       |
| 666        | +95 to +120°C adjustable (STW, STB)                     |
| 671        | +70 to +130°C adjustable (STW, STB)                     |
|            | additional control/limit ranges on request              |
|            | (6) Switching differential                              |
| 00         | no differential   |
| 028        | approx. 2.5%  |
| 095        | approx. 7%  |
|            | (7) Capillary length                                    |
| 0          | 0 mm (room thermostat only)                             |
| 2000       | 2000 mm   |
| ...        | special length (specify in plain text, in 500 mm steps) |
|            | (8) Material of capillary                               |
| 40         | copper (Cu)   |
| 26         | stainless steel (CrNi, 1.4571)                          |



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# JUMO Room thermostats Type ATHR

## Brief description

Type ATHR room thermostats are used in HVAC, in industrial and commercial premises, garden centers and stables for the control of heating/cooling, air-conditioning and ventilation systems. Room thermostats in the ATHR series operate on the principle of liquid expansion. A temperature change in the liquid-filled sensing system, which consists of probe, capillary and diaphragm, produces a volume change. The resulting movement of the diaphragm operates a microswitch through a lever mechanism.

## Switching action

### Temperature controller TR and temperature monitor TW

If the temperature at the probe exceeds the set limit, the circuit is opened through a snap-action switch. If the temperature falls below the set limit (by the switching differential), the switch returns to its initial position.

## Types

### Single thermostats

- ATHR-1** temperature controller TR  
switching point externally adjustable
- ATHR-2** temperature monitor TW  
switching point adjustable after removing case cover

### Twin thermostats

- ATHR-11** 2 x temperature controller TR
- ATHR-12** 1 x temperature controller TR / 1 x temperature monitor TW
- ATHR-22** 2 x temperature monitor TW



## Technical data

### Electrical data

| Switching element   | Single thermostat  | Twin thermostat                         |
|---------------------|--|---|
|                     | 1 microswitch with changeover contact                            | 2 microswitches with changeover contact |
| Max. contact rating | 10 (2) A, 230 V AC +10%, p.f. = 1 (0.6)<br>0.25 A, 230 V DC +10% |   |

### Operating data

|                           |   |
|---------------------------|---|
| Control ranges            | 0 to +50°C or -10 to +40°C                        |
| Switching point accuracy  | ±0.5°C at 20°C                                    |
| Switching differential    | 0.5 — 1.5°C                                       |
| Permissible ambient temp. | in operation: -20 to +60°C                        |
| Permissible storage temp. | -50 to +50°C                                      |
| Nominal position (NL)     | to DIN 16 257, NL 0 — NL 90 (other NL on request) |

### Case

|                      |  |                 |
|----------------------|--|-----------------|
| Case                 | plastic case in impact-resistant polycarbonate<br>color: cover pebble gray – RAL 7032, base anthracite gray – RAL 7016 |                 |
| Case fixing          | by 2 screws on inside of case  |                 |
| Cable entry          | as standard: clamping gland M 20 x 1.5, for 8 — 10 mm cable diameter   |                 |
| Enclosure protection | EN 60 529-IP54   |                 |
| Temperature probe    | 1 or 2 coiled probe(s), tinned copper  |                 |
| Weight               | approx. 0.35 kg  | approx. 0.65 kg |



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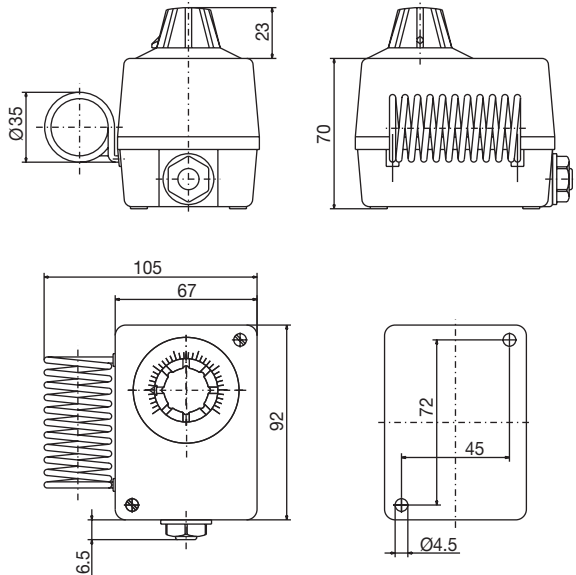
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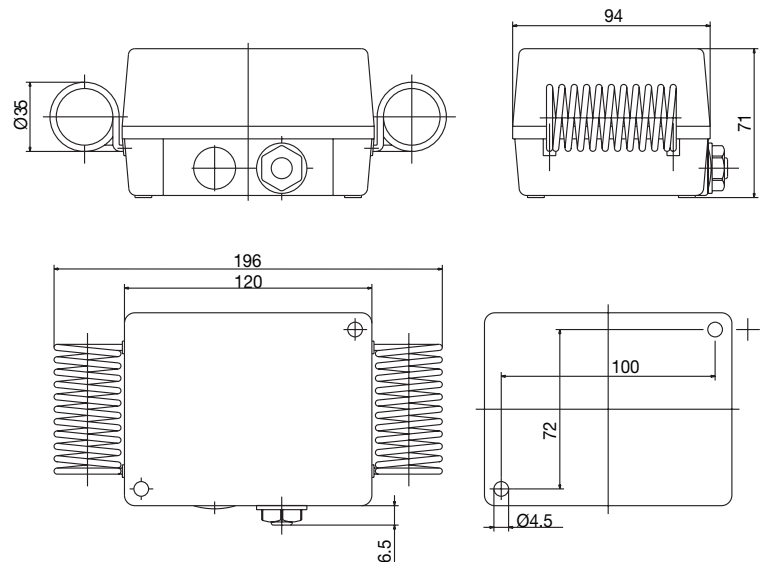


## Dimensions

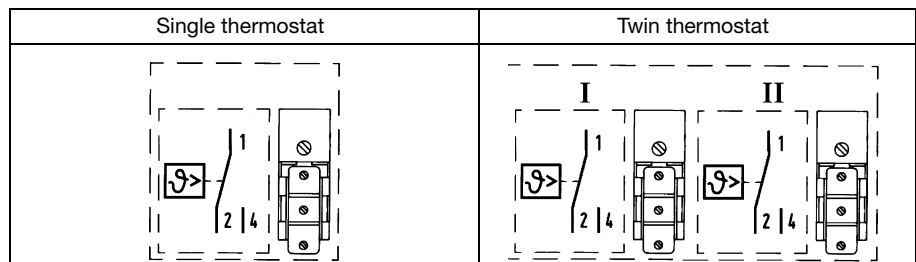
ATHR-1



ATHR-22



## Connection diagrams

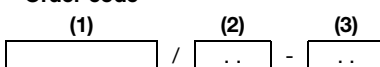


## Order details:

### ATHR series

| Order code                 | (1) Basic type  |
|----------------------------|---|
| 604024                     | room thermostat Typ ATHR  |
| (2) Basic type extension   |   |
| 01                         | ATHR-1 1 x temperature controller TR, switching point externally adjustable   |
| 02                         | ATHR-2 1 x temperature monitor TW, switching point adjustable after removing case cover   |
| 11                         | ATHR-11 2 x temperature controller TR, switching point externally adjustable  |
| 12                         | ATHR-12 1 x temperature controller TR, switching point externally adjustable,<br>1 x temperature monitor TW, switching point adjustable after removing case cover |
| 22                         | ATHR-22 2 x temperature monitor TW, switching point adjustable after removing case cover  |
| (3) Control / limit ranges |   |
| 16                         | -10 to + 40°C   |
| 21                         | 0 to + 50°C   |

### Order code



### Order example

/  -  = thermostat with microswitch and changeover contact, 1 x temperature controller TR, switching point externally adjustable, 0 to + 50°C

/  -  = thermostat with microswitch and changeover contact, 1 x temperature controller TR, switching point externally adjustable, 1 x temperature monitor TW, switching point adjustable after removing case cover, -10 to + 40°C

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# JUMO Room thermostats Type AMRc

## Brief description

Type AMRc room thermostats are used in HVAC, in industrial and commercial premises, garden centers and stables for the control of heating /cooling, air-conditioning and ventilation systems.

Room thermostats in the AMRc series operate on the principle of liquid expansion. A temperature change in the liquid-filled sensing system, which consists of probe, capillary and diaphragm, produces a volume change. The resulting movement of the diaphragm operates a microswitch through a lever mechanism.

## Switching action

### TR and TW

If the temperature at the probe exceeds the set limit, the circuit is opened through a snap-action switch. If the temperature falls below the set limit (by the switching differential), the switch returns to its initial position.

## Types

**AMRc-1** temperature controller TR  
switching point externally adjustable

**AMRc-2** temperature monitor TW  
switching point adjustable after removing case cover



AMRc-1



AMRc-2

## Technical data

### Electrical data

|                       |  |
|-----------------------|--|
| Switching element     | 1-pole microswitch with changeover contact   |
| Max. contact rating   | 10 (2) A, 230 V AC +10%, p.f. = 1 (0.6)<br>0.25 A, 230 V DC +10%,<br>max. permissible starting current:<br>break contact: 16 A<br>make contact: 10 A |
| Electrical connection | via terminal strip, after removal of case cover  |

### Operating data

|                           |   |
|---------------------------|---|
| Control ranges            | 0 to +50°C or -10 to +40°C                        |
| Switching point accuracy  | ±0.75°C at +20°C                                  |
| Switching differential    | 1 – 2°C   |
| Permissible ambient temp. | in operation: -20 to +60°C                        |
| Permissible storage temp. | -50 to +50°C                                      |
| Nominal position (NL)     | to DIN 16 257, NL 0 – NL 90 (other NL on request) |

### Case

|                   |  |
|-------------------|--|
| Case              | plastic case in impact-resistant polycarbonate<br>color: cover pebble gray – RAL 7032, base anthracite gray – RAL 7016 |
| Case fixing       | by 2 screws on inside of case  |
| Cable entry       | as standard: clamping gland M 20 x 1.5, for 8 – 10 mm cable diameter   |
| Protection        | EN 60 529-IP54   |
| Temperature probe | coiled probe, tinned copper  |
| Weight            | approx. 0.32 kg  |

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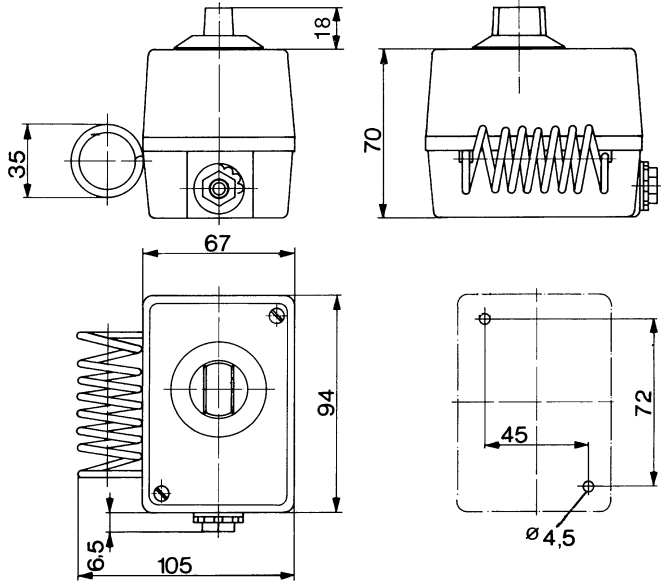
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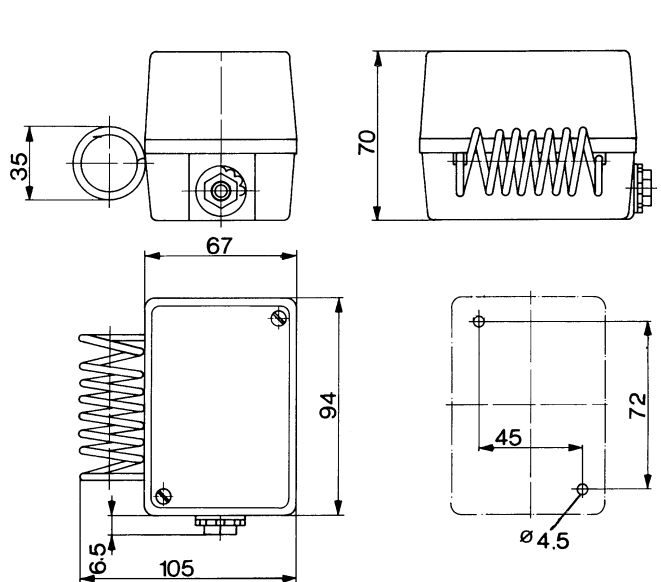


## Dimensions

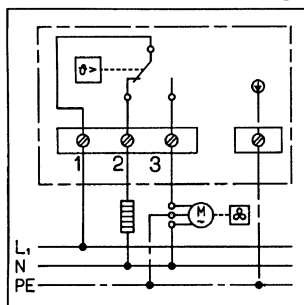
AMRc-1



AMRc-2



## Connection diagram



## Order details

**AMRc series**

| Order code                         | (1) Basic type   |
|------------------------------------|--|
| 604041                             | room thermostat Typ AMRc   |
| (2) Basic type extension           |  |
| 01                                 | AMRc-1 temperature controller (TR),<br>switching point externally adjustable with rotary knob              |
| 02                                 | AMRc-2 temperature monitor (TW),<br>switching point adjustable with screwdriver, after removing case cover |
| (3) Control / limit setting ranges |  |
| 016                                | -10 to +40 °C  |
| 021                                | 0 to +50 °C  |

| Order code | (1) | (2) | (3)   |
|------------|-----|-----|-------|
| 604041     | /   | ..  | - ... |

**Order example**  
 604041 / 16 - 016 = Temperature monitor (TW),  
 switching point adjustable with screwdriver, after removing case cover, -10 to +40 °C

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## Room Thermostat Type AMFRc-1333

- IP54 protection
- 4-stage room thermostat in surface-mounting housing, switching in sequence
- electrical wiring on pcb
- setpoint adjustment from outside by turning the knob
- contact spacing permanently set in factory to customer specification



### Brief description

The room thermostat Type AMFRc-1333 is a 4-stage temperature controller with a high response accuracy. The wiring has been laid out for fan control by different speed stages. The contact spacing of the individual switching stages in °C is permanently set in the factory to customer specification. Room thermostats operate on the principle of liquid expansion, with a micro-switch serving as the electrical switching device.

### Switching action

If the temperature at the temperature probe exceeds the selected setpoint, the microswitch is operated through a mechanism and the circuit is opened or closed. When the temperature falls below the selected setpoint (by the amount of the switching differential), the microswitch returns to its initial position.

## Technical data

### Electrical data

|                       |  |
|-----------------------|--|
| Electrical connection | via terminal board, after removal of cover, temperature controller and terminal board are mounted on a pcb and electrically wired up in accordance with the connection diagram |
| Switching device      | 4 single-pole snap-action switches with changeover contact   |
| Max. contact rating   | 10 (2) A, 230 V AC +10%, p.f. = 1 (0.6)<br>0.25 A, 230 V DC +10%,<br>max. permissible starting current:<br>break contact: 16 A<br>make contact: 10 A                           |

### Operating data

|                           |  |  |
|---------------------------|--|--|
| Control ranges            | -10 to +40°C or 0 to +50°C   |  |
| Switching point accuracy  | setpoint: ± 0.75 °C at 20°C, contact spacing: ± 0.25 °C  |  |
| Contact spacing           | The contact spacing is defined in °C relative to the setpoint (contact I).<br>10 °C max. / 0.5 °C min. | The switching stages are assigned to be below the setpoint. The contact spacing of the 3 switching stages is specified in °C relative to the setpoint.<br>(For example, -1°C/-2°C/-3°C, i.e. with a setpoint selection +20°C and rising temperature, the first stage switches at +17°C, the second stage at +18°C, the third stage at +19°C and the fourth stage at the setpoint +20°C). |
| Switching differential    | approx. 1.2 °C   |  |
| Permissible ambient temp. | in operation -20 to +60°C  |  |
| Permissible storage temp. | -50 to +50°C   |  |
| Nominal position (NL)     | to DIN 16 257, NL 0 — NL 90 (other NL on request)  |  |

### Housing

|                      |  |
|----------------------|--|
| Housing              | plastic housing in impact-resistant polycarbonate<br>color: cover pebble gray RAL 7032, base anthracite RAL 7016 |
| Housing fixing       | by 2 screws inside housing   |
| Cable entry          | standard: clamping gland M20 x 1.5, for 8 — 10 mm cable diameter   |
| Enclosure protection | EN 60 529-IP54   |
| Temperature probe    | coiled probe, tinned copper  |
| Weight               | approx. 0.5 kg   |

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**Note:**

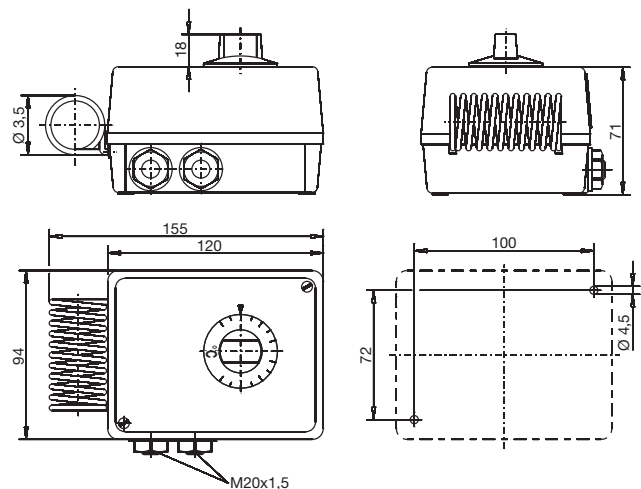
Physical and toxicological properties of the expansion fluid that may escape in the event of a system fracture.

| Dangerous reactions | Fire / explosion hazard |                       | Water contamination | irritant | Toxicological data |       |
|---------------------|-------------------------|-----------------------|---------------------|----------|--------------------|-------|
|                     | Ignition temperature °C | Explosion limit % v/v |                     |          | danger to health   | toxic |
| no                  | + 355                   | 0.6 – 8               | yes                 | yes      | 1)                 | no    |

1) At present there is no restrictive statement from the health authorities concerning any danger to health over short periods and at low concentration, e.g. after a fracture of the measuring system.

| Connection diagram    | Switching action  |                       |                   |          |    |     |   |                       |                       |                       |
|-----------------------|---|-----------------------|-------------------|----------|----|-----|---|-----------------------|-----------------------|-----------------------|
|                       | <p>The setpoint is at contact I. If this setpoint is set to +28°C, for instance, and the room temperature is below +20°C, then the fan operates with the lowest transformer voltage. This lowest transformer voltage is on terminal 5. In this case, the current flows from terminal 5 via the contacts IV, III, II and I to terminal 6, or to the fan.</p> <p>If the room temperature rises to +20°C, then stage IV switches over and the next-higher transformer voltage, terminal 4, is switched through to the fan. On reaching +23°C, the voltage from terminal 3 is switched through, at +25°C from terminal 2 and at +28°C from terminal 1 (mains supply voltage).</p> <p>With falling temperature, the switchover takes place in reverse order, but lower than the corresponding setpoint by the amount of the switching differential of the thermostats (1.2°C).</p> |                       |                   |          |    |     |   |                       |                       |                       |
|                       | <p>Switching sequence with rising temperature</p> <table border="1"> <thead> <tr> <th>Contact</th> <th>Follow-on contact</th> <th>Setpoint</th> </tr> </thead> <tbody> <tr> <td>IV</td> <td>III</td> <td>I</td> </tr> <tr> <td>e.g. <math>\vartheta</math>-8°C</td> <td>e.g. <math>\vartheta</math>-5°C</td> <td>e.g. <math>\vartheta</math>-3°C</td> </tr> </tbody> </table>   | Contact               | Follow-on contact | Setpoint | IV | III | I | e.g. $\vartheta$ -8°C | e.g. $\vartheta$ -5°C | e.g. $\vartheta$ -3°C |
| Contact               | Follow-on contact   | Setpoint              |                   |          |    |     |   |                       |                       |                       |
| IV                    | III   | I                     |                   |          |    |     |   |                       |                       |                       |
| e.g. $\vartheta$ -8°C | e.g. $\vartheta$ -5°C   | e.g. $\vartheta$ -3°C |                   |          |    |     |   |                       |                       |                       |

**Dimensions**



**Order details**

Available from stock

| Sales No.   | Type       | Control range °C | Switching differential °C | Contact spacing  |
|-------------|------------|------------------|---------------------------|------------------|
| 60/60000406 | AMFRc-1333 | 0 to +50         | 1.2                       | -1°C, -2°C, -3°C |

**Not available from stock**

|                       |  |
|-----------------------|--|
| <b>Order code</b> (1) | <b>Basic type</b>  |
| 604045                | AMFRc-1333 4-stage room thermostat in surface-mounting housing, factory-set to switching in sequence |
| (2)                   | <b>Control ranges</b>  |
| 016                   | -10 to + 40°C  |
| 021                   | 0 to + 50°C  |
| (3)                   | <b>Contact spacing</b>   |
| .....                 | details in plain text (e.g. -2°C, -4°C, -6°C)  |

**Order code**

(1) 604045 / (2) [ ] (3) [ ]

**Order example**

604045 / 021 - -2°C, -4°C, -6°C

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## JUMO Room Thermostats (1-pole) Type AMDR

### Brief description

Type AMDR room thermostats are used in HVAC, in industrial and commercial premises, garden centers and stables for the control of heating / cooling, air-conditioning and ventilation systems. Room thermostats in the AMDR series operate on the principle of liquid expansion. A temperature change in the liquid-filled sensing system, which consists of probe, capillary and diaphragm, produces a volume change. The resulting movement of the diaphragm operates a microswitch through a lever mechanism.

### Switching action

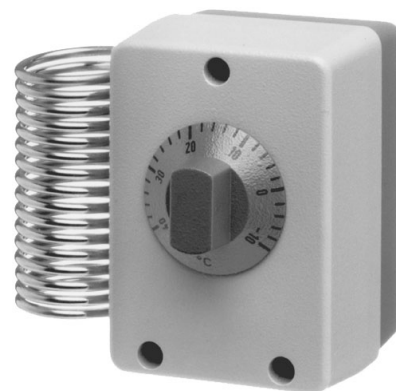
#### TR and TW

If the temperature at the probe exceeds the set limit, the circuit is opened through a snap-action switch. If the temperature falls below the set limit (by the switching differential), the switch returns to its initial position.

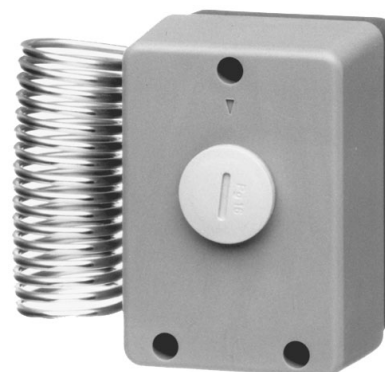
### Types

**AMDR-1** Temperature controller TR,  
switching point externally adjustable

**AMDR-2** Temperature monitor TW,  
switching point adjustable after removing the screw plug



AMDR-1



AMDR-2

## Technical data

### Electrical data

|                       |   |
|-----------------------|---|
| Switching element     | 1-pole microswitch with changeover contact  |
| Max. rating           | terminal 2: 16 (3) A, 230 V AC +10%, p.f. = 1 (0.6)<br>terminal 4: 8 (1.5) A, 230 V AC +10%, p.f. = 1 (0.6)<br>0.25 A, 230 V DC +10%<br>max. starting current: 16 A, p.f. = 0.6 |
| Electrical connection | after removing housing cover, at screw terminals up to 2.5mm <sup>2</sup> conductor cross-section   |

### Operating data

|                           |   |
|---------------------------|---|
| Control ranges            | 0 to +50°C or -10 to +40°C                        |
| Switching point accuracy  | ±0.75°C at +20°C                                  |
| Switching differential    | 1 – 2°C   |
| Permissible ambient temp. | in operation: -20 to +60°C                        |
| Permissible storage temp. | -50 to +50°C                                      |
| Nominal position (NL)     | to DIN 16 257, NL 0 – NL 90 (other NL on request) |

### Housing

|                      |   |
|----------------------|---|
| Housing              | plastic housing in impact-resistant polycarbonate<br>color: cover gray beige, RAL 1019; base/setpoint knob light brown RAL 8025 |
| Housing fixing       | by 2 screws on the inside of housing  |
| Cable entry          | as standard: clamping gland M 20 x 1.5, for 8 – 10 mm cable diameter  |
| Enclosure protection | IP54 to EN 60 529   |
| Temperature probe    | coiled probe, tinned copper   |
| Weight               | approx. 0.35 kg   |

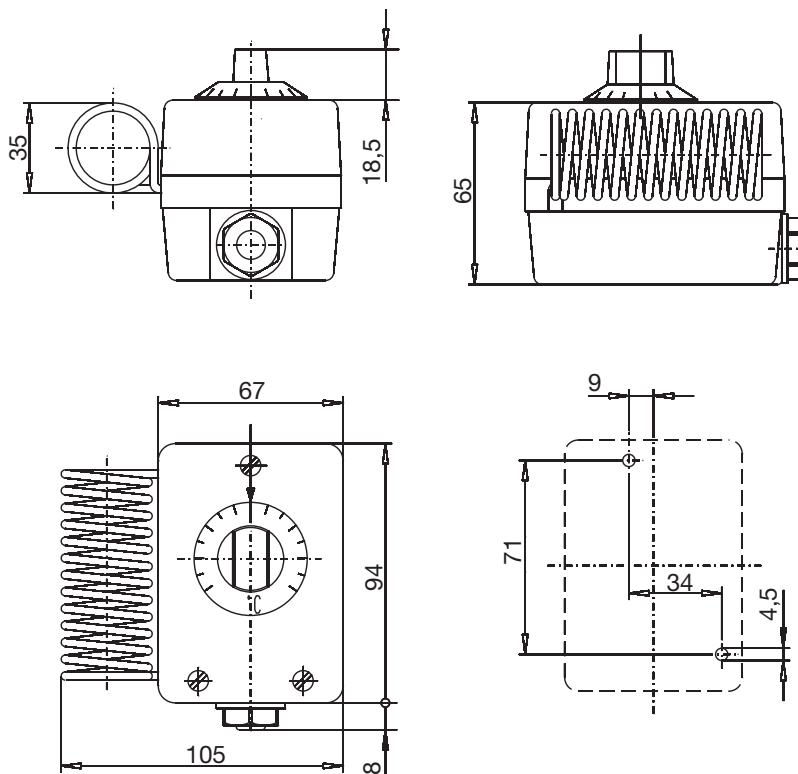
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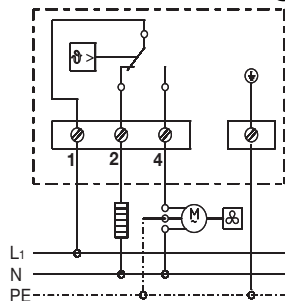
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## Dimensions



## Connection diagram



## Order details: AMDR Series

|                   |   |
|-------------------|---|
| <b>Order code</b> | <b>(1) Basic type</b>   |
| 604046            | Room thermostat, AMDR series  |
|                   | <b>(2) Basic type extension</b>   |
| 01                | AMDR-1 Temperature controller (TR),<br>switching point externally adjustable by rotary knob                   |
| 02                | AMDR-2 Temperature monitor (TW),<br>switching point adjustable with screwdriver after removing the screw plug |
|                   | <b>(3) Control / limit ranges</b>   |
| 016               | -10 to +40 °C   |
| 021               | 0 to +50 °C   |

## Order code

(1) 604046 / (2) .. - (3) ...

### Order example

604046 / 02 - 016 = Temperature monitor (TW),  
switching point adjustable with screwdriver after removing the screw plug, -10 to +40 °C

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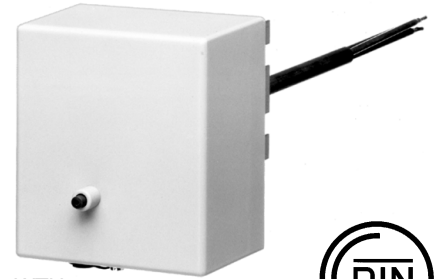
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# Warm-air Thermostats WTHc Series tested to DIN 3440

for stock items  
 see page 4



WTHc-2280



WTHc-2280-SW

## Brief description

Thermostats control and monitor thermal processes. Thermostats in the WTHc series are suitable for application in warm-air heating installations to DIN 4794. They consist of 3 separate sensing and switching systems that can function as temperature controller TR, temperature monitor TW and safety temperature limiter STB.

In fault condition, the STB sets the system being monitored to a safe operational state. Warm-air thermostats operate on the principle of liquid expansion. Microswitches serve as the electrical switching devices.

## Switching action

### Temperature controller TR and temperature monitor TW

When the temperature at the probe exceeds the selected setpoint, the microswitch is operated via the transmission mechanism and the circuit is opened or closed. When the temperature drops below the selected setpoint (by the amount of the switching differential), the microswitch returns to its initial position.

### Lock-out facility on the safety temperature limiter STB

If the temperature at the probe exceeds the set limit, the circuit is opened and the microswitch is locked out mechanically. After the temperature has fallen below the critical temperature by about 10 °C, the microswitch can be reset manually.

### Self-monitoring facility on the safety temperature limiter STB

In the event of a measuring system failure, i.e. if the expansion liquid has leaked, then the pressure on the diaphragm of the STB drops and the electrical circuit is permanently open. It is no longer possible to reset the system. When the temperature at the probe falls below -20°C, the circuit is also opened, but will close again automatically when the temperature rises.

## Types and approvals

| Types                  | Switching action | DIN Reg. No.     | Test         |
|------------------------|------------------|------------------|--------------|
| WTHc-2280<br>WTHc-2240 | TR/TW/STB        | TR/TW/STB 106405 | <br>DIN 3440 |

| Extra codes   |   |
|---|---|
| <b>U</b><br>STB with break (n.c.) contact, lock-out and additional signal contact (Type WTHc-2240 only) | <b>SW</b><br>housing with IP54 rating, protected against dust and splashing water |

## Technical data

### Control ranges and limit

| Control range / limit | Fan controller                | Burner monitor                | Protection temperature limiter       |
|-----------------------|-------------------------------|-------------------------------|--------------------------------------|
|                       | TR – System 2<br>+20 to +80°C | TW – System 2<br>+70 to +90°C | STB – System 80 or 40<br>limit 100°C |

### Capillary and temperature probe

|                   |   |
|-------------------|---|
| Capillary         | material: copper (Cu), Mat. Ref. 2.0090   |
|                   | diameter: Ø 1.5 mm  |
|                   | capillary length including probe: 350 mm with support tube<br>1250 mm without support tube <sup>1</sup> |
|                   | minimum bending radius: 5 mm  |
| Temperature probe | material: copper (Cu), Mat. Ref. 2.0090, brazed   |
|                   | diameter: 3 probes Ø 4 mm   |

<sup>1</sup> probe coding on version with capillary: fan controller TR: red, burner monitor TW: blue



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**Electrical data**

|                          |   |   |   |
|--------------------------|---|---|---|
| Switching device         | Fan controller<br>Burner monitor  | Safety temperature limiter STB<br>System 80           | Safety temperature limiter STB<br>System 40/U                                       |
|                          | microswitch with changeover contact   | microswitch with break (n.c.) contact<br>and lock-out | microswitch with break (n.c.) contact,<br>lock-out and<br>additional signal contact |
| Max.<br>contact rating   | 10 (2) A, 230 V AC +10%, p.f. = 1 (0.6)<br>0.25A, 230 V DC +10%   |   |   |
| Electrical<br>connection | via terminal strip, after removing housing cover;<br>temperature controller and terminal strip are mounted on a printed circuit board (epoxy-resin glass fiber) |   |   |

**Operating data**

|   |   |  |                   |
|---|---|--|-------------------|
| Switching differential                    | Switching action:   | fan controller TR                              | 14 ± 2°C          |
|   |   | burner monitor TW                              | 6 ± 1°C           |
| Switching point<br>accuracy               | Switching action:   | in upper third<br>of scale or at limit setting | at start of scale |
|   |   | fan controller TR                              | ± 4°C             |
|   |   | burner monitor TW                              | ± 4°C             |
|   |   | safety temperature limiter STB                 | +0<br>-5 °C       |
| Ambient<br>temperature effect             | on switch head: 0.35 °C per °C<br>on capillary: per meter: 0.07 °C per °C |  |                   |
| Operating medium                          | air   |  |                   |
| Time constant                             | in air: ≤ 120 sec   |  |                   |
| Safe overtemperature                      | at the temperature probe: +200°C  |  |                   |
| Permissible storage<br>temperature        | -50 to +50°   |  |                   |
| Permissible ambient<br>temperature in use | 80°C max.   |  |                   |
| Nominal<br>position (NL)                  | to DIN 16 257, NL 0 — NL 90 (other NL on request)                         |  |                   |

**Housing**

|                       |   |  |
|-----------------------|---|--|
| standard              | housing cover: polycarbonate<br>base: sheet steel, zinc-plated                      | color: pebble gray RAL 7032  |
| Extra code SW         | housing cover: polycarbonate, impact-resistant<br>base: die-cast aluminium, painted | color: pebble gray RAL 7032<br>color: anthracite gray RAL 7015   |
| Setpoint adjustment   | safety temperature limiter STB:<br>fixed factory setting                            | fan controller TR and burner monitor TW:<br>switching point adjustable with screwdriver, after<br>removing housing cover |
|                       | <b>standard</b>   | <b>with extra code /SW</b>   |
| Enclosure protection  | EN 60 529 - IP40  | EN 60 529 - IP54   |
| Cable entry           | 2 push sockets  | clamping nipple M 20 x 1.5, for 8 — 10 mm cable dia.   |
| Switch head<br>fixing | by 2 screws through housing base  | by 2 screws at the flange of the support tube, then by one<br>screw at the hexagon of the support tube                   |
| Weight                | approx. 0.7 kg  |  |

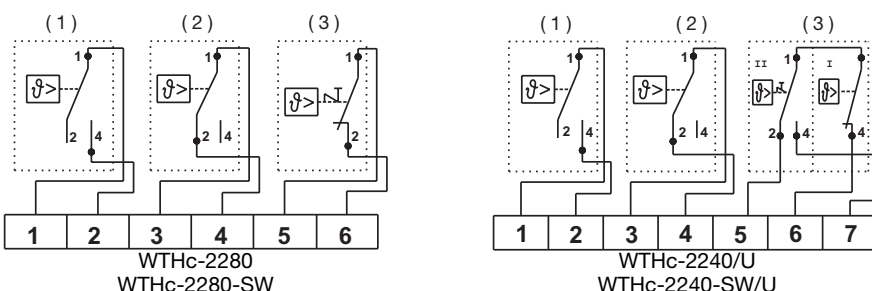
**Note:**

Physical and toxicological properties of the expansion fluid that may escape in the event of a system fracture.

| Control range<br>with end of scale | Dangerous<br>reactions | Fire and explosion hazard |                 | Water<br>contamination | irritant | Toxicological data  |       |
|------------------------------------|------------------------|---------------------------|-----------------|------------------------|----------|---------------------|-------|
|                                    |                        | Ignition<br>temperature   | Explosion limit |                        |          | danger to<br>health | toxic |
| ≤ +200°C                           | no                     | + 355°C                   | 0.6 — 8 % v/v   | yes                    | yes      | 1                   | no    |

At present, there is no restrictive statement from the health authorities concerning any danger to health over short periods and at low concentrations, e.g. after a fracture of the measuring system.

**Connection diagrams**



- (1) TR (fan)
- (2) TW (burner)
- (3) STB (burner)

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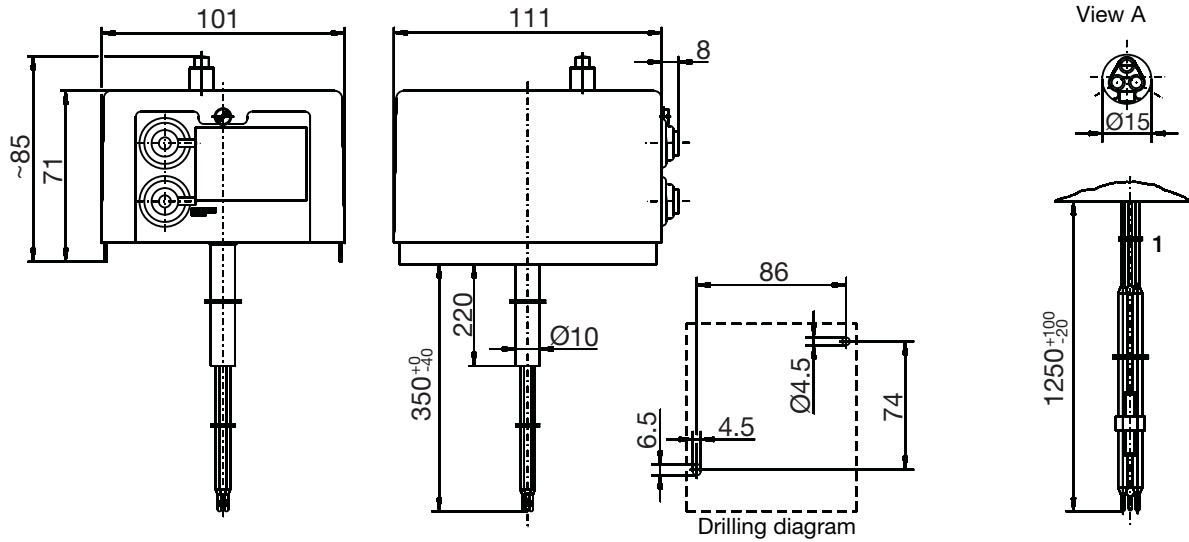
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## Dimensions

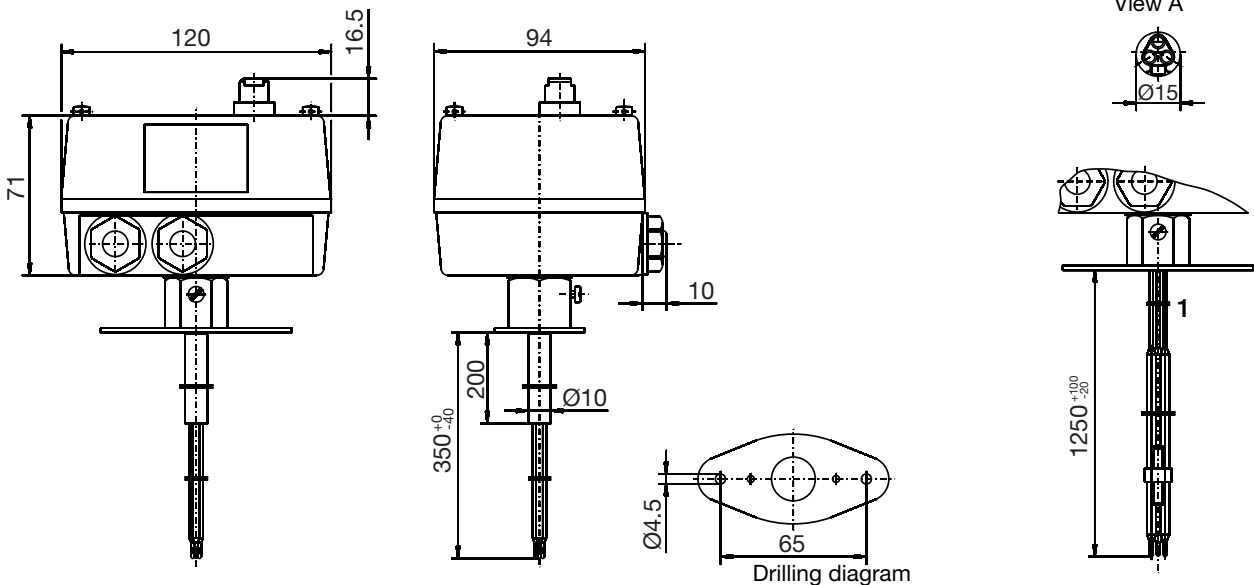
WTHc-2280  
 WTHc-2240/U  
 IP40 protection



Style 1  
**with** support tube,  
 switch head mounted by 2 screws  
 through housing base,  
 extra code **r**

Style 2  
**no** support tube, switch head  
 mounted by 2 screws through  
 housing base,  
 extra code **r** with capillary,  
 process connection **A**

WTHc-2280-SW  
 WTHc-2240/U/SW  
 IP54 protection



Style 1  
**with** support tube,  
 process connection **UOF**,  
 mounting flange with support tube

Style 2  
**no** support tube, switch head  
 fixing by mounting flange in CuZn  
 (brass), extra code **b** with  
 capillary, process connection **A**

<sup>1</sup>probe coding: fan controller TR: **RED**; burner monitor TW: **BLUE**

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## Stock items

(delivery: 3 working days after receipt of order)

| Sales No.   | Type         | Control range °C   | Capillary incl. probe mm | Fitting length mm |
|-------------|--------------|--|--------------------------|-------------------|
| 60/60002161 | WTHc-2280    | TR = + 20 to +80<br>TW = + 70 to +90<br>STB = +100 fixed | --                       | 350               |
| 60/60002162 | WTHc-2280    |  | 1250                     | --                |
| 60/60002658 | WTHc-2280-SW |  | --                       | 320               |

## Order details

### Warm-air thermostats, WTHc series

|                   |   |
|-------------------|---|
| <b>Order code</b> | (1) <b>Basic type</b>   |
| 604514            | Warm-air thermostat, WTHc series  |
|                   | (2) <b>Basic type extensions</b>  |
| 2280              | WTHc-2280 temperature controller TR and temperature monitor TW with changeover contact, safety temperature limiter STB with break (SPST-NC) contact and lock-out  |
| 2240              | WTHc-2240 temperature controller TR and temperature monitor TW with changeover (SPDT) contact, safety temperature limiter STB with break (SPST-NC) contact, lock-out and additional signal contact (with extra code U only) |
|                   | (3) <b>Style</b>  |
| 1                 | with support tube   |
| 2                 | without support tube, with capillary  |
|                   | (4) <b>Control / limit range for temperature controller<sup>1</sup></b>   |
| 040               | +20 to +80°C  |
|                   | (5) <b>Control / limit range for temperature monitor<sup>1</sup></b>  |
| 070               | +70 to +90°C  |
|                   | (6) <b>Limit for safety temperature limiter<sup>1</sup></b>   |
| 100               | +100°C  |
|                   | (7) <b>Capillary length</b>   |
| 0                 | style 01, without capillary   |
| 1250              | 1250 mm   |
| ...               | (special length, details in mm, max. 5000 mm)   |
|                   | (8) <b>Process connection (PA)</b>  |
| 00                | switch head mounting r, Style 01  |
| 10                | A = plain cylindrical probe (on Style 02 only)  |
| 26                | UOF = mounting flange with support tube   |
|                   | (9) <b>Fitting length S (immersion tube length)</b>   |
| 000               | Style 02, with capillary  |
| 350               | 350 mm  |
| ...               | (special length, details in mm)   |
|                   | (10) <b>Probe diameter</b>  |
| 4                 | 4 mm  |
|                   | (11) <b>Extra codes<sup>2</sup></b>   |
| 000               | no extra code   |
| 574               | <b>U</b> STB with break (n.c.) contact, lock-out and additional signal contact (on type WTHc-2240 only)   |
| 718               | <b>SW</b> housing with IP54 rating, protected against dust and splashing water  |
| 711               | <b>r</b> switch head mounting by 2 screws through housing base  |
| 764               | <b>b</b> mounting flange in CuZn (brass)  |

|                      |        |      |      |     |     |     |     |     |     |      |                   |     |   |     |    |   |     |   |   |   |     |
|----------------------|--------|------|------|-----|-----|-----|-----|-----|-----|------|-------------------|-----|---|-----|----|---|-----|---|---|---|-----|
| <b>Order code</b>    | (1)    | (2)  | (3)  | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) <sup>2</sup> |     |   |     |    |   |     |   |   |   |     |
| 604514               | /      | .... | -    | .   | -   | ... | -   | ... | -   | ..   | -                 | ... | / | ... |    |   |     |   |   |   |     |
| <b>Order example</b> | 604514 | /    | 2240 | -   | 1   | -   | 040 | -   | 070 | -    | 100               | -   | 0 | -   | 26 | - | 350 | - | 4 | / | 574 |

<sup>1</sup> other control/limit ranges on request

<sup>2</sup> List extra codes in sequence, separated by commas.

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# Explosion-protected surface-mounting Thermostat ATH-Ex Series

EC type examination to ATEX Directive 94/9/EC for explosive gas atmosphere Zone 1 and explosive dust atmosphere Zone 21

**TW** temperature monitor  
**STW** fail-safe temperature monitor



## Brief description

Explosion-protected surface-mounting thermostats in the ATH-Ex series control and monitor thermal processes. They can be used directly in the hazardous area (zone 1 and zone 21). The thermostats are available both as temperature monitor TW and temperature monitor STW (fail-safe).

Ex thermostats operate on the principle of liquid or gas expansion. The electrical switching device is a microswitch inside a flameproof enclosure.

## Ex marking

**Ex** II 2G EEx ed IIC T6 for explosive gas atmospheres

**Ex** II 2D IP65 T80°C for explosive dust atmospheres

## Explosion protection

**Ex** II 2G Equipment group II, Category 2, Equipment for explosive gas atmospheres

**Ex** II 2D Equipment group II, Category 2, Equipment for explosive dust atmospheres

## Type of explosion protection:

### EEx ed IIC T6

|            |                             |  |
|------------|-----------------------------|--|
| <b>EEx</b> | <b>General requirements</b> | Euronorm EN 50014 / VDE 0170 / 0171 Part 1 |
| <b>e</b>   | <b>Increased safety</b>     | Euronorm EN 50019 / VDE 0170 / 0171 Part 6 |
| <b>d</b>   | <b>Flameproof enclosure</b> | Euronorm EN 50018 / VDE 0170 / 0171 Part 5 |
| <b>IIC</b> | <b>Gas group</b>            |  |
| <b>T6</b>  | <b>Temperature class</b>    |  |

### IP65 T80°C

**Application in combustible dusts** Euronorm EN 50281-1-1 / VDE 0170 / 0171 Part 15-1-1

**IP65** Protection to EN 60529-IP65  
**T80°C** Max. permissible surface temperature (use in combustible dusts)



## Switching action

|   |   |
|---|---|
| <p><b>Temperature monitor TW and fail-safe temperature monitor STW</b></p> <p>If the temperature at the probe exceeds the selected setpoint, the microswitch is operated through a mechanism, and the circuit is opened or closed. If the temperature falls below the selected setpoint (by the amount of the switching differential), the microswitch returns to its initial position.</p> | <p><b>Self-monitoring facility on the fail-safe temperature monitor STW</b></p> <p>A failure of the measuring system, i.e. when the expansion liquid escapes, will cause the pressure under the diaphragm to drop (STW), thus permanently opening the circuit. The thermostat can no longer be reset.</p> <p>If the probe cools down to a temperature in accordance with the control range table, e.g. below -20°C, the circuit will also open. The STW is reset automatically.</p> |
|---|---|



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## Types and approvals

| Type      | Switching action | Test certificate | Test   | DIN Reg. No.  |
|-----------|------------------|------------------|--|---|
| ATH-Ex-2  | TW               | PTB 03 ATEX 1167 |  Pressure Equipment<br>Directive 97/23/EC<br>(ATH-Ex-20 only) | TW 76602  |
| ATH-Ex-20 | STW              |                  |  |  |

## Technical data

### Control ranges and probe table

| Control range<br>°C | Switching point accuracy<br>in upper third of scale * |                     | Maximum<br>capillary<br>length<br>mm | Maximum<br>probe temp. to<br>DIN 3440<br>°C | STW opens at<br>probe temp.<br>below (°C): | Probe length L<br>for d = 6 mm |     |
|---------------------|---|---------------------|--------------------------------------|---|--|--------------------------------|-----|
|                     | TW  | STW                 |                                      |   |  | TW                             | STW |
| -20 to + 50         | + 0 °C<br>- 3 °C                                      | + 0 °C<br>- 3.5 °C  | 5000                                 | + 60  | -30  | 153                            | 132 |
| 0 to + 50           | + 0 °C<br>- 2 °C                                      | + 0 °C<br>- 2.5 °C  |                                      | + 60  | -10  | 202                            | 172 |
| 0 to +100           | + 0 °C<br>- 4 °C                                      | + 0 °C<br>- 5 °C    |                                      | +115  | -10  | 117                            | 102 |
| +40 to +120         | + 0 °C<br>- 3 °C                                      | + 0 °C<br>- 4 °C    |                                      | +140  | -10  | 135                            | 117 |
| +50 to +200         | + 0 °C<br>- 6 °C                                      | + 0 °C<br>- 8 °C    |                                      | +230  | -10  | 107                            | 94  |
| +80 to +250         | + 0 °C<br>- 7 °C                                      | + 0 °C<br>- 8.5 °C  |                                      | +300  | -20  | 90                             | 78  |
| +50 to +300         | + 0 °C<br>- 10 °C                                     | + 0 °C<br>- 12.5 °C | +345                                 | -30   | 67   | 60                             |     |
| +20 to +400         | + 0 °C<br>- 15 °C                                     | + 0 °C<br>- 19 °C   | 1000                                 | +460  | -30  | - - -                          | 202 |
| +20 to +500         | + 0 °C<br>- 19 °C                                     | + 0 °C<br>- 24 °C   | 2000                                 | +550  | -30  | 237                            | 149 |

\* The switching point accuracy can be shifted to a different part of the scale, to special order.

### Capillary and temperature probe

| Type                                | End of scale                      | Capillary 1.5mm dia.                             | Temperature probe   | Notes         |
|-------------------------------------|-----------------------------------|--|---|---------------|
| ATH-Ex-..                           | up to 200 °C                      | copper (Cu)<br>Mat. Ref. 2.0090<br>electrotinned | copper (Cu)<br>Mat. Ref. 2.0090<br>braze<br>electrotinned | -             |
|                                     | up to 300 °C                      | copper (Cu)<br>Mat. Ref. 2.0090<br>electrotinned | stainless steel (CrNi)<br>Mat. Ref. 1.4571<br>braze       | -             |
|                                     | up to 500 °C                      | stainless steel (CrNi)<br>Mat. Ref. 1.4571       | stainless steel (CrNi)<br>Mat. Ref. 1.4571<br>welded      | -             |
|                                     | up to 300 °C                      | stainless steel (CrNi)<br>Mat. Ref. 1.4571       | stainless steel (CrNi)<br>Mat. Ref. 1.4571<br>welded      | at extra cost |
| Capillary length                    | 1000 mm is standard, max. 5000 mm |  |   |               |
| Min. bending radius<br>of capillary | 5 mm                              |  |   |               |

### Electrical data

|                       |  |
|-----------------------|--|
| Switching device      | microswitch in flameproof enclosure<br>with changeover contact                             |
| Contact rating        | 5 A, 230 V AC +10%, p.f. ≥ 0.9   |
| Electrical connection | screw terminals in housing, suitable for conductor cross-section up to 2.5 mm <sup>2</sup> |

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**Operating data**

| Switching differential in % of control /limit range        | Ranges with end of scale $\leq 350^{\circ}\text{C}$  |                       |   | Ranges with end of scale $> 350^{\circ}\text{C}$ |   |                         |
|--|--|-----------------------|---|--|---|-------------------------|
|  | Switching action   | Nominal value         | Possible measured value                             | Switching action                                 | Nominal value                                       | Possible measured value |
|  | TW   | 3                     | 3-5   | TW   | 5   | 5-9                     |
|  | STW  | 5                     | 5-7   | STW  | 6   | 6-11                    |
| Ambient temperature error referred to control /limit range | A deviation of the ambient temperature at the housing from the calibrated ambient temperature $22^{\circ}\text{C}$ will result in a displacement of the switching point:<br>higher ambient temperature = lower switching point<br>lower ambient temperature = higher switching point |                       |   |  |   |                         |
|  | surface-mounting thermostats with end of scale   |                       |   |  |   |                         |
|  | $< 200^{\circ}\text{C}$  |                       | $\geq 200^{\circ}\text{C} \leq 350^{\circ}\text{C}$ |  | $> 350^{\circ}\text{C} \leq 500^{\circ}\text{C}$    |                         |
|  | TW   | STW (STB)             | TW  | STW (STB)  | TW  | STW (STB)               |
|  | on thermostat head $\%/^{\circ}\text{C}$   |                       |   |  |   |                         |
|  | 0.08   | 0.17                  | 0.06  | 0.13   | 0.14  | 0.12                    |
| on capillary $\%/^{\circ}\text{C}$ per meter               |  |                       |   |  |   |                         |
| 0.047  | 0.054  | 0.09                  | 0.11  | 0.04   | 0.03  |                         |
| Permissible storage temperature                            | -50 to $+50^{\circ}\text{C}$   |                       |   |  |   |                         |
| Permissible ambient temperature in operation               | max.   |                       | Capillary   | Thermostat head                                  | with end of scale                                   |                         |
|  |  |                       | $+50^{\circ}\text{C}$                               | $+50^{\circ}\text{C}$                            |   |                         |
|  | min.   |                       | $-40^{\circ}\text{C}$                               | $-20^{\circ}\text{C}$                            | $< 200^{\circ}\text{C}$                             |                         |
|  |  |                       | $-20^{\circ}\text{C}$                               | $-20^{\circ}\text{C}$                            | $\geq 200^{\circ}\text{C} \leq 350^{\circ}\text{C}$ |                         |
|  |  | $-40^{\circ}\text{C}$ | $-20^{\circ}\text{C}$                               | $> 350^{\circ}\text{C} \leq 500^{\circ}\text{C}$ |   |                         |
| Nom. position (NL)   | to DIN 16257, NL 0 – NL 90 (other NL on request)   |                       |   |  |   |                         |

**Housing**

|                     |  |
|---------------------|--|
| Material            | black polyester housing, glass-fiber reinforced, with lead-sealable screws |
| Limit setting       | limit adjustable at setpoint spindle, after removal of housing cover       |
| Protection          | EN 60 529-IP65   |
| Cable entry         | Ex cable gland M 20 x 1.5, for cable diameters 6 – 12 mm                   |
| Weight              | approx. 0.6 kg   |
| Thermostat mounting | by 4 screws, after removal of housing cover                                |

**Process connection\***

|                                  |  |
|----------------------------------|--|
| Series ATH-Ex-... with capillary | plain cylindrical probe A (standard)   |
|                                  | pocket U (on request)  |
|                                  | screw-in pocket with screw-in spigot G 1/2 Form A to DIN 3852/2 and clamping clip with fixing screw for securing the probe |
| Material Pocket U                | up to $+150^{\circ}\text{C}$ : CuZn is standard<br>above $+150^{\circ}\text{C}$ : St is standard<br>(CrNi on request)      |
| Fitting length S                 | standard lengths: 100, 120, 150, 200 or 300 mm (other lengths on request)  |
| Immersion tube dia.              | D = 8 mm   |

\*for other process connections and pockets, see Data Sheet 60.6710 (US, UO, Q and V only).

**Note**

Physical and toxicological properties of the expansion media that may escape in the event of a measuring system fracture.

| Control range with end of scale                     | Dangerous reactions | Fire/explosion hazard             |                         | Water contamination | Toxicological data |                  |       |
|---|---------------------|-----------------------------------|-------------------------|---------------------|--------------------|------------------|-------|
|   |                     | Ignition temp. $^{\circ}\text{C}$ | Explosion limit $\%v/v$ |                     | irritant           | danger to health | toxic |
| $< +200^{\circ}\text{C}$                            | no                  | + 355                             | 0,6 – 8                 | yes                 | yes                | <sup>1)</sup>    | no    |
| $\geq 200^{\circ}\text{C} \leq 350^{\circ}\text{C}$ | no                  | + 490                             | - -                     | yes                 | yes                | <sup>1)</sup>    | no    |
| $> 350^{\circ}\text{C} \leq 500^{\circ}\text{C}$    | no                  | no                                | no                      | no                  | no                 | no               | no    |

<sup>1)</sup> At present there is no statement from the health authorities concerning any danger to health over short periods and at low concentration, e.g. after a fracture of the measuring system.

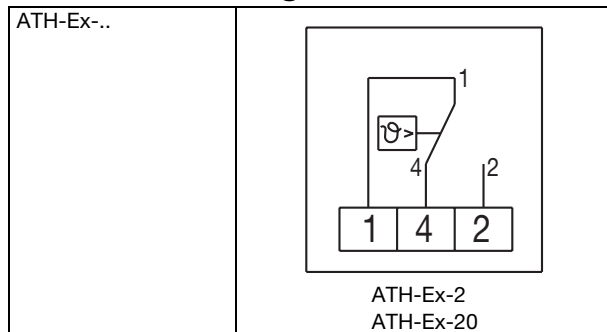
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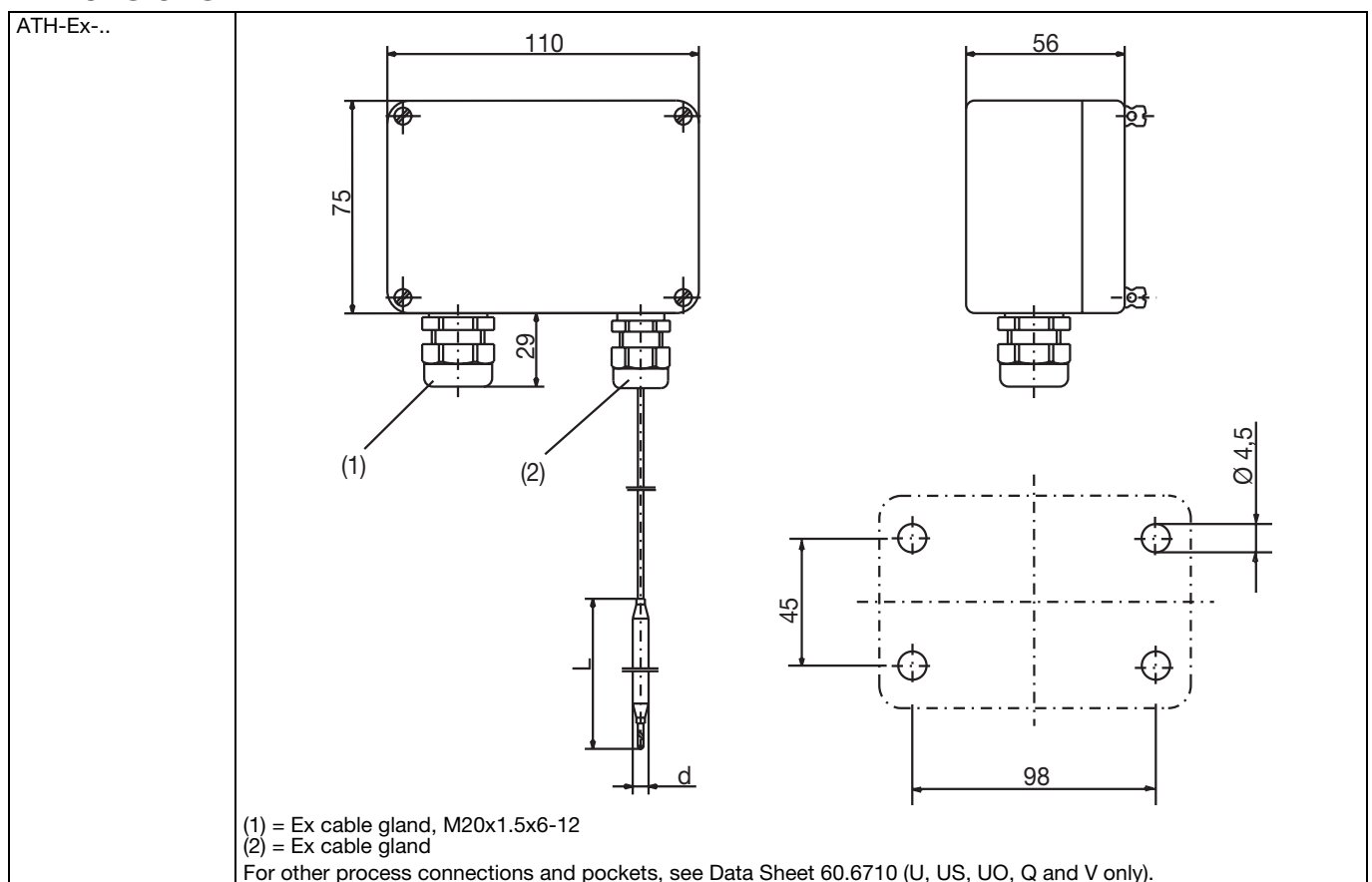
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## Connection diagram



## Dimensions



## Stock items

(delivery 3 working days after receipt of order)

| Sales No.   | Type      | Control range °C | Material of measuring system | Capillary mm | Probe dia. x length mm |
|-------------|-----------|------------------|------------------------------|--------------|------------------------|
| 60/60001242 | ATH-Ex-2  | -20+ 50          | CrNi                         | 2000         | 6 x 153                |
| 60/60001243 | ATH-Ex-2  | 0+ 50            | CrNi                         | 2000         | 6 x 202                |
| 60/60001244 | ATH-Ex-2  | +40+120          | CrNi                         | 2000         | 6 x 135                |
| 60/60001246 | ATH-Ex-2  | +50+300          | CrNi                         | 2000         | 6 x 67                 |
| 60/60001247 | ATH-Ex-20 | +40+120          | CrNi                         | 2000         | 6 x 117                |
| 60/60001248 | ATH-Ex-20 | +50+300          | CrNi                         | 2000         | 6 x 60                 |

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## Order details

### ATH-Ex Series

| Order code | (1) Basic type   |
|------------|--|
| 605041     | Surface-mounting thermostat for hazardous areas, ATH-Ex series   |
|            | (2) Basic type extension   |
| 02         | ATH-Ex-2 Temperature monitor TW  |
| 20         | ATH-Ex-20 Fail-safe temperature monitor STW  |
|            | (3) Control / Limit ranges °C  |
| 014        | -20 to + 50  |
| 021        | 0 to + 50  |
| 025        | 0 to +100  |
| 056        | +40 to +120  |
| 062        | +50 to +200  |
| 080        | +80 to +250  |
| 064        | +50 to +300  |
| 045        | +20 to +400  |
| 046        | +20 to +500  |
|            | (4) Capillary length   |
| 1000       | 1000 mm  |
| 2000       | 2000 mm  |
| 3000       | 3000 mm  |
| 4000       | 4000 mm  |
| 5000       | 5000 mm  |
| ....       | (special length, details in plain text)  |
|            | (5) Material of capillary  |
| 40         | Cu copper, electrotinned (only up to +300°C)   |
| 20         | CrNi stainless steel 1.4571  |
|            | (6) Process connection (PA)  |
| 10         | A = plain cylindrical probe (standard)  |
| 20         | U = screw-in pocket                     |
|            | (7) Thread for process connection  |
| 00         | no thread (process connection A)   |
| 13         | male thread G 1/2  |
|            | (8) Material of process connection   |
| 00         | only for process connection A  |
| 46         | CuZn (brass)   |
| 01         | St (steel)   |
| 20         | CrNi (stainless steel 1.4571)  |
|            | (9) Fitting length S (immersion tube length)   |
| 000        | ATH-Ex without pocket  |
| 100        | 100mm  |
| 120        | 120mm  |
| 150        | 150mm  |
| 200        | 200mm  |
| 300        | 300mm  |
| 400        | 400mm  |
|            | (10) Diameter D (immersion tube dia.)  |
| 00         | ATH-Ex without pocket  |
| 8          | 8 mm   |
|            | (11) Diameter d (probe dia.)   |
| 6          | 6 mm   |

### Order code

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11)  
 605041 / [ .. ] - [ ... ] - [ .... ] - [ .. ] - [ .. ] - [ .. ] - [ .. ] - [ .. ] - [ ... ] - [ .. ] - [ . ]

### Order example

605041 / [ 20 ] - [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]



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# Surface-mounting Thermostat with explosion protection ATH-EXx Series

- EC-type examination as per ATEX Directive 94/9/EC
- for potentially explosive gas atmospheres, Zone 1
- and potentially explosive dust atmospheres, Zone 21

## Version to DIN 3440

- TW Temperature monitor
- TB Temperature limiter
- STW Fail-safe temperature monitor
- STB Fail-safe protection temperature limiter

## Brief description

ATH-EXx Series surface-mounting thermostats with explosion protection control and monitor thermal processes. They can be used directly in the hazardous area, in Zone 1 and Zone 21. The thermostats can be supplied as temperature monitors TW, temperature limiters TB, fail-safe temperature monitors STW and fail-safe protection temperature limiters STB. The thermostats operate on the principle of liquid or gas expansion. The electrical switching device is a microswitch inside a flameproof enclosure.

## Ex marking

- Ex II 2G EEx ed IIC T6 or T5 for potentially explosive gas atmospheres
- Ex II 2D IP65 T80°C for potentially explosive dust atmospheres

## Explosion protection

- Ex II 2G Equipment group II, Category 2, Equipment for potentially explosive gas atmospheres
- Ex II 2D Equipment group II, Category 2, Equipment for potentially explosive dust atmospheres

### Type of protection:

#### EEx ed IIC T6

|            |                             |  |
|------------|-----------------------------|--|
| <b>EEx</b> | <b>General requirements</b> | European Standard EN 50 014 / VDE 0170 / 0171 Part 1 |
| <b>e</b>   | <b>Increased Safety</b>     | European Standard EN 50 019 / VDE 0170 / 0171 Part 6 |
| <b>d</b>   | <b>Flameproof enclosure</b> | European Standard EN 50 018 / VDE 0170 / 0171 Part 5 |
| <b>IIC</b> | <b>Gas group</b>            |  |
| <b>T6</b>  | <b>Temperature class</b>    |  |

#### IP65 T 80°C

**Application in combustible dusts** European Standard EN 50 281-1-1 / VDE 0170 / 0171 Part 15-1-1

**IP65 Enclosure protection to EN 60 529-IP65**  
**T 80°C Max. permissible surface temperature**  
 (application in combustible dusts)

## Types and approvals

| Type                      | Switching action | Test certificate | Tests |
|---------------------------|------------------|------------------|-------|
| ATH-EXx-2                 | TW               | PTB 03 ATEX 1187 |       |
| ATH-EXx-20                | STW              |                  |       |
| ATH-EXx-7                 | TB               |                  |       |
| ATH-EXx-7-F <sup>1</sup>  | TB               |                  |       |
| ATH-EXx-70                | STB              |                  |       |
| ATH-EXx-70-F <sup>1</sup> | STB              |                  |       |

<sup>1</sup> Limit is permanently set at the factory and sealed



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## Switching action

|  |  |  |
|--|--|--|
| <p><b>Temperature monitor TW and fail-safe temperature monitor STW</b><br/>         If the temperature at the probe exceeds the selected setpoint, the microswitch is operated via the transmission mechanism and the circuit is opened or closed.<br/>         When the temperature drops below the selected setpoint (by the amount of the switching differential), the microswitch returns to its initial position.</p> | <p><b>Lock-out facility on the temperature limiter TB and fail-safe protection temperature limiter STB</b><br/>         If the temperature at the probe exceeds the set limit, the circuit is opened and the microswitch is locked out mechanically.<br/>         After the temperature has fallen below the critical temperature by about 10 % of the scale span (about 15% for limit setting &gt; 350°C), the microswitch can be manually reset.</p> | <p><b>Self-monitoring on the fail-safe temperature monitor STW and fail-safe protection temperature limiter STB</b><br/>         In the event of a measuring system failure, i.e. if the expansion liquid has leaked, the pressure on the diaphragm of the STB and STW drops, thus permanently opening the electrical circuit. It is no longer possible to reset the system.<br/>         If the probe cools down to a temperature given by the control range table, e.g. below -20°C, the circuit will also open. When the temperature rises above -20°C, the STB must be reset manually. On the STW, the reset is performed automatically.</p> |
|--|--|--|

## Technical data

### Control ranges and probe table

| Control range<br>°C | Switching point accuracy<br>in upper third of scale <sup>1</sup> |                    | Maximum<br>capillary<br>length<br>(mm) | Maximum<br>probe temperature<br>to DIN 3440<br>°C | STW + STB<br>opens at<br>probe temp.<br>below °C | Probe length L<br>for d = 6 mm |            |
|---------------------|--|--------------------|--|---|--|--------------------------------|------------|
|                     | TW, TB   | STW, STB           |  |   |  | TW<br>TB                       | STW<br>STB |
| -20 to + 50         | + 0 °C<br>- 3 °C   | + 0 °C<br>- 3.5°C  | 5000                                   | + 60  | -30  | 142                            | 115        |
| 0 to + 50           | + 0 °C<br>- 2 °C   | + 0 °C<br>- 2.5°C  |  | + 60  | -10  | 185                            | 149        |
| 0 to +100           | + 0 °C<br>- 4 °C   | + 0 °C<br>- 5 °C   |  | +115  | -10  | 107                            | 89         |
| +40 to +120         | + 0 °C<br>- 3 °C   | + 0 °C<br>- 4 °C   |  | +140  | -10  | 125                            | 103        |
| +50 to +200         | + 0 °C<br>- 6 °C   | + 0 °C<br>- 8 °C   |  | +230  | -10  | 101                            | 83         |
| +80 to +250         | + 0 °C<br>- 7 °C   | + 0 °C<br>- 8.5°C  |  | +300  | -20  | 82                             | 68         |
| +50 to +300         | + 0 °C<br>- 10 °C  | + 0 °C<br>- 12.5°C | 1000                                   | +345  | -30  | 63                             | 53         |
| +20 to +400         | + 0 °C<br>- 15 °C  | + 0 °C<br>- 19 °C  |  | +460  | -30  | 278                            | 176        |
| +20 to +500         | + 0 °C<br>- 19 °C  | + 0 °C<br>- 24 °C  |  | 2000<br>4000                                      | +550<br>+550                                     | -30<br>-30                     | 148<br>202 |

<sup>1</sup> The switching point accuracy can be shifted to another part of the scale, to special order.

### Capillary and temperature probe

| Type                             | End of scale                      | Capillary 1.5mm dia.                            | Temperature probe                                       | Notes         |
|----------------------------------|-----------------------------------|---|---|---------------|
| ATH-EXx-..                       | up to 200°C                       | copper (Cu), Mat. Ref. 2.0090<br>electro-tinned | copper (Cu), Mat. Ref. 2.0090<br>brazed, electro-tinned | -             |
|                                  | up to 300°C                       | copper (Cu), Mat. Ref. 2.0090<br>electro-tinned | st. steel (CrNi), Mat. Ref. 1.4571<br>brazed            | -             |
|                                  | up to 500°C                       | st. steel (CrNi), Mat. Ref. 1.4571              | st. steel (CrNi), Mat. Ref. 1.4571<br>welded            | -             |
|                                  | up to 300°C                       | st. steel (CrNi), Mat. Ref. 1.4571              | st. steel (CrNi), Mat. Ref. 1.4571<br>welded            | at extra cost |
| Capillary length                 | 1000 mm is standard, max. 5000 mm |   |   |               |
| Min. bending radius of capillary | 5 mm                              |   |   |               |

### Electrical data

| Switching device       | TW, STW  | TB, STB  |
|------------------------|--|--|
|                        | microswitch in flameproof enclosure<br>with changeover contact   | microswitch in flameproof enclosure<br>with (n.c.) break contact and lock-out<br>and additional signal contact |
| Max.<br>contact rating | terminals 1-4: (n.c. break)<br>AC-1: 10 A, 230 V +10%<br>AC-15: 2 A, 230 V +10%<br>DC-1: 0.25A, 230 V +10% | terminals 1-4: (n.c. break)<br>AC-1: 16 A, 230 V +10%<br>AC-15: 2 A, 230 V +10%<br>DC-1: 0.25A, 230 V +10%     |
|                        | terminals 1-2: (n.o. make)<br>AC-1: 5 A, 230 V +10%<br>AC-15: 0.8 A, 230 V +10%<br>DC-1: 0.25A, 230 V +10% | terminals 1-2: (n.o. make)<br>AC-1: 10 A, 230 V +10%<br>AC-15: 1.5 A, 230 V +10%<br>DC-1: 0.25A, 230 V +10%    |
| Electrical connection  | 5-pole terminal strip, suitable for conductor cross-sections up to 2.5 mm <sup>2</sup>                     |  |

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## Technical data

### Operating data

| Switching differential in % of control / limit range         | Ranges with end of scale $\leq 350^{\circ}\text{C}$   |   |   | Ranges with end of scale $> 350^{\circ}\text{C}$ |  |                       |
|--|---|---|---|--|--|-----------------------|
|  | Switching action  | Nominal value                                       | Possible actual value                               | Switching action                                 | Nominal value                                    | Possible actual value |
|  | TW  | 3   | 3-5   | TW   | 5  | 5-9                   |
| STW  | 5   | 5-7   | STW   | 6  | 6-11   |                       |
| Ambient temperature effect referred to control / limit range | A deviation of the ambient temperature at the housing from the calibrated ambient temperature $22^{\circ}\text{C}$ will result in a shift of the switching point:<br>higher ambient temperature = lower switching point<br>lower ambient temperature = higher switching point |   |   |  |  |                       |
|  | Surface-mounting thermostats with end of scale  |   |   |  |  |                       |
|  | $< 200^{\circ}\text{C}$   |   | $\geq 200^{\circ}\text{C} \leq 350^{\circ}\text{C}$ |  | $> 350^{\circ}\text{C} \leq 500^{\circ}\text{C}$ |                       |
|  | TW / TB   | STB/STW   | TW / TB   | STB/STW  | TW / TB  | STB/STW               |
|  | effect due to switch head   |   |   |  |  |                       |
|  | 0.08%/°C  | 0.17%/°C  | 0.06%/°C  | 0.13%/°C   | 0.14%/°C   | 0.12%/°C              |
|  | effect due to capillary (per meter)   |   |   |  |  |                       |
|  | 0.047%/°C   | 0.054%/°C   | 0.09%/°C  | 0.11%/°C   | 0.04%/°C   | 0.03%/°C              |
| Permissible storage temperature                              | -50 to $+50^{\circ}\text{C}$  |   |   |  |  |                       |
| Permissible ambient temperature in operation                 | Temperature class   | for end of scale                                    |   | Capillary  |  | Switch head           |
|  | T6 max.   |   |   | $+40^{\circ}\text{C}$                            |  | $+40^{\circ}\text{C}$ |
|  | T5 max.   |   |   | $+55^{\circ}\text{C}$                            |  | $+55^{\circ}\text{C}$ |
|  | min.  | $< 200^{\circ}\text{C}$                             |   | $-40^{\circ}\text{C}$                            |  | $-20^{\circ}\text{C}$ |
|  |   | $\geq 200^{\circ}\text{C} \leq 350^{\circ}\text{C}$ |   | $-20^{\circ}\text{C}$                            |  | $-20^{\circ}\text{C}$ |
|  | $> 350^{\circ}\text{C} \leq 500^{\circ}\text{C}$  |   | $-40^{\circ}\text{C}$                               |  | $-20^{\circ}\text{C}$                            |                       |
| Nominal position (NL)  | to DIN 16257, NL 0 – NL 90 (other NL on request)  |   |   |  |  |                       |

### Housing

|                      |  |  |
|----------------------|--|--|
| Material             | polyester housing, glass-fiber reinforced, black               |  |
| Limit setting        | ATH-EXx-2<br>ATH-EXx-7<br>ATH-EXx-20                           | Limit adjustable at setpoint spindle, after removing housing cover.  |
|                      | ATH-EXx-70   | Limit adjustable at setpoint spindle, after removing housing cover.<br>Afterwards, the setpoint spindle must be sealed by the installer in order to protect the limit that has been set. |
|                      | ATH-EXx-7-F<br>ATH-EXx-70-F                                    | The limit setting is fixed at the factory and sealed.  |
| Enclosure protection | IP65 to EN 60 529  |  |
| Cable entry          | Ex cable gland M 20 x 1.5, for cable diameters from 6 to 12 mm |  |
| Weight               | approx. 1.2 kg   |  |
| Switch head fixing   | by 4 screws after removing housing cover                       |  |

### Process connection<sup>1</sup>

|                                   |   |  |
|-----------------------------------|---|--|
| Series ATH-EXx-... with capillary | plain cylindrical probe A (standard)  |  |
|                                   | pocket U (on request)   |  |
|                                   | screw-in pocket with screw-in spigot G 1/2 Form A to DIN 3852/2 and clamping clip with fixing screw for securing the probe      |  |
| Material of pocket U              | up to $+150^{\circ}\text{C}$ : CuZn, nickel-plated is standard; above $+150^{\circ}\text{C}$ : St is standard (CrNi on request) |  |
| Fitting length S                  | standard lengths: 100, 120, 150, 200 or 300 mm (other lengths on request)   |  |
| Immersion tube dia.               | D = 8 mm  |  |

<sup>1</sup> For other process connections and pockets, see data sheet 60.6710 (only US, UO, Q and V).

### Note:

Physical and toxicological properties of the expansion fluid that may escape in the event of a system fracture.

| Control range with end of scale                     | Dangerous reactions | Fire and explosion hazard |                 | Water contamination | irritant | Toxicological data |       |
|---|---------------------|---------------------------|-----------------|---------------------|----------|--------------------|-------|
|   |                     | Ignition temperature      | Explosion limit |                     |          | danger to health   | toxic |
| $< +200^{\circ}\text{C}$                            | no                  | $+ 355^{\circ}\text{C}$   | 0.6 – 8 % v/v   | yes                 | yes      | 1                  | no    |
| $\geq 200^{\circ}\text{C} \leq 350^{\circ}\text{C}$ | no                  | $+ 490^{\circ}\text{C}$   | --              | yes                 | yes      | 1                  | no    |
| $> 350^{\circ}\text{C} \leq 500^{\circ}\text{C}$    | no                  | no                        | no              | no                  | no       | no                 | no    |

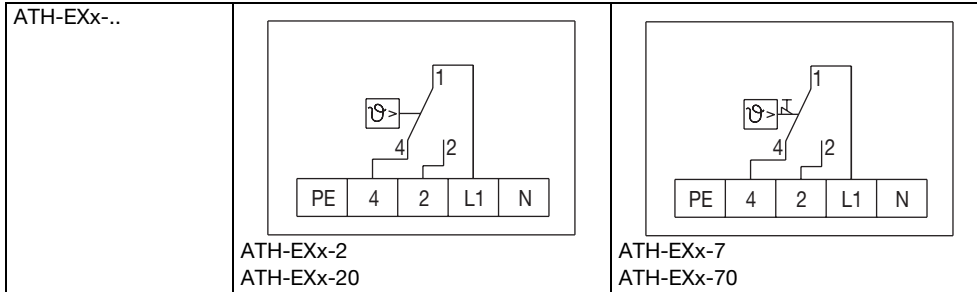
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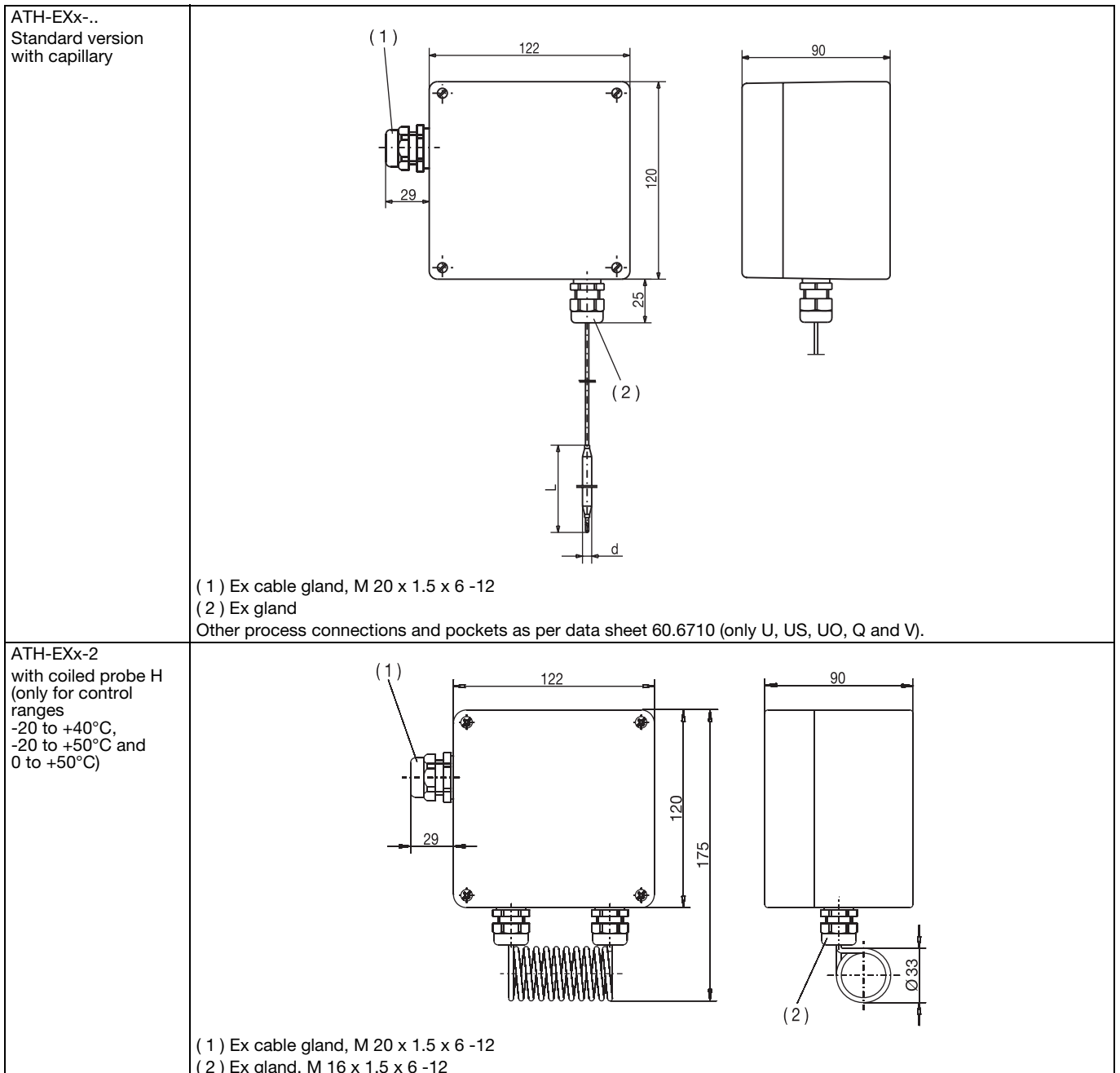
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## Connection diagrams



## Dimensions



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## Order details

### Surface-mounting thermostat, ATH-EXx Series

| Order code | (1) Basic type   |
|------------|--|
| 605051     | Surface-mounting thermostat for areas with an explosion hazard, ATH-EXx Series   |
|            | <b>(2) Basic type extensions</b>   |
| 02         | ATH-EXx-2 Temperature monitor TW   |
| 20         | ATH-EXx-20 Fail-safe temperature monitor STW   |
| 07         | ATH-EXx-7 Temperature limiter TB   |
| 70         | ATH-EXx-70 Fail-safe protection temperature limiter STB  |
|            | <b>(3) Control/limit ranges °C</b>   |
| 013        | -20 to + 40  |
| 014        | -20 to + 50  |
| 021        | 0 to + 50  |
| 025        | 0 to +100  |
| 056        | +40 to +120  |
| 062        | +50 to +200  |
| 080        | +80 to +250  |
| 064        | +50 to +300  |
| 045        | +20 to +400  |
| 046        | +20 to +500  |
|            | <b>(4) Capillary length</b>  |
| 1000       | 1000 mm  |
| 2000       | 2000 mm  |
| 3000       | 3000 mm  |
| 4000       | 4000 mm  |
| 5000       | 5000 mm  |
| ....       | special length, details in plain text  |
|            | <b>(5) Material of capillary</b>   |
| 40         | Cu copper, electro-tinned (only up to +300°C)  |
| 20         | CrNi stainless steel 1.4571  |
|            | <b>(6) Process connection (PA)</b>   |
| 10         | A = plain cylindrical probe (standard)                              |
| 15         | H = coiled probe  (only for -20 to +40°C, -20 to +50°C, 0 to +50°C) |
| 20         | U = screw-in pocket   |
|            | <b>(7) Thread for process connection</b>   |
| 00         | no thread (process connection 10)  |
| 13         | external thread G 1/2  |
|            | <b>(8) Material of process connection</b>  |
| 00         | only with process connection A   |
| 46         | CuZn (brass)   |
| 01         | St (steel)   |
| 20         | CrNi (stainless steel 1.4571)  |
|            | <b>(9) Fitting length S (immersion tube length)</b>  |
| 000        | ATH-EXx without pocket   |
| 100        | 100mm  |
| 120        | 120mm  |
| 150        | 150mm  |
| 200        | 200mm  |
| 300        | 300mm  |
| 400        | 400mm  |
|            | <b>(10) Diameter D (immersion tube dia.)</b>   |
| 00         | ATH-EXx without pocket   |
| 8          | 8 mm   |
|            | <b>(11) Diameter d (probe diameter)</b>  |
| 6          | 6 mm   |
|            | <b>(12) Extra codes<sup>1</sup></b>  |
| 000        | none   |
| 520        | F Limit is fixed at the factory and sealed (only with TB + STB).   |

Order code  /  -  -  -  -  -  -  -  -  -  /  , ...<sup>1</sup>  
 Order example 605051 / 70 - 062 - 2000 - 20 - 10 - 00 - 00 - 000 - 00 - 6 / 000<sup>1</sup>

<sup>1</sup> List extra codes in sequence, separated by commas.

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# Electronic Thermostat TE-1

## Brief description

The TE-1 electronic thermostat is a temperature controller with ON/OFF action, in a housing for DIN rail or wall mounting. The relay at the controller output switches in accordance with the temperature at the probe (process value  $x$ ) and the value that has been selected as the setpoint ( $w$ ).

The setpoint is selected as an analog value on a scale, by means of a knob on the front of the controller. The knob is fitted with an adjustable stop for range restriction or limitation. An adjustable switching differential is a standard feature, as is zero-point adjustment.

Suitable probes that may be connected are platinum resistance sensors with a positive temperature coefficient to EN 60584 (Pt100) in 2-wire or 3-wire circuit, or thermocouples (NiCr-Ni) to EN 60584.



## Types

| Typen  | for connection to   | Switching action  |
|--------|---|---|
| TE-1wO | Pt100 resistance thermometer<br>as standard: 2-wire circuit | break action (SPST-NC) (standard)<br>relay de-energized at $x \geq w$ |
| TE-1wS |   | make action (SPST-NO)<br>relay energized at $x > w$                   |
| TE-1tO | Thermocouple<br>NiCr-Ni K                                   | break action (SPST-NC) (standard)<br>relay de-energized at $x \geq w$ |
| TE-1tS |   | make action (SPST-NO)<br>relay energized at $x > w$                   |

| Extra codes |           |   |
|-------------|-----------|---|
|             | <b>b3</b> | front-panel mounting by means of 2 screws                                 |
|             | <b>ka</b> | terminal cover, IP40 protection   |
|             | <b>sw</b> | dust-tight and water-jet proof housing,<br>polycarbonate, IP65 protection |

## Technical data

### Electrical data

|                               |               |  |
|-------------------------------|---------------|--|
| Supply voltage                | as standard:  | 230 V AC +10/-15%, 48 — 63 Hz<br>115 V AC +10/-15%, 48 — 63 Hz<br>24 V DC +10/-15%<br>other voltages on request  |
| Contact rating                |               | 10 A, 250 V AC resistive load, 300000 operations at rated load<br>10 A, 24 V DC  |
| Power drawn                   |               | max. 3 VA  |
| Controller output             |               | relay with floating changeover contact; for 3-wire circuit: only 1 break (SPST-NC) or 1 make (SPST-NO)   |
| Electromagnetic compatibility |               | to EN 61326<br>interference emission: Class B, interference immunity: to industrial requirements   |
| Electrical connection         |               | via screw terminals, max. conductor cross-section: 4 mm <sup>2</sup>   |
| Electrical safety             | to EN 60730-1 | overvoltage category III<br>pollution degree 2<br>for 24 V DC supply:<br>SELV and PELV operation   |
|                               |               | creepage distance equals air gaps:<br>mains supply to electronics and probe $\geq$ 6 mm<br>mains supply to relay $\geq$ 3 mm<br>relay to electronics and probe $\geq$ 6 mm |

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**Measurement input: Pt100 resistance thermometer**

|                              |   |  |
|------------------------------|---|--|
| <b>Control ranges</b>        | Control range °C  | Relay is de-energized at a probe temperature below:                                    |
|                              | -50 to + 30<br>-20 to + 40<br>0 to + 50<br>0 to +100<br>0 to +150<br>0 to +200<br>0 to +300<br>0 to +400<br>0 to +500   | - 85°C<br>- 45°C<br>- 25°C<br>- 40°C<br>- 65°C<br>- 85°C<br>-130°C<br>-165°C<br>-225°C |
| Probe cable error            | When using a 2-wire temperature probe with a probe cable that is different from the standard types ( lead resistance $R_L = 165 \text{ m}\Omega$ ), there will be an error of about 1°C per 0.39 $\Omega$ change in lead resistance. This means that, if the probe cable is extended using a 2-core copper cable, the following error will occur: |  |
|                              | Core cross-section  | Temperature change per meter of cable  |
|                              | 0.50 mm <sup>2</sup><br>0.75 mm <sup>2</sup><br>1.00 mm <sup>2</sup><br>1.50 mm <sup>2</sup>  | 0.18 °C/m<br>0.12 °C/m<br>0.09 °C/m<br>0.06 °C/m                                       |
|                              | In the case of a 3-wire circuit, the probe cable length is internally compensated.  |  |
| Measuring circuit monitoring | The resistance probe and the probe cable are monitored for break and short-circuit. In the event of a fault, the relay switches to the de-energized state.  |  |

**Measurement input: NiCr-Ni thermocouple**

|                              |  |
|------------------------------|--|
| <b>Control ranges</b>        | Control range °C   |
|                              | +200 to + 600<br>+400 to + 800<br>+600 to +1000<br>+800 to +1200 |
| Measuring circuit monitoring | The thermocouple and compensating cable are monitored for break. |
| Temperature compensation     | provided as standard   |

**Operating data**

|                                 |   |
|---------------------------------|---|
| Switching point accuracy        | ± 2% of control range span  |
| Switching differential          | adjustable from 0.25 to 5%, factory-set to minimum value  |
| Zero-point correction           | enables the optimum matching of the switching point and probe accuracy to the respective working point or range |
| Permissible ambient temperature | in operation -10 to +50°C   |
| Permissible storage temperature | -40 to +75°C  |
| Ambient temperature error       | < 0.5% per 10 °C  |
| Climatic conditions             | relative humidity ≤ 75% annual mean, no condensation  |

**Housing**

|                                  |  |
|----------------------------------|--|
| Enclosure protection to EN 60529 | standard: IP20   |
|                                  | with extra code ka: IP40   |
|                                  | with extra code sw: IP65   |
| Housing                          | plastic housing, polycarbonate, color: light gray, RAL 7035        |
| Relay status indication          | The yellow LED on the front indicates that the relay is energized. |
| Mounting                         | standard: on rail to EN 60715, 35 x 7.5 mm                         |
| Operating position               | unrestricted   |
| Weight                           | approx. 200 gm   |



## Block diagram

**Operation**

The sensor signal of the temperature probe (1) is linearized and amplified at the input stage (2) and reaches the comparator (3) as process value  $x$ . The comparator forms the difference between the process value  $x$  and the setpoint  $w$  that was set on the setpoint knob (4), resulting in the control deviation  $x_w = x - w$ .

The contact action O or S is determined internally, through links (5). The difference signal produced during a control deviation acts through the integrated amplifier (7) on the subsequent trigger stage (8). The switching differential  $x_{sd}$  of the trigger stage is adjusted by means of the potentiometer (9). The trigger output signal uses the transistor (11) to operate the relay, which has a floating changeover contact (12). In the case of type TE-1w in 3-wire circuit, only one make or one break contact is available. The "relay energized" status is indicated by the LED (10).

The measurement circuit monitor (6), which comes as standard, checks the probe and the probe cable for break or short-circuit. The voltage required to operate the modules is generated and stabilized in the power supply (13).

## Electrical connection

| Type TE-1<br>as standard | Type TE-1w<br>3-wire circuit |  |         |                |                                |  |
|--------------------------|------------------------------|--|---------|----------------|--------------------------------|--|
|                          |                              | Connection for   | Typ     | Control status | Terminals                      |  |
|                          |                              | Relay output<br>(41 not applicable<br>with 3-wire circuit) | O       | $x \geq w^*$   | 41 break (SPST-NC)             |  |
|                          |                              |  | S       | $x \leq w$     | 42 common<br>43 make (SPST-NO) |  |
|                          |                              | Supply   | Code    |                | L1 line                        |  |
|                          |                              |  | AC      |                |                                |  |
|                          |                              | Resistance thermometer<br>in 2-wire circuit                |         |                | L+                             |  |
|                          |                              |  |         |                | L-                             |  |
|                          |                              | Resistance thermometer<br>in 3-wire circuit (Pt100)        | w       | t              | 11<br>12                       |  |
|                          |                              | Thermocouple<br>(NiCr-Ni)                                  | w...-dl | t              | 11<br>12<br>14                 |  |

\*  $x$  = process value,  $w$  = setpoint



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## Dimensions

|  |  |
|--|--|
| <p>Type TE-1<br/>is standard</p>                         |  |
| <p><b>Extra code</b></p>                                 |  |
| <p>ka<br/>with terminal cover</p>                        |  |
| <p>b3<br/>for front-panel mounting</p>                   |  |
| <p>sw<br/>housing, polycarbonate<br/>IP65 protection</p> |  |
| <p>Temperature probe</p>                                 | <p>see Data Sheet 60.5521;<br/>see sectional catalog 90 "Transducers" for additional temperature probes and styles</p> |

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## Order details for the Electronic Thermostat TE-1

### Stock items:

(delivery 3 working days after receipt of order)

Supply voltage 230 V AC +10/-15%, 48 – 63 Hz

| Sales No.   | Type    | Control range °C | Probe input                      |
|-------------|---------|------------------|----------------------------------|
| 60/60001962 | TE-1w O | -50+30           | Pt100<br>in<br>2-wire circuit    |
| 60/60001923 | TE-1w O | -20+40           |                                  |
| 60/60001924 | TE-1w O | 0+50             |                                  |
| 60/60001925 | TE-1w O | 0+100            |                                  |
| 60/60001953 | TE-1w O | 0+150            |                                  |
| 60/60001954 | TE-1w O | 0+200            |                                  |
| 60/60001955 | TE-1w O | 0+300            |                                  |
| 60/60001956 | TE-1w O | 0+400            |                                  |
| 60/60001961 | TE-1w O | 0+500            | Thermocouple<br>NiCr-Ni (Type K) |
| 60/60002137 | TE-1t O | +200+600         |                                  |
| 60/60002138 | TE-1t O | +400+800         |                                  |
| 60/60002139 | TE-1t O | +600+1000        |                                  |
| 60/60002140 | TE-1t O | +800+1200        |                                  |

### Non-stock items:

| Order code | (1) Basic type   |                                |          |
|------------|--|--------------------------------|----------|
| 605501     | TE-1   |                                |          |
|            | (2) Basic type extension   |                                |          |
| 11         | TE-1 wO with break action  | for Pt100 in 2-wire circuit    | standard |
| 12         | TE-1 wS with make action   | for Pt100 in 2-wire circuit    | standard |
| 21         | TE-1 wO with break action  | for Pt100 in 3-wire circuit    |          |
| 22         | TE-1 wS with make action   | for Pt100 in 3-wire circuit    |          |
| 31         | TE-1 tO with break action  | for thermocouples NiCr-Ni      |          |
| 32         | TE-1 tS with make action   | for thermocouples NiCr-Ni      |          |
|            | (3) Control ranges   |                                |          |
| 011        | -50 to 30°C  |                                |          |
| 013        | -20 to 40°C  |                                |          |
| 021        | 0 to 50°C  |                                |          |
| 025        | 0 to 100°C   |                                |          |
| 027        | 0 to 150°C   | only with                      |          |
| 028        | 0 to 200°C   | Pt100 resistance thermometer   |          |
| 030        | 0 to 300°C   |                                |          |
| 031        | 0 to 400°C   |                                |          |
| 032        | 0 to 500°C   |                                |          |
| 086        | 200 to 600°C   |                                |          |
| 087        | 400 to 800°C   |                                |          |
| 088        | 600 to 1000°C  | only with NiCr-Ni thermocouple |          |
| 089        | 800 to 1200°C  |                                |          |
|            | (4) Supply   |                                |          |
| 02         | 230 V AC +10/-15%, 48 – 63 Hz                                    |                                |          |
| 05         | 115 V AC +10/-15%, 48 – 63 Hz                                    |                                |          |
| 29         | 24 V DC +10/-15%   |                                |          |
|            | (5) Extra codes  |                                |          |
| 706        | <b>b3</b> front-panel mounting by 2 screws M3                    |                                |          |
| 717        | <b>ka</b> terminal cover, IP40 protection                        |                                |          |
| 718        | <b>sw</b> dust-tight and waterjet-proof housing, IP65 protection |                                |          |

#### Order code

(1) 605501 / (2) .. - (3) ... - (4) .. / (5) ...

#### Order example

605501 / 11 - 025 - 02 / 706

TE-1 wO with break action, for Pt100 in 2-wire circuit  
 control range 0 to +100°C  
 230 V AC +10/-15%, 48 – 63 Hz  
 front-panel mounting by 2 screws M3

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## Resistance Thermometer with Pt100 resistance sensor 2DIN IEC Class B

- for temperatures from -50 to +400°C
- high measurement accuracy and long-term stability
- short response time, 50% time in water approx. 5sec, in air approx. 60sec

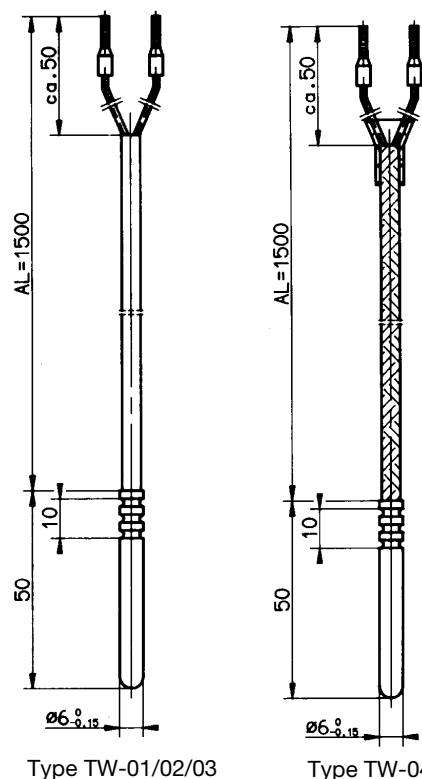
### General application

Resistance thermometers are used for direct temperature measurement, for instance in air-conditioning and refrigeration, in heating systems, ovens and in equipment engineering.

Thanks to standardized reference values, resistance thermometers can be interchanged without the need for recalibrating indicators, controllers or recorders. The resistance values and their permissible tolerances are specified in standard tables.

### Principle of operation

The resistance thermometer is based on the principle of measuring the change in resistance of metal wires with temperature. The resistance sensors are made from platinum wire, and its resistance is an indication of the particular temperature. In accordance with IEC 751, the resistance of a Pt100 at 0°C is 100Ω. At higher temperatures, the resistance is correspondingly higher, and at lower temperatures it is smaller.



### Technical data / Stock items

| Sales No.   | Type  | Temperature probe          |                            | Material            | Connecting cable: stranded wire 2 x 0.35mm <sup>2</sup> |               |        |
|-------------|-------|----------------------------|----------------------------|---------------------|---|---------------|--------|
|             |       | Operating temperature min. | Operating temperature max. |                     | Operating temp. max.                                    | Material      | Length |
| 60/00085315 | TW-01 | - 5°C                      | + 80°C                     | st. steel<br>1.4303 | + 80°C  | PVC           | 1.5m   |
| 60/00085316 | TW-02 | - 5°C                      | +105°C                     |                     | +105°C  | PUR           |        |
| 60/00085313 | TW-03 | -50°C                      | +200°C                     |                     | +180°C  | silicone      |        |
| 60/00085311 | TW-04 | -50°C                      | +400°C                     |                     | +400°C  | CrNi braiding |        |

For other resistance thermometers to DIN specification and in special versions (also for temperatures up to +500°C), see the Sectional Catalog "Transducers".

Protection tube in brass, steel or CrNi as push-in pocket U G<sup>1</sup>/<sub>2</sub>, length 100 – 300mm as per Data Sheet 60.6710.

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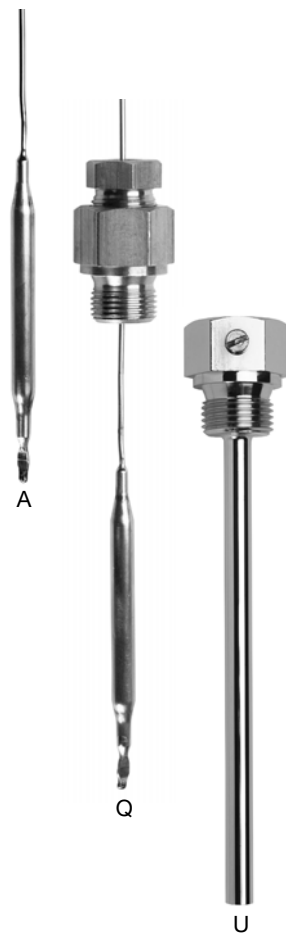


## Process connections for thermostats

- Temperature probes
- Screw fittings
- Pockets

### Temperature probes

| Order code:     | 1                                  | 2                                     | 3                  |    |   |   |                                     |
|-----------------|------------------------------------|---------------------------------------|--------------------|----|---|---|-------------------------------------|
| Outline drawing | Designation                        | Material                              | Probe dia. d in mm |    |   |   | Notes                               |
|                 | plain cylindrical bulb<br><b>A</b> | Cu (copper)<br>CrNi (stainless steel) | 5                  | 6  | 7 | 8 | other probe diameters on request    |
| Order code:     | 606710-10                          | 40 20                                 | 5                  | 6  | 7 | 8 |                                     |
|                 | coiled bulb<br><b>H</b>            | Cu (copper)                           | 17                 | 35 |   |   | up to +200°C max. probe temperature |
| Order code:     | 606710-15                          | 40                                    | 17                 | 35 |   |   |                                     |



|                |           |          |          |
|----------------|-----------|----------|----------|
|                | <b>1</b>  | <b>2</b> | <b>3</b> |
| Order code:    | 606710-.. | - ..     | - .      |
| Order example: | 606710-10 | - 20     | - 8      |

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**Screw fittings**

| Order code:     | 1   | 2                        |                           |                          | 3                      |            |                        | 4   | 5                  |   |   |   | 6                 |                        |
|-----------------|---|--------------------------|---------------------------|--------------------------|------------------------|------------|------------------------|---|--------------------|---|---|---|-------------------|------------------------|
| Outline drawing | Designation   | Thread G                 |                           |                          | Material of connection |            |                        | Immersion tube length S in mm                                   | Probe dia. d in mm |   |   |   | Material of probe |                        |
|                 | screw fitting <b>B</b><br>probe mounting C with loose nipple, threaded at both ends                                   | G 1/2<br>L1=14<br>27 a/f | G 3/8<br>L1=12<br>22 a/f  | G 3/4<br>L1=16<br>32 a/f | CuZn (brass)           | St (steel) | CrNi (stainless steel) | 100<br>120<br>150<br>200<br>300<br>400<br>details in plain text | 5                  | 6 | 7 | 8 | Cu (copper)       | CrNi (stainless steel) |
| Order code:     | 606710-50   | 13                       | 12                        | 14                       | 46                     | 01         | 20                     | ...   | 5                  | 6 | 7 | 8 | 40                | 20                     |
|                 | screw fitting <b>C</b><br>plain cylindrical bulb with shoulder and union nut. Shoulder brazed or welded to capillary. | G 1/2<br>L1=10<br>27 a/f | G 3/8<br>L1=7,5<br>22 a/f | G 3/4<br>L1=11<br>32 a/f | CuZn (brass)           | St (steel) | CrNi (stainless steel) | 100<br>120<br>150<br>200<br>300<br>400<br>details in plain text | 5                  | 6 | 7 | 8 | Cu (copper)       | CrNi (stainless steel) |
| Order code:     | 606710-52   | 13                       | 12                        | 14                       | 46                     | 01         | 20                     | ...   | 5                  | 6 | 7 | 8 | 40                | 20                     |
|                 | screw fitting <b>D</b><br>plain cylindrical bulb, threaded connector brazed or welded to capillary.                   | G 1/2<br>L1=14<br>27 a/f | G 3/8<br>L1=12<br>22 a/f  |                          | CuZn (brass)           | St (steel) | CrNi (stainless steel) | 100<br>120<br>150<br>200<br>300<br>400<br>details in plain text | 5                  | 6 | 7 | 8 | Cu (copper)       | CrNi (stainless steel) |
| Order code:     | 606710-54   | 13                       | 12                        |                          | 46                     | 01         | 20                     | ...   | 5                  | 6 | 7 | 8 | 40                | 20                     |

Process connection B, C and D: max. permissible pressure with instrument function STB, STW (STB) = 2 bar / TR, TW and TB on request.

|                 |           |   |    |   |    |   |     |   |   |   |    |
|-----------------|-----------|---|----|---|----|---|-----|---|---|---|----|
| Order code:     | 606710-.. | - | .. | - | .. | - | ... | - | . | - | .. |
| Order example : | 606710-50 | - | 13 | - | 20 | - | 200 | - | 6 | - | 20 |

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## Screw fittings

| Order code:     | 1   | 2                                     |                                       | 3            |                        |  |
|-----------------|---|---------------------------------------|---------------------------------------|--------------|------------------------|--|
| Outline drawing | Designation   | Thread                                |                                       | Material     |                        | Notes  |
|                 | <p>screw fitting<br/> <b>Q</b><br/>           thread at both ends, for retrofitting on capillary.<br/>           Max. probe temperature +200°C.</p> | G 1/2<br>L <sub>1</sub> =14<br>27 a/f | G 3/8<br>L <sub>1</sub> =12<br>22 a/f | CuZn (brass) | CrNi (stainless steel) | Only suitable for probe dia. d up to 8 mm.<br>For use in unpressurized media <b>only</b> . |
| Order code:     | 606710-60   | 13                                    | 12                                    | 46           | 20                     |  |
|                 | <p>screw fitting<br/> <b>V</b><br/>           sealing gland for retrofitting on capillary.<br/>           Max. probe temperature +200°C.</p>        | M 14 x 1<br>19 a/f                    |                                       | CuZn (brass) | CrNi (stainless steel) | Only suitable for probe dia. d up to 6 mm.<br>For use in unpressurized media <b>only</b> . |
| Order code:     | 606710-65   | 35                                    |                                       | 46           | 20                     |  |

Order code: 

|           |
|-----------|
| 1         |
| 606710-.. |

 - 

|    |
|----|
| 2  |
| .. |

 - 

|    |
|----|
| 3  |
| .. |

Order example: 

|           |
|-----------|
| 1         |
| 606710-60 |

 - 

|    |
|----|
| 2  |
| 13 |

 - 

|    |
|----|
| 3  |
| 20 |

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## Pockets

| Order code:     | 1   | 2   |   | 3            |            |                        | 4  | 5   |                                    |                                     |
|-----------------|---|---|---|--------------|------------|------------------------|--|---|------------------------------------|-------------------------------------|
| Outline drawing | Designation   | Thread G                                      |   | Material     |            |                        | Immersion tube length S in mm                                      | Immersion tube dia. D in mm                                       |                                    |                                     |
|                 | screw-in pocket<br><b>U</b><br>with<br>screw-in spigot, Form<br>A to<br>DIN 3852/2<br>with<br>fixing screw  | G 1/2<br><br>L <sub>1</sub> =14<br><br>27 a/f | G 3/8<br><br>L <sub>1</sub> =12<br><br>24 a/f | CuZn (brass) | St (steel) | CrNi (stainless steel) | 100<br>120<br>150<br>200<br>300<br>400<br>details<br>in plain text | 8<br>(in-<br>side<br>dia.<br>6.5)                                 | 10<br>(in-<br>side<br>dia.<br>8.5) | 15<br>(in-<br>side<br>dia.<br>13.5) |
| Order code:     | 606710-20   | 13  | 12  | 46           | 01         | 20                     | ...  | 8   | 10                                 | 15                                  |
|                 | screw-in pocket<br><b>UO</b><br>open at<br>end,<br>with<br>screw-in spigot, Form<br>A to<br>DIN 3852/2<br>with<br>fixing screw<br>(clip for securing<br>bulb supplied with<br>code f) | G 1/2<br><br>L <sub>1</sub> =14<br><br>27 a/f | G 3/8<br><br>L <sub>1</sub> =12<br><br>24 a/f | CuZn (brass) | St (steel) | CrNi (stainless steel) | 100<br>120<br>150<br>200<br>300<br>400<br>details<br>in plain text | 8<br>(in-<br>side<br>dia.<br>6.5)                                 |                                    |                                     |
| Order code:     | 606710-21   | 13  | 12  | 46           | 01         | 20                     | ...  | 8   |                                    |                                     |
|                 | weld-in pocket<br><b>US</b><br>with<br>fixing screw   | no thread                                     |   |              | St (steel) | CrNi (stainless steel) | 100<br>120<br>150<br>200<br>300<br>400<br>details<br>in plain text |   | 10<br>(in-<br>side<br>dia.<br>8.5) | 15<br>(in-<br>side<br>dia.<br>13.5) |
| Order code:     | 606710-22   | 00  |   |              | 01         | 20                     | ...  |   | 10                                 | 15                                  |
|                 | weld-in pocket<br><b>US</b><br>with<br>fixing screw,<br>immersion tube<br>tapered from<br>12 to 8 mm  | no thread                                     |   |              | St (steel) | CrNi (stainless steel) | 100<br>120<br>150<br>200<br>300<br>400<br>details<br>in plain text | immersion tube<br>tapered from 12 to<br>8 mm<br>(inside dia. 6.5) |                                    |                                     |
| Order code:     | 606710-23   | 00  |   |              | 01         | 20                     | ...  | 8   |                                    |                                     |

|                |           |   |    |   |    |   |     |   |    |
|----------------|-----------|---|----|---|----|---|-----|---|----|
| Order code:    | 606710-.. | - | .. | - | .. | - | ... | - | .. |
| Order example: | 606710-20 | - | 13 | - | 01 | - | 100 | - | 10 |

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**Pockets**

| Order code:     | 1  | 2         | 3     | 4            | 5  |                                |                                 |                                  |    |
|-----------------|--|-----------|-------|--------------|--|--------------------------------|---------------------------------|----------------------------------|----|
| Outline drawing | Designation  | Thread G  |       | Material     | Immersion tube length S in mm                                      | Immersion tube dia. D in mm    |                                 |                                  |    |
|                 | screw-in pocket<br><b>UH</b><br>with<br>fixing screw,<br><b>no</b> sealing shoulder,<br>for sealing with<br>hemp   | G 1/2     |       | CuZn (brass) | 120  | 15 mm                          |                                 |                                  |    |
| Order code:     | 606710-24  | 13        |       | 46           | 120  | 15                             |                                 |                                  |    |
|                 | screw-in pocket<br><b>UZ</b><br>with<br>fixing screw and ex-<br>tension, for theros-<br>tat with rigid stem and<br>probe temperature<br>above +150°C                     | G 1/2     | G 3/8 | St (steel)   | 100<br>120<br>150<br>200<br>300<br>400<br>details<br>in plain text | 8 (in-<br>side<br>dia.<br>6.5) | 10 (in-<br>side<br>dia.<br>8.5) | 15 (in-<br>side<br>dia.<br>13.5) |    |
| Order code:     | 606710-30  | 13        | 12    | 01           | 20   | ...                            | 8                               | 10                               | 15 |
|                 | screw-in pocket<br><b>UZO</b><br>open at<br>end,<br>with<br>fixing screw and ex-<br>tension, for theros-<br>tat with rigid stem and<br>probe temperature<br>above +150°C | G 1/2     | G 3/8 | St (steel)   | 100<br>120<br>150<br>200<br>300<br>400<br>details<br>in plain text | 8                              |                                 |                                  |    |
| Order code:     | 606710-31  | 13        | 12    | 01           | 20   | ...                            | 8                               |                                  |    |
|                 | weld-in pocket<br><b>UZS</b><br>with<br>fixing screw and ex-<br>tension, for theros-<br>tat with rigid stem and<br>probe temperature<br>above +150°C                     | no thread |       | St (steel)   | 100<br>120<br>150<br>200<br>300<br>400<br>details<br>in plain text |                                | 10 (in-<br>side<br>dia.<br>8.5) | 15 (in-<br>side<br>dia.<br>13.5) |    |
| Order code:     | 606710-32  | 00        |       | 01           | 20   | ...                            |                                 | 10                               | 15 |

Order code:  -  -  -  -

Order example:  -  -  -  -



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**Pockets**

| Order code:     | 1  | 2                                     |                                       | 3            |            |                        | 4   | 5  |                       |                        |
|-----------------|--|---------------------------------------|---------------------------------------|--------------|------------|------------------------|---|--|-----------------------|------------------------|
| Outline drawing | Designation  | Thread G                              |                                       | Material     |            |                        | Immersion tube length S in mm                                   | Immersion tube dia. D in mm                              |                       |                        |
|                 | screw-in pocket <b>E</b><br>with screw-in spigot*, Form A to DIN 3852/2, pocket secured with union nut, probe mounting C. (52)   | G 1/2<br>L <sub>1</sub> =14<br>27 a/f | G 3/8<br>L <sub>1</sub> =12<br>22 a/f | CuZn (brass) | St (steel) | CrNi (stainless steel) | 100<br>120<br>150<br>200<br>300<br>400<br>details in plain text | 8 (in-side dia. 6.5)                                     | 10 (in-side dia. 8.5) |                        |
| Order code:     | 606710-40  | 13                                    | 12                                    | 46           | 01         | 20                     | ...   | 8  | 10                    | 15                     |
|                 | weld-in pocket <b>ES</b><br>for thermostats with capillary, with welding shoulder. Pocket secured with union nut, probe mounting C. (52)   | no thread                             |                                       |              | St (steel) | CrNi (stainless steel) | 100<br>120<br>150<br>200<br>300<br>400<br>details in plain text |  | 10 (in-side dia. 8.5) |                        |
| Order code:     | 606710-41  | 00                                    |                                       |              | 01         | 20                     | ...   |  | 10                    | 15                     |
|                 | weld-in pocket <b>ES</b><br>immersion tube tapered from 12 to 8 mm, for thermostats with capillary, with welding shoulder. Pocket secured with union nut, probe mounting C. (52) | no thread                             |                                       |              | St (steel) | CrNi (stainless steel) | 100<br>120<br>150<br>200<br>300<br>400<br>details in plain text | immersion tube tapered from 12 to 8 mm (inside dia. 6.5) |                       |                        |
| Order code:     | 606710-42  | 00                                    |                                       |              | 01         | 20                     | ...   | 8  |                       |                        |
|                 | weld-in pocket <b>EZS</b><br>with thread G <sup>3</sup> / <sub>4</sub> on instrument side and extension, for thermostats with rigid stem and probe temperature above +150°C      | no thread                             |                                       |              | St (steel) | CrNi (stainless steel) | 100<br>120<br>150<br>200<br>300<br>400<br>details in plain text |  | 10 (in-side dia. 8.5) | 15 (in-side dia. 13.5) |
| Order code:     | 606710-45  | 00                                    |                                       |              | 01         | 20                     | ...   |  | 10                    | 15                     |

Order code:  -  -  -  -

Order example:  -  -  -  -

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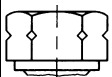
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## Permissible loading on the pocket Pockets U, US, UZ, UZS, E, ES and EZS

The values below refer to the maximum loading on the corresponding probe mounting.  
 The maximum pressure that can be sealed depends on the mounting conditions and may be lower.

### Steel pocket

| Material | Tube      | Screw-in nipple up to 300°C | Screw-in nipple up to 450°C | Weld-in nipple                |  |
|----------|-----------|-----------------------------|-----------------------------|-------------------------------|---|
|          | St 35.8 I | 9 SMnPb28 K                 | 16 Mo 3<br>(turned groove)  | 16 Mo 3<br>(no turned groove) |   |

| Loading                      | Temperature | Tube diameter D      |              |              |
|------------------------------|-------------|----------------------|--------------|--------------|
|                              |             | 8 x 0.75 mm or taper | 10 x 0.75 mm | 15 x 0.75 mm |
| Maximum permissible pressure |             |                      |              |              |
|                              | 100°C       | 89 bar               | 72 bar       | 48 bar       |
|                              | 150°C       | 83 bar               | 67 bar       | 45 bar       |
|                              | 200°C       | 78 bar               | 63 bar       | 42 bar       |
|                              | 300°C       | 59 bar               | 47 bar       | 32 bar       |
|                              | 350°C       | 50 bar               | 40 bar       | 27 bar       |
|                              | 400°C       | 46 bar               | 37 bar       | 25 bar       |
|                              | 450°C       | 24 bar               | 19 bar       | 13 bar       |

| Max. permissible operating temperature   | Tube      | Nipple      | Max. permissible operating temperature* |         |
|--|-----------|-------------|---|---------|
|  | St 35.8 I | 9 SMnPb28 K | static load                             | no load |
|  |           | 16 Mo 3     | +300°C                                  | +530°C  |
| * Please observe the maximum permissible probe temperature for the corresponding thermostat version.<br>At operating temperatures above +420°C: operating time with static load is limited to 200,000 hrs. TRD 508 must be observed.<br>Pockets UO and UZO: for use in unpressurized media only. |           |             |   |         |

### Stainless steel pocket

| Material | Tube and nipple: X 6 CrNiMoTi 17 122 (1.4571) |
|----------|---|
|----------|---|

| Loading                      | Temperature | Tube diameter D      |              |              |
|------------------------------|-------------|----------------------|--------------|--------------|
|                              |             | 8 x 0.75 mm or taper | 10 x 0.75 mm | 15 x 0.75 mm |
| Maximum permissible pressure |             |                      |              |              |
|                              | 100°C       | 92 bar               | 74 bar       | 50 bar       |
|                              | 150°C       | 88 bar               | 71 bar       | 48 bar       |
|                              | 200°C       | 83 bar               | 67 bar       | 45 bar       |
|                              | 300°C       | 72 bar               | 58 bar       | 39 bar       |
|                              | 400°C       | 67 bar               | 54 bar       | 36 bar       |

| Max. permissible operating temperature* | static load +400°C   |  | no load +530°C |  |
|---|--|--|----------------|--|
|   | * Please observe the maximum permissible probe temperature for the corresponding thermostat version. |  |                |  |

### Brass pocket

| Material | Tube and nipple: brass (CuZn) |
|----------|-------------------------------|
|----------|-------------------------------|

| Loading                      | Temperature | Tube diameter D |              |              |
|------------------------------|-------------|-----------------|--------------|--------------|
|                              |             | 8 x 0.75 mm     | 10 x 0.75 mm | 15 x 0.75 mm |
| Maximum permissible pressure |             |                 |              |              |
|                              | 100°C       | 50 bar          | 40 bar       | 27 bar       |
|                              | 150°C       | 48 bar          | 39 bar       | 26 bar       |

| Max. permissible operating temperature* | +150°C   |  |  |  |
|---|--|--|--|--|
|   | * Please observe the maximum permissible probe temperature for the corresponding thermostat version. |  |  |  |

| Pocket UH*   | Temperature | Maximum permissible pressure |
|--|-------------|------------------------------|
|  | 110°C       | 16 bar                       |
| * Please observe the maximum permissible probe temperature for the corresponding thermostat version. |             |                              |

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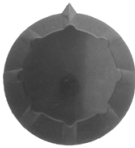





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# JUMO setpoint adjusters for thermostats, EM series

**Individual components:  
spindle-fitting knobs, adjustable stops, setpoint dials, surrounds, screws**

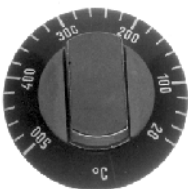






|   |  |   |  |
|---|--|---|--|
| <p>01</p>    | <p>21</p>    | <p>11</p>   | <p>18</p>                                   |
| <p>02</p>    |  | <p>12</p>   |  |
| <p><b>01</b><br/> <b>Spindle-fitting knobs for pushing onto 6 mm dia. shafts, with 4.6 mm flat</b></p> <p><b>Part no. 60 701 205</b></p> <p>Max. dia. 30.0 mm<br/>       Height 19.0 mm<br/>       Index radius 17.5 mm<br/>       Panel hole 14.0 mm<br/>       Operating temperature +120 °C<br/>       Material thermoplastic, slate grey RAL 7015</p> <p><b>02</b><br/> <b>Part no. 61 079 200</b><br/>       As above, but with adjustable pointer relative to spindle flat<br/>       Cap, light grey, RAL 7035</p> | <p><b>21</b><br/> <b>Setpoint dial (see Data Sheet 60.2021 for standard ranges)</b></p> <p>Outer dia. 50.0 mm<br/>       Height 4.8 mm<br/>       Fixing with two M3 screws<br/>       Spacing 22.0 mm<br/>       Marking iron-grey RAL 7011</p> <p>Operating temperature +120 °C<br/>       Material thermoplastic, flint grey RAL 7032</p> <p>Dial divisions over 250° angle</p> | <p><b>11</b><br/> <b>Stop for knobs 01 and 02</b></p> <p><b>Part no. 60 701 203</b></p> <p>Limiting to limit the scale max. endpoint, right stop<br/>       Adjustment 125 to 250° angle</p> <p><b>12</b><br/> <b>Stop for knob 01 only</b><br/> <b>Part no. 60 701 202</b><br/>       Limiting to limit the scale min. starting point, left stop<br/>       Adjustment 0 to 125° angle</p> | <p><b>18</b><br/> <b>Fixing screws M3 x 8 DIN 84</b></p> <p><b>Part no. 60 037 100</b></p> <p>Material nickel-plated brass</p> |

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|---|---|---|--|
|    |    |   |   |
|    |   |   |   |
| <p><b>07</b><br/> <b>Spindle-fitting knobs for pushing onto 6 mm dia. shafts, with 4.6 mm flat (see Data Sheet 60.2021 for standard ranges)</b></p> <p>Max. dia. 41.0 mm<br/>       Height 18.0 mm<br/>       Panel hole 16.0 mm<br/>       Operating temperature +80 °C<br/>       Material thermoplastic, slate grey RAL 7015<br/>       Marking white</p> <p><b>08</b><br/> <b>Knob</b><br/> <b>Part no. 64 336 008</b><br/>       As above, but with pointer as index</p> | <p><b>23</b><br/> <b>Surround</b></p> <p><b>Part no. 63 202 000</b><br/>       Max. dia. 47 mm<br/>       Max. height 7.3 mm<br/>       Fixing spacing a) 22 mm<br/>       b) 28 mm</p> <p>Fixing for a) 2 screws M3 x 8<br/>       b) 2 screws M4 x 8</p> <p>Operating temperature +80 °C<br/>       Material thermoplastic, bright chrome electroplated</p> | <p><b>15</b><br/> <b>Stop</b></p> <p><b>Part no. 63 205 002</b><br/>       Limiting to limit the max. and min. of the scale starting point or end point<br/>       Adjustment -125° or +125° angle<br/>       Fixing spacing 22 mm</p> <p><b>16</b><br/> <b>Stop</b><br/> <b>Part no. 63 205 001</b><br/>       As above, but with fixing spacing 28 mm</p> | <p><b>18</b><br/> <b>Fixing screws</b></p> <p><b>Part no. 60 037 100</b><br/>       M3 x 8 DIN 84 for spacing 22 mm</p> <p><b>19</b><br/> <b>Fixing screws</b></p> <p><b>Part no. 00 000 128</b><br/>       M4 x 8 DIN 84 for spacing 28 mm<br/>       Material brass tenned</p> |

**Standard setpoint adjusters for panel-mounting thermostats EMf-1**

|   |  |  |
|---|--|--|
| <p><b>Type W1</b><br/>       consisting of knob 01<br/>       adjustable stop 11<br/>       setpoint dial 21<br/>       2 screws 18</p> | <p><b>Type W8</b><br/>       consisting of knob 07<br/>       surround 23<br/>       adjustable stop 15<br/>       2 screws 18</p> | <p><b>Type W8 (heatTHERM)</b><br/>       consisting of knob 07<br/>       surround 23<br/>       adjustable stop 16<br/>       2 screws M4 x 8</p> |
|---|--|--|

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## Contents:

## Dial thermometers

| Series | Class | Protection | No. |
|--------|-------|------------|-----|
|--------|-------|------------|-----|

### Dial thermometers with bimetal measuring system

|                        |     |              |         |
|------------------------|-----|--------------|---------|
| Standard version       | 1.5 | IP51         | 60.8001 |
| Industrial version     | 1   | IP54 or IP65 | 60.8002 |
| Chemical plant version | 1   | IP65         | 60.8003 |
| Transformer version    | 1.5 | IP55         | 60.8005 |

### Dial thermometers with liquid- or gas-filled measuring system

#### Indicators

|   |     |              |         |
|---|-----|--------------|---------|
| Temperature indicator in stainless steel case                   | 1.5 | IP53 or IP65 | 60.8201 |
| Temperature indicator in plastic case                           | 2   | IP53         | 60.8202 |
| Temperature indicator in stainless steel case with bayonet lock | 1   | IP65         | 60.8225 |

#### Temperature switches

|   |  |              |         |
|---|--|--------------|---------|
| Bimetal temperature switch with a fixed switching temperature |  | IP52 or IP65 | 60.8301 |
|---|--|--------------|---------|

#### Controllers with slow-break contact

|   |   |       |         |
|---|---|-------|---------|
| Contact dial thermometer<br>with indication for panel or surface mounting | 1 | IP 65 | 60.8425 |
|---|---|-------|---------|

#### Controllers with microswitch contact

|   |     |              |         |
|---|-----|--------------|---------|
| MICROSTAT-M with 1 microswitch for panel mounting   | 2   | IP53         | 60.8501 |
| MICROSTAT-M with 2 microswitches for panel mounting   | 2   | IP53         | 60.8502 |
| MICROSTAT-M1 with 1 microswitch for panel mounting, low cost version  | 2   | IP53         | 60.8504 |
| MICROSTAT-M with 1 microswitch for panel mounting   | 1.5 | IP53         | 60.8510 |
| Contact dial thermometer for panel mounting or self-supporting  | 1.5 | IP51 or IP53 | 60.8520 |
| Contact dial thermometer for panel mounting or self-supporting<br>in stainless steel case with bayonet lock | 1.5 | IP65         | 60.8523 |
| Contact thermometer-TF, transformer and industrial versions   | 1.5 | IP54         | 60.8540 |

### Digital indicators with integrated transmitter

|          |  |      |         |
|----------|--|------|---------|
| dTHERM-M |  | IP65 | 60.8624 |
|----------|--|------|---------|

### Special devices, Accessories

|   |  |  |         |
|---|--|--|---------|
| Process Connections for Dial Thermometers<br>Temperature probes (TF), Process connections (TA), Pockets (SH)<br>(prices on request) |  |  | 60.8730 |
|---|--|--|---------|

### Timers

|  |  |  |         |
|--|--|--|---------|
| with mechanical drive or synchronous motor |  |  | 60.8901 |
|--|--|--|---------|

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## Dial Thermometer Standard Version

- Temperature indicator with a bimetal sensing system
- Steel housing
- Class 1.5
- IP51 protection
- Housing sizes: 50 mm, 63 mm, 80 mm, 100 mm and 160 mm dia.

### Brief description

Standard version dial thermometers are instruments for universal use in on-site temperature measurement.



Type 608001/1810

### Technical data

|                                   | Basic type extensions   |   |
|-----------------------------------|---|---|
|                                   | 0150, 0163, 0180, 0110, 1863, 1880, 1810  | 0116, 1816                                    |
| <b>Housing</b>                    | housing and bezel in zinc-plated steel<br>angle block in aluminium (style 18)               | housing and bezel in stainless steel (1.4301) |
| <b>Protection</b>                 | IP51 to DIN 60 529  |   |
| <b>Window</b>                     | glass, with extra code 432 in plexiglass (PMMA)   |   |
| <b>Scale</b>                      | blank aluminium, black lettering  |   |
| <b>Indication</b>                 | linear, Class 1.5 similar to EN 13190   |   |
| <b>Response time</b>              | $t_{0.9}$ response approx 30 sec (measured in agitated water with a 10 mm dia. brass probe) |   |
| <b>Ambient temperature effect</b> | no effect   |   |
| <b>Limit temperatures</b>         | -30 to +80°C (storage and transport -30 to +80°C)   |   |
| <b>Nominal position</b>           | unrestricted  |   |

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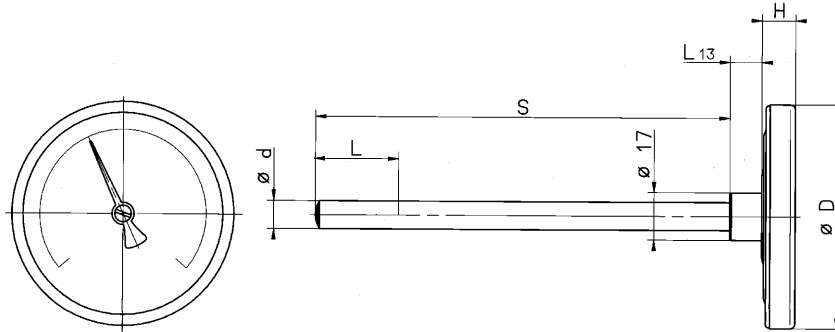
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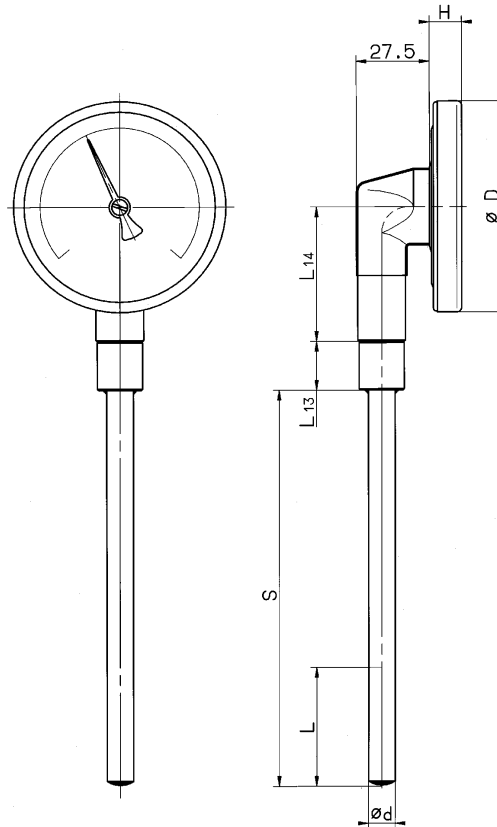


## Dimensions

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 608001/0163  
 608001/0180  
 608001/0110  
 608001/0116



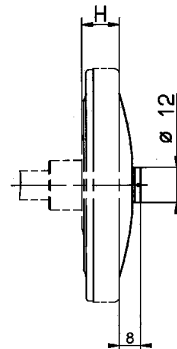
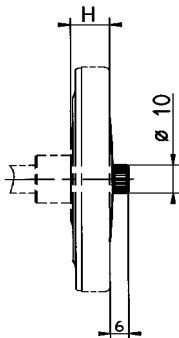
Types: 608001/1863  
 608001/1880  
 608001/1810  
 608001/1816



Extra codes

430

432



| Type        | Ø D | H  | L <sub>14</sub> |
|-------------|-----|----|-----------------|
| 608001/0150 | 50  | 13 | --              |
| 608001/0163 | 63  | 14 | --              |
| 608001/1863 |     |    | 26              |
| 608001/0180 | 80  | 13 | --              |
| 608001/1880 |     |    | 51              |
| 608001/0110 | 100 | 18 | --              |
| 608001/1810 |     |    | 51              |
| 608001/0116 | 160 | 19 | --              |
| 608001/1816 |     |    | 81              |

See Data Sheet 60.8730 for dimensions Ø d and L<sub>13</sub>.

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## Order details

### Dial thermometer, standard version, Type 608001

| Order code                         | (1) Basic type  |  |
|------------------------------------|---|--|
| 608001                             | Mechanical dial thermometer, standard version, Class 1.5                              |  |
| <b>(2) Basic type extensions</b>   |   |  |
| 0150                               | Style 01; housing size: 50 mm dia.  |  |
| 0163                               | Style 01; housing size: 63 mm dia.  |  |
| 0180                               | Style 01; housing size: 80 mm dia.  |  |
| 0110                               | Style 01; housing size: 100 mm dia.   |  |
| 0116                               | Style 01; housing size: 160 mm dia.   |  |
| 1863                               | Style 18; housing size: 63 mm dia.  |  |
| 1880                               | Style 18; housing size: 80 mm dia.  |  |
| 1810                               | Style 18; housing size: 100 mm dia.   |  |
| 1816                               | Style 18; housing size: 160 mm dia.   |  |
| <b>(3) Indication range (AB)</b>   |   |  |
| 628                                | -20 to + 40°C; measuring range -10 to + 30°C, accuracy 1.5°C                          |  |
| 632                                | -20 to + 60°C; measuring range -10 to + 60°C, accuracy 1.5°C                          |  |
| 635                                | -20 to + 80°C; measuring range -10 to + 70°C, accuracy 1.5°C                          |  |
| 639                                | -20 to +100°C; measuring range 0 to + 80°C, accuracy 3.0°C                            |  |
| 643                                | -20 to +120°C; measuring range 0 to +100°C, accuracy 3.0°C                            |  |
| 564                                | -30 to + 30°C; measuring range -20 to + 20°C, accuracy 1.5°C                          |  |
| 566                                | -30 to + 50°C; measuring range -20 to + 40°C, accuracy 1.5°C                          |  |
| 570                                | -30 to + 70°C; measuring range -20 to + 60°C, accuracy 1.5°C                          |  |
| 585                                | -30 to +170°C; measuring range -10 to +150°C, accuracy 3.0°C                          |  |
| 469                                | -40 to + 40°C; measuring range -30 to + 30°C, accuracy 1.5°C                          |  |
| 472                                | -40 to + 60°C; measuring range -30 to + 50°C, accuracy 1.5°C                          |  |
| 357                                | -50 to + 50°C; measuring range -40 to + 40°C, accuracy 1.5°C                          |  |
| 807                                | 0 to + 60°C; measuring range +10 to + 50°C, accuracy 1.5°C                            |  |
| 810                                | 0 to + 80°C; measuring range +10 to + 70°C, accuracy 1.5°C                            |  |
| 814                                | 0 to +100°C; measuring range +10 to + 90°C, accuracy 1.5°C                            |  |
| 818                                | 0 to +120°C; measuring range +20 to +100°C, accuracy 3.0°C                            |  |
| 826                                | 0 to +160°C; measuring range +20 to +140°C, accuracy 3.0°C                            |  |
| 832                                | 0 to +200°C; measuring range +20 to +180°C, accuracy 3.0°C                            |  |
| 834                                | 0 to +250°C; measuring range +30 to +220°C, accuracy 4.0°C                            |  |
| 840                                | 0 to +300°C; measuring range +30 to +270°C, accuracy 8.0°C                            |  |
| 843                                | 0 to +350°C; measuring range +50 to +300°C, accuracy 8.0°C                            |  |
| 848                                | 0 to +400°C; measuring range +50 to +350°C, accuracy 8.0°C                            |  |
| 854                                | 0 to +500°C; measuring range +50 to +450°C, accuracy 8.0°C                            |  |
| <b>(4) Process connection (PA)</b> |   |  |
| 010                                | TA 01; immersion tube with shoulder   |  |
| 844                                | TA 02; immersion tube with union nut and loose nipple <sup>2)</sup>                   |  |
| 845                                | TA 03; immersion tube with loose union nut  |  |
| 841                                | TA 04; immersion tube with fixed hexagon <sup>2)</sup>                                |  |
| 847                                | TA 06; immersion tube with sliding clamp fitting (20 bar max.) <sup>2)</sup>          |  |
| 018                                | TA 08; immersion tube with sliding fixing plate in zinc-plated steel and fixing screw |  |
| 858                                | SH04; screw-in pocket, one-piece  |  |
| 891                                | SH05; screw-in pocket, assembled  |  |
| 913                                | SH07; screw-in pocket, assembled, with fixing screw                                   |  |
| 820                                | SH09; weld-in pocket, assembled, with fixing screw                                    |  |



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## Order details

### Dial thermometer, standard version, Type 608001

|                   |   |
|-------------------|---|
| <b>Order code</b> | <b>(5) Diameter of process connection (PA)<sup>1)</sup></b>   |
| 6                 | 6 mm dia.   |
| 10                | 10 mm dia.  |
| 12                | 12 mm dia. (with SH05, SH07 only)   |
| 14                | 14 mm dia. (with SH05, SH07, SH09 only)   |
| 17                | 17 mm dia. (with SH04 only)   |
|                   | <b>(6) Thread for process connection (PA)<sup>1)</sup></b>  |
| 000               | no thread (TA01 only)   |
| 103               | G <sup>3</sup> / <sub>8</sub> thread  |
| 104               | G <sup>1</sup> / <sub>2</sub> thread  |
| 105               | G <sup>3</sup> / <sub>4</sub> thread  |
| 144               | 1/2-14NPT thread  |
|                   | <b>(7) Material of probe<sup>1)</sup></b>   |
| 01                | steel (St)  |
| 26                | stainless steel (CrNi, 1.4571)  |
| 46                | brass (CuZn) (up to 200°C)  |
|                   | <b>(8) Material of process connection (PA)<sup>1)</sup></b>   |
| 01                | steel (St)  |
| 26                | stainless steel (CrNi, 1.4571)  |
| 46                | brass (CuZn)  |
|                   | <b>(9) Fitting length of process connection (PA) (dimension S)</b>  |
| 50                | 50 mm   |
| 100               | 100 mm  |
| 150               | 150 mm  |
| 200               | 200 mm  |
| ...               | special length (details in plain text, in 50 mm steps)  |
|                   | <b>(10) Extra codes (TZ)</b>  |
| 000               | no extra code   |
| 430               | peak-reading pointer (only with basic type extension 0163, 0180, 0110, 1863, 1880, 1810, indication range span: 100 °C min.)  |
| 432               | marker (plexiglass window, only with basic type extension 0163, 0180, 0110, 1863, 1880, 1810, +70°C max. ambient temperature) |
| 522               | customized scale  |

Special versions on request!

#### Order code

(1) 608001 / (2) .... - (3) ... - (4) ... - (5) .. - (6) ... - (7) .. - (8) .. - (9) ... / (10) ... , ...

#### Order example

608001 / 0180 - 818 - 845 - 10 - 104 - 96 - 46 - 100 / 000<sup>3</sup> , ...

<sup>1</sup> See Data Sheet 60.8730 for description and features.

<sup>2</sup> Screw-in spigot to DIN 3852 Form A (not with NPT thread).

<sup>3</sup> List extra codes in sequence, separated by commas.

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## Dial Thermometers Industrial Version

- Temperature indicator with bimetal sensing system
- Stainless steel housing
- Class 1
- Protection IP65 max.
- Housing sizes: 50 mm, 60 mm, 80 mm,  
100 mm and 160 mm dia.

Dial thermometers, industrial version, are instruments for universal use in local temperature measurement.



Type 608002/1810

### Technical data

|                                   |   |
|-----------------------------------|---|
| <b>Housing</b>                    | housing and bezel in stainless steel (1.4301)<br>angle block in aluminium (Style 18)  |
| <b>Protection</b>                 | IP54 to EN 60 529 (IP65 with extra code 404)  |
| <b>Window</b>                     | glass, with extra code 404: plexiglass (PMMA)   |
| <b>Scale</b>                      | blank aluminium, black lettering  |
| <b>Accuracy class</b>             | Class 1 to EN 13190   |
| <b>Time constant</b>              | $t_{0.632}$ response approx. 20 sec (measured in agitated water with a 10 mm dia. stainless steel probe)                    |
| <b>Ambient temperature effect</b> | no effect   |
| <b>Limit temperatures</b>         | -30 to +80°C (with extra code 404: -20 to +70°C)<br>storage and transport: -30 to +80°C (with extra code 404: -20 to +70°C) |
| <b>Nominal position</b>           | unrestricted  |

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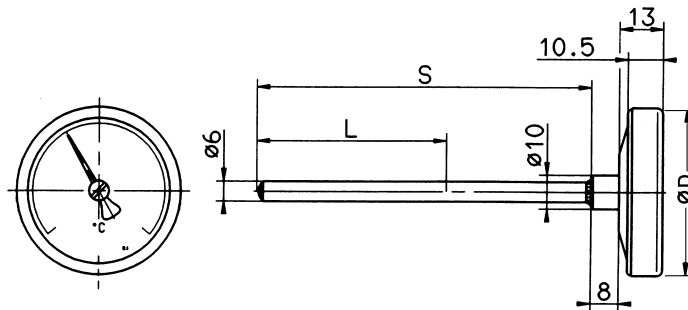
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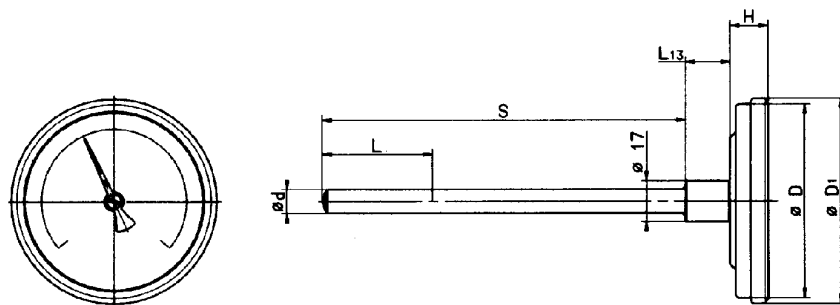


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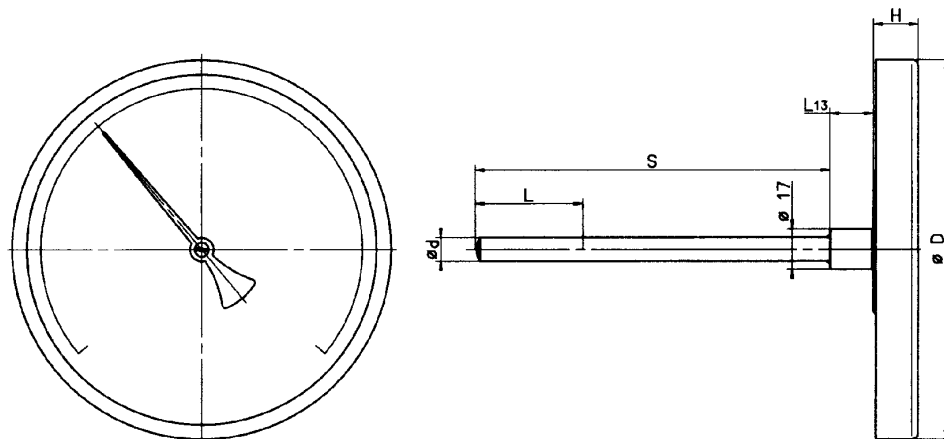
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Types: 608002/0160  
 608002/0180  
 608002/0110



Type: 608002/0116



| Type        | Ø D | Ø D <sub>1</sub> | H    |
|-------------|-----|------------------|------|
| 608002/0150 | 50  | —                | —    |
| 608002/0160 | 60  | 65               | 17.5 |
| 608002/0180 | 80  | 85               | 18.5 |
| 608002/0110 | 100 | 106              | 18.5 |
| 608002/0116 | 160 | —                | 20.0 |

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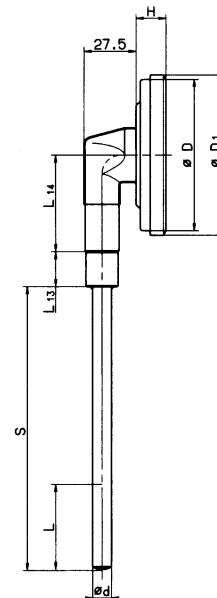
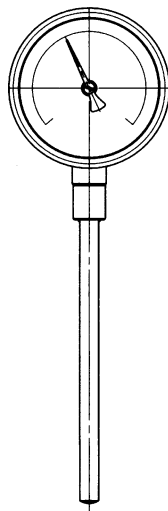
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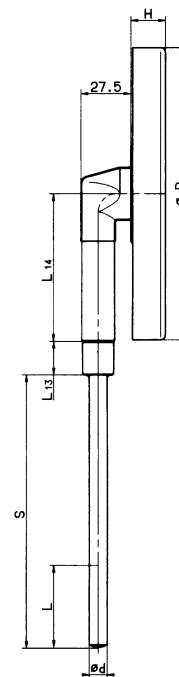
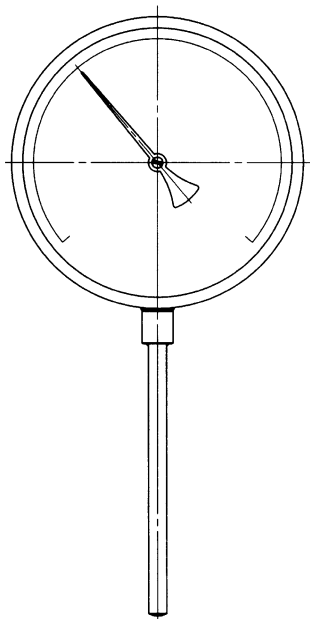
## Dimensions

Types: 608002/1860  
 608002/1880  
 608002/1810



Type: 608002/1816

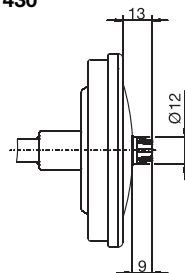
| Type        | Ø D | Ø D <sub>1</sub> | H    | L <sub>14</sub> |
|-------------|-----|------------------|------|-----------------|
| 608002/1860 | 60  | 65               | 17.5 | 26              |
| 608002/1880 | 80  | 85               | 18.5 | 51              |
| 608002/1810 | 100 | 106              | 18.5 | 51              |
| 608002/1816 | 160 | —                | 20.0 | 81              |



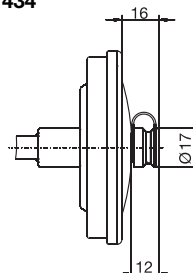
for dimensions Ø d and L<sub>13</sub>,  
 see Data Sheet 60.8730.

### Extra codes

430



434



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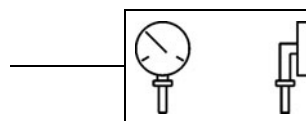
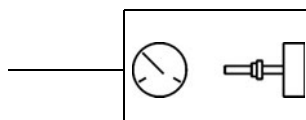
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## Order details

| Order code                       | (1) Basic type   |
|----------------------------------|--|
| 608002                           | Mechanical dial thermometer, industrial version, Class 1     |
| <b>(2) Basic type extension</b>  |  |
| 0150                             | Style 01; housing size: 50 mm dia.                           |
| 0160                             | Style 01; housing size: 60 mm dia.                           |
| 0180                             | Style 01; housing size: 80 mm dia.                           |
| 0110                             | Style 01; housing size: 100 mm dia.                          |
| 0116                             | Style 01; housing size: 160 mm dia.                          |
| 1860                             | Style 18; housing size: 60 mm dia.                           |
| 1880                             | Style 18; housing size: 80 mm dia.                           |
| 1810                             | Style 18; housing size: 100 mm dia.                          |
| 1816                             | Style 18; housing size: 160 mm dia.                          |
| <b>(3) Indication range (AB)</b> |  |
| 628                              | -20 to + 40°C; measuring range -10 to + 30°C, accuracy 1.0°C |
| 632                              | -20 to + 60°C; measuring range -10 to + 60°C, accuracy 1.0°C |
| 635                              | -20 to + 80°C; measuring range -10 to + 70°C, accuracy 1.0°C |
| 639                              | -20 to +100°C; measuring range 0 to + 80°C, accuracy 2.0°C   |
| 643                              | -20 to +120°C; measuring range 0 to +100°C, accuracy 2.0°C   |
| 564                              | -30 to + 30°C; measuring range -20 to + 20°C, accuracy 1.0°C |
| 566                              | -30 to + 50°C; measuring range -20 to + 40°C, accuracy 1.0°C |
| 570                              | -30 to + 70°C; measuring range -20 to + 60°C, accuracy 1.0°C |
| 585                              | -30 to +170°C; measuring range -10 to +150°C, accuracy 2.0°C |
| 469                              | -40 to + 40°C; measuring range -30 to + 30°C, accuracy 1.0°C |
| 472                              | -40 to + 60°C; measuring range -30 to + 50°C, accuracy 1.0°C |
| 357                              | -50 to + 50°C; measuring range -40 to + 40°C, accuracy 1.0°C |
| 807                              | 0 to + 60°C; measuring range +10 to + 50°C, accuracy 1.0°C   |
| 810                              | 0 to + 80°C; measuring range +10 to + 70°C, accuracy 1.0°C   |
| 814                              | 0 to +100°C; measuring range +10 to + 90°C, accuracy 1.0°C   |
| 818                              | 0 to +120°C; measuring range +20 to +100°C, accuracy 2.0°C   |
| 826                              | 0 to +160°C; measuring range +20 to +140°C, accuracy 2.0°C   |
| 832                              | 0 to +200°C; measuring range +20 to +180°C, accuracy 2.0°C   |
| 834                              | 0 to +250°C; measuring range +30 to +220°C, accuracy 2.5°C   |
| 840                              | 0 to +300°C; measuring range +30 to +270°C, accuracy 5.0°C   |
| 843                              | 0 to +350°C; measuring range +50 to +300°C, accuracy 5.0°C   |
| 848                              | 0 to +400°C; measuring range +50 to +350°C, accuracy 5.0°C   |
| 854                              | 0 to +500°C; measuring range +50 to +450°C, accuracy 5.0°C   |



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**Order details**

|                   |  |  |
|-------------------|--|--|
| <b>Order code</b> | <b>(4) Process connection (PA)<sup>1</sup></b>   |  |
| 010               | TA 01; immersion tube with shoulder  |  |
| 844               | TA 02; immersion tube with union nut and loose nipple <sup>2, 4</sup>  |  |
| 845               | TA 03; immersion tube with loose union nut <sup>4</sup>  |  |
| 846               | TA 04; immersion tube with fixed hexagon <sup>2</sup>  |  |
| 847               | TA 06; immersion tube with sliding clamp fitting (20 bar max.) <sup>2, 4</sup>   |  |
| 018               | TA 08; immersion tube with sliding fixing plate (zinc-plated steel) and fixing screw <sup>4</sup>  |  |
| 858               | SH04; screw-in pocket, solid, to DIN 16 179 <sup>4</sup>   |  |
| 891               | SH05; screw-in pocket, assembled <sup>2, 4</sup>   |  |
| 913               | SH07; screw-in pocket, assembled, with fixing screw <sup>2, 4</sup>  |  |
| 820               | SH09; weld-in pocket, assembled, with fixing screw <sup>4</sup>  |  |
|                   | <b>(5) Diameter of process connection (PA)<sup>1</sup></b>   |  |
| 6                 | Ø 6 mm   |  |
| 10                | Ø 10 mm <sup>4</sup>   |  |
| 12                | Ø 12 mm (with SH05, SH07 only)   |  |
| 14                | Ø 14 mm (with SH05, SH07, SH09 only)   |  |
| 17                | Ø 17 mm (with SH04 only)   |  |
|                   | <b>(6) Type of thread for process connection (PA)<sup>1</sup></b>  |  |
| 000               | no thread (TA01, TA08, SH09 only)  |  |
| 102               | thread G <sup>1</sup> / <sub>4</sub> (only with basic type extension 0150)   |  |
| 103               | thread G <sup>3</sup> / <sub>8</sub> <sup>4</sup>  |  |
| 104               | thread G <sup>1</sup> / <sub>2</sub> <sup>4</sup>  |  |
| 105               | thread G <sup>3</sup> / <sub>4</sub> <sup>4</sup>  |  |
| 144               | thread 1/2-14NPT   |  |
|                   | <b>(7) Material of probe<sup>1</sup></b>   |  |
| 26                | stainless steel (CrNi, 1.4571)   |  |
|                   | <b>(8) Material of process connection (PA)<sup>1</sup></b>   |  |
| 26                | stainless steel (CrNi, 1.4571)   |  |
|                   | <b>(9) Fitting length of process connection (PA) (dimension S)</b>   |  |
| 50                | 50 mm  |  |
| 100               | 100 mm   |  |
| 150               | 150 mm   |  |
| 200               | 200 mm   |  |
| ...               | special length (details in plain text, in 50 mm steps)   |  |
|                   | <b>(10) Extra code (TZ)<sup>3</sup></b>  |  |
| 000               | no extra code  |  |
| 430               | peak-reading pointer (only with basic type extension 0160, 0180, 0110, 1860, 1880, 1810 - min. indication range span: 100 °C; not with TZ 404)           |  |
| 404               | IP65 protection to EN 60 529 (only with basic type extension 0160, 0110, 1860, 1810; not with TZ 430, TZ 434)  |  |
| 522               | scale to customer specification  |  |
| 434               | peak-reading pointer, adjustable with screwdriver, protected by cap (only with basic type extension 0160, 0180, 0110, 1860, 1880, 1810; not with TZ 404) |  |

Special versions on request!

**Order code**

(1) 608002 / (2) .... - (3) ... - (4) ... - (5) .. - (6) ... - (7) .. - (8) .. - (9) ... / (10) ... , ...

**Order example**

608002 / 0180 - 818 - 845 - 10 - 104 - 26 - 26 - 100 / 000<sup>3</sup>

<sup>1</sup> See Data Sheet 60.8730 for description and special features.

<sup>2</sup> Screw-in spigot to DIN 3852 Form A (not with NPT thread).

<sup>3</sup> List extra codes in sequence, separated by commas.

<sup>4</sup> not with basic type extension 0150.

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## Dial Thermometer Chemical Plant Version

- Temperature indicator with a bimetal sensing system
- Stainless steel housing with bayonet lock
- Class 1
- IP65 protection
- Housing sizes: 80 mm, 100 mm and 160 mm dia.

### Brief description

Chemical plant version dial thermometers are instruments for universal use in on-site temperature measurement.



Type 608003/1010

### Technical data

|                                   |   |
|-----------------------------------|---|
| <b>Housing</b>                    | housing and bezel in stainless steel (1.4301)   |
| <b>Protection</b>                 | IP65 to EN 60 529   |
| <b>Window</b>                     | glass, with extra code 434 in plexiglass (PMMA)   |
| <b>Scale</b>                      | blank aluminium, black lettering  |
| <b>Indication</b>                 | linear, Class 1 to EN 13 190  |
| <b>Response time</b>              | $t_{0,9}$ response approx. 30 sec (measured in agitated water with a 10 mm dia. probe in stainless steel) |
| <b>Ambient temperature effect</b> | no effect   |
| <b>Limit temperatures</b>         | -30 to +80°C (storage and transport: -30 to +80°C)  |
| <b>Nominal position</b>           | unrestricted  |
| <b>Indication adjustment</b>      | The bezel can be removed and the indication corrected on the pointer.                                     |

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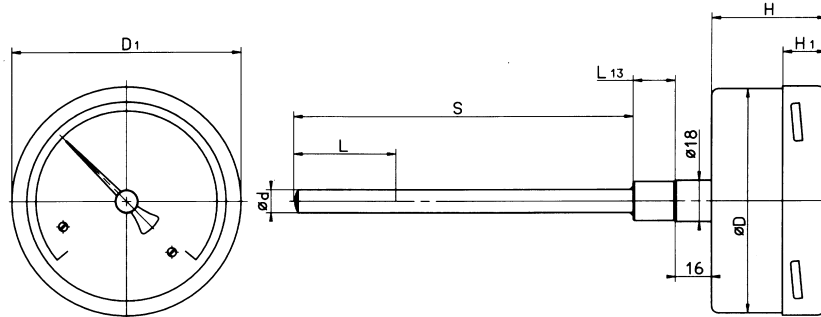
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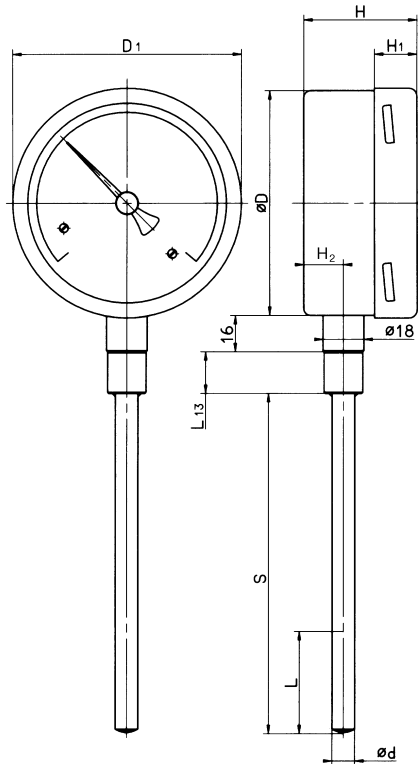


## Dimensions

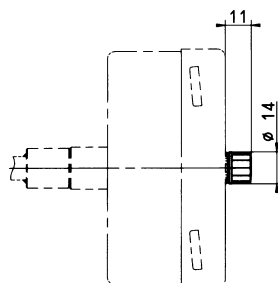
Types: 608003/0180  
 608003/0110  
 608003/0116



Types: 608003/1080  
 608003/1010  
 608003/1016



Extra code 434  
 (peak-reading pointer)



| Type               | Ø D | Ø D <sub>1</sub> | H  | H <sub>1</sub> | H <sub>2</sub> |
|--------------------|-----|------------------|----|----------------|----------------|
| 608003/0180        | 79  | 80               | 55 | 15.5           | 16.8           |
| 608003/1080        |     |                  | 50 |                |                |
| 608003/0110        | 99  | 101.5            | 55 | 19             | 12.5           |
| 608003/0110 TZ 474 |     |                  | 50 |                |                |
| 608003/1010        |     |                  | 50 |                |                |
| 608003/0116        | 159 | 161.5            | 50 | 21             | 12.5           |
| 608003/1016        |     |                  | 50 |                |                |

See Data Sheet 60.8730 for dimensions Ø d and L<sub>13</sub>.



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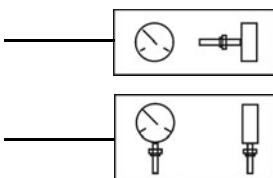
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## Order details

### Dial thermometer, chemical plant version, Type 608003

| Order code                | (1) Basic type   |
|---------------------------|--|
| 608003                    | Mechanical dial thermometer, chemical plant version, Class 1 |
| (2) Basic type extensions |  |
| 0180                      | Style 01; housing size: 80 mm dia.                           |
| 0110                      | Style 01; housing size: 100 mm dia.                          |
| 0116                      | Style 01; housing size: 160 mm dia.                          |
| 1080                      | Style 10; housing size: 80 mm dia.                           |
| 1010                      | Style 10; housing size: 100 mm dia.                          |
| 1016                      | Style 10; housing size: 160 mm dia.                          |
| (3) Indication range (AB) |  |
| 628                       | -20 to + 40°C; measuring range -10 to + 30°C, accuracy 1.0°C |
| 632                       | -20 to + 60°C; measuring range -10 to + 60°C, accuracy 1.0°C |
| 635                       | -20 to + 80°C; measuring range -10 to + 70°C, accuracy 1.0°C |
| 639                       | -20 to +100°C; measuring range 0 to + 80°C, accuracy 2.0°C   |
| 643                       | -20 to +120°C; measuring range 0 to +100°C, accuracy 2.0°C   |
| 564                       | -30 to + 30°C; measuring range -20 to + 20°C, accuracy 1.0°C |
| 566                       | -30 to + 50°C; measuring range -20 to + 40°C, accuracy 1.0°C |
| 570                       | -30 to + 70°C; measuring range -20 to + 60°C, accuracy 1.0°C |
| 585                       | -30 to +170°C; measuring range -10 to +150°C, accuracy 2.0°C |
| 469                       | -40 to + 40°C; measuring range -30 to + 30°C, accuracy 1.0°C |
| 472                       | -40 to + 60°C; measuring range -30 to + 50°C, accuracy 1.0°C |
| 357                       | -50 to + 50°C; measuring range -40 to + 40°C, accuracy 1.0°C |
| 807                       | 0 to + 60°C; measuring range +10 to + 50°C, accuracy 1.0°C   |
| 810                       | 0 to + 80°C; measuring range +10 to + 70°C, accuracy 1.0°C   |
| 814                       | 0 to +100°C; measuring range +10 to + 90°C, accuracy 1.0°C   |
| 818                       | 0 to +120°C; measuring range +20 to +100°C, accuracy 2.0°C   |
| 826                       | 0 to +160°C; measuring range +20 to +140°C, accuracy 2.0°C   |
| 832                       | 0 to +200°C; measuring range +20 to +180°C, accuracy 2.0°C   |
| 834                       | 0 to +250°C; measuring range +30 to +220°C, accuracy 2.5°C   |
| 840                       | 0 to +300°C; measuring range +30 to +270°C, accuracy 5.0°C   |
| 843                       | 0 to +350°C; measuring range +50 to +300°C, accuracy 5.0°C   |
| 848                       | 0 to +400°C; measuring range +50 to +350°C, accuracy 5.0°C   |
| 854                       | 0 to +500°C; measuring range +50 to +450°C, accuracy 5.0°C   |



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## Order details

### Dial thermometer, chemical plant version, Type 608003

| Order code   | (4) Process connection (PA)  |  |
|--|--|--|
| 010  | TA 01; immersion tube with shoulder  |  |
| 843  | TA 02; immersion tube with union nut and loose nipple <sup>2)</sup>  |  |
| 845  | TA 03; immersion tube with loose union nut   |  |
| 846  | TA 04; immersion tube with fixed hexagon <sup>2)</sup>   |  |
| 847  | TA 06; immersion tube with sliding clamp fitting (20 bar max.) <sup>2)</sup>   |  |
| 018  | TA 08; immersion tube with sliding fixing plate<br>in zinc-plated steel and fixing screw   |  |
| 858  | SH04; screw-in pocket, one-piece   |  |
| 891  | SH05; screw-in pocket, assembled   |  |
| 913  | SH07; screw-in pocket, assembled, with fixing screw  |  |
| 820  | SH09; weld-in pocket, assembled, with fixing screw   |  |
| <b>(5) Diameter of process connection (PA)<sup>1)</sup></b>        |  |  |
| 6  | 6 mm dia.  |  |
| 10   | 10 mm dia.   |  |
| 12   | 12 mm dia. (with SH05, SH07 only)  |  |
| 14   | 14 mm dia. (with SH05, SH07, SH09 only)  |  |
| 17   | 17 mm dia. (with SH04 only)  |  |
| <b>(6) Thread for process connection (PA)<sup>1)</sup></b>         |  |  |
| 000  | no thread (TA01 only)  |  |
| 103  | G <sup>3</sup> / <sub>8</sub> thread   |  |
| 104  | G <sup>1</sup> / <sub>2</sub> thread   |  |
| 105  | G <sup>3</sup> / <sub>4</sub> thread   |  |
| 144  | 1/2-14NPT thread   |  |
| <b>(7) Material of process connection (PA)<sup>1)</sup></b>        |  |  |
| 26   | stainless steel (CrNi, 1.4571)   |  |
| <b>(8) Fitting length of process connection (PA) (dimension S)</b> |  |  |
| 50   | 50 mm  |  |
| 100  | 100 mm   |  |
| 150  | 150 mm   |  |
| 200  | 200 mm   |  |
| ...  | special length (details in plain text, in 50 mm steps)   |  |
| <b>(9) Extra codes (TZ)</b>  |  |  |
| 000  | no extra code  |  |
| 522  | customized scale   |  |
| 434  | peak-reading pointer adjustable with screwdriver, protected through screw cap<br>(plexiglass window; +70°C max. ambient temperature) |  |
| 474  | silicone-filled pointer damper<br>(only with basic type extension 0180, 0110, 0116)  |  |

Special versions on request!

| Order code           | (1) | (2)  | (3) | (4) | (5) | (6) | (7) | (8) | (9) |     |   |    |   |     |   |                   |       |
|----------------------|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|---|----|---|-----|---|-------------------|-------|
| 608003               | /   | .... | -   | ... | -   | ... | -   | ..  | -   | ... | - | .. | - | ... | / | ...               | , ... |
| <b>Order example</b> |     |      |     |     |     |     |     |     |     |     |   |    |   |     |   |                   |       |
| 608003               | /   | 0180 | -   | 818 | -   | 845 | -   | 10  | -   | 104 | - | 26 | - | 100 | / | 000 <sup>3)</sup> |       |

<sup>1</sup> See Data Sheet 60.8730 for description and features.  
<sup>2</sup> Screw-in spigot to DIN 3852 Form A (not with NPT thread).  
<sup>3</sup> List extra codes in sequence, separated by commas.

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# Dial Thermometer Transformer Version

- Temperature indicator with a bimetal sensing system
- Stainless steel housing
- Peak-reading pointer
- Class 1.5
- IP55 protection
- Housing size: 80mm dia.

## Brief description

Dial thermometers for transformers are universal instruments for local temperature measurement.

for stock items  
see price catalog



Caution: only for stock items  
- Pack of 3 -  
Quantity ordered must be a multiple of 3 !

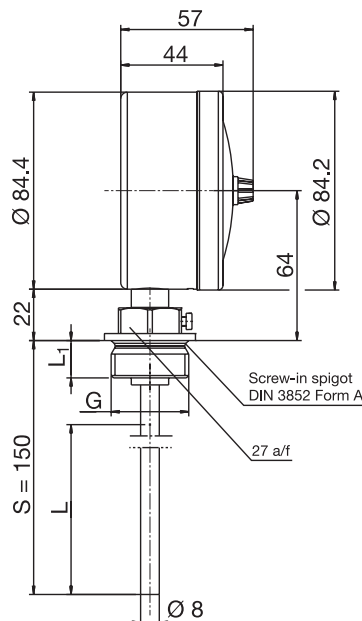
Type 608005/1080

## Technical data

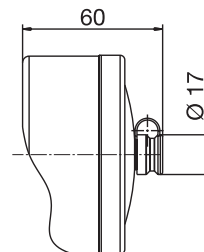
|                              |   |
|------------------------------|---|
| Housing                      | housing and bezel in stainless steel (1.4301)                                       |
| Enclosure protection         | IP55 to EN 60 529   |
| Window                       | Plexiglas (PMMA)  |
| Scale                        | white, black lettering  |
| Accuracy class               | Class 1.5 similar to EN 13 190  |
| Time constant<br>$t_{0.632}$ | approx. 20 sec (measured in agitated water with an 8 mm dia. stainless steel probe) |
| Ambient temperature effect   | no effect   |
| Limit temperatures           | -30 to +80°C (storage and transport -30 to +80°C)                                   |
| Nominal position             | NL 90, symbol ⊥   |

## Dimensions

Type: 608005/1080



### Extra code 434



| Pipe thread G                   | L <sub>1</sub> | L (active probe dimension) |
|---------------------------------|----------------|----------------------------|
| G <sup>1</sup> / <sub>2</sub> A | 14             | 75                         |
| G <sup>3</sup> / <sub>4</sub> A | 16             |                            |
| G1A                             | 16             |                            |

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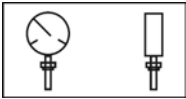
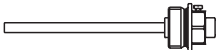
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## Order details

### Dial thermometer, transformer version, Type 608005

|                   |  |  |
|-------------------|--|--|
| <b>Order code</b> | <b>(1) Basic type</b>  |  |
| 608005            | Mechanical dial thermometer, transformer version, Class 1.5, with peak-reading pointer |  |
|                   | <b>(2) Basic type extension</b>  |  |
| 1080              | Style 10; housing size: 80 mm dia.   |   |
|                   | <b>(3) Indication range (AB)</b>   |  |
| 818               | 0 to +120°C; measuring range +20 to +100°C, accuracy 3.0°C                             |  |
| 643               | -20 to +120°C; measuring range 0 to +100°C, accuracy 3.0°C                             |  |
|                   | <b>(4) Process connection (PA)</b>   |  |
| 874               | TA 24; immersion tube with screw connection, O ring seal and clamping screw            |  |
|                   | <b>(5) Diameter of process connection (PA)</b>   |  |
| 8                 | 8 mm dia.  |  |
|                   | <b>(6) Type of thread for process connection (PA)</b>                                  |  |
| 104               | G <sup>1</sup> / <sub>2</sub> thread   |  |
| 105               | G <sup>3</sup> / <sub>4</sub> thread   |  |
| 106               | G1 thread  |  |
|                   | <b>(7) Material of process connection (PA)</b>   |  |
| 97                | stainless steel (1.4571) for temperature probe (TF) / brass for probe mounting (TA)    |  |
|                   | <b>(8) Fitting length of process connection (PA) (dimension S)</b>                     |  |
| 150               | 150 mm   |  |
| ...               | special length (on request, details in plain text)                                     |  |
|                   | <b>(9) Extra codes (TZ)</b>  |  |
| 000               | no extra code  |  |
| 522               | customized scale   |  |
| 434               | peak-reading pointer adjustable with screwdriver; protected by cap                     |  |

Special versions on request!

#### Order code

(1) 608005 / (2) ... - (3) ... - (4) ... - (5) .. - (6) ... - (7) .. - (8) ... / (9) ... , ...

#### Order example

608005 / 1080 - 818 - 874 - 8 - 106 - 50 - 150 / 000<sup>1</sup> , ...

<sup>1</sup> List extra codes in sequence, separated by commas.

#### Note:

For contact dial thermometers for transformers, see data sheet 60.8540.

For temperature indicators and contact dial thermometers with capillary, see data sheets 60.8201 and 60.8520.

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## Dial Thermometer

- Temperature indicator for panel or surface mounting
- Class 1.5
- IP65 protection max.
- Housing sizes: 60 mm dia., 80 mm dia. and 100 mm dia.  
 Bezel: 72 x 72 mm and 96 x 96 mm

### Brief description

Dial thermometers are temperature indicators for universal use. The instruments feature a stainless steel housing with a liquid-filled or gas-filled measuring system.

The temperature-dependent change in volume of a liquid-filled measuring system (or the temperature-dependent change of pressure in a gas-filled system) is converted into a rotary movement of the pointer by a Bourdon tube, without any intermediate gearing.



Type 608201/2160



Type 608201/2572

### Technical data

|                              |   |
|------------------------------|---|
| <b>Housing or bezel</b>      | stainless steel (1.4301)  |
| <b>Protection</b>            | IP53 as per EN 60529 (IP65 with extra code 404)   |
| <b>Window</b>                | glass, with styles 24 and 25, and with extra codes 473 and 404: PMMA (plexiglass)                               |
| <b>Scale</b>                 | white, black lettering (silver, black lettering with extra codes 473 and 404)                                   |
| <b>Accuracy class</b>        | Class 1,5 to EN 13190   |
| <b>Indication adjustment</b> | at the housing rear,<br>no indication adjustment with extra codes 473 and 404                                   |
| <b>Limit temperatures</b>    | storage and transport -30 to +70°C<br>(for indication range -40 to +40°C: up to 50°C; -30 to +50°C: up to 60°C) |
| <b>Nominal position</b>      | unrestricted  |

|  | liquid-filled   | gas-filled  |
|--|---|---|
| <b>Measuring system</b>                    | indication range (AB) ≤ 350°C   | indication range (AB) ≥ 400°C   |
| <b>Time constant</b><br>t <sub>0,632</sub> | approx. 12 sec, measured in water bath,<br>with a 6 mm dia. copper probe            | approx. 4 sec, measured in oil bath,<br>with a 10 mm dia. stainless steel probe |
| <b>Ambient temperature effect</b>          | in % of indication range (referred to the deviation from the reference value +23°C) |   |
| <b>on housing</b>                          | 0.15% of indication range<br>per °C change in ambient temperature                   | 0.05% of indication range<br>per °C change in ambient temperature               |
| <b>on capillary (per meter)</b>            | 0.03% of indication range<br>per °C change in ambient temperature                   | no effect   |
|  | at higher ambient temperature – higher temperature indication                       |   |

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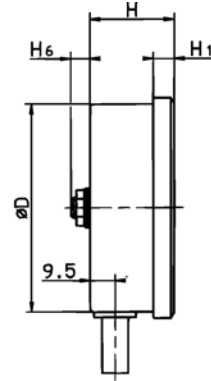
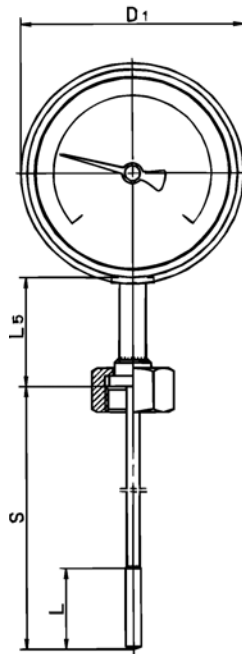
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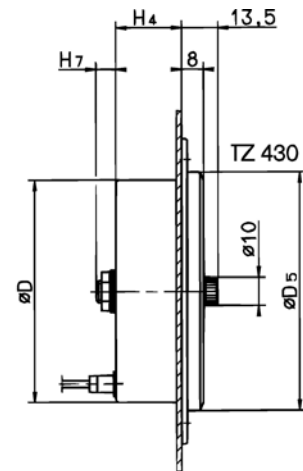
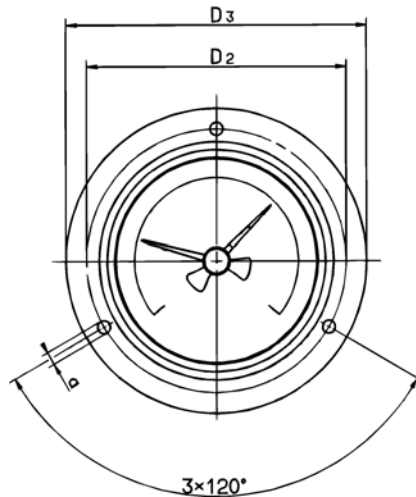


## Dimensions

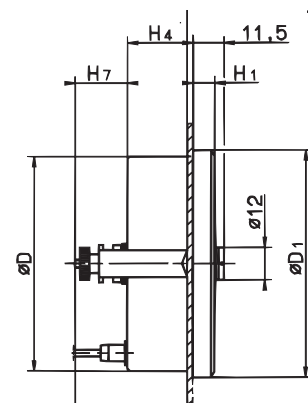
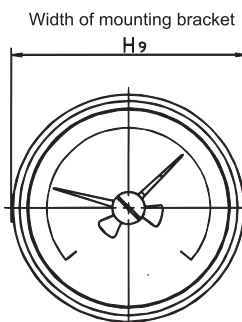
Types: 608201/1060  
 608201/1080  
 608201/1010



Types: 608201/2060  
 608201/2080  
 608201/2010



Types: 608201/2160  
 608201/2180  
 608201/2110



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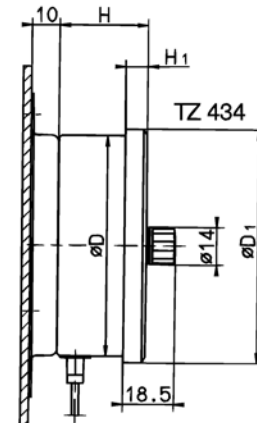
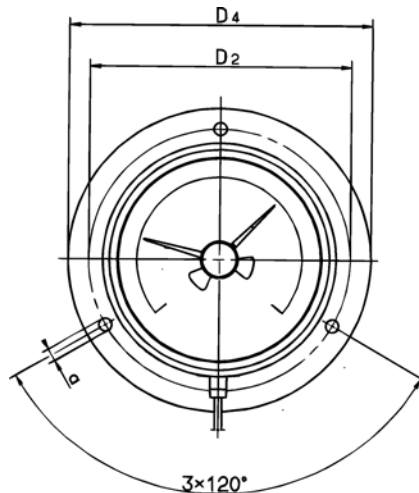
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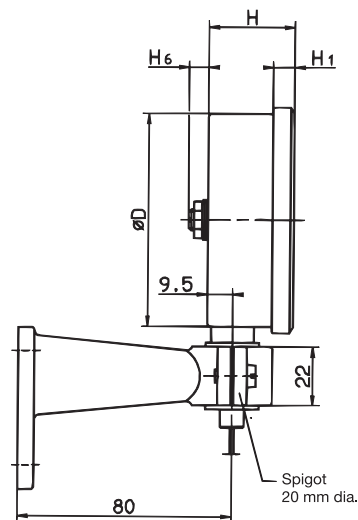
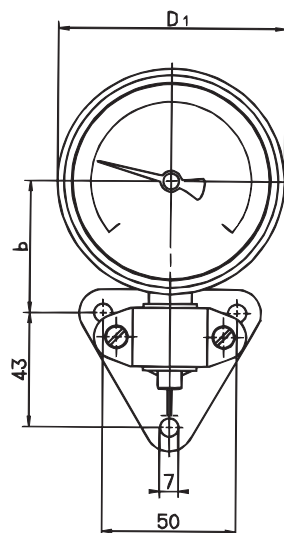


## Dimensions

Types: 608201/2260  
 608201/2280  
 608201/2210



Types: 608201/2360  
 608201/2380  
 608201/2310



| Housing dia. | Diameter of panel cut-out |
|--------------|---------------------------|
| 60 mm        | 62 <sup>0.5</sup> mm      |
| 80 mm        | 82 <sup>0.5</sup> mm      |
| 100 mm       | 102 <sup>0.5</sup> mm     |

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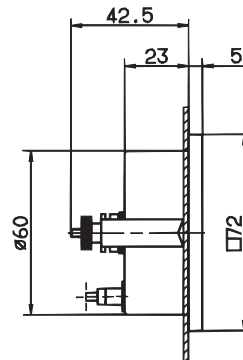
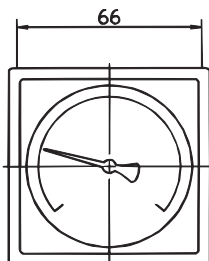
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## Dimensions

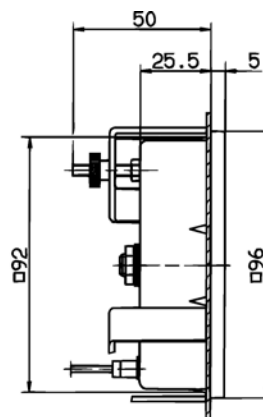
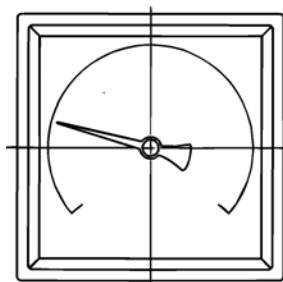
Type: 608201/2572

Width of mounting bracket



Panel cut-out:  $62^{+0.5}$  mm dia.

Type: 608201/2496



Panel cut-out:  $92 \times 92^{+0.8}$  mm

| Housing dia. | H       | H <sub>1</sub> | H <sub>4</sub> | H <sub>6</sub> | H <sub>7</sub> | H <sub>9</sub> | D   | D <sub>1</sub> | D <sub>2</sub> | D <sub>3</sub> | D <sub>4</sub> | D <sub>5</sub> | a   | b         | L <sub>5</sub> |
|--------------|---------|----------------|----------------|----------------|----------------|----------------|-----|----------------|----------------|----------------|----------------|----------------|-----|-----------|----------------|
| 60           | 30 (36) | 7              | 23 (28)        | approx.<br>7.5 | 19.5           | 66             | 60  | 65             | 75             | 85             | 86             | 66             | 3.6 | 39.5 (50) | 41.5*          |
| 80           | 32.5    | 8              | 24.5           |                |                | 86             | 80  | 85             | 95             | 110            | 110            | 86             |     | 49.5      |                |
| 100          | 33 (36) |                | 25 (28)        |                |                | 106            | 100 | 106            | 116            | 132            | 132            | 107.5          |     | 59.5 (70) |                |

All dimensions in mm

\* on probe mounting TA 02 L<sub>5</sub> = ≤ 70.5 mm  
 on probe mountings TA 22 and TA 31 L<sub>5</sub> = 49.5 mm  
 values in brackets apply to TZ 473 or TZ 404



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## Order details

### Dial thermometer Class 1.5, Type 608201

#### Order code (1) Basic type

608201 Mechanical dial thermometer Class 1.5

#### (2) Basic type extensions

|      |                                      |  |
|------|--------------------------------------|--|
| 1060 | Style: 10; housing size: 60 mm dia.  |  |
| 1080 | Style: 10; housing size: 80 mm dia.  |  |
| 1010 | Style: 10; housing size: 100 mm dia. |  |
| 2060 | Style: 20; housing size: 60 mm dia.  |  |
| 2080 | Style: 20; housing size: 80 mm dia.  |  |
| 2010 | Style: 20; housing size: 100 mm dia. |  |
| 2160 | Style: 21; housing size: 60 mm dia.  |  |
| 2180 | Style: 21; housing size: 80 mm dia.  |  |
| 2110 | Style: 21; housing size: 100 mm dia. |  |
| 2260 | Style: 22; housing size: 60 mm dia.  |  |
| 2280 | Style: 22; housing size: 80 mm dia.  |  |
| 2210 | Style: 22; housing size: 100 mm dia. |  |
| 2360 | Style: 23; housing size: 60 mm dia.  |  |
| 2380 | Style: 23; housing size: 80 mm dia.  |  |
| 2310 | Style: 23; housing size: 100 mm dia. |  |
| 2496 | Style: 24; housing size: 96 x 96 mm  |  |
| 2572 | Style: 25; housing size: 72 x 72 mm  |  |

#### (3) Indication range (AB)

|     |  |
|-----|--|
| 469 | -40 to + 40°C; measuring range -30 to + 30°C, accuracy 1.5°C |
| 566 | -30 to + 50°C; measuring range -20 to + 40°C, accuracy 1.5°C |
| 643 | -20 to +120°C; measuring range 0 to +100°C, accuracy 3.0°C   |
| 807 | 0 to + 60°C; measuring range +10 to + 50°C, accuracy 1.5°C   |
| 810 | 0 to + 80°C; measuring range +10 to + 70°C, accuracy 1.5°C   |
| 814 | 0 to +100°C; measuring range +10 to + 90°C, accuracy 1.5°C   |
| 818 | 0 to +120°C; measuring range +20 to +100°C, accuracy 3.0°C   |
| 826 | 0 to +160°C; measuring range +20 to +140°C, accuracy 3.0°C   |
| 832 | 0 to +200°C; measuring range +20 to +180°C, accuracy 3.0°C   |
| 834 | 0 to +250°C; measuring range +30 to +220°C, accuracy 4.0°C   |
| 926 | +50 to +250°C; measuring range +70 to +230°C, accuracy 3.0°C |
| 840 | 0 to +300°C; measuring range +30 to +270°C, accuracy 6.0°C   |
| 927 | +50 to +300°C; measuring range +80 to +270°C, accuracy 4.0°C |
| 843 | 0 to +350°C; measuring range +50 to +300°C, accuracy 6.0°C   |
| 932 | +50 to +350°C; measuring range +80 to +320°C, accuracy 6.0°C |
| 848 | 0 to +400°C; measuring range +50 to +350°C, accuracy 6.0°C   |
| 851 | 0 to +450°C; measuring range +50 to +400°C, accuracy 6.0°C   |
| 854 | 0 to +500°C; measuring range +50 to +450°C, accuracy 8.0°C   |
| 858 | 0 to +600°C; measuring range +100 to +500°C, accuracy 10.0°C |

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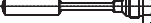
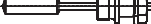






## Order details

### Dial thermometer Class 1.5, Type 608201

#### Order code

| (4) Capillary type (FL) <sup>1</sup> |  |
|--------------------------------------|--|
| 00                                   | none (with rigid connection)   |
| 02                                   | FL02 copper capillary with copper braiding, approx. 2.5 mm dia. (up to +300°C top of indication range) |
| 11                                   | FL11 copper capillary with PE sleeve, approx. 3.5 mm dia. (up to +120°C top of indication range)       |
| 17                                   | FL17 stainless steel capillary, 1.5 mm dia.  |
| 21                                   | FL21 copper capillary, 1.0 mm dia. (up to +300°C top of indication range)                              |

| (5) Capillary length <sup>1</sup> |  |
|-----------------------------------|--|
| 0                                 | none (with rigid connection)   |
| 1000                              | 1000 mm  |
| 2000                              | 2000 mm  |
| 3000                              | 3000 mm  |
| 4000                              | 4000 mm  |
| 5000                              | 5000 mm  |
| ...                               | special length (specify in plain text: 1000 mm steps, maximum length 10000 mm) |

| (6) Process connection (PA) <sup>1</sup> |   |   |
|--|---|---|
| 750                                      | TF 01; temperature probe with stepped support tube  |    |
| 752                                      | TF 11; temperature probe without support tube   |   |
| 843                                      | TA 02; immersion tube with union nut and loose nipple <sup>2</sup>  |  |
| 161                                      | TA 03; immersion tube with loose union nut  |  |
| 847                                      | TA 06; sliding clamp fitting on support tube <sup>2</sup>   |  |
| 311                                      | TA 20; immersion tube with loose nipple and shoulder <sup>2</sup>   |  |
| 872                                      | TA 21; immersion tube with loose plug and conical seal  |  |
| 873                                      | TA 22; immersion tube with loose plug, conical seal and loose nipple <sup>2</sup>   |  |
| 401                                      | TA 23; immersion tube with plug and spring clip   |  |
| 848                                      | TA 25; sliding clamp fitting on capillary <sup>2</sup><br>(with FL 17 and FL 21 only)   |  |
| 913                                      | SH 07; screw-in pocket, assembled, with clamping clip and fixing screw <sup>2</sup><br>(with TF 01)   |  |
| 820                                      | SH 09; screw-in pocket, assembled, with clamping clip and fixing screw<br>(not with FL21 - welding shoulder with steel 1.4515) (with TF 01) |  |
| 876                                      | SH10; screw-in pocket, assembled <sup>2</sup>   |  |
| 871                                      | SH11; screw-in pocket, assembled <sup>2</sup>   |  |

| (7) Diameter of process connection (PA) <sup>1</sup> |            |
|--|------------|
| 6  | 6 mm dia.  |
| 8  | 8 mm dia.  |
| 10   | 10 mm dia. |
| 11   | 11 mm dia. |
| 12   | 12 mm dia. |

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## Order details

### Dial thermometer Class 1.5, Type 608201

#### Order code

|   |   |
|---|---|
| <b>(8) Thread for process connection (PA)<sup>1</sup></b>                             |   |
| 000   | no thread (with TF 01 and TF 11)  |
| 103   | G <sup>3</sup> / <sub>8</sub> thread  |
| 104   | G <sup>1</sup> / <sub>2</sub> thread  |
| 105   | G <sup>3</sup> / <sub>4</sub> thread  |
| 114   | M 10 x 1 thread (with TA 23 and SH 11 only)   |
| <b>(9) Material of probe / support tube<sup>1</sup></b>                               |   |
| 26  | stainless steel (CrNi, 1.4571)  |
| 96  | copper (Cu) / brass (CuZn) (up to 200°C)  |
| 95  | stainless steel (CrNi, 1.4571) – probe / brass (CuZn) – support tube (above 250°C)                                |
| <b>(10) Material of process connection (PA)<sup>1</sup></b>                           |   |
| 00  | none (TF01 and TF11 only)   |
| 01  | steel (St)  |
| 26  | stainless steel (CrNi, 1.4571)  |
| 46  | brass (CuZn)  |
| <b>(11) Fitting length of process connection (PA)<sup>1</sup> (dimension EL or S)</b> |   |
| 0   | minimum fitting length TF 11 (active probe dimension)   |
| 50  | 50 mm   |
| 100   | 100 mm  |
| 150   | 150 mm  |
| 200   | 200 mm  |
| ...   | special length (specify in plain text, in 50 mm steps)  |
| <b>(12) Extra codes (TZ)</b>  |   |
| 000   | no extra code   |
| 430   | peak-reading pointer, with housing diameters 60, 80 and 100 mm (not with TZ 473 or TZ 404)                        |
| 440   | housing with bimetal compensation   |
| 473   | housing with damping fluid (only with basic type extension: 2060, 2260, 2360, 2010, 2210, 2310)                   |
| 410   | metal bezel ring, bezel or flange, black  |
| 315   | capillary reinforcement on housing and probe (not with FL 21)   |
| 404   | IP65 enclosure protection to EN 60 529 (only with basic type extension: 2060, 2260, 2360, 2010, 2210, 2310)       |
| 522   | customized scale  |
| 651   | peak-reading pointer adjustable with screwdriver; protected by screw-on cap (not available with TZ 473 or TZ 404) |

Special versions on request!

#### Order code

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12)  
 608201 / .... - ... - .. - .... - ... - .. - ... - .. - .. - ... / .. , ...

#### Order example

608201 / 1010 - 818 - 00 - 0 - 750 - 8 - 000 - 26 - 26 - 100 / 000<sup>3</sup>

<sup>1</sup> See Data Sheet 60.8730 for description and features

<sup>2</sup> Screw-in spigot to DIN 3852 Form A.

<sup>3</sup> List extra codes in sequence, separated by commas.

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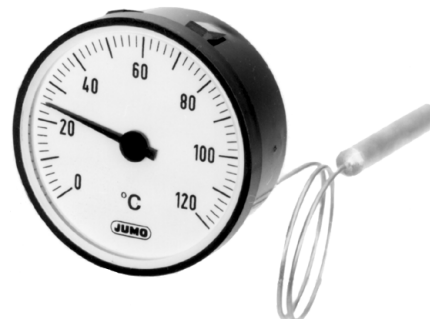
## Dial Thermometer

- Temperature indicator for panel mounting
- Class 2
- IP53 front protection
- Housing sizes: 52 mm and 60 mm dia.  
 Bezel: 48x48 mm, 52x52 mm and 72x72 mm

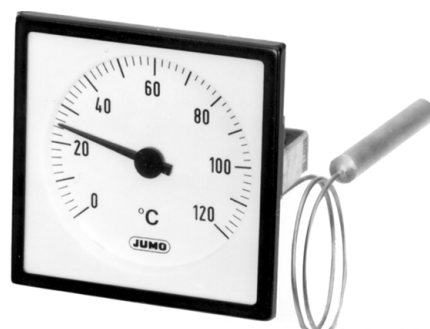
### Brief description

Dial thermometers are universal temperature indicators for monitoring the temperature. The instruments feature a plastic housing with a liquid-filled measuring system.

The temperature-dependent change in volume of the liquid-filled measuring system is converted into a rotary movement of the pointer by a Bourdon tube, without any intermediate gearing.



Type 608202/2660



Type 608202/2772

### Technical data

|                                     |   |
|-------------------------------------|---|
| <b>Housing or bezel</b>             | black plastic (ABS)   |
| <b>Protection</b>                   | IP53 front protection to EN 60529   |
| <b>Window</b>                       | polycarbonate (PC), standard size 60 in PMMA (Plexiglas)                            |
| <b>Scale</b>                        | white, black lettering  |
| <b>Accuracy class</b>               | Class 2 to EN 13190   |
| <b>Indication adjustment</b>        | at the housing rear   |
| <b>Limit temperatures</b>           | storage and transport -20 to +60°C<br>(indication range -40 to +40°C: up to 50°C)   |
| <b>Nominal position</b>             | unrestricted  |
| <b>Measuring system</b>             | liquid-filled   |
| <b>Time constant</b><br>$t_{0,632}$ | approx. 12 sec, measuring in agitated water bath, with a 6 mm dia. probe            |
| <b>Ambient temperature effect</b>   | in % of indication range (referred to the deviation from the reference value +23°C) |
| <b>on housing</b>                   | 0.15% of indication range<br>per °C change in ambient temperature                   |
| <b>on capillary (per meter)</b>     | 0.03% of indication range<br>per °C change in ambient temperature                   |
|                                     | at higher ambient temperature – higher temperature indication                       |

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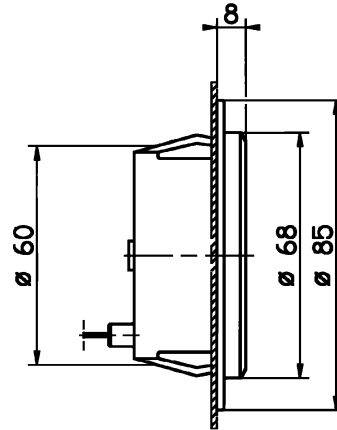
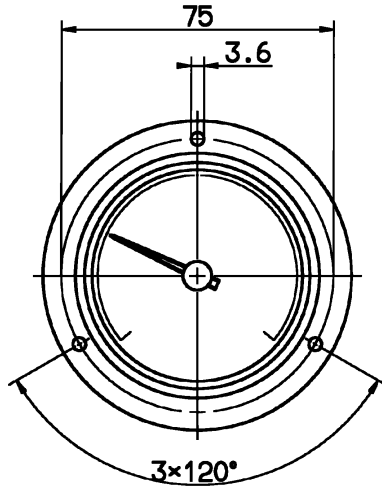
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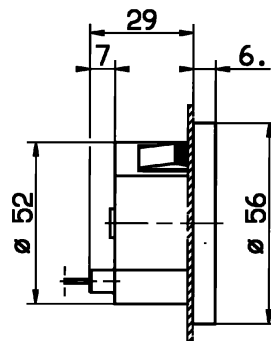
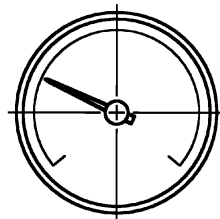
## Dimensions

Type: 608202/2060



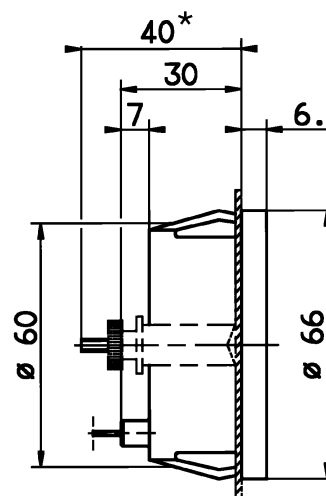
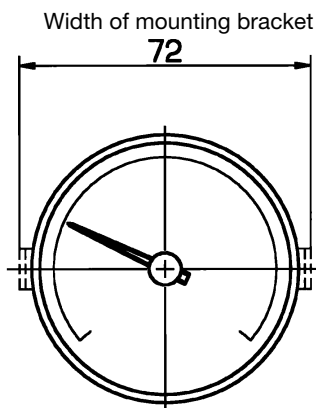
Panel cut-out:  $\varnothing 62^{+0.5}_{0}$  mm

Type: 608202/2652



Panel cut-out:  $\varnothing 52^{+0.5}_{0}$  mm

Type: 608202/2660



Panel cut-out:  $\varnothing 62^{+0.5}_{0}$  mm

\* with code TZ 455

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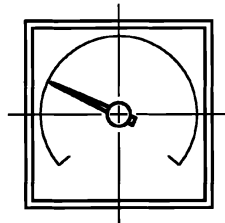
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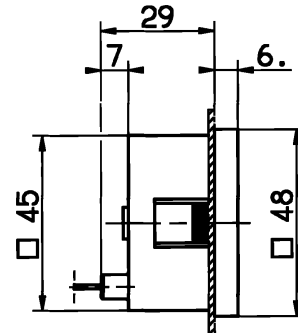


## Dimensions

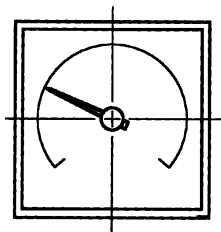
Type: 608202/2748



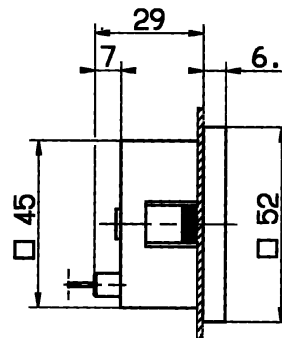
Panel cut-out: 45 x 45  $+0.6$  mm



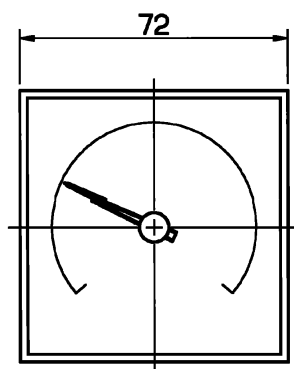
Type: 608202/2752



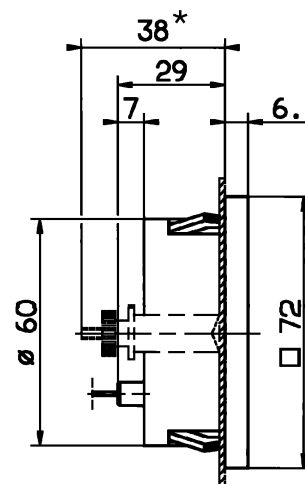
Panel cut-out: 45 x 45  $+0.6$  mm



Type: 608202/2772



Panel cut-out:  $\varnothing$  62  $+0.5$  mm



\* with code TZ 455

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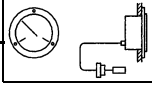
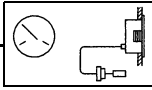
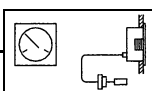
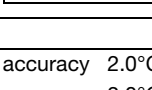
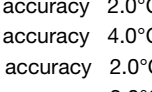
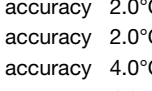
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## Order details

### Dial thermometer, Class 2, Type 608202

| Order code                           | (1) Basic type   |
|--------------------------------------|--|
| 608202                               | Mechanical dial thermometer, Class 2   |
| (2) Basic type extensions            |  |
| 2060                                 | Style: 20; housing size: 60 mm dia.   |
| 2652                                 | Style: 26; housing size: 52 mm dia.   |
| 2660                                 | Style: 26; housing size: 60 mm dia.   |
| 2748                                 | Style: 27; housing size: 48 mm dia.   |
| 2752                                 | Style: 27; housing size: 52 mm dia.   |
| 2772                                 | Style: 27; housing size: 72 mm dia.  |
| (3) Indication range (AB)            |  |
| 469                                  | -40 to + 40°C; measuring range -30 to + 30°C, accuracy 2.0°C   |
| 566                                  | -30 to + 50°C; measuring range -20 to + 40°C, accuracy 2.0°C   |
| 643                                  | -20 to +120°C; measuring range 0 to +100°C, accuracy 4.0°C   |
| 807                                  | 0 to + 60°C; measuring range +10 to + 50°C, accuracy 2.0°C   |
| 810                                  | 0 to + 80°C; measuring range +10 to + 70°C, accuracy 2.0°C   |
| 814                                  | 0 to +100°C; measuring range +10 to + 90°C, accuracy 2.0°C   |
| 818                                  | 0 to +120°C; measuring range +20 to +100°C, accuracy 4.0°C   |
| 826                                  | 0 to +160°C; measuring range +20 to +140°C, accuracy 4.0°C   |
| 832                                  | 0 to +200°C; measuring range +20 to +180°C, accuracy 4.0°C   |
| 834                                  | 0 to +250°C; measuring range +30 to +220°C, accuracy 5.0°C   |
| 926                                  | +50 to +250°C; measuring range +70 to +230°C, accuracy 4.0°C   |
| 840                                  | 0 to +300°C; measuring range +30 to +270°C, accuracy 10.0°C  |
| 927                                  | +50 to +300°C; measuring range +80 to +270°C, accuracy 5.0°C   |
| 843                                  | 0 to +350°C; measuring range +50 to +300°C, accuracy 10.0°C  |
| 932                                  | +50 to +350°C; measuring range +80 to +320°C, accuracy 10.0°C  |
| (4) Capillary type (FL) <sup>1</sup> |  |
| 02                                   | FL02 copper capillary with copper braiding, approx. 2.5 mm dia.<br>(up to +300°C top of indication range)              |
| 11                                   | FL11 copper capillary with PE sleeve, approx. 3.5 mm dia.<br>(up to +120°C top of indication range)                    |
| 17                                   | FL17 stainless steel capillary, 1.5 mm dia.  |
| 21                                   | FL21 copper capillary, 1.0 mm dia. (up to +300°C top of indication range)  |
| (5) Capillary length <sup>1</sup>    |  |
| 1000                                 | 1000 mm  |
| 2000                                 | 2000 mm  |
| 3000                                 | 3000 mm  |
| 4000                                 | 4000 mm  |
| 5000                                 | 5000 mm  |
| ...                                  | special length (specify in plain text: in 1000 mm steps, maximum length: 10000 mm)                                     |

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## Order details

### Dial thermometer, Class 1.5, Type 608202

#### Order code

| <b>(6) Process connection (PA)<sup>1</sup></b> |  |  |
|--|--|--|
| 750  | TF 01; temperature probe with stepped support tube   |  |
| 752  | TF 11; temperature probe without support tube  |  |
| 843  | TA 02; immersion tube with union nut and loose nipple <sup>2</sup>   |  |
| 161  | TA 03; immersion tube with loose union nut   |  |
| 847  | TA 06; sliding clamp fitting on support tube <sup>2</sup>  |  |
| 311  | TA 20; immersion tube with loose nipple and shoulder <sup>2</sup>  |  |
| 872  | TA 21; immersion tube with loose plug and conical seal   |  |
| 873  | TA 22; immersion tube with loose plug, conical seal and loose nipple <sup>2</sup>  |  |
| 401  | TA 23; immersion tube with plug and spring clip  |  |
| 848  | TA 25; sliding clamp fitting on capillary <sup>2</sup><br>(with FL 17 and FL 21 only)  |  |
| 913  | SH 07; screw-in pocket, assembled,<br>with clamping clip and fixing screw <sup>2</sup> (with TF 01)  |  |
| 820  | SH 09; weld-in pocket, assembled,<br>with clamping clip and fixing screw<br>(not with FL21 - welding shoulder with steel 1.4515)<br>(with TF 01) |  |
| 876  | SH10; screw-in pocket, assembled <sup>2</sup>  |  |
| 871  | SH11; screw-in pocket, assembled <sup>2</sup>  |  |

| <b>(7) Diameter of process connection (PA)<sup>1</sup></b> |            |
|--|------------|
| 6  | 6 mm dia.  |
| 8  | 8 mm dia.  |
| 10   | 10 mm dia. |
| 11   | 11 mm dia. |
| 12   | 12 mm dia. |

| <b>(8) Thread for process connection (PA)<sup>1</sup></b> |   |
|---|---|
| 000   | no thread (with TF 01 and TF 11)            |
| 103   | G <sup>3</sup> / <sub>8</sub> thread        |
| 104   | G <sup>1</sup> / <sub>2</sub> thread        |
| 105   | G <sup>3</sup> / <sub>4</sub> thread        |
| 114   | M 10 x 1 thread (with TA 23 and SH 11 only) |



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## Order details

### Dial thermometer, Class 1.5, Type 608202

#### Order code

| <b>(9) Material of probe / support tube<sup>1</sup></b> |  |
|---|--|
| 26  | stainless steel (CrNi, 1.4571)   |
| 96  | copper (Cu) / brass (CuZn) (up to 200°C)   |
| 95  | stainless steel (CrNi, 1.4571) – probe / brass (CuZn) – support tube (above 250°C) |

| <b>(10) Material of process connection (PA)<sup>1</sup></b> |                                |
|---|--------------------------------|
| 00  | none (TF01 and TF11 only)      |
| 01  | steel (St)                     |
| 26  | stainless steel (CrNi, 1.4571) |
| 46  | brass (CuZn)                   |

| <b>(11) Fitting length of process connection (PA)<sup>1</sup> (dimension EL or S)</b> |  |
|---|--|
| 0   | minimum fitting length TF 11 (active probe dimension)  |
| 50  | 50 mm  |
| 100   | 100 mm   |
| 150   | 150 mm   |
| 200   | 200 mm   |
| ...   | special length (specify in plain text, in 50 mm steps) |

| <b>(12) Extra codes (TZ)</b> |   |
|------------------------------|---|
| 000                          | no extra code   |
| 440                          | housing with bimetal compensation                                     |
| 455                          | mounting bracket at rear with 60 mm housing dia. and 72 x 72 mm bezel |
| 410                          | metal bezel or flange, black  |
| 411                          | metal bezel or flange   |
| 315                          | capillary reinforcement on housing and probe (not with FL 21)         |
| 522                          | customized scale  |

Special versions on request!

#### Order code

(1) 608202 / (2) .... - (3) ... - (4) .. - (5) .... - (6) ... - (7) .. - (8) ... - (9) .. - (10) .. - (11) ... / (12) .. , ...

#### Order example

608202 / 2660 - 832 - 11 - 2000 - 161 - 6 - 104 - 96 - 46 - 150 / 000<sup>3</sup>

<sup>1</sup> See Data Sheet 60.8730 for description and features

<sup>2</sup> Screw-in spigot to DIN 3852 Form A.

<sup>3</sup> List extra codes in sequence, separated by commas.

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## Dial Thermometer

- temperature indicator for panel mounting or self-supporting
- stainless steel housing with bayonet lock
- Class 1
- IP65 protection
- housing sizes: 100 mm and 160 mm dia.

### Brief description

Dial thermometers are universal instruments for temperature measurement and monitoring. The volume change in a liquid-filled measuring system as an effect of temperature, or the change of pressure with temperature inside a gas-filled system, is converted into a rotation of the pointer by means of a Bourdon tube, without any intermediate gearing.

The pointer is directly linked to the measuring system, which makes the overall system extremely torsionally rigid. Vibrations are transmitted to the pointer only to a minor extent.



Type 608225/1016

### Technical data

|                              |   |
|------------------------------|---|
| <b>Housing</b>               | housing with bayonet lock in stainless steel (1.4301)                           |
| <b>Enclosure protection</b>  | IP65 to EN 60 529   |
| <b>Window</b>                | glass, with extra code 434: polycarbonate                                       |
| <b>Scale</b>                 | white, black lettering  |
| <b>Accuracy class</b>        | Class 1 to EN 13190   |
| <b>Reinforcement spring</b>  | instruments with capillary: on housing and temperature probe                    |
| <b>Indication adjustment</b> | at the back (no indication adjustment on Style 01)                              |
| <b>Limit temperatures</b>    | for transport and storage -20°C to +70°C (for the 0 to +60°C range: up to 65°C) |
| <b>Nominal position (NL)</b> | unrestricted  |

|                                     | liquid-filled   | gas-filled   |
|-------------------------------------|---|--|
| <b>Measuring system</b>             | indication range $\leq 350^{\circ}\text{C}$   | indication range $\geq 400^{\circ}\text{C}$                                  |
| <b>Time constant</b><br>$t_{0.632}$ | approx. 12 sec, measured in water bath, with a 6 mm dia. copper probe               | approx. 4 sec, measured in oil bath, with a 10 mm dia. stainless steel probe |
| <b>Ambient temperature effect</b>   | in % of indication range (referred to the deviation from the +23°C reference value) |  |
| <b>on housing</b>                   | 0.15% of indication range per °C ambient temperature change                         | 0.05% of indication range per °C ambient temperature change                  |
| <b>on capillary (per m)</b>         | 0.03% of indication range per °C ambient temperature change                         | no effect  |
|                                     | higher ambient temperature – higher temperature indication – lower switching point  |  |

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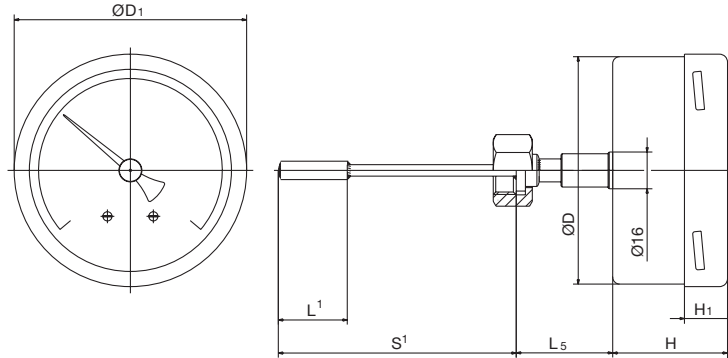
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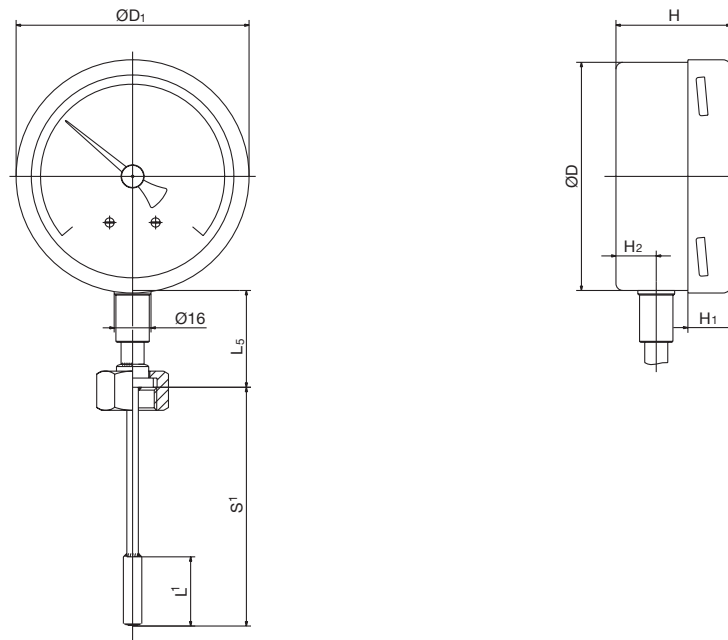


## Dimensions

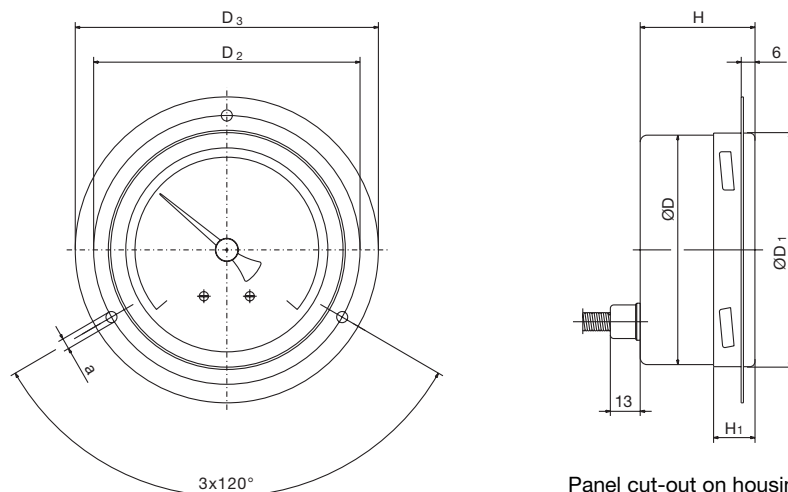
Types: 608225/0110  
 608225/0116



Types: 608225/1010  
 608225/1016



Types: 608225/2010  
 608225/2016



Panel cut-out on housing:  
 100mm dia. =  $105.5^{+0.5}$ mm  
 160mm dia. =  $165.5^{+0.5}$ mm

<sup>1</sup> see Data Sheet 60.8730 for details about lengths

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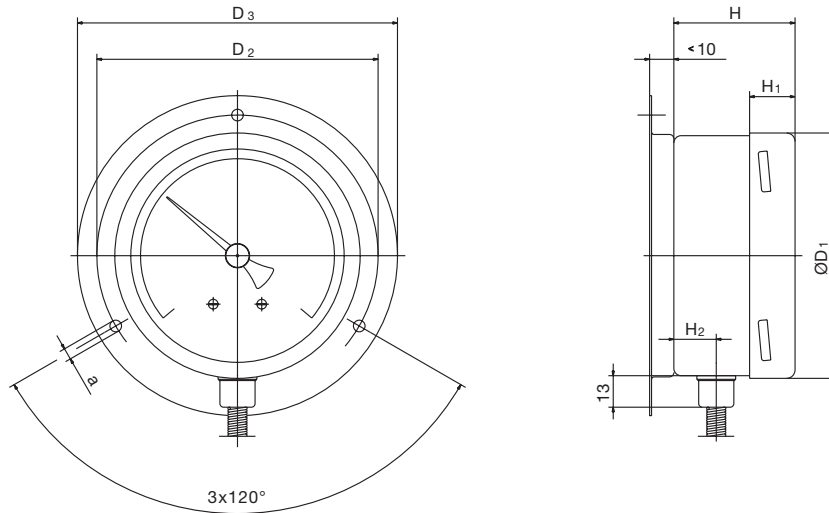
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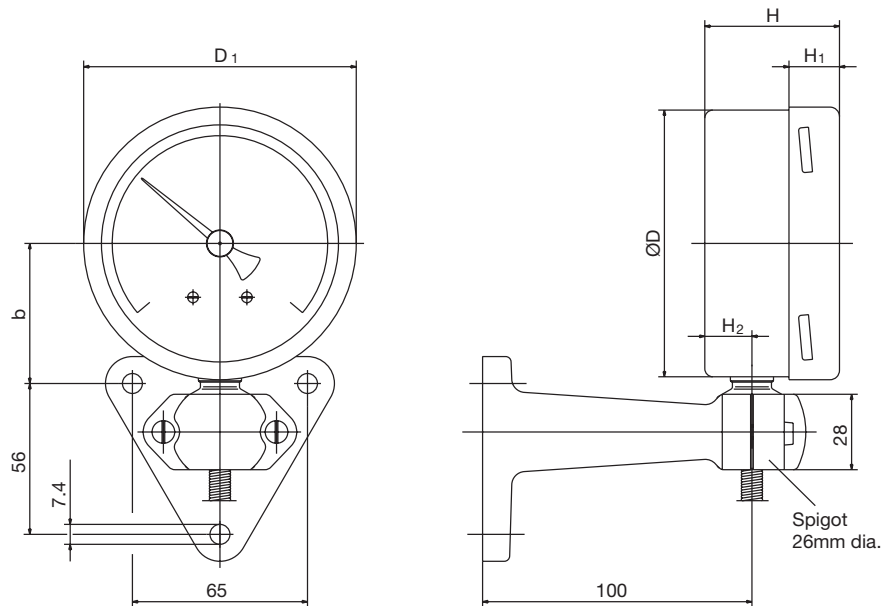


## Dimensions

Types: 608225/2210  
 608225/2216



Types: 608225/2310  
 608225/2316



Mounting bracket to DIN 16 281

| Housing dia. | H  | H <sub>1</sub> | H <sub>2</sub> | D   | D <sub>1</sub> | D <sub>2</sub> | D <sub>3</sub> | a   | b  | L <sub>5</sub>  |
|--------------|----|----------------|----------------|-----|----------------|----------------|----------------|-----|----|-----------------|
| 100          | 50 | 19             | 17.5           | 99  | 101.5          | 116            | 132            | 4.8 | 52 | 40 <sup>1</sup> |
| 160          | 50 | 21             |                | 159 | 161.5          | 178            | 196            | 5.8 | 82 |                 |

<sup>1</sup> for probe mounting TA 02 L<sub>5</sub> is ≤69 mm

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## Order details

### Dial thermometer Class 1, Type 608225

|                   |   |                |
|-------------------|---|----------------|
| <b>Order code</b> | <b>(1) Basic type</b>   |                |
| 608225            | Mechanical dial thermometer   |                |
|                   | <b>(2) Basic type extension</b>   |                |
| 0110              | Style: 01; housing size: 100 mm dia.  |                |
| 0116              | Style: 01; housing size: 160 mm dia.  |                |
| 1010              | Style: 10; housing size: 100 mm dia.  |                |
| 1016              | Style: 10; housing size: 160 mm dia.  |                |
| 2010              | Style: 20; housing size: 100 mm dia.  |                |
| 2016              | Style: 20; housing size: 160 mm dia.  |                |
| 2210              | Style: 22; housing size: 100 mm dia.  |                |
| 2216              | Style: 22; housing size: 160 mm dia.  |                |
| 2310              | Style: 23; housing size: 100 mm dia.  |                |
| 2316              | Style: 23; housing size: 160 mm dia.  |                |
|                   | <b>(3) Indication range (AB)</b>  |                |
| 469               | -40 to +40°C; range -30 to + 30°C   | Accuracy 1.0°C |
| 566               | -30 to +50°C; range -20 to + 40°C   | Accuracy 1.0°C |
| 807               | 0 to +60°C; range +10 to + 50°C   | Accuracy 1.0°C |
| 810               | 0 to +80°C; range +10 to + 70°C   | Accuracy 1.0°C |
| 814               | 0 to +100°C; range +10 to + 90°C  | Accuracy 1.0°C |
| 818               | 0 to +120°C; range +20 to +100°C  | Accuracy 2.0°C |
| 826               | 0 to +160°C; range +20 to +140°C  | Accuracy 2.0°C |
| 832               | 0 to +200°C; range +20 to +180°C  | Accuracy 2.0°C |
| 834               | 0 to +250°C; range +30 to +220°C  | Accuracy 2.5°C |
| 840               | 0 to +300°C; range +30 to +270°C  | Accuracy 5.0°C |
| 843               | 0 to +350°C; range +50 to +300°C  | Accuracy 5.0°C |
| 848               | 0 to +400°C; range +50 to +350°C  | Accuracy 5.0°C |
| 854               | 0 to +500°C; range +50 to +450°C  | Accuracy 5.0°C |
|                   | <b>(4) Capillary type (FL)<sup>1</sup></b>  |                |
| 00                | none (for rigid stem mounting)  |                |
| 04                | FL04 stainless steel capillary (1.4571), 2.2 mm dia.                              |                |
|                   | <b>(5) Capillary length<sup>1</sup></b>   |                |
| 0                 | none (for rigid stem mounting)  |                |
| 1000              | 1000 mm   |                |
| 2000              | 2000 mm   |                |
| 3000              | 3000 mm   |                |
| 4000              | 4000 mm   |                |
| 5000              | 5000 mm   |                |
| ...               | special length (details in plain text: in 1000 mm steps, maximum length 10000 mm) |                |
|                   | <b>(6) Process connection (PA)<sup>1</sup></b>                                    |                |
| 750               | TF01 temperature probe with shouldered support tube                               |                |
| 753               | TF05 temperature probe with plain support tube                                    |                |
| 752               | TF11 temperature probe without support tube                                       |                |
| 843               | TA02 stem with union nut and loose nipple <sup>2</sup>                            |                |
| 161               | TA03 stem with loose union nut (on TF01)  |                |
| 846               | TA04 stem with fixed hexagon screw-in spigot <sup>2</sup>                         |                |
| 847               | TA06 sliding clamp fitting on support tube <sup>2</sup>                           |                |
| 891               | SH05 screw-in pocket, assembled <sup>2</sup> (with 14 mm dia. only)               |                |
| 913               | SH07 screw-in pocket, assembled, with clamping clip and fixing screw <sup>2</sup> |                |

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## Order details

### Dial thermometer Class 1, Type 608225

|                   |   |
|-------------------|---|
| <b>Order code</b> | <b>(7) Diameter of process connection (PA)<sup>1</sup></b>                                |
| 6                 | ø 6 mm  |
| 8                 | ø 8 mm  |
| 10                | ø 10 mm   |
| 14                | ø 14 mm (SH05 only)   |
|                   | <b>(8) Thread for process connection (PA)<sup>1</sup></b>                                 |
| 000               | no thread (TF01, TF05 and TF11)   |
| 103               | thread G 3/8  |
| 104               | thread G 1/2  |
| 105               | thread G 3/4  |
|                   | <b>(9) Material of process connection (PA)<sup>1</sup></b>                                |
| 26                | stainless steel (1.4571)  |
| 97                | stainless steel (1.4571)-TF / brass -TA, SH   |
|                   | <b>(10) Fitting length of process connection (PA)<sup>1</sup> (dimension "EL" or "S")</b> |
| 0                 | minimum fitting length TF 11 (active probe dimension)                                     |
| 50                | 50 mm   |
| 100               | 100 mm  |
| 150               | 150 mm  |
| 200               | 200 mm  |
| ...               | special length (details in plain text, in 50 mm steps)                                    |
|                   | <b>(11) Extra codes (TZ)</b>  |
| 000               | no extra code   |
| 434               | peak-reading pointer adjustable with screwdriver, protected by cover                      |
| 522               | scale to customer specification   |

Special versions on request !

#### Order code

(1) 608225 / (2) ... - (3) ... - (4) .. - (5) .... - (6) ... - (7) .. - (8) ... - (9) .. - (10) ... / (11) ... , ...

#### Order example

608225 / 2010 - 818 - 04 - 2000 - 750 - 8 - 000 - 26 - 100 / 000<sup>3</sup>

<sup>1</sup> For description and special features see Data Sheet 60.8730

<sup>2</sup> Screw-in spigot to DIN 3852 Form A

<sup>3</sup> List extra codes in sequence, separated by commas

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## Bimetal Temperature Switch

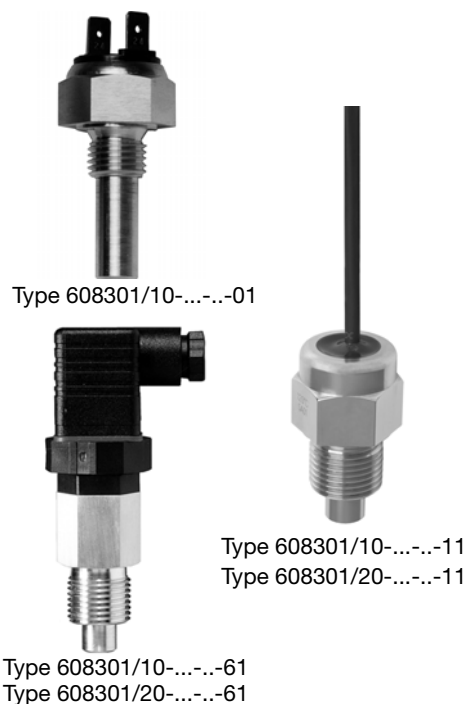
- electromechanical temperature switch with a fixed switching temperature
- IP67 protection (max.)
- simple installation
- contact rating up to 2.5 kVA

### Brief description

The bimetal temperature switch lends itself to universal use. Areas of application include temperature monitoring/control and signaling in cooling and heating systems, compressors and motors.

The temperature switch can, to a limited extent, also be used as a temperature controller.

The temperature change is transferred to a mechanism via the fitting. When the switching temperature is reached, the temperature switch is activated.



### Technical data

Minimum ordering quantity: 50 items

|   | Faston connector<br>A 6.3-08   | Connecting cable<br>with cable gland                                      | Encapsulated<br>connecting cable  | Plug connector<br>for cable connection *                      |
|---|--|---|---|---|
| <b>Fitting</b>  | brass or stainless steel; screw-in spigot similar to DIN 3852<br>Form A for sealing and sealing ring |   |   |   |
| <b>Protection</b>   | IP52   | IP65  | IP67  | IP65  |
| <b>Electrical contact<br/>Snap-action switch<br/>Connection</b>   | A 6.3-0.8<br>to DIN 46244  | cable diameter approx. 5.5 mm;<br>core cross-section 0.75 mm <sup>2</sup> |   | cable diameter<br>6 – 8 mm;<br>earth contact not<br>connected |
| <b>Contact rating</b>   | 5 A, 30 V DC, +10 / -15%<br>10(10) A, 230 V AC +10/-15%, 48 – 63Hz, p.f. = 0.75                      |   |   |   |
| <b>Contact resistance</b>   | < 30 mΩ  |   |   |   |
| <b>Breakdown strength</b>   | 1500 V AC /1min  |   |   |   |
| <b>Electrical contact<br/>Slow-action contact<br/>Contact rating</b>  | -  | -   | 8 A, 12 V DC +10/-15%<br>4 A, 24 V DC +10/-15%<br>6 A, 115 V AC +10/-15%, 48 – 63Hz |   |
| If the bimetal temperature switch is operated off a voltage above 50 V, the fitting must be provided with a protective earth according to VDE or the corresponding local regulations. |  |   |   |   |

\* to EN 175301-803 (DIN 43650)



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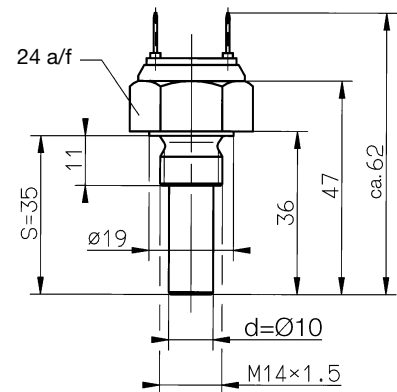
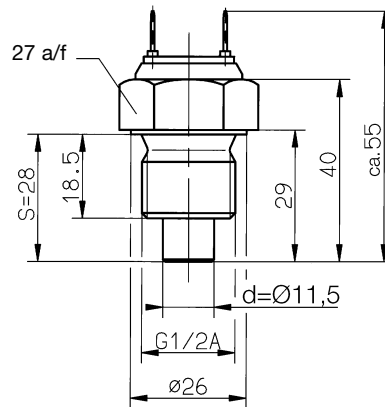


## Technical data

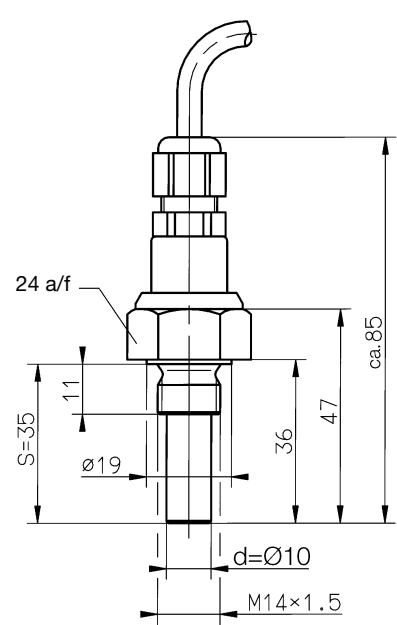
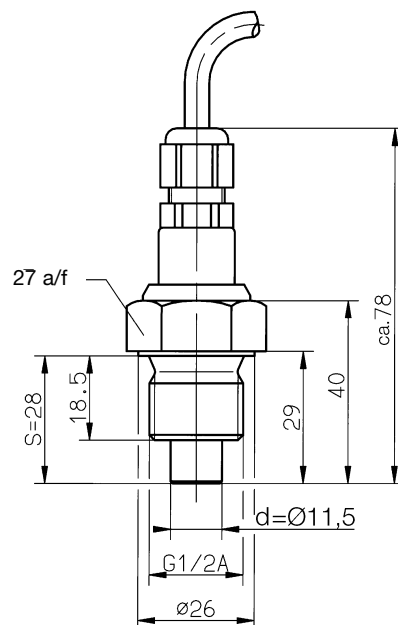
|                          | Snap-action switch  | Slow-action contact   |
|--------------------------|---|---|
| Switching temperature    | +40°C to +140°C; 5 °C steps   |   |
| Reset temperature        | 15 to 30 °C below the switching temperature   | approx. 1.5 °C below the switching temperature (measured in water bath, switching point 40°C) |
| Switching point accuracy | switching temperature: up to 130 °C ±5 °C, above 130 °C ±10 °C<br>at a rate of temperature change of 1 °C/min   |   |
| Vibration strength       | 13 g (vibration in direction of central axis, at a frequency of 45 Hz and an amplitude of ± 1.6 mm)   |   |
| Dynamic response         | t <sub>0,9</sub> approx. 3.5 min, measured in agitated oil bath; brass fitting, G1/2 A  |   |
| Switching output (SA)    | break (n.c.) SA01 <br>or make (n.o.) SA02  referred to rising temperature |   |
| Limit temperatures       | for temperature and storage -5 to +80°C   |   |
| Nominal position         | any   |   |
| Weight                   | approx. 50 g  |   |

## Dimensions

Type 608301/10-...-...-01



Type 608301/10-...-...-18





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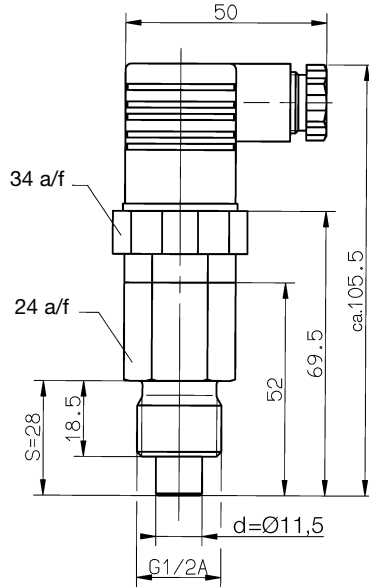
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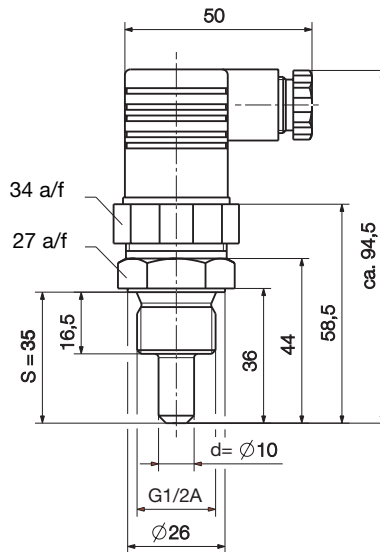


## Dimensions

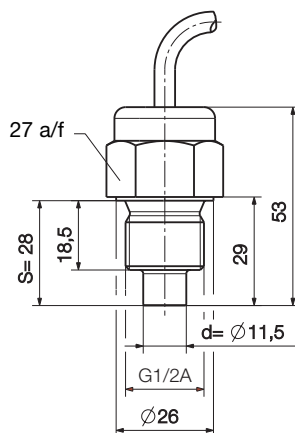
Type 608301/10-...-...-61



Type 608301/20-...-...-61



Types 608301/10-...-...-11  
 608301/20-...-...-11



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**Order details**

**Bimetal temperature switch Type 608301**

Minimum ordering quantity: 50 items

|   |   | (1) Basic type  |  |
|---|---|---|--|
|   |   | 608301  | Electromechanical temperature switch with a fixed switching temperature                            |
|   |   | <b>(2) Basic type extension</b>                                     |  |
| X |   | 10  | snap-action switch   |
|   | X | 20  | slow-action contact  |
|   |   | <b>(3) Switching temperature</b>                                    |  |
| X | X | ...   | in degrees, within the range from +40°C to +140°C, in 5 °C increments<br>(e.g. 85 $\Delta$ + 85°C) |
|   |   | <b>(4) Switching output (SA)</b>                                    |  |
| X | X | 98  | break (n.c.) (SA01)  |
| X | X | 99  | make (n.o.) (SA02)   |
|   |   | <b>(5) Electrical connection</b>                                    |  |
| X |   | 01  | faston connector A 6.3-0.8 DIN 46244   |
| X | X | 61  | plug connector for cable connection to EN 175301-803 (DIN 43650)                                   |
| X |   | 18  | connecting cable with cable gland  |
| X | X | 11  | encapsulated connecting cable (continuous operating temperature: 120°C max.)                       |
|   |   | <b>(6) Material of process connection</b>                           |  |
| X | X | 50  | brass (CuZn)   |
| X | X | 78  | stainless steel (CrNi, 1.4305)   |
|   |   | <b>(7) Diameter of process connection (PA), dimension "d"</b>       |  |
|   |   | 10  | 10 mm  |
|   |   | 11,5  | 11.5 mm  |
|   |   | <b>(8) Type of thread for process connection (PA)</b>               |  |
|   |   | 121   | thread M14x1.5   |
|   |   | 104   | thread G 1/2   |
|   |   | <b>(9) Fitting length of process connection (PA), dimension "S"</b> |  |
|   |   | 28  | 28 mm  |
|   |   | 35  | 35 mm  |
|   |   | <b>(10) Cable length</b>  |  |
| X | X | 0   | none   |
| X | X | 1000  | 1000 mm  |
| X | X | 2000  | 2000 mm  |
| X | X | 3000  | 3000 mm  |
| X | X | 4000  | 4000 mm  |
| X | X | 5000  | 5000 mm  |
|   |   | <b>(11) Extra codes (TZ)</b>  |  |
| X | X | 000   | no extra codes   |

Other versions (switching temperatures, fittings etc.) available on request.

**Order code**

(1) 608301 / (2) ... - (3) ... - (4) .. - (5) .. - (6) .. - (7) ... - (8) ... - (9) .. - (10) .... / (11) ...

**Order example**

608301 / 10 - 85 - 98 - 01 - 50 - 10 - 121 - 35 - 0 / 000

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## Contact Dial Thermometers

- temperature controller with indication for panel or surface mounting
- Class 1
- protection up to IP65
- housing sizes: 100 mm and 160 mm diameter, bezel 96 x 96 mm

### Brief description

Contact dial thermometers are universally applicable instruments with indication of the actual value, for temperature measurement, control and monitoring.

The temperature-dependent change in volume of a liquid-filled measuring system (or the temperature-dependent change of pressure in a gas-filled measuring system) is converted into a rotary movement of the pointer by a Bourdon tube, without any intermediate gearing. The rotary movement of the pointer shaft is used to operate the switched output.

The pointer is directly linked to the measuring system, which makes the overall system extremely torsionally rigid. Vibrations are transmitted to the pointer only to a minor extent.

The switched output can be implemented as a slow-break, magnetic snap-action or inductive contact. The slow-break or magnetic snap-action contact is an auxiliary circuit switch that, depending on the direction of movement, opens or closes an electrical circuit at the set limits, by means of a contact arm that is attached to the moving pointer.

The inductive contact is an electronic limit detector operated by a contactless position sensor (proximity switch).



Type 608425/2316



Type 608425/2496

### Technical data



|   | Type 608425<br>round panel- or surface-mounting housing   | Typ 608425<br>square panel-mounting instrument  |
|---|---|---|
| <b>Housing</b>                              | housing with bayonet lock in stainless steel (1.4301)   | galvanized sheet steel housing, fixed at back by a bracket; front bezel in stainless steel (1.4301) |
| <b>Enclosure protection</b>                 | IP65 as per EN 60 529   | front: IP51 as per EN 60 529<br>back: IP00 as per EN 60 529   |
| <b>Electrical connection</b>                | terminal box: conductor cross-section up to 2.5mm <sup>2</sup><br>cable gland suitable for cable dia. 6.5 – 13 mm | screw terminals: conductor cross-section up to 2.5mm <sup>2</sup>                                   |
| <b>Glass window</b>                         | polycarbonate   | plexiglas (PMMA)  |
| <b>Scale</b>                                | white, black lettering  |   |
| <b>Accuracy class</b>                       | Class 1 to EN 13190   |   |
| <b>Anti-kink spring</b>                     | for capillary instruments, at the housing and probe   |   |
| <b>Setpoint adjustment</b>                  | through setpoint adjuster on the glass window   |   |
| <b>Indication correction</b>                | at the back, no indication correction for styles 01 and 20 (100 mm dia.)  |   |
| <b>Temperature limits</b>                   | for transport and storage -20°C to +70°C (with a 0 to +60°C range: max. 65°C)                                     |   |
| <b>Operating position (NL)</b>              | unrestricted  |   |
|   | <b>Liquid filling</b>   | <b>Gas filling</b>  |
| <b>Measuring system</b>                     | range (AB) ≤350°C   | range (AB) ≤400°C   |
| <b>Time constant</b><br>t <sub>0.632</sub>  | approx. 12 sec, measured in water bath, with a 6 mm dia. copper probe   | approx. 4 sec, measured in oil bath, with a 10 mm dia. stainless steel probe                        |
| <b>Ambient temperature error at housing</b> | in % of indication range (referred to the deviation from the reference value at +23°C)                            |   |
| <b>on capillary (per meter)</b>             | 0.15% of indication range per °C change of ambient temperature  | 0.05% of indication range per °C change of ambient temperature                                      |
|   | 0.03% of indication range per °C change of ambient temperature  | no effect   |
|   | At higher ambient temperatures – higher temperature indication – lower switching point                            |   |

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|                                   | Standard  | Extra code (TZ) 442  |
|-----------------------------------|---|--|
| <b>Electrical contact</b>         |   |  |
| <b>Contact type</b>               | electromechanical slow-break contact with single-pole make contacts   | electromechanical magnetic snap-action contact with single-pole make contacts  |
| <b>Contact rating</b>             | 230 V AC/DC, +10/-15%, 48 – 63Hz, p.f = 1 (0.6)   |  |
|                                   | max. 18 VA / 10 W   | max. 50 VA / 30 W  |
| <b>Switching differential</b>     | ≤0.5% of indication range   | approx.2% of indication range  |
| <b>Switching point accuracy</b>   | ±0.5% of indication range (referred to the switching point for rising temperature)  |  |
| <b>Switching reliability</b>      | To ensure maximum switching reliability, we recommend a minimum voltage of 24 V and a minimum current of 20 mA  |  |
|                                   | Electromechanical limit contact   | Inductive limit contact  |
| <b>Switching output (SA)</b>      | SA 01 to SA 11  | SA 30 and SA 31<br>The inductive limit contact is operated by a contactless proximity switch. The sensor is a slot-type initiator attached to the setpoint indicator. The control flag is activated by the pointer.<br>If the control flag moves into the sensor gap, the internal resistance increases (active area is damped: initiator is high-resistance, relay is de-energized). The switching amplifier of the control device responds to the resulting change in current.<br>Switching action according to the "active current principle".<br>Control flag is not within the sensor air gap, relay is energized:<br><br>Current drawn ≥ 3mA<br>(active area is clear, the oscillator is active).<br>Control flag is within the sensor air gap,<br>Relay is de-energized:<br><br>Current drawn ≤1mA<br>(active area is damped, no oscillation).<br>Inductive limit contact<br>as per Directive 94/9 EC (ATEX),<br>suitable for II 2 G EEx ia IIC T6 |
|                                   | for switching sequence and diagrams: see order details  |  |
| <b>Secondary switched devices</b> | For electromechanical limit detectors we recommend using Type MSR multi-function relays from: Wiebrock Mess- und Regeltechnik GmbH, www.wiebrock.de.<br>These switching amplifiers increase the switching reliability and switching capacity of slow-break and magnetic snap-action contacts, and reduce their contact loading.<br>Unintended switching of the limit contact (caused by vibration) can be considerably reduced by using a drop-out delay.<br>With inductive limit detectors, you can use the transistor relay:<br>Type KFA6-SR2-Ex...W (II (1) G D [EEx ia] IIC) from Pepperl & Fuchs (www.pepperlfuchs.de).<br>Intrinsic safety II 2 G EEx ia IIC T6 can only be ensured if this transistor relay is used. |  |

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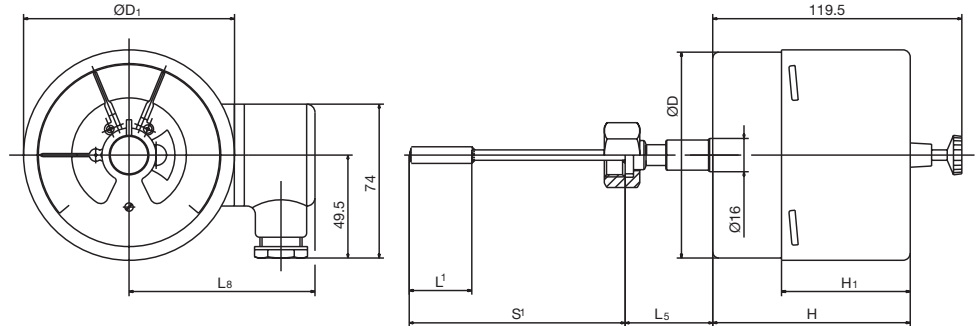
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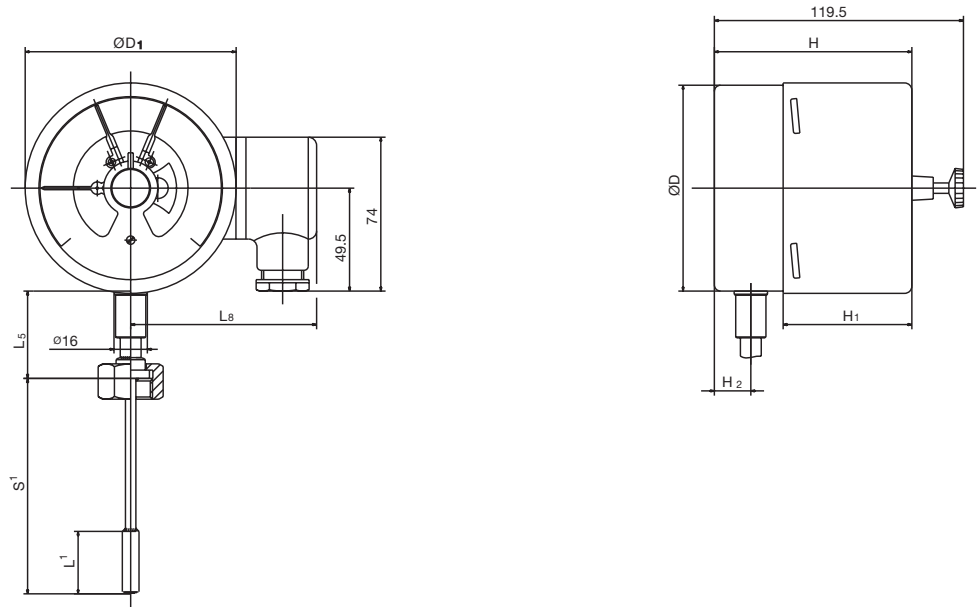


## Dimensions

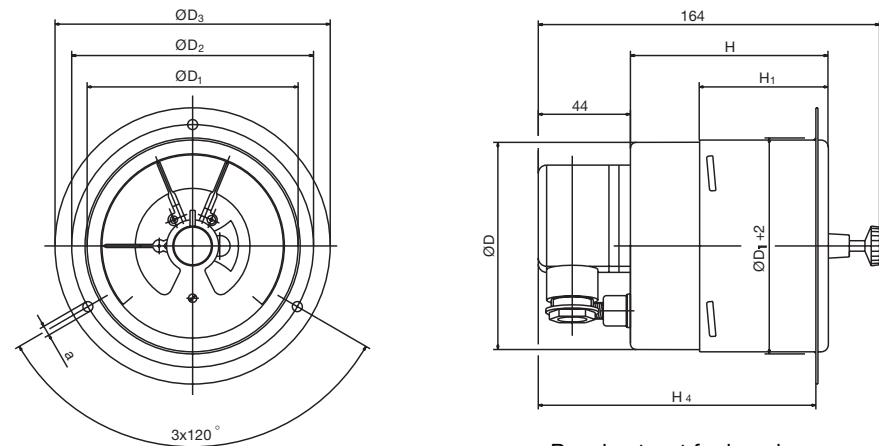
Types: 608425/0110  
 608425/0116



Types: 608425/1010  
 608425/1016



Types: 608425/2010  
 608425/2016



Panel cut-out for housing  
 diameter 100mm =  $105.5^{+0.5}$ mm  
 diameter 160mm =  $165.5^{+0.5}$ mm

<sup>1</sup> for lengths, see Data Sheet 60.8730

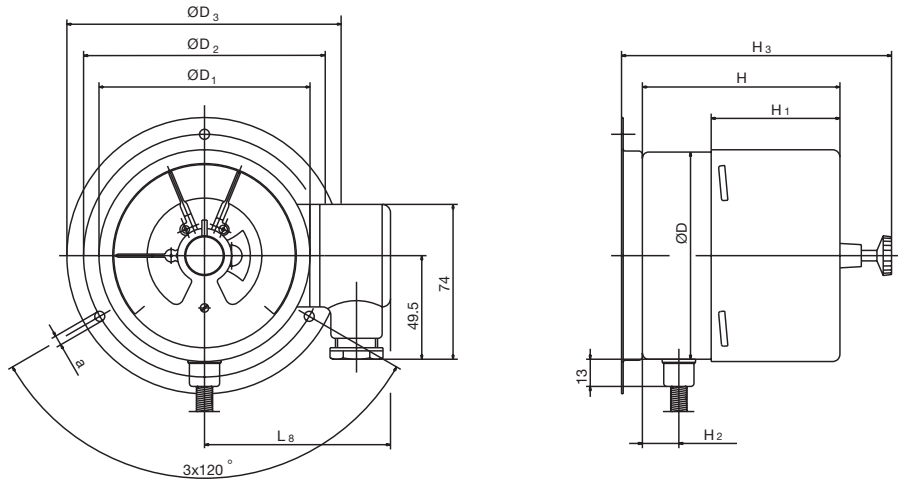
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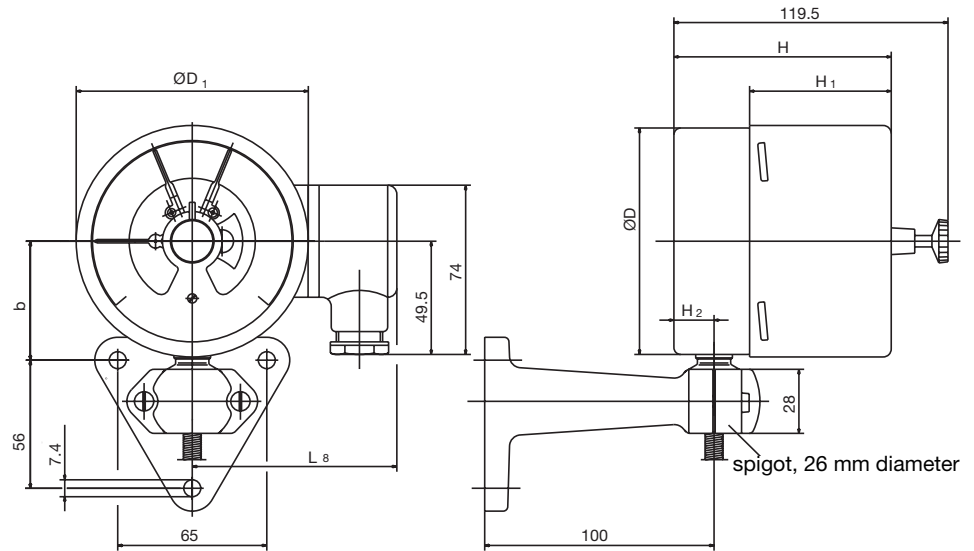
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Types: 608425/2210  
 608425/2216



Types: 608425/2310  
 608425/2316

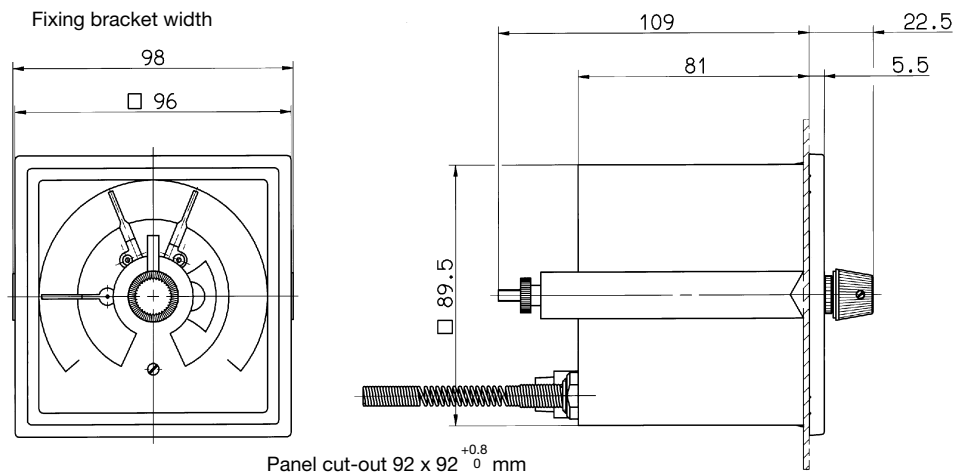


instrument mounting to DIN 16281

| Housing diameter | H  | H <sub>1</sub> | H <sub>2</sub> | H <sub>3</sub> | H <sub>4</sub> | D   | D <sub>1</sub> | D <sub>2</sub> | D <sub>3</sub> | a   | b  | L <sub>5</sub>  | L <sub>8</sub> |
|------------------|----|----------------|----------------|----------------|----------------|-----|----------------|----------------|----------------|-----|----|-----------------|----------------|
| 100              | 95 | 62             | 17.5           | 129.5          | 129            | 99  | 101.5          | 116            | 132            | 4.8 | 52 | 40 <sup>1</sup> | 90             |
| 160              | 96 | 63             |                | 121            | 130            | 159 | 161.5          | 178            | 196            | 5.8 | 82 |                 | 120            |

<sup>1</sup> for probe mounting TA 02, L<sub>5</sub> is ≤69 mm.

Type: 608425/2496



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## Order details

### Contact dial thermometers, Class 1, Type 608425

|   |      | <b>(1) Basic type</b>                          |   |
|---|------|--|---|
|   |      | 608425   | Mechanical contact dial thermometer, Class 1 (round, panel- or surface-mounting instrument) |
|   |      | 608425   | Mechanical contact dial thermometer, Class 1 (square, panel-mounting instrument)            |
|   |      | <b>(2) Basic type extensions</b>               |   |
| X | 0110 | Style: 01; housing size: diameter 100 mm       |   |
| X | 0116 | Style: 01; housing size: diameter 160 mm       |   |
| X | 1010 | Style: 10; housing size: diameter 100 mm       |   |
| X | 1016 | Style: 10; housing size: diameter 160 mm       |   |
| X | 2010 | Style: 20; housing size: diameter 100 mm       |   |
| X | 2016 | Style: 20; housing size: diameter 160 mm       |   |
| X | 2210 | Style: 22; housing size: diameter 100 mm       |   |
| X | 2216 | Style: 22; housing size: diameter 160 mm       |   |
| X | 2310 | Style: 23; housing size: diameter 100 mm       |   |
| X | 2316 | Style: 23; housing size: diameter 160 mm       |   |
| X | 2496 | Style: 24; housing size: 96 x 96 mm            |   |
|   |      | <b>(3) Indication range (AB)</b>               |   |
| X | X    | 469  | -40 to +40°C; range -30 to + 30°C Error limit 1.0°C   |
| X | X    | 566  | -30 to +50°C; range -20 to + 40°C Error limit 1.0°C   |
| X | X    | 807  | 0 to +60°C; range +10 to + 50°C Error limit 1.0°C   |
| X | X    | 810  | 0 to +80°C; range +10 to + 70°C Error limit 1.0°C   |
| X | X    | 814  | 0 to +100°C; range +10 to + 90°C Error limit 1.0°C  |
| X | X    | 818  | 0 to +120°C; range +20 to +100°C Error limit 2.0°C  |
| X | X    | 826  | 0 to +160°C; range +20 to +140°C Error limit 2.0°C  |
| X | X    | 832  | 0 to +200°C; range +20 to +180°C Error limit 2.0°C  |
| X | X    | 834  | 0 to +250°C; range +30 to +220°C Error limit 2.5°C  |
| X | X    | 840  | 0 to +300°C; range +30 to +270°C Error limit 5.0°C  |
| X | X    | 843  | 0 to +350°C; range +50 to +300°C Error limit 5.0°C  |
| X | X    | 848  | 0 to +400°C; range +50 to +350°C Error limit 5.0°C  |
| X | X    | 854  | 0 to +500°C; range +50 to +450°C Error limit 5.0°C  |
|   |      | <b>(4) Capillary type (FL)<sup>1</sup></b>     |   |
| X |      | 00   | none (with rigid stem)  |
| X | X    | 04   | FL04 capillary, stainless steel (1.4571), diameter 2.2 mm                                   |
|   |      | <b>(5) Capillary length<sup>1</sup></b>        |   |
| X | X    | 0000   | none (rigid connection)   |
| X | X    | 1000   | 1000 mm   |
| X | X    | 2000   | 2000 mm   |
| X | X    | 3000   | 3000 mm   |
| X | X    | 4000   | 4000 mm   |
| X | X    | 5000   | 5000 mm   |
| X | X    | ....   | special length (specify in plain text: 1000 mm steps, maximum length 10000 mm)              |
|   |      | <b>(6) Process connection (PA)<sup>1</sup></b> |   |
| X | X    | 750  | TF01 temperature probe with shoulder on support tube  |
| X | X    | 753  | TF05 temperature probe with plain support tube  |
| X | X    | 752  | TF11 temperature probe without support tube   |
| X | X    | 843  | TA02 stem with union nut and loose nipple (only TF01) <sup>2</sup>                          |
| X | X    | 161  | TA03/01 stem with loose union nut (with TF01)   |
| X | X    | 846  | TA04 stem with fixed hexagon screw-in spigot (only TF01) <sup>2</sup>                       |
| X | X    | 847  | TA06 sliding clamp fitting on support tube <sup>2</sup>                                     |
| X | X    | 891  | SH05 screw-in pocket, assembled <sup>2</sup> (with 14 mm dia. only)                         |
| X | X    | 913  | SH07 screw-in pocket, assembled, with clamping clip and fixing screw <sup>2</sup>           |

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|   |   |   |  |  |  |
|---|---|---|--|--|--|
|   |   | <b>(7) Diameter of process connection (PA)<sup>1</sup></b>                                |  |  |  |
| X | X | 6   | diameter 6 mm  |  |  |
| X | X | 8   | diameter 8 mm  |  |  |
| X | X | 100   | diameter 10 mm   |  |  |
| X | X | 140   | diameter 14 mm (only SH05)   |  |  |
|   |   | <b>(8) Thread for process connection (PA)<sup>1</sup></b>                                 |  |  |  |
| X | X | 000   | no thread (with TF01, TF05 and TF11)   |  |  |
| X | X | 103   | thread G 3/8   |  |  |
| X | X | 104   | thread G 1/2   |  |  |
| X | X | 105   | thread G 3/4   |  |  |
|   |   | <b>(9) Process connection (PA) material<sup>1</sup></b>                                   |  |  |  |
| X | X | 26  | stainless steel (CrNi, 1.4571)   |  |  |
| X | X | 97  | stainless steel (CrNi, 1.4571)-TF / brass (CuZn)-TA, SH  |  |  |
|   |   | <b>(10) Fitting length of process connection (PA)<sup>1</sup> (dimension "EL" or "S")</b> |  |  |  |
| X | X | 0   | minimum fitting length TF 11 (active probe dimension)  |  |  |
| X | X | 50  | 50 mm  |  |  |
| X | X | 100   | 100 mm   |  |  |
| X | X | 150   | 150 mm   |  |  |
| X | X | 200   | 200 mm   |  |  |
| X | X | ...   | special length (specify in plain text, steps of 50 mm)   |  |  |
|   |   | <b>(11) Switching output (SA)</b>   |  |  |  |
| X | X | 01  | SA01 (2) <sup>3</sup> With rising temperature: contact 1 opens (2) <sup>3</sup>  |  |  |
| X | X | 02  | SA02 (1) <sup>3</sup> With rising temperature: contact 1 closes (1) <sup>3</sup>   |  |  |
| X | X | 03  | SA03 (21) <sup>3</sup> With rising temperature: contact 1 opens and contact 2 closes (21) <sup>3</sup>                         |  |  |
| X | X | 04  | SA04 (11) <sup>3</sup> With rising temperature: contact 1 and contact 2 close (11) <sup>3</sup>                                |  |  |
| X | X | 05  | SA05 (22) <sup>3</sup> With rising temperature: contact 1 opens and contact 2 opens (22) <sup>3</sup>                          |  |  |
| X |   | 10  | SA10 (21) <sup>3</sup> With rising temperature: contact 1 opens and contact 2 closes (with separate circuit) (21) <sup>3</sup> |  |  |
| X |   | 11  | SA11 (11) <sup>3</sup> With rising temperature: contact 1 and contact 2 close (with separate circuits) (11) <sup>3</sup>       |  |  |
| X | X | 30  | SA30 (2) <sup>3</sup> With rising temperature: flag moves in, break action (2) <sup>3</sup>                                    |  |  |
| X | X | 31  | SA31 (1) <sup>3</sup> With rising temperature: flag moves out, make action (1) <sup>3</sup>                                    |  |  |
|   |   | <b>(12) Extra codes (TZ)</b>  |  |  |  |
| X | X | 000   | no extra code  |  |  |
| X | X | 410   | metal front bezel, black   |  |  |
| X | X | 442   | electromechanical magnetic snap-action contact   |  |  |
| X |   | 509   | setpoint adjustment with key   |  |  |
| X | X | 522   | customized scale   |  |  |

Special versions on request !

Order code

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12)  
 608425 / [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] / [ ] , ...

Order example

608425 / 2010 - 818 - 04 - 2000 - 750 - 8 - 000 - 26 - 100 - 01 / 000<sup>4</sup> , ...

<sup>1</sup> for description and features, see Data Sheet 60.8730

<sup>2</sup> screw-in spigot to DIN 3852 Form A

<sup>3</sup> figures in brackets ( . . ) correspond to the designation of the switching function code as per DIN 16196

<sup>4</sup> list extra codes in sequence, separated by a comma



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## MICROSTAT-M

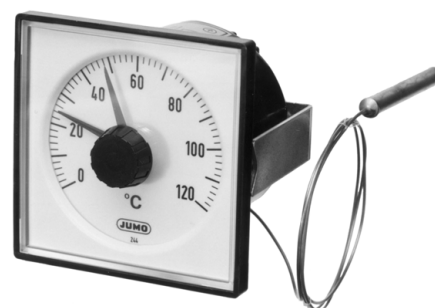
- Electromechanical temperature controller with indication
- Class 2 with one microswitch
- IP53 front protection
- Housing sizes: 60 mm, 80 mm and 100 mm dia.  
 Bezel sizes: 72 x 72 mm and 96 x 96 mm

### Brief description

The MICROSTAT-M is an electromechanical temperature controller with indication for universal use. The instrument has a plastic housing and a liquid-filled or gas-filled measuring system. The temperature-dependent change in volume of a liquid-filled measuring system, or the temperature-dependent change in pressure of a gas-filled system, is converted by a Bourdon tube into a rotary movement of the pointer, without any transmission gearing. The rotary movement of the pointer spindle operates the microswitch through a lever system.



Type 608501/2160



Type 608501/2572

### Technical data

|  |   |   |                             |
|--|---|---|-----------------------------|
| <b>Housing or bezel</b>                          | black plastic;<br>steel housing (extra code 415)  |   |                             |
| <b>Protection</b>                                | front: IP53 to EN 60 529<br>rear: IP00 to EN 60 529 (IP54 with extra code 426)  |   |                             |
| <b>Scale</b>                                     | white, black lettering  |   |                             |
| <b>Accuracy class</b>                            | Class 2 to EN 13190   |   |                             |
| <b>Measuring system</b>                          | <b>liquid-filled</b>  | <b>gas-filled</b>   |                             |
|  | indication range $\leq 350^{\circ}\text{C}$   | indication range $\geq 400^{\circ}\text{C}$                                       |                             |
| <b>Time constant</b><br>$t_{0.632}$              | approx. 12 sec, measured in water bath,<br>with a 6 mm dia. copper probe  | approx. 4 sec, measured in oil bath,<br>with a 10 mm dia. stainless steel probe   |                             |
| <b>Ambient temperature error effect</b>          | in % of indication range (referred to the deviation from the reference value $+23^{\circ}\text{C}$ )  |   |                             |
| <b>on housing</b>                                | 0.15% of indication range<br>per $^{\circ}\text{C}$ change in ambient temperature   | 0.05% of indication range<br>per $^{\circ}\text{C}$ change in ambient temperature |                             |
| <b>on capillary (per meter)</b>                  | 0.03% of indication range<br>per $^{\circ}\text{C}$ change in ambient temperature   | no effect   |                             |
|  | higher ambient temperature – higher temperature indication – lower switching point  |   |                             |
|  | standard  | extra code (TZ) 651   | extra code (TZ) 650         |
| <b>Electrical contact</b><br><b>Contact type</b> | single-pole microswitch with a mechanically operated changeover contact   |   |                             |
| <b>Contact rating</b>                            | 230 V AC $\pm 10/-15\%$ , 48 – 63 Hz, p.f. = 1 (0.6)  |   |                             |
|  | 5 (1.5) A   | 3 (1) A   | 10 (3) A                    |
| <b>Switching differential</b>                    | approx. 2% of indication range  |   | 2 to 4% of indication range |
| <b>Switching point accuracy</b>                  | $\pm 0.5\%$ of indication range referred to the switch-off point with rising temperature  |   |                             |
| <b>Switching reliability</b>                     | To ensure maximum switching reliability, we recommend a minimum voltage of 24 V and a minimum current of 20 mA.   |   |                             |
|  | standard  | extra code (TZ) 507   |                             |
| <b>Electrical connection</b>                     | faston connectors A 6.3 x 0.8 to DIN 46 244   | screw terminals: for up to 1.5 mm <sup>2</sup><br>conductor cross-section         |                             |
| <b>Setpoint adjustment</b>                       | by setting device on window   |   |                             |
| <b>Limit temperatures</b>                        | for transport and storage: $-20$ to $+70^{\circ}\text{C}$<br>(for indication range $-40$ to $+40^{\circ}\text{C}$ : up to $50^{\circ}\text{C}$ ; for indication range $-30$ to $+50^{\circ}\text{C}$ : up to $60^{\circ}\text{C}$ ) |   |                             |
| <b>Nominal position</b>                          | unrestricted  |   |                             |

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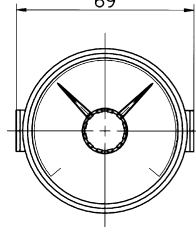
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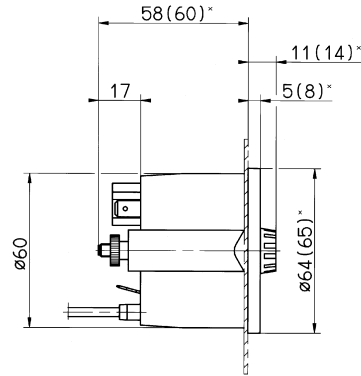
## Dimensions

**Types:** 608501/2160  
 608501/2160 TZ 415

Width of mounting bracket  
 69

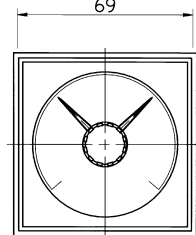


Panel cut-out  $\varnothing 62 \begin{smallmatrix} +0.5 \\ 0 \end{smallmatrix}$  mm

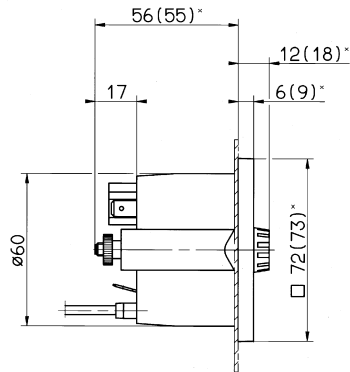


**Types:** 608501/2572  
 608501/2572 TZ 415

Width of mounting bracket  
 69

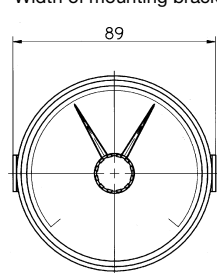


Panel cut-out  $\varnothing 62 \begin{smallmatrix} +0.5 \\ 0 \end{smallmatrix}$  mm

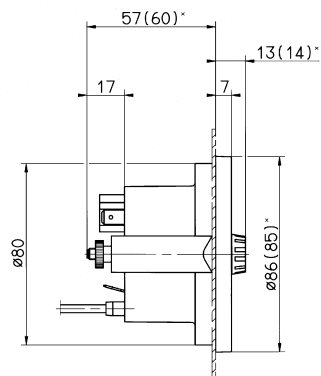


**Types:** 608501/2180  
 608501/2180 TZ 415

Width of mounting bracket  
 89

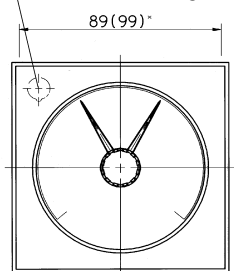


Panel cut-out  $\varnothing 82 \begin{smallmatrix} +0.5 \\ 0 \end{smallmatrix}$  mm

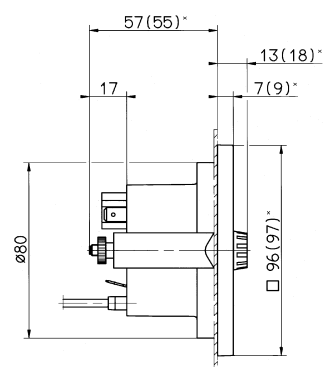


**Types:** 608501/2596  
 608501/2596 TZ 415

TZ 572 (indicator light), only with  
 92 x 92 +0.8 mm panel cut-out  
 Width of mounting bracket



Panel cut-out  $\varnothing 82 \begin{smallmatrix} +0.5 \\ 0 \end{smallmatrix}$  mm or 92 x 92  $\begin{smallmatrix} +0.8 \\ 0 \end{smallmatrix}$  mm (TZ 460)



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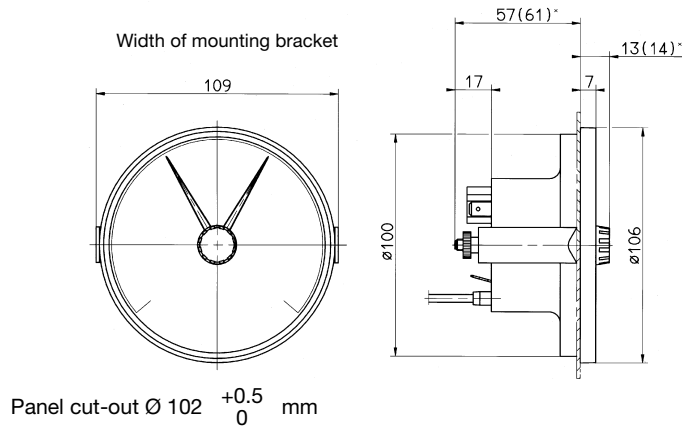
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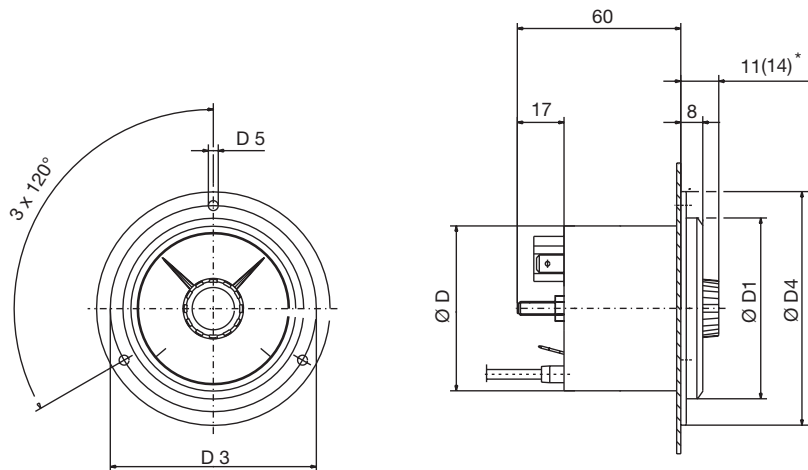


## Dimensions

**Types:** 608501/2110  
 608501/2110 TZ 415

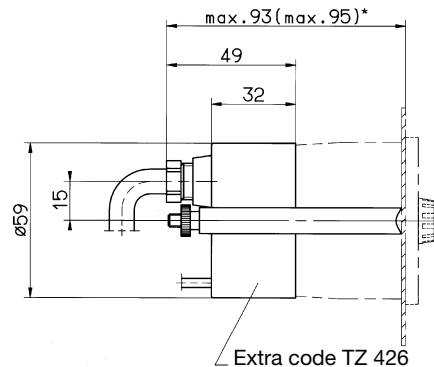


**Types:** 608501/2060  
 608501/2060 TZ 415  
 608501/2080 TZ 415  
 608501/2010 TZ 415



| Type                              | $\varnothing D$ | $\varnothing D1$ | $\varnothing D3$ | $\varnothing D4$ | $\varnothing D5$ | Panel cut-out<br>$\varnothing \begin{matrix} +0.5 \\ 0 \end{matrix}$ mm |
|-----------------------------------|-----------------|------------------|------------------|------------------|------------------|---|
|                                   | (mm)            |                  |                  |                  |                  |   |
| 608501/2060<br>608501/2060 TZ 415 | 60              | 66               | 75               | 85               | 3.6              | 62  |
| 608501/2080 TZ 415                | 80              | 86               | 95               | 110              | 4.8              | 82  |
| 608501/2010 TZ 415                | 100             | 107              | 116              | 132              | 4.8              | 102   |

**Extra code 426**



\* for steel housing (extra code TZ 415)

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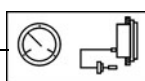

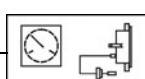
**Order details**

**MICROSTAT-M Type 608501**

**Order code (1) Basic type**

608501 Mechanical temperature controller MICROSTAT-M Class 2, with one microswitch

**(2) Basic type extensions**

|      |                                      |                    |   |
|------|--------------------------------------|--------------------|---|
| 2060 | Style: 20; housing size: 60 mm dia.  |                    |   |
| 2080 | Style: 20; housing size: 80 mm dia.  | (with TZ 415 only) |  |
| 2010 | Style: 20; housing size: 100 mm dia. | (with TZ 415 only) |   |
| 2160 | Style: 21; housing size: 60 mm dia.  |                    |  |
| 2180 | Style: 21; housing size: 80 mm dia.  |                    |   |
| 2110 | Style: 21; housing size: 100 mm dia. |                    |   |
| 2572 | Style: 25; housing size: 72 x 72 mm  |                    |  |
| 2596 | Style: 25; housing size: 96 x 96 mm  |                    |   |

**(3) Indication range (AB)**

|     |   |
|-----|---|
| 469 | -40 to + 40°C; measuring range -30 to + 30°C, accuracy 2.0°C  |
| 566 | -30 to + 50°C; measuring range -20 to + 40°C, accuracy 2.0°C  |
| 643 | -20 to +120°C; measuring range 0 to +100°C, accuracy 4.0°C    |
| 807 | 0 to + 60°C; measuring range +10 to + 50°C, accuracy 2.0°C    |
| 810 | 0 to + 80°C; measuring range +10 to + 70°C, accuracy 2.0°C    |
| 814 | 0 to +100°C; measuring range +10 to + 90°C, accuracy 2.0°C    |
| 818 | 0 to +120°C; measuring range +20 to +100°C, accuracy 4.0°C    |
| 826 | 0 to +160°C; measuring range +20 to +140°C, accuracy 4.0°C    |
| 832 | 0 to +200°C; measuring range +20 to +180°C, accuracy 4.0°C    |
| 834 | 0 to +250°C; measuring range +30 to +220°C, accuracy 5.0°C    |
| 926 | +50 to +250°C; measuring range +70 to +230°C, accuracy 4.0°C  |
| 840 | 0 to +300°C; measuring range +30 to +270°C, accuracy 10.0°C   |
| 927 | +50 to +300°C; measuring range +80 to +270°C, accuracy 5.0°C  |
| 843 | 0 to +350°C; measuring range +50 to +300°C, accuracy 10.0°C   |
| 932 | +50 to +350°C; measuring range +80 to +320°C, accuracy 10.0°C |
| 848 | 0 to +400°C; measuring range +50 to +350°C, accuracy 10.0°C   |
| 851 | 0 to +450°C; measuring range +50 to +400°C, accuracy 10.0°C   |
| 854 | 0 to +500°C; measuring range +50 to +450°C, accuracy 10.0°C   |
| 858 | 0 to +600°C; measuring range +100 to +500°C, accuracy 15.0°C  |

**(4) Capillary type (FL)<sup>1</sup>**

|    |  |
|----|--|
| 02 | FL02 copper capillary with copper braiding, approx. 2.5 mm dia. (up to +300°C top of indication range) |
| 11 | FL11 copper capillary with PE sleeve, approx. 3.5 mm dia. (up to +120°C top of indication range)       |
| 17 | FL17 stainless steel capillary, 1.5 mm dia.  |
| 21 | FL21 copper capillary, 1.0 mm dia. (up to +300°C top of indication range)                              |

**(5) Capillary length<sup>1</sup>**

|      |  |
|------|--|
| 1000 | 1000 mm  |
| 2000 | 2000 mm  |
| 3000 | 3000 mm  |
| 4000 | 4000 mm  |
| 5000 | 5000 mm  |
| ...  | special length (specify in plain text: in 1000 mm steps, maximum length: 10000 mm) |

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## Order details

### MICROSTAT-M Type 608501

#### Order code

| <b>(6) Process connection (PA)<sup>1</sup></b>              |   |  |
|---|---|--|
| 750   | TF 01; temperature probe with stepped support tube  |  |
| 752   | TF 11; temperature probe without support tube   |  |
| 843   | TA 02; immersion tube with union nut and loose nipple <sup>2</sup>  |  |
| 161   | TA 03; immersion tube with loose union nut  |  |
| 847   | TA 06; sliding clamp fitting on support tube <sup>2</sup>   |  |
| 311   | TA 20; immersion tube with loose nipple and shoulder <sup>2</sup>   |  |
| 872   | TA 21; immersion tube with loose plug and conical seal  |  |
| 873   | TA 22; immersion tube with loose plug, conical seal and loose nipple <sup>2</sup>   |  |
| 401   | TA 23; immersion tube with plug and spring clip   |  |
| 913   | SH 07; screw-in pocket, assembled, with clamping clip and fixing screw <sup>2</sup>   |  |
| 820   | SH 09; weld-in pocket, assembled, with clamping clip and fixing screw<br>(not with FL21 - welding shoulder with steel 1.4515) |  |
| 876   | SH10; screw-in pocket, assembled <sup>2</sup>   |  |
| 871   | SH11; screw-in pocket, assembled <sup>2</sup>   |  |
| <b>(7) Diameter of process connection (PA)<sup>1</sup></b>  |   |  |
| 6   | 6 mm dia.   |  |
| 8   | 8 mm dia.   |  |
| 10  | 10 mm dia.  |  |
| 11  | 11 mm dia.  |  |
| 12  | 12 mm dia.  |  |
| <b>(8) Thread for process connection (PA)<sup>1</sup></b>   |   |  |
| 000   | no thread (with TF 01 and TF 11)  |  |
| 103   | G <sup>3</sup> / <sub>8</sub> thread  |  |
| 104   | G <sup>1</sup> / <sub>2</sub> thread  |  |
| 105   | G <sup>3</sup> / <sub>4</sub> thread  |  |
| 114   | M 10 x 1 thread (with TA 23 and SH 11 only)   |  |
| <b>(9) Material of probe / support tube<sup>1</sup></b>     |   |  |
| 26  | stainless steel (CrNi, 1.4571)  |  |
| 96  | copper (Cu) / brass (CuZn) (up to 200°C)  |  |
| 95  | stainless steel (CrNi, 1.4571) - probe / brass (CuZn) - support tube (from 250°C)   |  |
| <b>(10) Material of process connection (PA)<sup>1</sup></b> |   |  |
| 00  | none (TF01 and TF11 only)   |  |
| 01  | steel (St)  |  |
| 26  | stainless steel (CrNi, 1.4571)  |  |
| 46  | brass (CuZn)  |  |

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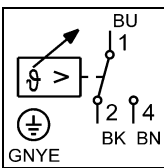


**Order details**  
**MICROSTAT-M Type 608501**

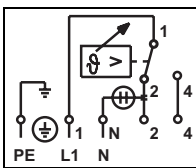
**Order code**

| <b>(11) Fitting length of process connection (PA)<sup>1</sup> (dimension EL or S)</b> |  |
|---|--|
| 0   | minimum fitting length TF 11 (active probe dimension)  |
| 50  | 50 mm  |
| 100   | 100 mm   |
| 150   | 150 mm   |
| 200   | 200 mm   |
| ...   | special length (specify in plain text, in 50 mm steps) |

| <b>(12) Switching output (SA)</b> |                   |
|-----------------------------------|-------------------|
| 20                                | SA 20 one contact |



Connection diagram, standard



Connection diagram, with indicator light (TZ 572)

| <b>(13) Extra codes (TZ)</b> |   |
|------------------------------|---|
| 000                          | no extra code   |
| 507                          | Electrical connection by screw terminals for cable up to 1.5 mm <sup>2</sup> conductor cross-section  |
| 426                          | Plastic cover to protect the tab connectors or screw terminals against touching and splashing water, IP54, with cable gland, suitable for 6 – 8 mm cable dia. |
| 650                          | Microswitch 10 (3) A ( 230 V AC/DC +10/-15%, 48 – 63 Hz, p.f. = 1 (0.6)) (not with TZ 577)  |
| 410                          | Metal front bezel or flange ring, black (not with basic type extensions 2080 and 2180)  |
| 411                          | Metal front bezel or flange ring (not with basic type extensions 2080 and 2180)   |
| 572                          | Indicator light (only with types: 608501/2572 TZ 460, 415 and 608501/2596 TZ 460, 415)  |
| 510                          | Stop for upper or lower limit of setpoint adjustment, factory-set   |
| 460                          | Housing centered for panel cut-out 68 x 68 mm and 92 x 92 mm (with basic type extensions 2572 and 2596 only)  |
| 415                          | Steel housing with metal bezel or flange  |
| 315                          | Capillary reinforcement on housing and probe (not with FL21)  |
| 477                          | Setpoint adjustment protected by screw cap. Adjustment with tool.   |
| 577                          | Protection against capillary break (not with TZ 650, 651)   |
| 520                          | Switching point fixed in the factory.   |
| 522                          | Customized scale  |
| 482                          | Knob 22 x 10 mm dia.  |
| 651                          | Microswitch 3 (1) A (230 V AC/DC +10/-15%, 48 – 63 Hz, p.f. = 1 (0.6)) (not with TZ 577)  |

**Special versions on request!**

**Order code**

|            |            |            |            |            |            |            |            |            |             |             |             |             |   |     |   |    |   |      |   |     |       |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|---|-----|---|----|---|------|---|-----|-------|
| <b>(1)</b> | <b>(2)</b> | <b>(3)</b> | <b>(4)</b> | <b>(5)</b> | <b>(6)</b> | <b>(7)</b> | <b>(8)</b> | <b>(9)</b> | <b>(10)</b> | <b>(11)</b> | <b>(12)</b> | <b>(13)</b> |   |     |   |    |   |      |   |     |       |
| 608501     | /          | ....       | -          | ...        | -          | ..         | -          | ....       | -           | ...         | -           | ..          | - | ... | - | .. | - | .... | - | ... | , ... |

**Order example**

|        |   |      |   |     |   |    |   |      |   |     |   |   |   |     |   |    |   |    |   |     |   |    |   |                  |
|--------|---|------|---|-----|---|----|---|------|---|-----|---|---|---|-----|---|----|---|----|---|-----|---|----|---|------------------|
| 608501 | / | 2160 | - | 818 | - | 21 | - | 2000 | - | 750 | - | 8 | - | 000 | - | 96 | - | 00 | - | 100 | - | 20 | / | 000 <sup>3</sup> |
|--------|---|------|---|-----|---|----|---|------|---|-----|---|---|---|-----|---|----|---|----|---|-----|---|----|---|------------------|

<sup>1</sup> See Data Sheet 60.8730 for description and features.

<sup>2</sup> Screw-in spigot to DIN 3852 Form A.

<sup>3</sup> List extra codes in sequence, separated by commas.

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# MICROSTAT-M

- Electromechanical temperature controller with indication
- Class 2 with two microswitches
- IP53 front protection
- Housing sizes: 60 mm, 80 mm and 100 mm dia.  
 Bezel sizes: 72 x 72 mm and 96 x 96 mm

## Brief description

The MICROSTAT-M is an electromechanical temperature controller with indication for universal use. The instrument has a plastic housing and a liquid-filled or gas-filled measuring system.

The temperature-dependent change in volume of a liquid-filled measuring system, or the temperature-dependent change in pressure of a gas-filled system, is converted by a Bourdon tube into a rotary movement of the pointer, without any transmission gearing. The rotary movement of the pointer spindle operates the microswitches through a lever system.




Type 608502/2160



Type 608502/2596

## Technical data

|  |   |  |
|--|---|--|
| <b>Housing or bezel</b>                          | black plastic;<br>steel housing (extra code 415)  |  |
| <b>Enclosure protection</b>                      | front: IP53 to EN 60 529<br>rear: IP00 to EN 60 529 (IP54 with extra code 426)  |  |
| <b>Scale</b>                                     | white, black lettering  |  |
| <b>Accuracy class</b>                            | Class 2 to EN 13190   |  |
| <b>Measuring system</b>                          | <b>liquid-filled</b>  | <b>gas-filled</b>  |
|  | indication range $\leq 350^{\circ}\text{C}$   | indication range $\geq 400^{\circ}\text{C}$  |
| <b>Time constant</b><br>$t_{0.632}$              | approx. 12 sec, measured in water bath,<br>with a 6 mm dia. copper probe  | approx. 4 sec, measured in oil bath,<br>with a 10 mm dia. stainless steel prob   |
| <b>Ambient temperature effect</b>                | in % of indication range (referred to the deviation from the reference value $+23^{\circ}\text{C}$ )  |  |
| <b>on housing</b>                                | 0.15% of indication range<br>per $^{\circ}\text{C}$ change in ambient temperature   | 0.05% of indication range<br>per $^{\circ}\text{C}$ change in ambient temperature  |
| <b>on capillary (per meter)</b>                  | 0.03% of indication range<br>per $^{\circ}\text{C}$ change in ambient temperature   | no effect  |
|  | higher ambient temperature – higher temperature indication – lower switching point  |  |
|  | standard  | extra code (TZ) 650  |
| <b>Electrical contact</b><br><b>Contact type</b> | single-pole microswitch with a mechanically operated changeover contact   |  |
| <b>Contact rating</b>                            | 230 V AC $\pm 10/-15\%$ , 48 – 63 Hz, p.f. = 1 (0.6)<br>5 (1.5) A   | 10 (3) A   |
| <b>Switching differential</b>                    | approx. 2% of indication range  | 2 to 4% of indication range  |
| <b>Switching point accuracy</b>                  | $\pm 0.5\%$ of indication range referred to the switch-off point with rising temperature  |  |
| <b>Switching reliability</b>                     | To ensure maximum switching reliability, we recommend a minimum voltage of 24 V and a minimum current of 20 mA.   |  |
|  | standard  | extra code (TZ) 507  |
| <b>Electrical connection</b>                     | faston connectors A 6.3 x 6.8 to DIN 46 244   | screw terminals: for cable up to 1.5 mm <sup>2</sup> conductor cross-section   |
| <b>Setpoint adjustment</b>                       | by setting device on the window   |  |
| <b>Indication adjustment</b>                     | With ambient temperatures that deviate considerably from the reference value but are constant, the indication can be adjusted by using a screwdriver as shown (not possible on Style 25).   | <br><b>shift division by max. <math>\pm 4.5\%</math> of the scale span by inserting a screwdriver in bore</b> |
| <b>Limit temperatures</b>                        | for transport and storage: $-20$ to $+70^{\circ}\text{C}$<br>(for indication range $-40$ to $+40^{\circ}\text{C}$ : up to $50^{\circ}\text{C}$ ; for indication range $-30$ to $+50^{\circ}\text{C}$ : up to $60^{\circ}\text{C}$ ) |  |
| <b>Nominal position</b>                          | unrestricted  |  |

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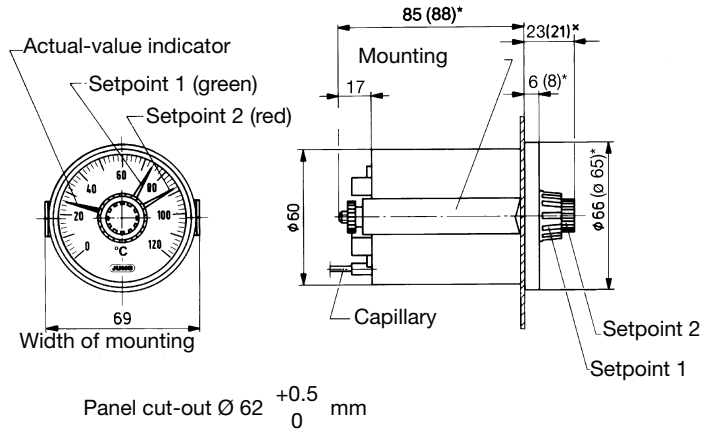
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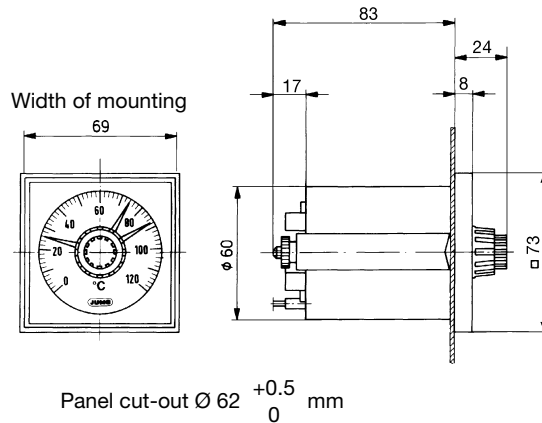


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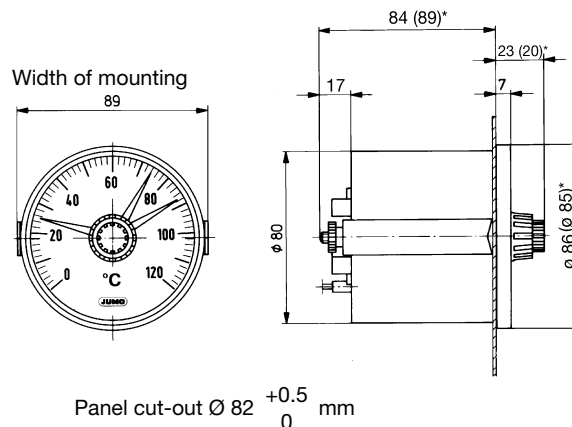
Types: 608502/2160  
 608502/2160 TZ 415



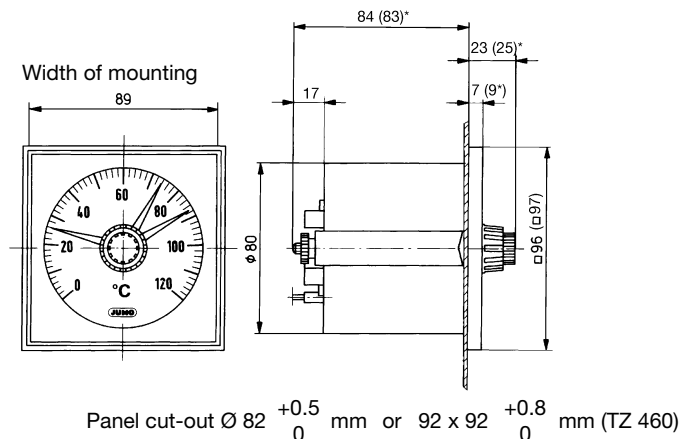
Types: 608502/2572 TZ 415



Types: 608502/2180  
 608502/2180 TZ 415



Types: 608502/2596  
 608502/2596 TZ 415





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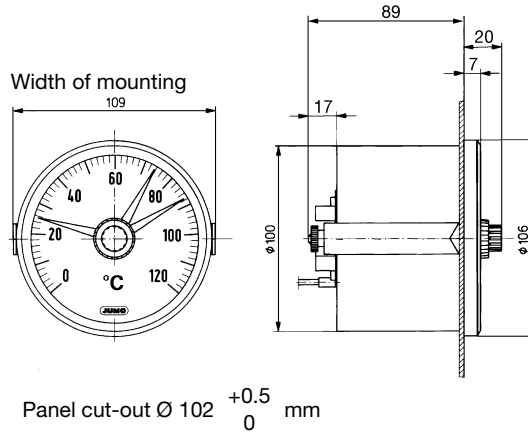
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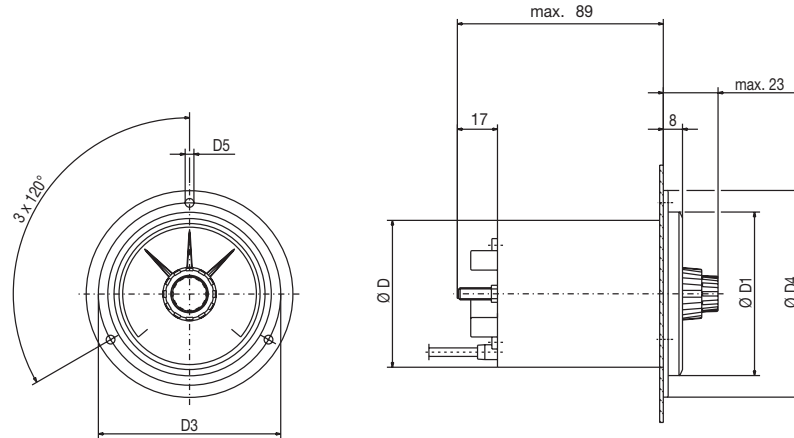


## Dimensions

Types: 608502/2110 TZ 415

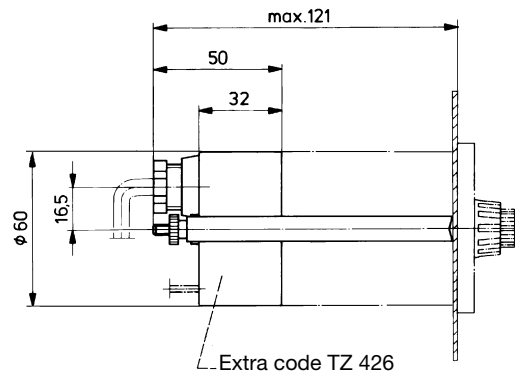


Types: 608502/2060  
 608502/2060 TZ 415  
 608502/2080 TZ 415  
 608502/2010 TZ 415



| Type                              | $\varnothing D$ | $\varnothing D1$ | $\varnothing D3$ | $\varnothing D4$ | $\varnothing D5$ | Panel cut-out<br>$\varnothing \begin{matrix} +0.5 \\ 0 \end{matrix}$ mm |
|-----------------------------------|-----------------|------------------|------------------|------------------|------------------|---|
| 608502/2060<br>608502/2060 TZ 415 | 60              | 68               | 75               | 85               | 3.6              | 62  |
| 608502/2080 TZ 415                | 80              | 86               | 95               | 110              | 4.8              | 82  |
| 608502/2010 TZ 415                | 100             | 107              | 116              | 132              | 4.8              | 102   |

Extra code 426



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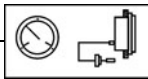
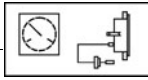
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**Order details**  
**MICROSTAT-M Type 608502**

| Order code | (1) Basic type   |
|------------|--|
| 608502     | Mechanical temperature controller MICROSTAT-M, Class 2, with two microswitches |

**(2) Basic type extensions**

|      |                                      |                    |   |
|------|--------------------------------------|--------------------|---|
| 2060 | Style: 20; housing size: 60 mm dia.  |                    |  |
| 2080 | Style: 20; housing size: 80 mm dia.  | (with TZ 415 only) |   |
| 2010 | Style: 20; housing size: 100 mm dia. | (with TZ 415 only) |   |
| 2160 | Style: 21; housing size: 60 mm dia.  |                    |  |
| 2180 | Style: 21; housing size: 80 mm dia.  |                    |   |
| 2110 | Style: 21; housing size: 100 mm dia. | (with TZ 415 only) |   |
| 2572 | Style: 25; housing size: 72 x 72 mm  |                    |  |
| 2596 | Style: 25; housing size: 96 x 96 mm  | (with TZ 415 only) |   |

**(3) Indication range (AB)**

|     |                                |                          |        |
|-----|--------------------------------|--------------------------|--------|
| 469 | -40 to + 40°C; measuring range | -30 to + 30°C, accuracy  | 2.0°C  |
| 566 | -30 to + 50°C; measuring range | -20 to + 40°C, accuracy  | 2.0°C  |
| 643 | -20 to +120°C; measuring range | 0 to +100°C, accuracy    | 4.0°C  |
| 807 | 0 to + 60°C; measuring range   | +10 to + 50°C, accuracy  | 2.0°C  |
| 810 | 0 to + 80°C; measuring range   | +10 to + 70°C, accuracy  | 2.0°C  |
| 814 | 0 to +100°C; measuring range   | +10 to + 90°C, accuracy  | 2.0°C  |
| 818 | 0 to +120°C; measuring range   | +20 to +100°C, accuracy  | 4.0°C  |
| 826 | 0 to +160°C; measuring range   | +20 to +140°C, accuracy  | 4.0°C  |
| 832 | 0 to +200°C; measuring range   | +20 to +180°C, accuracy  | 4.0°C  |
| 834 | 0 to +250°C; measuring range   | +30 to +220°C, accuracy  | 5.0°C  |
| 926 | +50 to +250°C; measuring range | +70 to +230°C, accuracy  | 4.0°C  |
| 840 | 0 to +300°C; measuring range   | +30 to +270°C, accuracy  | 10.0°C |
| 927 | +50 to +300°C; measuring range | +80 to +270°C, accuracy  | 5.0°C  |
| 843 | 0 to +350°C; measuring range   | +50 to +300°C, accuracy  | 10.0°C |
| 932 | +50 to +350°C; measuring range | +80 to +320°C, accuracy  | 10.0°C |
| 848 | 0 to +400°C; measuring range   | +50 to +350°C, accuracy  | 10.0°C |
| 851 | 0 to +450°C; measuring range   | +50 to +400°C, accuracy  | 10.0°C |
| 854 | 0 to +500°C; measuring range   | +50 to +450°C, accuracy  | 10.0°C |
| 858 | 0 to +600°C; measuring range   | +100 to +500°C, accuracy | 15.0°C |

**(4) Capillary type (FL)<sup>1</sup>**

|    |  |
|----|--|
| 02 | FL02 copper capillary with copper braiding, approx. 2.5 mm dia. (up to +300°C top of indication range) |
| 11 | FL11 copper capillary with PE sleeve, approx. 3.5 mm dia. (up to +120°C top of indication range)       |
| 17 | FL17 stainless steel capillary, 1.5 mm dia.  |
| 21 | FL21 copper capillary, 1.0 mm dia. (up to +300°C top of indication range)                              |

**(5) Capillary length<sup>1</sup>**

|      |  |
|------|--|
| 1000 | 1000 mm  |
| 2000 | 2000 mm  |
| 3000 | 3000 mm  |
| 4000 | 4000 mm  |
| 5000 | 5000 mm  |
| ...  | special length (specify in plain text: in 1000 mm steps, maximum length: 10000 mm) |

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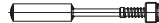
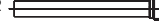



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## Order details

### MICROSTAT-M Type 608502

#### Order code

| <b>(6) Process connection (PA)<sup>1</sup></b>             |   |   |
|--|---|---|
| 750  | TF 01; temperature probe with stepped support tube  |    |
| 752  | TF 11; temperature probe without support tube   |    |
| 843  | TA 02; immersion tube with union nut and loose nipple <sup>2</sup>  |    |
| 161  | TA 03; immersion tube with loose union nut  |    |
| 847  | TA 06; sliding clamp fitting on support tube <sup>2</sup>   |    |
| 311  | TA 20; immersion tube with loose nipple and shoulder <sup>2</sup>   |    |
| 872  | TA 21; immersion tube with loose plug and conical seal  |    |
| 873  | TA 22; immersion tube with loose plug, conical seal and loose nipple <sup>2</sup>   |    |
| 401  | TA 23; immersion tube with plug and spring clip   |    |
| 913  | SH 07; screw-in pocket, assembled, with clamping clip and fixing screw <sup>2</sup>   |    |
| 820  | SH 09; weld-in pocket, assembled, with clamping clip and fixing screw<br>(not with FL21 - welding shoulder with steel 1.4515) |    |
| 876  | SH10; screw-in pocket, assembled <sup>2</sup>   |    |
| 871  | SH11; screw-in pocket, assembled <sup>2</sup>   |  |
| <b>(7) Diameter of process connection (PA)<sup>1</sup></b> |   |   |
| 6  | 6 mm dia.   |   |
| 8  | 8 mm dia.   |   |
| 10   | 10 mm dia.  |   |
| 11   | 11 mm dia.  |   |
| 12   | 12 mm dia.  |   |
| <b>(8) Thread for process connection (PA)<sup>1</sup></b>  |   |   |
| 000  | no thread (with TF 01 and TF 11)  |   |
| 103  | G <sup>3</sup> / <sub>8</sub> thread  |   |
| 104  | G <sup>1</sup> / <sub>2</sub> thread  |   |
| 105  | G <sup>3</sup> / <sub>4</sub> thread  |   |
| 114  | M 10 x 1 thread (with TA 23 and SH 11 only)   |   |
| <b>(9) Material of probe / support tube<sup>1</sup></b>    |   |   |
| 26   | stainless steel (CrNi, 1.4571)  |   |
| 96   | copper (Cu) / brass (CuZn) (up to 200°C)  |   |
| 95   | stainless steel (CrNi, 1.4571) - probe / brass (CuZn) - support tube (250°C and above)  |   |

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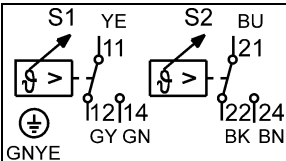
**Order details**  
**MICROSTAT-M Type 608502**

**Order code**

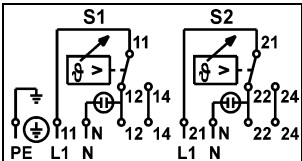
| <b>(10) Material of process connection (PA)<sup>1</sup></b> |                                |
|---|--------------------------------|
| 00  | none (TF01 and TF11 only)      |
| 01  | steel (St)                     |
| 26  | stainless steel (CrNi, 1.4571) |
| 46  | brass (CuZn)                   |

| <b>(11) Fitting length of process connection (PA)<sup>1</sup> (dimension EL or S)</b> |  |
|---|--|
| 0   | minimum fitting length TF 11 (active probe dimension)  |
| 50  | 50 mm  |
| 100   | 100 mm   |
| 150   | 150 mm   |
| 200   | 200 mm   |
| ...   | special length (specify in plain text, in 50 mm steps) |

| <b>(12) Switching output (SA)</b> |                    |
|-----------------------------------|--------------------|
| 21                                | SA 21 two contacts |



Connection diagram, standard



Connection diagram, with indicator light (TZ 572)

| <b>(13) Extra codes (TZ)</b> |  |
|------------------------------|--|
| 000                          | no extra code  |
| 507                          | electrical connection by screw terminals for cable up to 1.5 mm <sup>2</sup> conductor cross-section   |
| 426                          | plastic cover to protect the faston connectors or screw terminals against touching and splashing water, IP54, with cable gland, suitable for 6 – 8 mm cable dia. |
| 650                          | microswitch 10 (3) A (230 V AC/DC +10/-15%, 48 – 63 Hz, p.f. = 1 (0.6))  |
| 410                          | metal bezel or flange, black (not with basic type extensions 2080 and 2180)  |
| 411                          | metal bezel or flange (not with basic type extensions 2080 and 2180)   |
| 572                          | indicator light (only with types: 608502/2572 TZ 460, 415 and 608502/2596 TZ 460, 415)   |
| 510                          | stop for upper or lower limit of setpoint adjustment, factory-set  |
| 573                          | two changeover contacts with a fixed spacing;<br>minimum spacing: 2% of scale span; please state contact spacing when ordering                                   |
| 460                          | housing centered for panel cut-out<br>68 x 68 mm and 92 x 92 mm (with basic type extensions 2572 and 2596 only)  |
| 415                          | steel housing with metal bezel or flange   |
| 315                          | capillary reinforcement on housing and probe (not with FL21)   |
| 477                          | setpoint adjustment protected by screw cap,<br>adjustment with tool.   |
| 522                          | customized scale   |

**Special versions on request!**

**Order code**

|            |            |            |            |            |            |            |            |            |             |             |             |             |   |     |       |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|---|-----|-------|
| <b>(1)</b> | <b>(2)</b> | <b>(3)</b> | <b>(4)</b> | <b>(5)</b> | <b>(6)</b> | <b>(7)</b> | <b>(8)</b> | <b>(9)</b> | <b>(10)</b> | <b>(11)</b> | <b>(12)</b> | <b>(13)</b> |   |     |       |
| 608502     | /          | ....       | -          | ...        | -          | ..         | -          | ....       | -           | ...         | -           | ..          | - | ... | , ... |

**Order example**

|        |   |      |   |     |   |    |   |      |   |     |   |   |   |     |   |    |   |    |   |   |   |    |   |                  |
|--------|---|------|---|-----|---|----|---|------|---|-----|---|---|---|-----|---|----|---|----|---|---|---|----|---|------------------|
| 608502 | / | 2160 | - | 818 | - | 21 | - | 2000 | - | 752 | - | 8 | - | 000 | - | 96 | - | 00 | - | 0 | - | 21 | / | 000 <sup>3</sup> |
|--------|---|------|---|-----|---|----|---|------|---|-----|---|---|---|-----|---|----|---|----|---|---|---|----|---|------------------|

<sup>1</sup> See data sheet 60.8730 for description and features.

<sup>2</sup> Screw-in spigot to DIN 3852 Form A.

<sup>3</sup> List extra codes in sequence, separated by commas.

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# MICROSTAT-M1

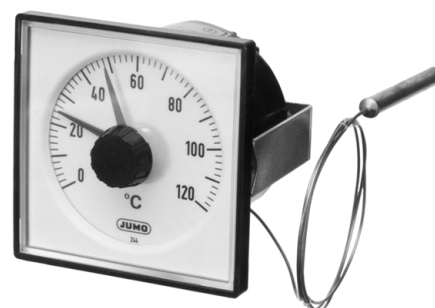
- Electromechanical temperature controller with indication
- Class 2 with one microswitch
- IP53 front protection

## Brief description

The MICROSTAT-M1 is an electromechanical temperature controller with indication for universal use. The instrument has a plastic housing and a liquid-filled or gas-filled measuring system. The temperature-dependent change in volume of a liquid-filled measuring system, or the temperature-dependent change in pressure of a gas-filled system, is converted by a Bourdon tube into a rotary movement of the pointer, without any transmission gearing. The rotary movement of the pointer spindle operates the microswitch through a lever system.



Type 608504/2160



Type 608504/2572

## Technical data

|                             |   |
|-----------------------------|---|
| <b>Housing or bezel</b>     | black plastic; housing fixing at rear, with bracket                                       |
| <b>Enclosure protection</b> | front: IP53 to EN 60 529<br>rear: IP00 to EN 60 529 (IP54 with extra code 426)            |
| <b>Scale</b>                | white, black lettering  |
| <b>Accuracy class</b>       | Class 2 to EN 13 190  |
| <b>Setpoint adjustment</b>  | by setting device on the window   |
| <b>Limit temperatures</b>   | for transport and storage: -20 to +70°C (indication range -40 to +40°C: up to 50°C max.). |
| <b>Nominal position</b>     | unrestricted  |

|                                     | liquid-filled   | gas-filled  |
|-------------------------------------|---|---|
| <b>Measuring system</b>             | indication range (AB) ≤350°C  | indication range (AB) ≥ 400°C   |
| <b>Time constant</b><br>$t_{0.632}$ | approx. 12 sec, measured in water bath,<br>with a 6 mm dia. copper probe            | approx. 4 sec, measured in oil bath,<br>with a 10 mm dia. stainless steel probe |
| <b>Ambient temperature effect</b>   | in % of indication range (referred to the deviation from the reference value +23°C) |   |
| <b>on housing</b>                   | 0.15% of indication range<br>per °C change in ambient temperature                   | 0.05% of indication range<br>per °C change in ambient temperature               |
| <b>on capillary (per meter)</b>     | 0.03% of indication range<br>per °C change in ambient temperature                   | no effect   |
|                                     | higher ambient temperature – higher temperature indication – lower switching point  |   |

|                                 |   |
|---------------------------------|---|
| <b>Electrical contact</b>       | single-pole microswitch with a mechanically operated changeover contact   |
| <b>Contact type</b>             |   |
| <b>Contact rating</b>           | 230 V AC +10/-15%, 48 – 63Hz, p.f. = 1 (0.6)<br>5 (1.5) A   |
| <b>Switching differential</b>   | < 3% of indication range  |
| <b>Switching point accuracy</b> | ± 0.5% of indication range referred to the switch-off point with rising temperature                             |
| <b>Switching reliability</b>    | To ensure maximum switching reliability, we recommend a minimum voltage of 24 V and a minimum current of 20 mA. |
| <b>Electrical connection</b>    | faston connectors A 6.3 x 0.8 to DIN 46 244   |

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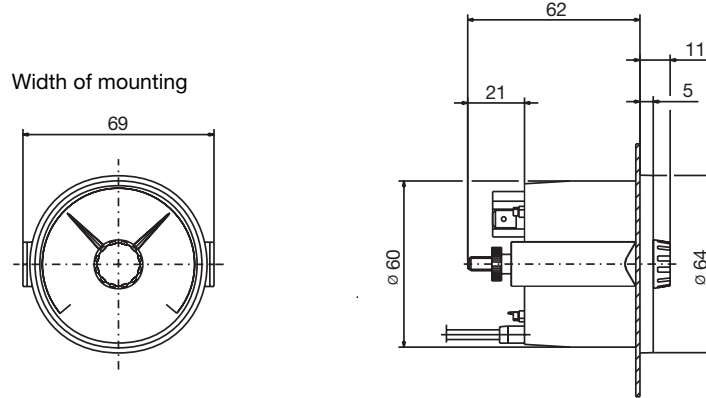
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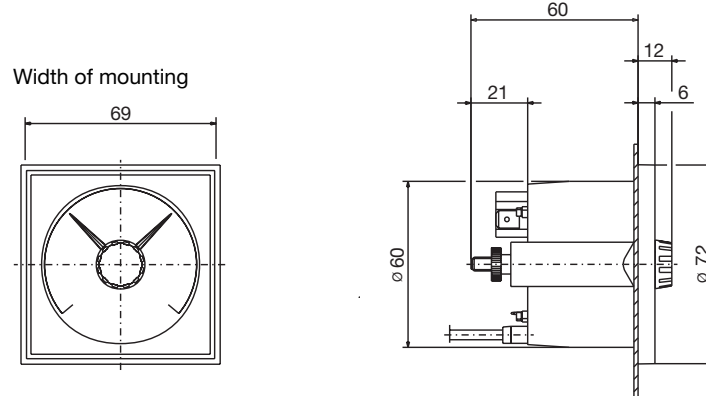
# Dimensions

Type: 608504/2160



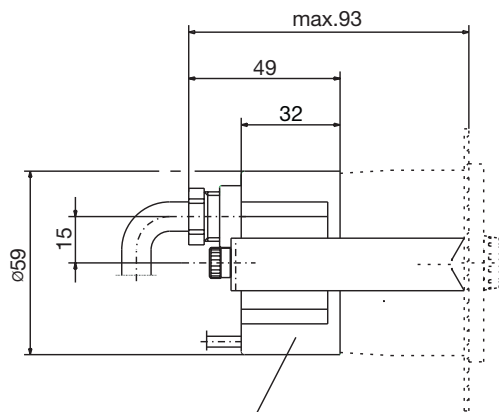
Panel cut-out Ø 62  $\begin{matrix} +0.5 \\ 0 \end{matrix}$  mm

Type: 608504/2572



Panel cut-out Ø 62  $\begin{matrix} +0.5 \\ 0 \end{matrix}$  mm

Extra code 426



Extra code TZ 426

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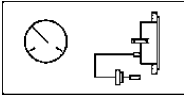
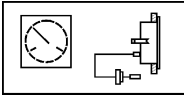











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## Order details

### MICROSTAT-M1 Type 608504

| Order code | (1) Basic type   |   |
|------------|--|---|
| 608504     | Mechanical temperature controller MICROSTAT-M1, Class 2, with one microswitch                          |   |
|            | (2) Basic type extensions  |   |
| 2160       | Style: 21; housing size: 60 mm dia.  |      |
| 2572       | Style: 25; housing size: 72 x 72 mm  |      |
|            | (3) Indication range (AB)  |   |
| 469        | -40 to + 40°C; measuring range -30 to + 30°C, accuracy 2.0°C   |   |
| 810        | 0 to + 80°C; measuring range +10 to + 70°C, accuracy 2.0°C   |   |
| 818        | 0 to +120°C; measuring range +20 to +100°C, accuracy 4.0°C   |   |
| 832        | 0 to +200°C; measuring range +20 to +180°C, accuracy 4.0°C   |   |
| 840        | 0 to +300°C; measuring range +30 to +270°C, accuracy 10.0°C  |   |
| 848        | 0 to +400°C; measuring range +50 to +350°C, accuracy 10.0°C  |   |
| 854        | 0 to +500°C; measuring range +50 to +450°C, accuracy 10.0°C  |   |
|            | (4) Capillary type (FL) <sup>1</sup>   |   |
| 02         | FL02 copper capillary with copper braiding, approx. 2.5 mm dia. (up to +300°C top of indication range) |   |
| 11         | FL11 copper capillary with PE sleeve, approx. 3.5 mm dia. (up to +120°C top of indication range)       |   |
| 17         | FL17 stainless steel capillary, 1.5 mm dia.  |   |
| 21         | FL21 copper capillary, 1.0 mm dia. (up to +300°C top of indication range)                              |   |
|            | (5) Capillary length <sup>1</sup>  |   |
| 1000       | 1000 mm  |   |
| 2000       | 2000 mm  |   |
| 3000       | 3000 mm  |   |
| 4000       | 4000 mm  |   |
| 5000       | 5000 mm  |   |
| ...        | special length (specify in plain text: in 1000 mm steps, maximum length: 10000 mm)                     |   |
|            | (6) Process connection (PA) <sup>1</sup>   |   |
| 750        | TF 01; temperature probe with stepped support tube   |  |
| 752        | TF 11; temperature probe without support tube  |  |
| 161        | TA 03; immersion tube with loose union nut   |  |
| 847        | TA 06; sliding clamp fitting on support tube <sup>2</sup>  |  |
| 311        | TA 20; immersion tube with loose nipple and shoulder <sup>2</sup>                                      |  |
| 872        | TA 21; immersion tube with loose plug and conical seal   |  |
| 873        | TA 22; immersion tube with loose plug, conical seal and loose nipple <sup>2</sup>                      |  |
| 401        | TA 23; immersion tube with plug and spring clip  |  |
| 913        | SH 07; screw-in pocket, assembled, with clamping clip and fixing screw <sup>2</sup>                    |  |
| 876        | SH10; screw-in pocket, assembled <sup>2</sup>  |  |
| 871        | SH11; screw-in pocket, assembled <sup>2</sup>  |  |
|            | (7) Diameter of process connection (PA) <sup>1</sup>   |   |
| 6          | 6 mm dia.  |   |
| 8          | 8 mm dia.  |   |
| 10         | 10 mm dia.   |   |

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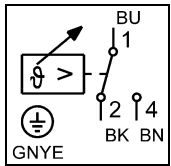
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## Order details

### MICROSTAT-M1 Type 608504

| Order code  | (8) Thread for process connection (PA) <sup>1</sup>   |
|---|---|
| 000   | no thread (with TF 01 and TF 11)  |
| 103   | G <sup>3</sup> / <sub>8</sub> thread  |
| 104   | G <sup>1</sup> / <sub>2</sub> thread  |
| 105   | G <sup>3</sup> / <sub>4</sub> thread  |
| 114   | M 10 x 1 thread (with TA 23 and SH 11 only)   |
| (9) Material of probe / support tube <sup>1</sup>                               |   |
| 26  | stainless steel (CrNi, 1.4571)  |
| 96  | copper (Cu) / brass (CuZn) (up to 200°C)  |
| 95  | stainless steel (CrNi, 1.4571) - probe / brass (CuZn) - support tube (250°C and above)  |
| (10) Material of process connection (PA) <sup>1</sup>                           |   |
| 00  | none (TF01 and TF11 only)   |
| 26  | stainless steel (CrNi, 1.4571)  |
| 46  | brass (CuZn)  |
| (11) Fitting length of process connection (PA) <sup>1</sup> (dimension EL or S) |   |
| 0   | minimum fitting length TF 11 (active probe dimension)   |
| 50  | 50 mm   |
| 100   | 100 mm  |
| 150   | 150 mm  |
| 200   | 200 mm  |
| ...   | special length (specify in plain text, in 50 mm steps)  |
| (12) Switching output (SA)  |   |
| 20  | SA 20 one contact    |
| (13) Extra codes (TZ)   |   |
| 000   | no extra code   |
| 315   | capillary reinforcement on housing and probe (not with FL21)  |
| 411   | metal bezel or flange   |
| 426   | plastic cover to protect the faston connectors against touching and splashing water, IP54 (rear), with cable gland, suitable for 6 – 11 mm cable dia. |
| 477   | setpoint adjustment protected by cap, adjustment with screwdriver.  |
| 510   | stop for upper or lower limit of setpoint adjustment, factory-set   |
| 520   | switching point fixed at the factory  |
| 522   | customized scale  |
| 577   | capillary break protection  |

Special versions on request!

| Order code    | (1)    | (2)  | (3)  | (4) | (5) | (6) | (7) | (8)  | (9)  | (10) | (11) | (12) | (13) |      |     |     |    |     |    |   |     |   |    |   |                  |
|---------------|--------|------|------|-----|-----|-----|-----|------|------|------|------|------|------|------|-----|-----|----|-----|----|---|-----|---|----|---|------------------|
| 608504        | /      | .... | -    | ... | -   | ..  | -   | .... | -    | ...  | -    | ..   | -    | .... | -   | ... | /  | ... |    |   |     |   |    |   |                  |
| Order example | 608504 | /    | 2160 | -   | 818 | -   | 02  | -    | 2000 | -    | 750  | -    | 8    | -    | 000 | -   | 96 | -   | 00 | - | 100 | - | 20 | / | 000 <sup>3</sup> |

<sup>1</sup> See data sheet 60.8730 for description and features

<sup>2</sup> Screw-in spigot to DIN 3852 Form A

<sup>3</sup> List extra codes in sequence, separated by commas.



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## MICROSTAT-M

- Electromechanical temperature controller with indication
- Class 1.5 with one microswitch
- IP53 front protection
- Housing sizes: 60 mm, 80 mm and 100 mm dia.  
 Bezel sizes: 72 x 72 mm and 96 x 96 mm

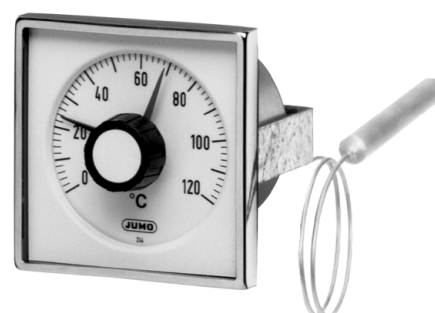
### Brief description

The MICROSTAT-M is an electromechanical temperature controller with indication for universal use. The instrument has a steel housing and a liquid-filled or gas-filled measuring system.

The temperature-dependent change in volume of a liquid-filled measuring system, or the temperature-dependent change in pressure of a gas-filled system, is converted by a Bourdon tube into a rotary movement of the pointer, without any transmission gearing. The rotary movement of the pointer spindle operates the microswitch through a lever system.



Type 608510/2160



Type 608510/2572

### Technical data

|   |   |   |                               |
|---|---|---|-------------------------------|
| <b>Housing or bezel</b>                 | zinc-plated steel, with metal bezel;<br>housing mounted at the rear by a bracket (not for style 20)   |   |                               |
| <b>Protection</b>                       | front: IP53 to EN 60 529 (IP54 with extra code 489)<br>rear: IP00 to EN 60 529 (IP54 with extra code 426)   |   |                               |
| <b>Scale</b>                            | white, black lettering  |   |                               |
| <b>Accuracy class</b>                   | Class 1.5 similar to EN 13 190  |   |                               |
| <b>Measuring system</b>                 | <b>liquid-filled</b>  | <b>gas-filled</b>   |                               |
|   | indication range $\leq 350^{\circ}\text{C}$   | indication range $\geq 400^{\circ}\text{C}$   |                               |
| <b>Time constant</b><br>$t_{0.632}$     | approx. 12 sec, measured in water bath,<br>with a 6 mm dia. copper probe  | approx. 2 sec, measured in an oil bath,<br>with a 10 mm dia. stainless steel probe. |                               |
| <b>Ambient temperature error effect</b> | in % of indication range (referred to the deviation from the reference value $+23^{\circ}\text{C}$ )  |   |                               |
| <b>on housing</b>                       | 0.15% of indication range<br>per $^{\circ}\text{C}$ change in ambient temperature   | approx. 4 sec, measured in oil bath,<br>with a 10 mm dia. stainless steel probe     |                               |
| <b>on capillary (per meter)</b>         | 0.03% of indication range<br>per $^{\circ}\text{C}$ change in ambient temperature   | no effect   |                               |
|   | higher ambient temperature – higher temperature indication – lower switching point  |   |                               |
|   | standard  | extra code (TZ) 651   | extra code (TZ) 650           |
| <b>Electrical contact</b>               | single-pole microswitch with a mechanically operated changeover contact   |   |                               |
| <b>Contact type</b>                     | 230 V AC $\pm 10\%$ -15%, 48 – 63 Hz, p.f. = 1 (0.6)  |   |                               |
| <b>Contact rating</b>                   | 5 (1.5) A   | 3 (1) A   | 10 (3) A                      |
| <b>Switching differential</b>           | approx. 1.5% of indication range  |   | 1.5 to 3% of indication range |
| <b>Switching point accuracy</b>         | $\pm 0.5\%$ of indication range span referred to the switch-off point with rising temperature   |   |                               |
| <b>Switching reliability</b>            | To ensure maximum switching reliability, we recommend<br>a minimum voltage of 24 V and a minimum current of 20 mA.  |   |                               |
|   | standard  | extra code (TZ) 507   |                               |
| <b>Electrical connection</b>            | faston connectors A 6.3 x 0.8 to DIN 46244  | screw terminals: for cable up to 1.5 mm <sup>2</sup> conductor cross-section        |                               |
| <b>Setpoint adjustment</b>              | by setting device on the window   |   |                               |
| <b>Limit temperatures</b>               | for transport and storage: $-20$ to $+70^{\circ}\text{C}$<br>(for indication range $-40$ to $+40^{\circ}\text{C}$ : up to $50^{\circ}\text{C}$ ; for indication range $-30$ to $+50^{\circ}\text{C}$ : up to $60^{\circ}\text{C}$ ) |   |                               |
| <b>Nominal position</b>                 | unrestricted  |   |                               |

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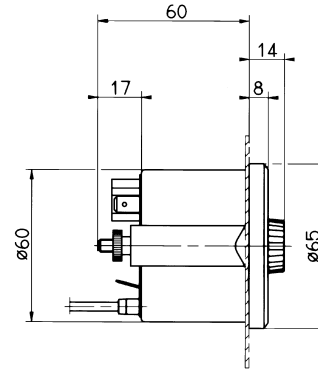
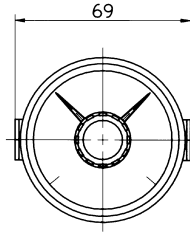
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## Dimensions

Type: 608510/2160

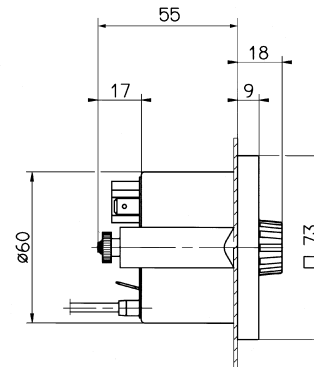
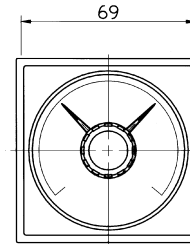
Width of mounting bracket



Panel cut-out  $\varnothing 62 \begin{smallmatrix} +0.5 \\ 0 \end{smallmatrix}$  mm

Type: 608510/2572

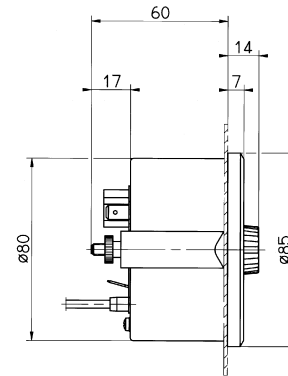
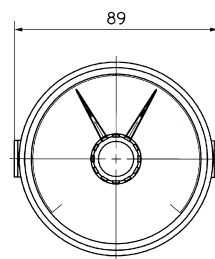
Width of mounting bracket



Panel cut-out  $\varnothing 62 \begin{smallmatrix} +0.5 \\ 0 \end{smallmatrix}$  mm

Type: 608510/2180

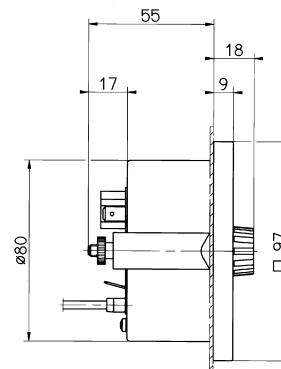
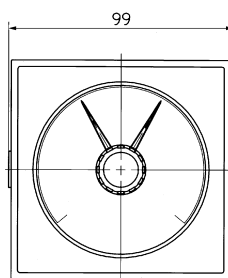
Width of mounting bracket



Panel cut-out  $\varnothing 82 \begin{smallmatrix} +0.5 \\ 0 \end{smallmatrix}$  mm

Type: 608510/2596

Width of mounting bracket



Panel cut-out  $\varnothing 82 \begin{smallmatrix} +0.5 \\ 0 \end{smallmatrix}$  mm or  $92 \times 92 \begin{smallmatrix} +0.8 \\ 0 \end{smallmatrix}$  mm (TZ 460)

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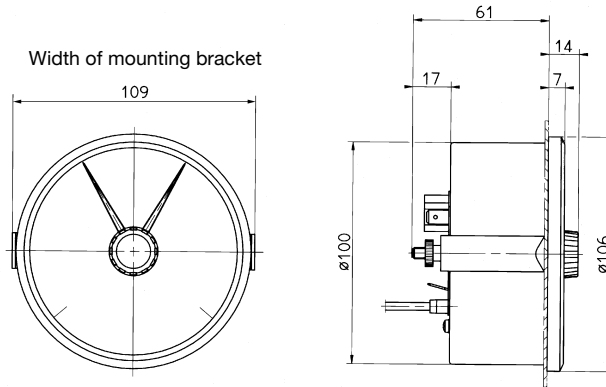
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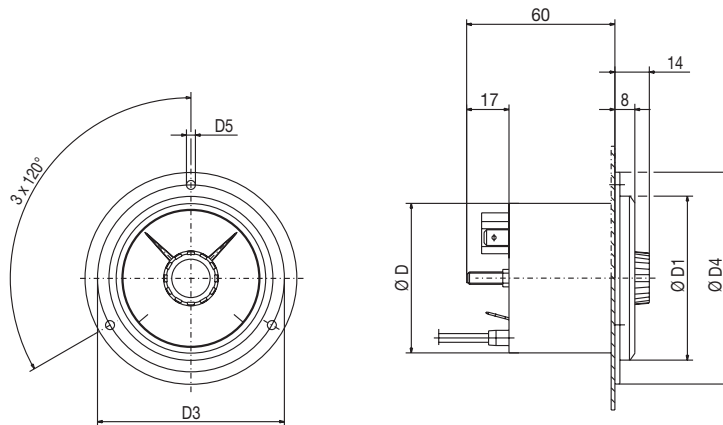
## Dimensions

Type: 608510/2110



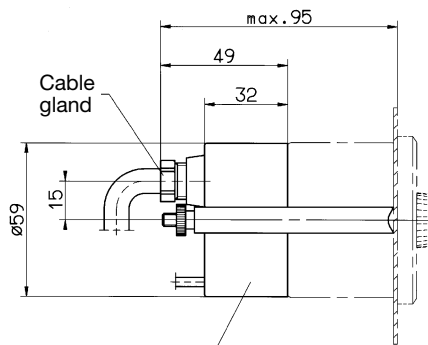
Panel cut-out  $\varnothing 102 \begin{matrix} +0.5 \\ 0 \end{matrix}$  mm

Types: 608510/2060  
 608510/2080  
 608510/2010



| Type        | $\varnothing D$ | $\varnothing D1$ | $\varnothing D3$ | $\varnothing D4$ | $\varnothing D5$ | Panel cut-out<br>$\varnothing \begin{matrix} +0.5 \\ 0 \end{matrix}$ mm |
|-------------|-----------------|------------------|------------------|------------------|------------------|---|
|             | (mm)            |                  |                  |                  |                  |   |
| 608510/2060 | 60              | 66               | 75               | 85               | 3.6              | 62  |
| 608510/2080 | 80              | 86               | 95               | 110              | 4.8              | 82  |
| 608510/2010 | 100             | 107              | 116              | 132              | 4.8              | 102   |

Extra code 426



Extra code TZ 426

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## Order details

### MICROSTAT-M Type 608510

| Order code                                 | (1) Basic type   |
|--|--|
| 608510                                     | Electromechanical temperature controller MICROSTAT-M, Class 2, with one microswitch                    |
| <b>(2) Basic type extensions</b>           |  |
| 2060                                       | Style: 20; housing size: 60 mm dia.  |
| 2080                                       | Style: 20; housing size: 80 mm dia.  |
| 2010                                       | Style: 20; housing size: 100 mm dia.   |
| 2160                                       | Style: 21; housing size: 60 mm dia.  |
| 2180                                       | Style: 21; housing size: 80 mm dia.  |
| 2110                                       | Style: 21; housing size: 100 mm dia.   |
| 2572                                       | Style: 25; housing size: 72 x 72 mm  |
| 2596                                       | Style: 25; housing size: 96 x 96 mm  |
| <b>(3) Indication range (AB)</b>           |  |
| 469  | -40 to + 40°C; measuring range -30 to + 30°C, accuracy 1.5°C   |
| 566  | -30 to + 50°C; measuring range -20 to + 40°C, accuracy 1.5°C   |
| 643  | -20 to +120°C; measuring range 0 to +100°C, accuracy 3.0°C   |
| 807  | 0 to + 60°C; measuring range +10 to + 50°C, accuracy 1.5°C   |
| 810  | 0 to + 80°C; measuring range +10 to + 70°C, accuracy 1.5°C   |
| 814  | 0 to +100°C; measuring range +10 to + 90°C, accuracy 1.5°C   |
| 818  | 0 to +120°C; measuring range +20 to +100°C, accuracy 3.0°C   |
| 826  | 0 to +160°C; measuring range +20 to +140°C, accuracy 3.0°C   |
| 832  | 0 to +200°C; measuring range +20 to +180°C, accuracy 3.0°C   |
| 834  | 0 to +250°C; measuring range +30 to +220°C, accuracy 4.0°C   |
| 926  | +50 to +250°C; measuring range +70 to +230°C, accuracy 3.0°C   |
| 840  | 0 to +300°C; measuring range +30 to +270°C, accuracy 6.0°C   |
| 927  | +50 to +300°C; measuring range +80 to +270°C, accuracy 4.0°C   |
| 843  | 0 to +350°C; measuring range +50 to +300°C, accuracy 6.0°C   |
| 932  | +50 to +350°C; measuring range +80 to +320°C, accuracy 6.0°C   |
| 848  | 0 to +400°C; measuring range +50 to +350°C, accuracy 6.0°C   |
| 851  | 0 to +450°C; measuring range +50 to +400°C, accuracy 6.0°C   |
| 854  | 0 to +500°C; measuring range +50 to +450°C, accuracy 8.0°C   |
| 858  | 0 to +600°C; measuring range +100 to +500°C, accuracy 10.0°C   |
| <b>(4) Capillary type (FL)<sup>1</sup></b> |  |
| 02   | FL02 copper capillary with copper braiding, approx. 2.5 mm dia. (up to +300°C top of indication range) |
| 11   | FL11 copper capillary with PE sleeve, approx. 3.5 mm dia. (up to +120°C top of indication range)       |
| 17   | FL17 stainless steel capillary, 1.5 mm dia.  |
| 21   | FL21 copper capillary, 1.0 mm dia. (up to +300°C top of indication range)                              |
| <b>(5) Capillary length<sup>1</sup></b>    |  |
| 1000                                       | 1000 mm  |
| 2000                                       | 2000 mm  |
| 3000                                       | 3000 mm  |
| 4000                                       | 4000 mm  |
| 5000                                       | 5000 mm  |
| ...  | special length (specify in plain text: in 1000 mm steps, maximum length: 10000 mm)                     |

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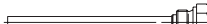
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**Order details**  
**MICROSTAT-M Type 608510**

**Order code**

| <b>(6) Process connection (PA)<sup>1</sup></b>             |   |   |
|--|---|---|
| 750  | TF 01; temperature probe with stepped support tube  |    |
| 752  | TF 11; temperature probe without support tube   |    |
| 843  | TA 02; immersion tube with union nut and loose nipple <sup>2</sup>  |    |
| 161  | TA 03; immersion tube with loose union nut  |    |
| 847  | TA 06; sliding clamp fitting on support tube <sup>2</sup>   |    |
| 311  | TA 20; immersion tube with loose nipple and shoulder <sup>2</sup>   |    |
| 872  | TA 21; immersion tube with loose plug and conical seal  |    |
| 873  | TA 22; immersion tube with loose plug, conical seal and loose nipple <sup>2</sup>   |    |
| 401  | TA 23; immersion tube with plug and spring clip   |    |
| 913  | SH 07; screw-in pocket, assembled, with clamping clip and fixing screw <sup>2</sup>   |    |
| 820  | SH 09; weld-in pocket, assembled, with clamping clip and fixing screw<br>(not with FL21 - welding shoulder with steel 1.4515) |    |
| 876  | SH10; screw-in pocket, assembled <sup>2</sup>   |   |
| 871  | SH11; screw-in pocket, assembled <sup>2</sup>   |  |
| <b>(7) Diameter of process connection (PA)<sup>1</sup></b> |   |   |
| 6  | 6 mm dia.   |   |
| 8  | 8 mm dia.   |   |
| 10   | 10 mm dia.  |   |
| 11   | 11 mm dia.  |   |
| 12   | 12 mm dia.  |   |
| <b>(8) Thread for process connection (PA)<sup>1</sup></b>  |   |   |
| 000  | no thread (with TF 01 and TF 11)  |   |
| 103  | G <sup>3</sup> / <sub>8</sub> thread  |   |
| 104  | G <sup>1</sup> / <sub>2</sub> thread  |   |
| 105  | G <sup>3</sup> / <sub>4</sub> thread  |   |
| 114  | M 10 x 1 thread (with TA 23 and SH 11 only)   |   |

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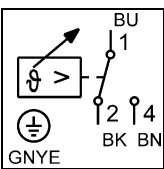
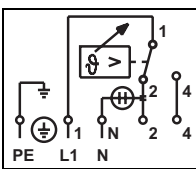
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**Order details**  
**MICROSTAT-M Type 608510**

**Order code**

|     |  |
|-----|--|
|     | <b>(9) Material of probe / support tube<sup>1</sup></b>  |
| 26  | stainless steel (CrNi, 1.4571)   |
| 96  | copper (Cu) / brass (CuZn) (up to 200°C)   |
| 95  | stainless steel (CrNi, 1.4571) - probe / brass (CuZn) - support tube (from 250°C)  |
|     | <b>(10) Material of process connection (PA)<sup>1</sup></b>  |
| 00  | none (TF01 and TF11 only)  |
| 01  | steel (St)   |
| 26  | stainless steel (CrNi, 1.4571)   |
| 46  | brass (CuZn)   |
|     | <b>(11) Fitting length of process connection (PA)<sup>1</sup> (dimension EL or S)</b>  |
| 00  | minimum fitting length TF 11 (active probe dimension)  |
| 50  | 50 mm  |
| 100 | 100 mm   |
| 150 | 150 mm   |
| 200 | 200 mm   |
| ... | special length (specify in plain text, in 50 mm steps)   |
|     | <b>(12) Switching output (SA)</b>  |
| 20  | SA 20 one contact  |
|     |   |
|     | Connection diagram, standard    Connection diagram, with indicator light (TZ 572)  |
|     | <b>(13) Extra codes (TZ)</b>   |
| 000 | no extra code  |
| 507 | Electrical connection by screw terminals for cable up to 1.5 mm <sup>2</sup> conductor cross-section   |
| 426 | Plastic cover to protect the faston connectors or screw terminals against touching and splashing water, IP54 at rear, with cable gland, suitable for 6 – 8 mm cable dia. |
| 650 | Microswitch 10 (3) A (230 V AC/DC +10/-15%, 48 – 63 Hz, p.f. = 1 (0.6)) (not with TZ 577)  |
| 410 | Metal bezel or flange, black   |
| 572 | Indicator light (only with types: 608510/2572 TZ 460 and 608510/2596 TZ 460)   |
| 510 | Stop for upper or lower limit of setpoint adjustment, factory-set  |
| 460 | Housing centered for panel cut-out<br>68 x 68 mm and 92 x 92 mm (with basic type extensions 2572 and 2596 only)  |
| 315 | Capillary reinforcement on housing and probe (not with FL21)   |
| 477 | Setpoint adjustment protected by screw cap.<br>Adjustment with screwdriver.  |
| 577 | Protection against capillary break (not with TZ 650 and TZ 651)  |
| 522 | Customized scale   |
| 489 | Setpoint adjustment by 28 mm dia. setting device, with aluminium front disk; protected to IP54 at the front  |
| 651 | Microswitch 3 (1) A (230 V AC/DC +10/-15%, 48 – 63 Hz, p.f. = 1 (0.6)) (not with TZ 577)   |

**Special versions on request!**

**Order code**

(1) 608510 / (2) ..... - (3) ... - (4) .. - (5) ..... - (6) ... - (7) .. - (8) ... - (9) .. - (10) .. - (11) ... - (12) .. / (13) ... , ...

**Order example**

608510 / 2160 - 818 - 21 - 2000 - 752 - 8 - 000 - 96 - 00 - 000 - 20 / 000<sup>3</sup>

<sup>1</sup> See Data Sheet 60.8730 for description and features.

<sup>2</sup> Screw-in spigot to DIN 3852 Form A.

<sup>3</sup> List extra codes in sequence, separated by commas.

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# Contact Dial Thermometer

- Temperature controller with indication for panel mounting or self-supporting
- Class 1.5
- Protection IP53 max.
- Housing sizes: 60mm dia., 80mm dia. and 100mm dia.  
 Bezel sizes: 72 x 72 mm and 96 x 96 mm

## Brief description

Contact dial thermometers are universal instruments with indication for temperature measurement, control and monitoring.

The volume change with temperature of a liquid-filled system, or the change of pressure with temperature inside a gas-filled system, is converted by a Bourdon tube into a rotation of the pointer without transmission gearing. The movement of the pointer spindle operates a microswitch through a lever system.



Type 608520/2380

## Technical data

|                                |   |
|--------------------------------|---|
| <b>Housing or bezel</b>        | stainless steel (1.4301)  |
| <b>Enclosure protection</b>    | IP51 to EN 60 529 (IP53 with extra code 401)  |
| <b>Window</b>                  | PMMA (plexiglass)   |
| <b>Chassis</b>                 | aluminium (3.2582.05)   |
| <b>Scale</b>                   | white, black lettering  |
| <b>Accuracy class</b>          | Class 1.5 similar to EN 13 190  |
| <b>Capillary reinforcement</b> | for instruments with capillary: on housing and temperature probe  |
| <b>Setpoint adjustment</b>     | by setting knob on window   |
| <b>Indication correction</b>   | at the rear   |
| <b>Limit temperatures</b>      | for transport and storage -30°C to +70°C<br>(for indication range -40 to +40°C up to 50°C; -30 to +50°C up to 60°C) |
| <b>Nominal position (NL)</b>   | unrestricted  |

|  | liquid-filled   | gas-filled  |
|--|---|---|
| <b>Measuring system</b>                    | indication range (AB) ≤350°C  | indication range (AB) ≥ 400°C   |
| <b>Time constant</b><br>t <sub>0.632</sub> | approx. 12 sec, measured in water bath,<br>with a 6 mm dia. copper probe            | approx. 4 sec, measured in oil bath,<br>with a 10 mm dia. stainless steel probe |
| <b>Ambient temperature effect</b>          | in % of indication range (referred to the deviation from the reference value +23°C) |   |
| <b>on housing</b>                          | 0.15% of indication range<br>per °C change in ambient temperature                   | 0.05% of indication range<br>per °C change in ambient temperature               |
| <b>on capillary (per m)</b>                | 0.03% of indication range<br>per °C change in ambient temperature                   | no effect   |
|  | higher ambient temperature – higher temperature indication – lower switching point  |   |

|                                 | standard   | extra code (TZ) 651 | extra code (TZ) 650           |
|---------------------------------|--|---------------------|-------------------------------|
| <b>Electrical contact</b>       | single-pole microswitch with mechanically operated changeover contact  |                     |                               |
| <b>contact type</b>             |  |                     |                               |
| <b>contact rating</b>           | 230V AC +10/-15%, 48 – 63Hz, p.f. = 1 (0.6)  |                     |                               |
|                                 | 5 (1.5) A  | 3 (1) A             | 10 (3) A                      |
| <b>switching differential</b>   | approx. 1.5% of indication range   |                     | 1.5 to 3% of indication range |
| <b>switching point accuracy</b> | ± 0.5% of indication range referred to the switch-off point with rising temperature                            |                     |                               |
| <b>switching reliability</b>    | To ensure maximum switching reliability, we recommend a minimum voltage of 24 V and a minimum current of 20 mA |                     |                               |

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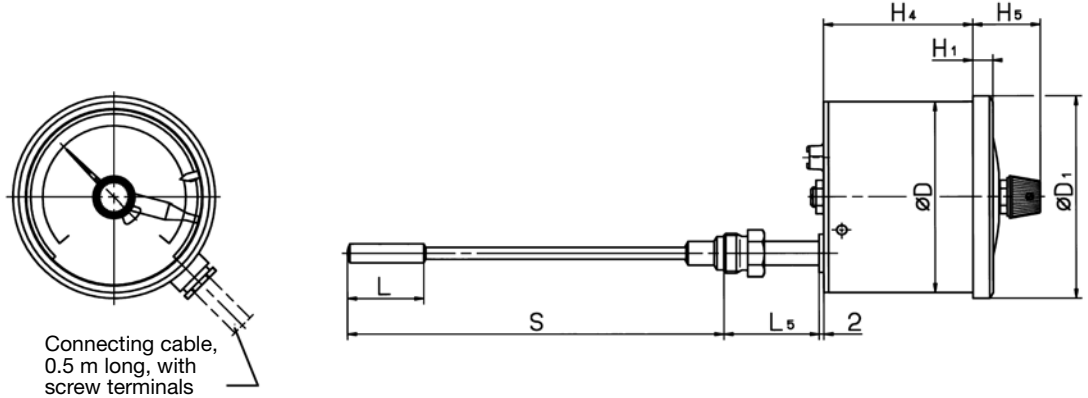
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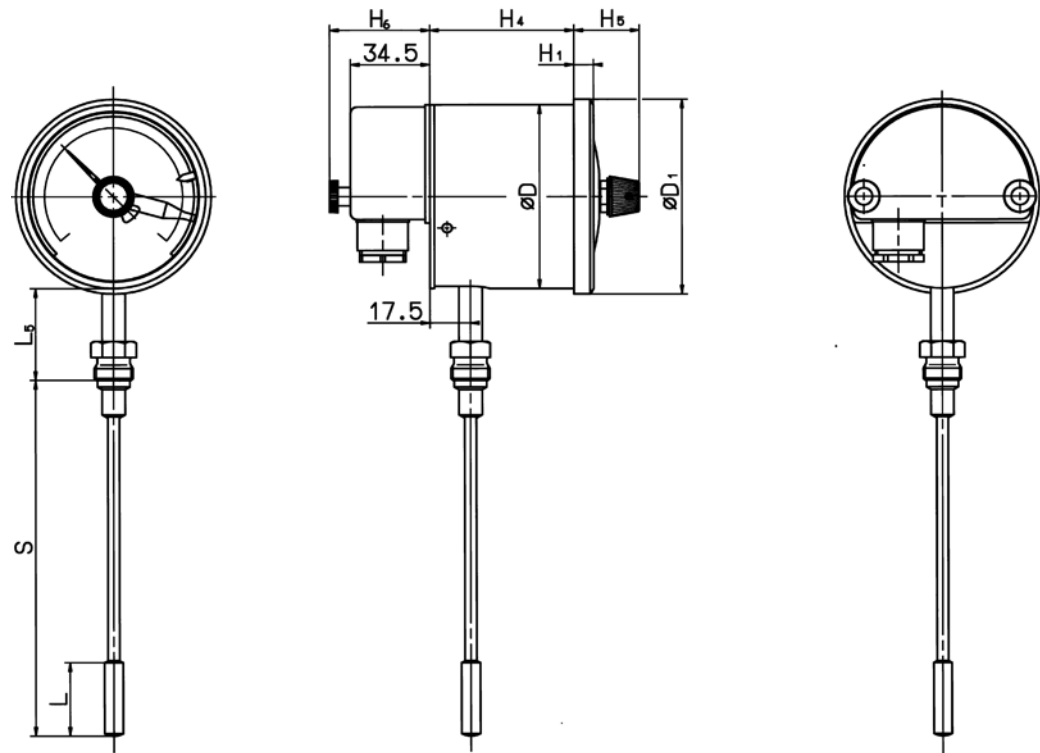
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|------------------------------|--|--|---|---|
|                              | standard   | Styles 02 and 22                               | Styles 10, 23 and TZ 426  | Housing 60mm dia.   |
| <b>Electrical connection</b> | screw terminals,<br>conductor cross-section<br>up to 2.5 mm <sup>2</sup> | connecting cable 0.5 m<br>with screw terminals | cover with cable gland,<br>suitable for cable<br>diameters<br>from 6.5 to 13 mm | cover with cable gland,<br>suitable for cable<br>diameters<br>from 8 to 10 mm |

**Dimensions**

Types: 608520/0280  
 608520/0210



Types: 608520/1080  
 608520/1010





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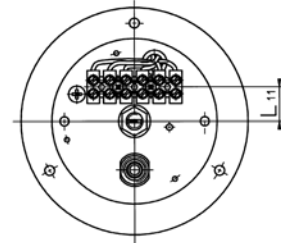
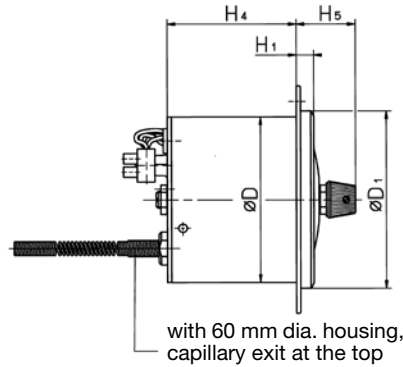
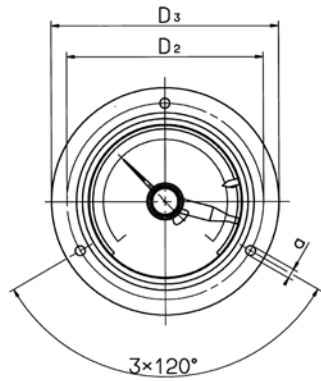
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## Dimensions

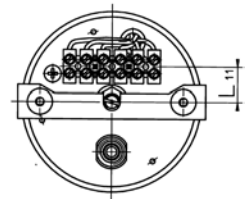
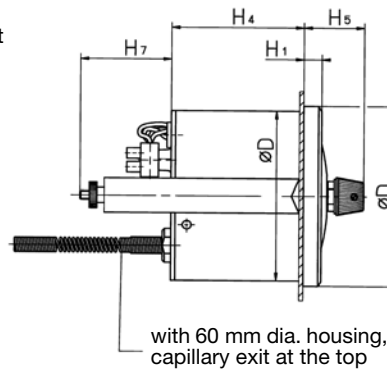
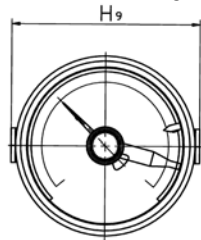
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 608520/2010



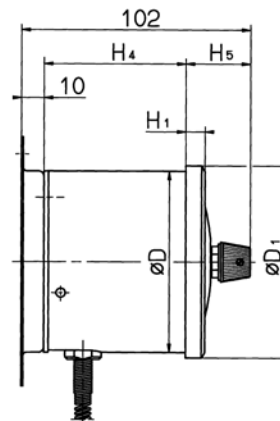
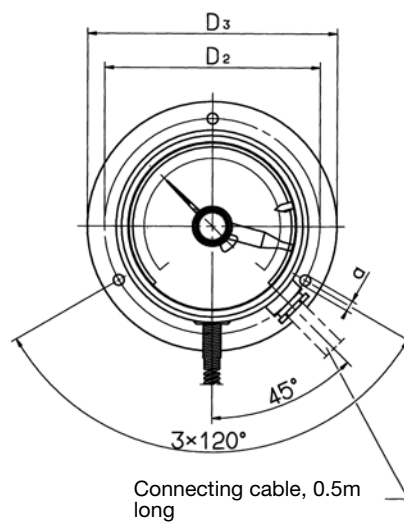
Panel cut-out on housing  
 60 mm dia. =  $62^{+0.5}_0$  mm  
 80 mm dia. =  $82^{+0.5}_0$  mm  
 100 mm dia. =  $102^{+0.5}_0$  mm

Types: 608520/2160  
 608520/2180  
 608520/2110

Width of mounting bracket



Types: 608520/2280  
 608520/2210



Panel cut-out for bezel  
 72 x 72 mm =  $62^{+0.5}_0$  mm dia.  
 96 x 96 mm =  $82^{+0.5}_0$  mm dia. or  
 96 x 96 mm = 92 x  $92^{+0.5}_0$  mm (TZ 460)

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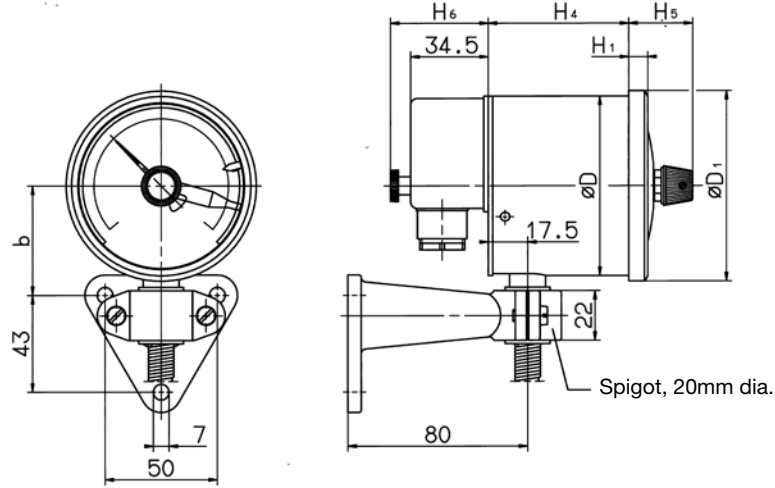
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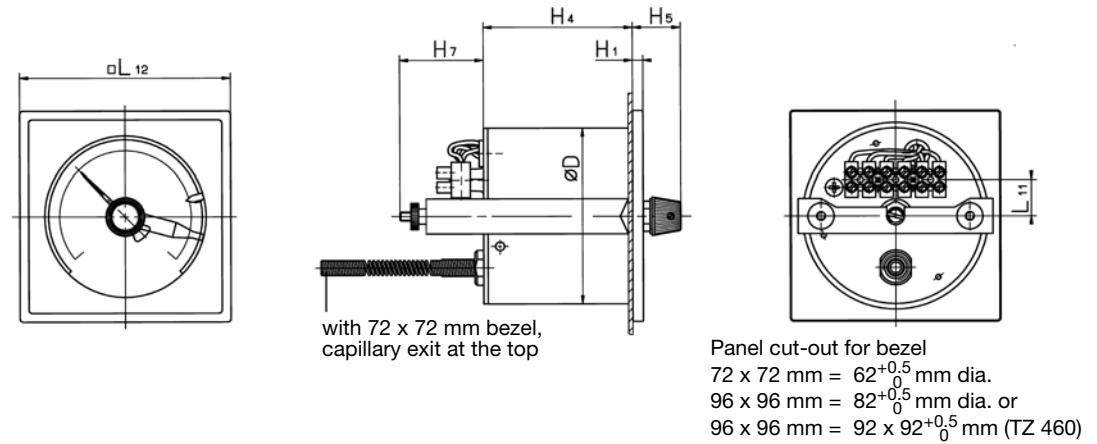


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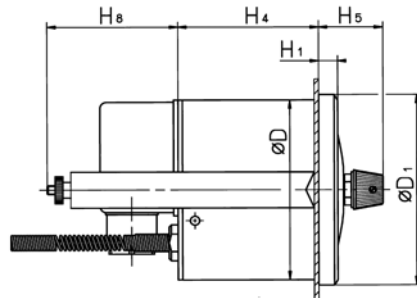
Types: 608520/2380  
 608520/2310



Types: 608520/2572  
 608520/2596



Extra code 426



| Housing | H <sub>1</sub> | H <sub>4</sub> | H <sub>5</sub> | H <sub>6</sub> | H <sub>7</sub> | H <sub>8</sub> | H <sub>9</sub> | D   | D <sub>1</sub> | D <sub>2</sub> | D <sub>3</sub> | a   | b  | L <sub>5</sub> | L <sub>11</sub> | L <sub>12</sub> |
|---------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----|----------------|----------------|----------------|-----|----|----------------|-----------------|-----------------|
| Ø 60    | 7.5            | 62.5           | 27.5           | 34             | 27             | 55             | 69             | 60  | 65             | 75             | 85             | 3.6 | —  | 40*            | —               | —               |
| Ø 80    | 8.5            |                | 28.5           | 43.5           | 44             | 59             | 89             | 80  | 85             | 95             | 110            | 4.8 | 49 |                | 16.5            | —               |
| Ø 100   |                |                | 25             | 59             | 109            | 100            | 106            | 116 | 132            | 59             | —              |     | —  |                |                 |                 |
| □ 72    | 5              | 68             | —              | —              | 27             | 55             | —              | 60  | —              | —              | —              | —   | —  | —              | —               | □ 72            |
| □ 96    |                |                | —              | —              | —              | 44             | 59             | —   | 80             | —              | —              | —   | —  | —              | —               | 16.5            |

\* with probe mounting TA 02 L<sub>5</sub> = ≤69mm  
 with probe mountings TA 22 and TA 31 L<sub>5</sub> = 48mm

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## Order details

### Contact dial thermometer Class 1.5, Type 608520

| Order code                       | (1) Basic type   |  |
|----------------------------------|--|--|
| 608520                           | Mechanical contact dial thermometer Class 1.5                |  |
| <b>(2) Basic type extension</b>  |  |  |
| 0280                             | Style: 02; housing size: 80 mm dia.                          |  |
| 0210                             | Style: 02; housing size: 100 mm dia.                         |  |
| 1080                             | Style: 10; housing size: 80 mm dia.                          |  |
| 1010                             | Style: 10; housing size: 100 mm dia.                         |  |
| 2060                             | Style: 20; housing size: 60 mm dia.                          |  |
| 2080                             | Style: 20; housing size: 80 mm dia.                          |  |
| 2010                             | Style: 20; housing size: 100 mm dia.                         |  |
| 2160                             | Style: 21; housing size: 60 mm dia.                          |  |
| 2180                             | Style: 21; housing size: 80 mm dia.                          |  |
| 2110                             | Style: 21; housing size: 100 mm dia.                         |  |
| 2280                             | Style: 22; housing size: 80 mm dia.                          |  |
| 2210                             | Style: 22; housing size: 100 mm dia.                         |  |
| 2380                             | Style: 23; housing size: 80 mm dia.                          |  |
| 2310                             | Style: 23; housing size: 100 mm dia.                         |  |
| 2572                             | Style: 25; housing size: 72 x 72 mm                          |  |
| 2596                             | Style: 25; housing size: 96 x 96 mm                          |  |
| <b>(3) Indication range (AB)</b> |  |  |
| 469                              | -40 to + 40°C; measuring range -30 to + 30°C, accuracy 1.5°C |  |
| 566                              | -30 to + 50°C; measuring range -20 to + 40°C, accuracy 1.5°C |  |
| 643                              | -20 to +120°C; measuring range 0 to +100°C, accuracy 3.0°C   |  |
| 807                              | 0 to + 60°C; measuring range +10 to + 50°C, accuracy 1.5°C   |  |
| 810                              | 0 to + 80°C; measuring range +10 to + 70°C, accuracy 1.5°C   |  |
| 814                              | 0 to +100°C; measuring range +10 to + 90°C, accuracy 1.5°C   |  |
| 818                              | 0 to +120°C; measuring range +20 to +100°C, accuracy 3.0°C   |  |
| 826                              | 0 to +160°C; measuring range +20 to +140°C, accuracy 3.0°C   |  |
| 832                              | 0 to +200°C; measuring range +20 to +180°C, accuracy 3.0°C   |  |
| 834                              | 0 to +250°C; measuring range +30 to +220°C, accuracy 4.0°C   |  |
| 926                              | +50 to +250°C; measuring range +70 to +230°C, accuracy 3.0°C |  |
| 840                              | 0 to +300°C; measuring range +30 to +270°C, accuracy 6.0°C   |  |
| 927                              | +50 to +300°C; measuring range +80 to +270°C, accuracy 4.0°C |  |
| 843                              | 0 to +350°C; measuring range +50 to +300°C, accuracy 6.0°C   |  |
| 932                              | +50 to +350°C; measuring range +80 to +320°C, accuracy 6.0°C |  |
| 848                              | 0 to +400°C; measuring range +50 to +350°C, accuracy 6.0°C   |  |
| 851                              | 0 to +450°C; measuring range +50 to +400°C, accuracy 6.0°C   |  |
| 854                              | 0 to +500°C; measuring range +50 to +450°C, accuracy 8.0°C   |  |
| 858                              | 0 to +600°C; measuring range +100 to +500°C, accuracy 10.0°C |  |

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## Order details

### Contact dial thermometer Class 1.5, Type 608520

#### Order code

| (4) Capillary type (FL) <sup>1</sup> |  |
|--------------------------------------|--|
| 00                                   | none (with rigid connection)   |
| 02                                   | FL02 copper capillary with copper braiding, approx. 2.5 mm dia. (up to +300°C top of indication range) |
| 11                                   | FL11 copper capillary with PE sleeve, approx. 3.5 mm dia. (up to +120°C top of indication range)       |
| 17                                   | FL17 stainless steel capillary, 1.5 mm dia.  |
| 21                                   | FL21 copper capillary, 1.0 mm dia. (up to +300°C top of indication range)                              |

| (5) Capillary length <sup>1</sup> |   |
|-----------------------------------|---|
| 0                                 | none (with rigid connection)  |
| 1000                              | 1000 mm   |
| 2000                              | 2000 mm   |
| 3000                              | 3000 mm   |
| 4000                              | 4000 mm   |
| 5000                              | 5000 mm   |
| ...                               | special length (details in plain text: in 1000 mm steps, up to 10000 mm length) |

| (6) Process connection (PA) <sup>1</sup> |  |  |
|--|--|--|
| 750                                      | TF 01; temperature probe with stepped support tube   |  |
| 752                                      | TF 11; temperature probe without support tube  |  |
| 843                                      | TA 02; immersion tube with union nut and loose nipple <sup>2</sup>   |  |
| 161                                      | TA 03; immersion tube with loose union nut   |  |
| 847                                      | TA 06; sliding clamp fitting on support tube <sup>2</sup>  |  |
| 311                                      | TA 20; immersion tube with loose nipple and shoulder <sup>2</sup>  |  |
| 872                                      | TA 21; immersion tube with loose plug and conical seal   |  |
| 873                                      | TA 22; immersion tube with loose plug, conical seal and loose nipple <sup>2</sup>  |  |
| 401                                      | TA 23; immersion tube with plug and spring clip  |  |
| 913                                      | SH 07; screw-in pocket, assembled, with clamping clip and fixing screw <sup>2</sup>  |  |
| 820                                      | SH 09; weld-in pocket, assembled, with clamping clip and fixing screw (not with FL21 - welding shoulder with steel 1.4515) |  |
| 876                                      | SH10; screw-in pocket, assembled <sup>2</sup>  |  |
| 871                                      | SH11; screw-in pocket, assembled <sup>2</sup>  |  |

| (7) Diameter of process connection (PA) <sup>1</sup> |         |
|--|---------|
| 6  | Ø 6 mm  |
| 8  | Ø 8 mm  |
| 10   | Ø 10 mm |
| 11   | Ø 11 mm |
| 12   | Ø 12 mm |

| (8) Type of thread for process connection (PA) <sup>1</sup> |   |
|---|---|
| 000   | no thread (with TF 01 and TF 11)            |
| 103   | thread G <sup>3</sup> / <sub>8</sub>        |
| 104   | thread G <sup>1</sup> / <sub>2</sub>        |
| 105   | thread G <sup>3</sup> / <sub>4</sub>        |
| 114   | thread M 10 x 1 (only with TA 23 and SH 11) |

| (9) Material of probe / support tube <sup>1</sup> |  |
|---|--|
| 26  | stainless steel (CrNi, 1.4571)   |
| 96  | copper (Cu) / brass (CuZn) (up to 200°C)   |
| 95  | stainless steel (CrNi, 1.4571) — probe / brass (CuZn) — support tube (above 250°C) |

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## Order details

### Contact dial thermometer Class 1.5, Type 608520

| Order code  | (9) Material of probe / support tube <sup>1</sup>                                  |
|---|--|
| 26  | stainless steel (CrNi, 1.4571)   |
| 96  | copper (Cu) / brass (CuZn) (up to 200°C)   |
| 95  | stainless steel (CrNi, 1.4571) — probe / brass (CuZn) — support tube (above 250°C) |
| (10) Material of process connection (PA) <sup>1</sup>                           |  |
| 00  | none (TF01 and TF11 only)  |
| 01  | steel (St)   |
| 26  | stainless steel (CrNi, 1.4571)   |
| 46  | brass (CuZn)   |
| (11) Fitting length of process connection (PA) <sup>1</sup> (dimension EL or S) |  |
| 0   | minimum fitting length TF 11 (active probe dimension)                              |
| 50  | 50 mm  |
| 100   | 100 mm   |
| 150   | 150 mm   |
| 200   | 200 mm   |
| ...   | special length (details in plain text — in 50 mm steps)                            |

### (12) Switch output (SA)

|    |       |                                    |  |
|----|-------|------------------------------------|--|
| 20 | SA 20 | one contact                        |  |
| 21 | SA 21 | two contacts                       |  |
| 22 | SA 22 | two contacts (sequential contacts) |  |

### (13) Extra codes (TZ)

|     |   |
|-----|---|
| 000 | no extra code   |
| 430 | peak-reading pointer  |
| 426 | cover to protect the terminal against accidental contact and splashing water (standard on styles 10 and 23; not with styles 22; not in conjunction with TZ 460) |
| 650 | microswitch 10 (3) A (230 V AC/DC +10/-15%, 48 — 63 Hz, p.f. = 1 (0.6))   |
| 410 | metal bezel, bezel ring or flange ring, black   |
| 518 | stop for min. or max. setpoint limit, factory-set   |
| 460 | housing centered for 92 x 92 mm panel cut-out (basic type extension 2596 only)  |
| 477 | setpoint adjustment protected by screw cap, adjustment by screwdriver   |
| 401 | IP53 protection to EN 60529, includes TZ 426 and TZ 477 (not for housing dia. 60 mm and bezel 72 x 72 mm; not with style 02 and 22)                             |
| 522 | customized scale  |
| 651 | microswitch 3 (1) A (230 V AC/DC +10/-15%, 48 — 63 Hz, p.f. = 1 (0.6))  |

special versions on request!

| Order code | (1) | (2)  | (3) | (4) | (5) | (6) | (7) | (8)  | (9) | (10) | (11) | (12) | (13) |    |   |     |   |    |   |    |       |
|------------|-----|------|-----|-----|-----|-----|-----|------|-----|------|------|------|------|----|---|-----|---|----|---|----|-------|
| 608520     | /   | .... | -   | ... | -   | ..  | -   | .... | -   | ...  | -    | ..   | -    | .. | - | ... | - | .. | / | .. | , ... |

| Order example   |
|---|
| 608520 / 2010 - 818 - 21 - 2000 - 750 - 8 - 000 - 26 - 00 - 100 - 000 <sup>3</sup> / 000 <sup>3</sup> |

<sup>1</sup> see Data Sheet 60.8730 for description and features

<sup>2</sup> screw-in spigot to DIN 3852 Form A

<sup>3</sup> List extra codes in sequence, separated by commas.

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## Contact Dial Thermometer

- Temperature controller with indication, panel mounting or self-supporting
- Class 1.5
- Protection IP65
- Housing size 100mm dia.

### Brief description

Contact dial thermometers are universal instruments with indication for temperature measurement, control and monitoring.

The volume change with temperature of a liquid-filled measuring system, or the change of pressure with temperature inside a gas-filled system, is converted by a Bourdon tube into a rotation of the pointer without transmission gearing. The movement of the pointer spindle operates a microswitch through a lever system.



Type 608523/2210

### Technical data

|                                     |   |   |
|-------------------------------------|---|---|
| <b>Housing</b>                      | housing with bayonet lock in stainless steel (1.4301)   |   |
| <b>Enclosure protection</b>         | IP65 to EN 60 529   |   |
| <b>Window</b>                       | polycarbonate   |   |
| <b>Scale</b>                        | white, black lettering  |   |
| <b>Accuracy class</b>               | Class 1.5 to EN 13190   |   |
| <b>Capillary reinforcement</b>      | for instruments with capillary: on housing and temperature probe  |   |
| <b>Setpoint adjustment</b>          | by setting knob on window using a screwdriver, protected by screw cap   |   |
| <b>Indication correction</b>        | at the rear, no indication correction on style 20   |   |
| <b>Limit temperatures</b>           | for transport and storage -20°C to +70°C<br>(for indication range: 0 to +60°C up to 65°C; -40 to +40°C up to 50°C; -30 to +50°C up to 60°C) |   |
| <b>Nominal position (NL)</b>        | unrestricted  |   |
|                                     | <b>liquid-filled</b>  | <b>gas-filled</b>   |
| <b>Measuring system</b>             | indication range (AB) ≤ 350°C   | indication range (AB) ≥ 400°C   |
| <b>Time constant</b><br>$t_{0.632}$ | approx. 12 sec, measured in water bath,<br>with a 6 mm dia. copper probe  | approx. 4 sec, measured in oil bath,<br>with a 10 mm dia. stainless steel probe |
| <b>Ambient temperature effect</b>   | in % of indication range (referred to the deviation from the reference value +23°C)   |   |
| <b>on housing</b>                   | 0.15% of indication range<br>per °C change in ambient temperature   | 0.05% of indication range<br>per °C change in ambient temperature               |
| <b>on capillary (per m)</b>         | 0.03% of indication range<br>per °C change in ambient temperature   | no effect   |
|                                     | higher ambient temperature – higher temperature indication – lower switching point  |   |
|                                     | standard  | extra code (TZ) 650   |
| <b>Electrical contact</b>           | single-pole microswitch with mechanically operated changeover contact   |   |
| <b>contact rating</b>               | 230V AC +10/-15%, 48 – 63Hz, p.f. = 1 (0.6)   |   |
|                                     | 5 (1.5) A   | 10 (3) A  |
| <b>switching differential</b>       | approx. 1.5% of indication range  | 1.5 to 3% of indication range   |
| <b>switching point accuracy</b>     | ± 0.5% of indication range span referred to the switch-off point with rising temperature  |   |
| <b>switching reliability</b>        | To ensure maximum switching reliability, we recommend a minimum voltage of 24 V and a minimum current of 20 mA.                             |   |
| <b>Electrical connection</b>        | terminal box: conductor cross-section up to 2.5 mm <sup>2</sup><br>suitable for cable diameters from 6.5 to 13 mm                           |   |

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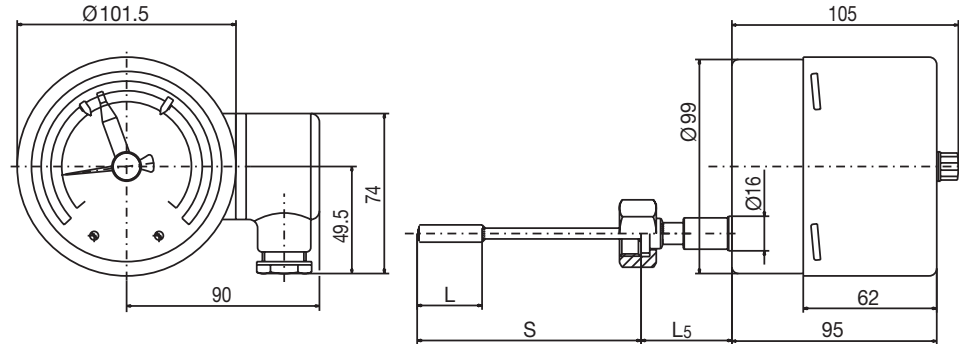
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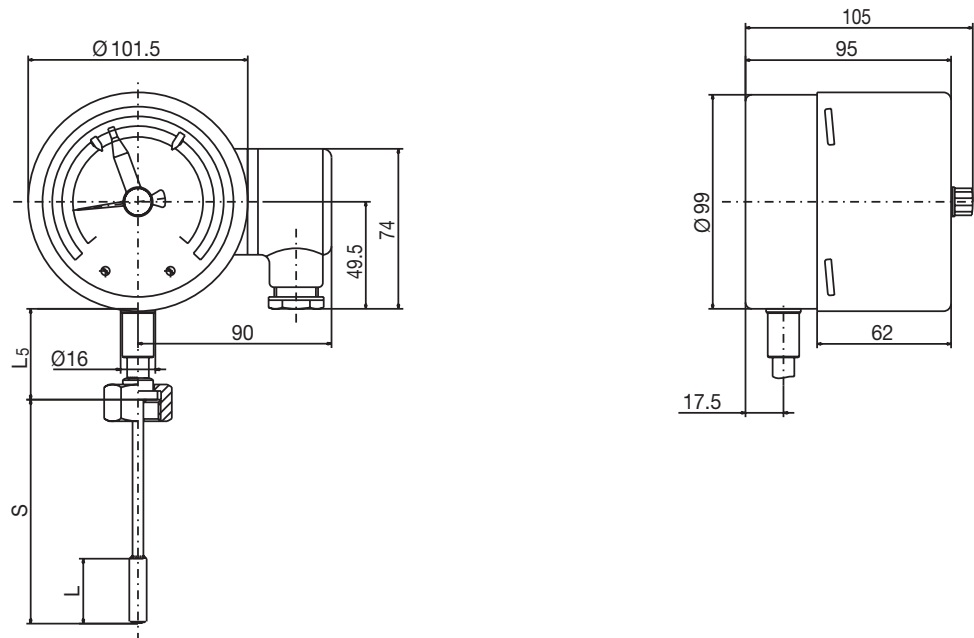


**Dimensions**

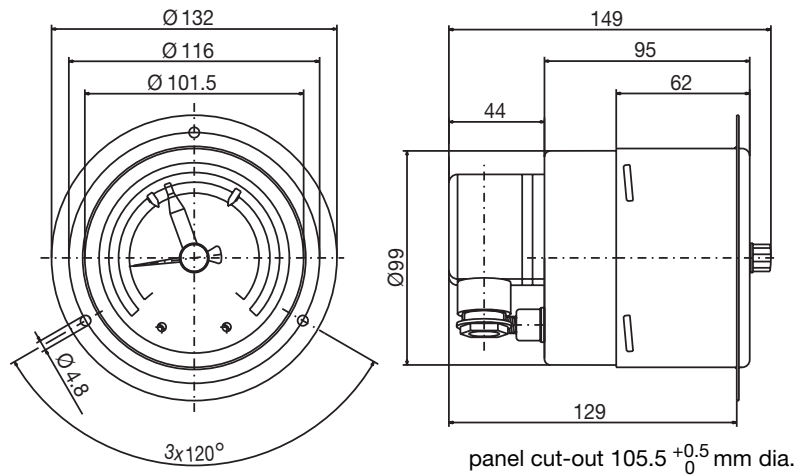
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Type: 608523/1010



Type: 608523/2010



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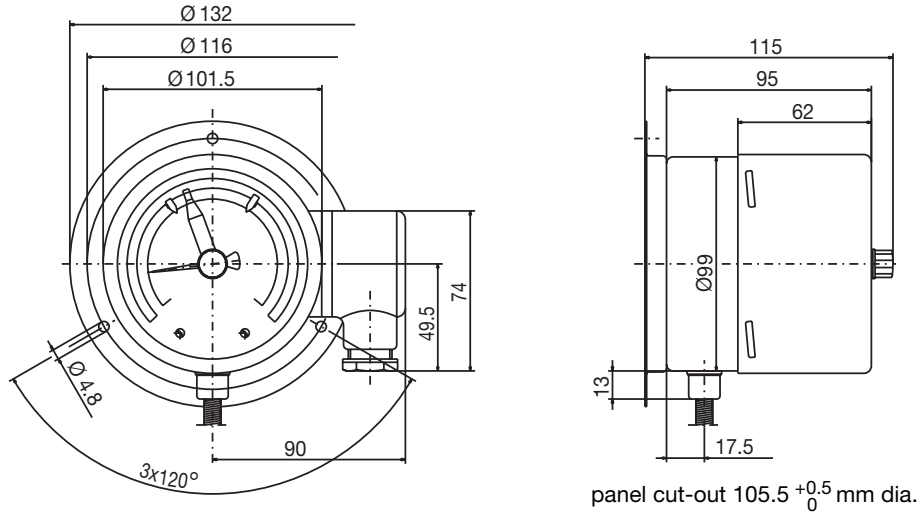
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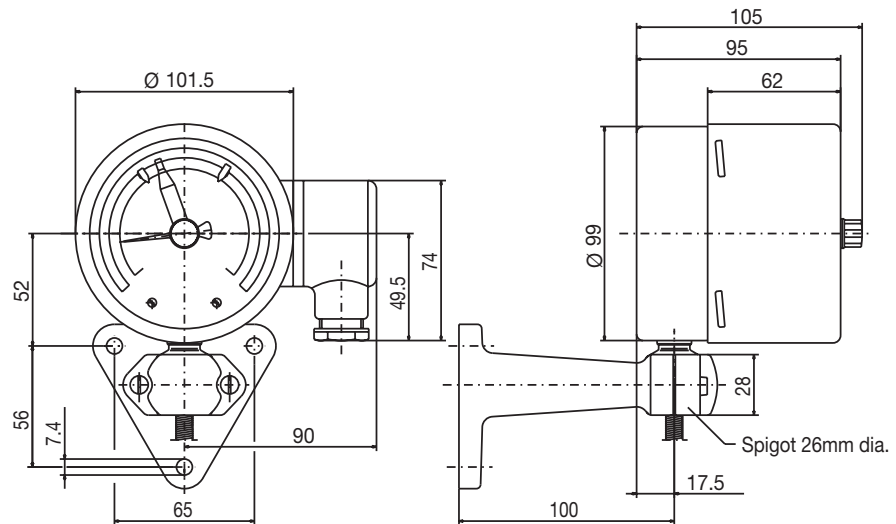


## Dimensions

Type: 608523/2210



Type: 608523/2310



Instrument mounting to DIN 16281

| $L_5$        | Probe mounting |
|--------------|----------------|
| 40 mm        | TA 03, TA 30   |
| $\leq 69$ mm | TA 02          |
| 42.5 mm      | TA 21          |
| 51.5 mm      | TA 22, TA 31   |



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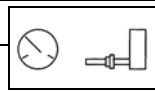
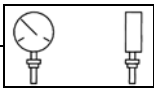
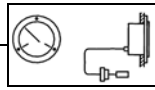
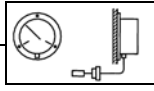

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## Order details

### Contact dial thermometer Class 1.5, Type 608523

| Order code                                 | (1) Basic type   |
|--|--|
| 608523                                     | Mechanical contact dial thermometer Class 1.5  |
| <b>(2) Basic type extension</b>            |  |
| 0210                                       | Style: 02; housing size: 100 mm dia.   |
| 1010                                       | Style: 10; housing size: 100 mm dia.  |
| 2010                                       | Style: 20; housing size: 100 mm dia.   |
| 2210                                       | Style: 22; housing size: 100 mm dia.  |
| 2310                                       | Style: 23; housing size: 100 mm dia.   |
| <b>(3) Indication range (AB)</b>           |  |
| 469  | -40 to + 40°C; measuring range -30 to + 30°C, accuracy 1.5°C   |
| 566  | -30 to + 50°C; measuring range -20 to + 40°C, accuracy 1.5°C   |
| 643  | -20 to +120°C; measuring range 0 to +100°C, accuracy 3.0°C   |
| 807  | 0 to + 60°C; measuring range +10 to + 50°C, accuracy 1.5°C   |
| 810  | 0 to + 80°C; measuring range +10 to + 70°C, accuracy 1.5°C   |
| 814  | 0 to +100°C; measuring range +10 to + 90°C, accuracy 1.5°C   |
| 818  | 0 to +120°C; measuring range +20 to +100°C, accuracy 3.0°C   |
| 826  | 0 to +160°C; measuring range +20 to +140°C, accuracy 3.0°C   |
| 832  | 0 to +200°C; measuring range +20 to +180°C, accuracy 3.0°C   |
| 834  | 0 to +250°C; measuring range +30 to +220°C, accuracy 4.0°C   |
| 926  | +50 to +250°C; measuring range +70 to +230°C, accuracy 3.0°C   |
| 840  | 0 to +300°C; measuring range +30 to +270°C, accuracy 6.0°C   |
| 927  | +50 to +300°C; measuring range +80 to +270°C, accuracy 4.0°C   |
| 843  | 0 to +350°C; measuring range +50 to +300°C, accuracy 6.0°C   |
| 932  | +50 to +350°C; measuring range +80 to +320°C, accuracy 6.0°C   |
| 848  | 0 to +400°C; measuring range +50 to +350°C, accuracy 6.0°C   |
| 851  | 0 to +450°C; measuring range +50 to +400°C, accuracy 6.0°C   |
| 854  | 0 to +500°C; measuring range +50 to +450°C, accuracy 8.0°C   |
| 858  | 0 to +600°C; measuring range +100 to +500°C, accuracy 10.0°C   |
| <b>(4) Capillary type (FL)<sup>1</sup></b> |  |
| 00   | none (with rigid connection)   |
| 02   | FL02 copper capillary with copper braiding, approx. 2.5 mm dia. (up to +300°C top of range)                              |
| 11   | FL11 copper capillary with PE sleeve, approx. 3.5 mm dia. (up to +120°C top of range)                                    |
| 17   | FL17 stainless steel capillary, 1.5 mm dia.  |
| 21   | FL21 copper capillary, 1.0 mm dia. (up to +300°C top of range)   |
| <b>(5) Capillary length<sup>1</sup></b>    |  |
| 0  | none (with rigid connection)   |
| 1000                                       | 1000 mm  |
| 2000                                       | 2000 mm  |
| 3000                                       | 3000 mm  |
| 4000                                       | 4000 mm  |
| 5000                                       | 5000 mm  |
| ...  | special length (details in plain text: in 1000 mm steps, up to 10000 mm length)  |

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## Order details

### Contact dial thermometer Class 1.5, Type 608523

#### Order code

| <b>(6) Process connection (PA)<sup>1</sup></b>                    |   |   |
|---|---|---|
| 750   | TF 01; temperature probe with stepped support tube  |    |
| 752   | TF 11; temperature probe without support tube   |    |
| 843   | TA 02; immersion tube with union nut and loose nipple <sup>2</sup>  |    |
| 161   | TA 03; immersion tube with loose union nut  |    |
| 311   | TA 20; immersion tube with loose nipple and shoulder <sup>2</sup>   |    |
| 872   | TA 21; immersion tube with loose plug and conical seal  |    |
| 873   | TA 22; immersion tube with loose plug, conical seal and loose nipple <sup>2</sup>   |    |
| 401   | TA 23; immersion tube with plug and spring clip   |    |
| 251   | TA 25; sliding clamp fitting on support tube <sup>2</sup>   |    |
| 913   | SH 07; screw-in pocket, assembled, with clamping clip and fixing screw <sup>2</sup>   |    |
| 820   | SH 09; weld-in pocket, assembled, with clamping clip and fixing screw<br>(not with FL21 - welding shoulder with steel 1.4515) |    |
| 876   | SH10; screw-in pocket, assembled <sup>2</sup>   |    |
| 871   | SH11; screw-in pocket, assembled <sup>2</sup>   |  |
| <b>(7) Diameter of process connection (PA)<sup>1</sup></b>        |   |   |
| 6   | Ø 6 mm  |   |
| 8   | Ø 8 mm  |   |
| 10  | Ø 10 mm   |   |
| 11  | Ø 11 mm   |   |
| 12  | Ø 12 mm   |   |
| <b>(8) Type of thread for process connection (PA)<sup>1</sup></b> |   |   |
| 000   | no thread (with TF 01 and TF 11)  |   |
| 103   | thread G <sup>3</sup> / <sub>8</sub>  |   |
| 104   | thread G <sup>1</sup> / <sub>2</sub>  |   |
| 105   | thread G <sup>3</sup> / <sub>4</sub>  |   |
| 114   | thread M 10 x 1 (TA 23 and SH 11 only)  |   |
| <b>(9) Material of probe / support tube<sup>1</sup></b>           |   |   |
| 26  | stainless steel (CrNi, 1.4571)  |   |
| 96  | copper (Cu) / brass (CuZn) (up to 200°C)  |   |
| 95  | stainless steel (CrNi, 1.4571) — probe / brass (CuZn) — support tube (above 250°C)  |   |
| <b>(10) Material of process connection (PA)<sup>1</sup></b>       |   |   |
| 00  | none (TF01 and TF11 only)   |   |
| 01  | steel (St)  |   |
| 26  | stainless steel (CrNi, 1.4571)  |   |
| 46  | brass (CuZn)  |   |

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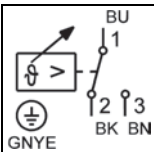
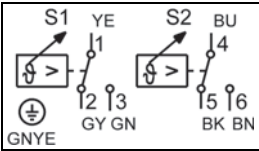
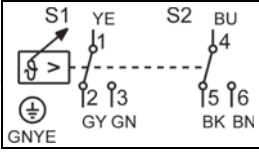


## Order details

### Contact dial thermometer Class 1.5, Type 608523

#### Order code

| <b>(11) Fitting length of process connection (PA)<sup>1</sup> (dimension EL or S)</b> |   |
|---|---|
| 0   | minimum fitting length TF 11 (active probe dimension)   |
| 50  | 50 mm   |
| 100   | 100 mm  |
| 150   | 150 mm  |
| 200   | 200 mm  |
| ...   | special length (details in plain text — in 50 mm steps) |

| <b>(12) Switch output (SA)</b> |   |
|--------------------------------|---|
| 28                             | SA 28 one contact<br>                          |
| 27                             | SA 27 two contacts<br>                        |
| 19                             | SA 19 two contacts (sequential contacts)<br> |

| <b>(13) Extra codes (TZ)</b> |   |
|------------------------------|---|
| 000                          | no extra code   |
| 430                          | peak-reading pointer  |
| 650                          | microswitch 10 (3) A (230 V AC/DC +10/-15%, 48 — 63 Hz, p.f. = 1 (0.6)) |
| 518                          | stop for min. or max. setpoint limit, factory-set                       |
| 522                          | customized scale  |

special versions on request!

#### Order code

(1) 608523 / (2) [ ] - (3) [ ] - (4) [ ] - (5) [ ] - (6) [ ] - (7) [ ] - (8) [ ] - (9) [ ] - (10) [ ] - (11) [ ] - (12) [ ] / (13) [ ] , ...

#### Order example

608523 / 2010 - 818 - 21 - 2000 - 750 - 8 - 000 - 26 - 00 - 100 - 28 / 000<sup>3</sup>

<sup>1</sup> see Data Sheet 60.8730 for description and features

<sup>2</sup> screw-in spigot to DIN 3852 Form A

<sup>3</sup> List extra codes in sequence, separated by commas.

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## Contact Thermometer-TF Transformer and industrial versions

- Electromechanical temperature controller, with indication of actual value
- Class 1.5
- IP54 protection
- One or two contacts; contact rating 5 or 10 A
- Housing size: 80mm dia.

for stock items  
 see price catalog



Type 608540/1080

### Brief description

The contact thermometer-TF is a universally applicable instrument with indication of the actual value, for temperature measurement, control and monitoring.

The temperature-dependent change in volume of a liquid-filled measuring system (or the temperature-dependent change of pressure in a gas-filled system) is converted into a rotary movement of the pointer by a Bourdon tube, without any intermediate gearing. The rotary movement of the pointer spindle operates the microswitch through a lever system.

### Technical data

|  |   |  |
|--|---|--|
| <b>Housing, bezel and protective cap</b> | plastic (PA 6), gray<br>UV-stabilized   |  |
| <b>Enclosure protection</b>              | IP54 to EN 60 529   |  |
| <b>Window</b>                            | PMMA (Plexiglas)  |  |
| <b>Scale</b>                             | white, black lettering  |  |
| <b>Accuracy class</b>                    | Class 1.5 similar to EN 13 190  |  |
|  | <b>liquid-filled</b>  | <b>gas-filled</b>  |
| <b>Measuring system</b>                  | indication range (AB) $\leq 350^{\circ}\text{C}$  | indication range (AB) $\geq 400^{\circ}\text{C}$                                   |
| <b>Time constant</b><br>$t_{0.632}$      | approx. 12 sec, measured in a water bath,<br>with a 6 mm dia. copper probe  | approx. 4 sec, measured in an oil bath,<br>with a 10 mm dia. stainless steel probe |
| <b>Ambient temperature effect</b>        | in % of indication range (referred to the deviation from the reference value $+23^{\circ}\text{C}$ )  |  |
| <b>on housing</b>                        | 0.15% of indication range<br>per $^{\circ}\text{C}$ change in ambient temperature   | 0.05% of indication range<br>per $^{\circ}\text{C}$ change in ambient temperature  |
| <b>on capillary (per meter)</b>          | 0.03% of indication range<br>per $^{\circ}\text{C}$ change in ambient temperature   | no effect  |
|  | higher ambient temperature – higher temperature indication – lower switching point  |  |
|  | standard  | extra code (TZ) 650  |
| <b>Electrical contact</b>                | single-pole microswitch with a mechanically operated changeover contact   |  |
| <b>Contact type</b>                      |   |  |
| <b>Contact rating</b>                    | 230V AC $\pm 10\%$ , 48 – 63Hz, p.f = 1 (0.6)   |  |
|  | 5 (1.5) A   | 10 (3) A   |
| <b>Switching differential</b>            | approx. 1.5% of indication range  |  |
| <b>Switching point accuracy</b>          | $\pm 0.5\%$ of indication range referred to the switch-off point with rising temperature  |  |
| <b>Switching reliability</b>             | To ensure maximum switching reliability, we recommend a minimum voltage of 24 V and a minimum current of 20 mA.   |  |
| <b>Electrical connection</b>             | screw terminals: for conductor cross-section up to $2.5\text{ mm}^2$ , protected by cap with cable gland<br>Suitable for cable diameters from 6.5 to 16 mm. |  |
| <b>Setpoint adjustment</b>               | with screwdriver, protected by cap.   |  |
| <b>Limit temperatures</b>                | $-30$ to $+70^{\circ}\text{C}$ (storage and transport $-30$ to $+70^{\circ}\text{C}$ )  |  |
| <b>Nominal position (NL)</b>             | NL90, symbol $\perp$  |  |

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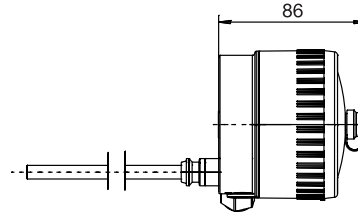
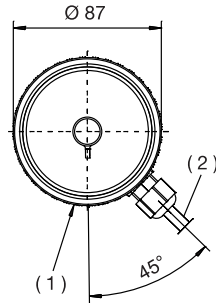
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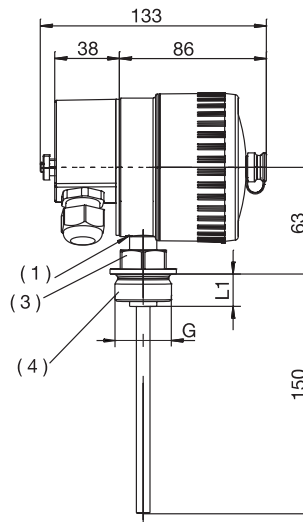
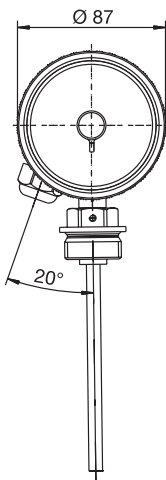
## Dimensions

Type 608540/0280



- (1) Vent opening
- (2) Connecting cable, 0.5 m long

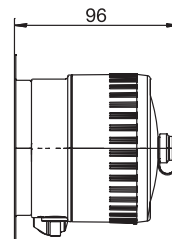
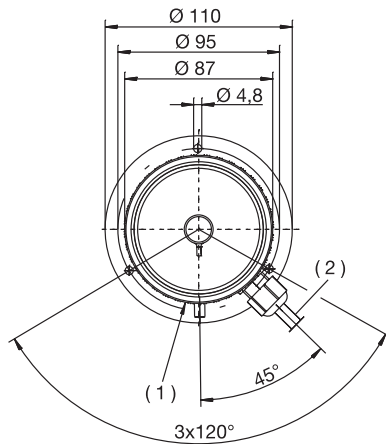
Type 608540/1080  
 (transformer version)



|        |     |    |
|--------|-----|----|
| G 1/2A | 27  | 14 |
| G 3/4A | 32  | 16 |
| G 1A   | 27  | 16 |
| G      | a/f | L1 |

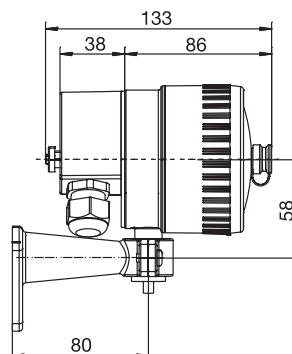
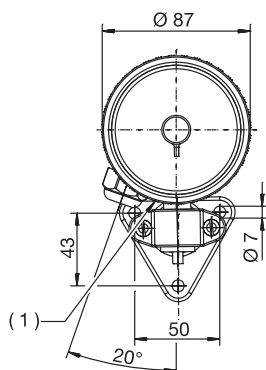
- (1) Vent opening
- (3) a/f
- (4) Screw-in spigot DIN 3852 Form A

Type 608540/2280



- (1) Vent opening
- (2) Connecting cable, 0.5 m long

Type 608540/2380



- (1) Vent opening

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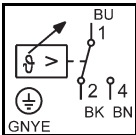
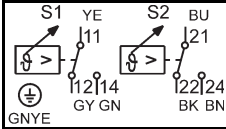
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**Order details: Transformer version**

**Contact thermometer-TF, type 608540**

|                   |   |   |  |
|-------------------|---|---|--|
| <b>Order code</b> | <b>(1) Basic type</b>   |   |  |
| 608540            | Mechanical contact thermometer, transformer version                             |   |  |
|                   | <b>(2) Basic type extensions</b>  |   |  |
| 1080              | Style: 10; housing size: Ø 80 mm dia.   |    |  |
|                   | <b>(3) Indication range (AB)</b>  |   |  |
| 643               | -20 to +120°C; range 0 to +100°C  |   | accuracy 3.0°C   |
| 818               | 0 to +120°C; range +20 to +100°C  |   | accuracy 3.0°C   |
| 921               | +20 to +120°C; range +38 to +104°C  |   | accuracy 3.0°C   |
|                   | <b>(4) Capillary type (FL)<sup>1</sup></b>                                      |   |  |
| 00                | none (with rigid connection)  |   |  |
|                   | <b>(5) Capillary length<sup>1</sup></b>   |   |  |
| 0                 | none (with rigid connection)  |   |  |
|                   | <b>(6) Process connection (PA)<sup>1</sup></b>                                  |   |  |
| 874               | TA 24; immersion tube with screw fitting, O ring seal and clamping screw        |  |  |
|                   | <b>(7) Diameter of process connection (PA)<sup>1</sup></b>                      |   |  |
| 8                 | 8 mm dia.   |   |  |
|                   | <b>(8) Thread for process connection (PA)<sup>1</sup></b>                       |   |  |
| 104               | G <sup>1</sup> / <sub>2</sub> (1/2" pipe) thread                                |   |  |
| 105               | G <sup>3</sup> / <sub>4</sub> (3/4" pipe) thread                                |   |  |
| 106               | G 1 (1" pipe) thread  |   |  |
|                   | <b>(9) Material of probe / support tube<sup>1</sup></b>                         |   |  |
| 26                | stainless steel (CrNi 1.4571)   |   |  |
|                   | <b>(10) Material of process connection (PA)<sup>1</sup></b>                     |   |  |
| 46                | brass (CuZn)  |   |  |
|                   | <b>(11) Fitting length of process connection (PA)<sup>1</sup> (dimension S)</b> |   |  |
| 150               | 150 mm  |   |  |
|                   | <b>(12) Switching output (SA)</b>   |   |  |
| 20                | SA 20   | one contact   |   |
| 21                | SA 21   | two contacts  |  |
|                   | <b>(13) Extra codes</b>   |   |  |
| 000               | no extra code   |   |  |
| 430               | peak-reading pointer  |   |  |
| 522               | customized scale  |   |  |

|                      |            |            |            |            |            |            |            |            |            |             |             |             |             |     |   |     |   |    |   |     |   |    |   |                  |
|----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|-----|---|-----|---|----|---|-----|---|----|---|------------------|
| <b>Order code</b>    | <b>(1)</b> | <b>(2)</b> | <b>(3)</b> | <b>(4)</b> | <b>(5)</b> | <b>(6)</b> | <b>(7)</b> | <b>(8)</b> | <b>(9)</b> | <b>(10)</b> | <b>(11)</b> | <b>(12)</b> | <b>(13)</b> |     |   |     |   |    |   |     |   |    |   |                  |
| 608540               | /          | ....       | -          | ...        | -          | ..         | -          | .          | -          | ...         | -           | ..          | -           | ..  | - | ... | - | .. | / | ..  |   |    |   |                  |
| <b>Order example</b> |            |            |            |            |            |            |            |            |            |             |             |             |             |     |   |     |   |    |   |     |   |    |   |                  |
| 608540               | /          | 1080       | -          | 921        | -          | 00         | -          | 0          | -          | 874         | -           | 8           | -           | 106 | - | 26  | - | 46 | - | 150 | - | 20 | / | 000 <sup>3</sup> |

<sup>1</sup> See data sheet 60.8730 for description and features.

<sup>3</sup> List extra codes in sequence, separated by commas.

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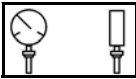
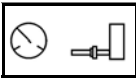
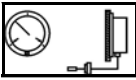

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**Order details: Industrial version**

**Contact thermometer-TF, type 608540**

| Order code                                 | (1) Basic type   |   |
|--|--|---|
| 608540                                     | Mechanical contact thermometer, industrial version   |   |
| <b>(2) Basic type extensions</b>           |  |   |
| 1080                                       | Style: 10; housing size: Ø 80 mm dia.  |  |
| 0280                                       | Style: 02; housing size: Ø 80 mm dia.  |  |
| 2280                                       | Style: 22; housing size: Ø 80 mm dia.  |  |
| 2380                                       | Style: 23; housing size: Ø 80 mm dia.  |  |
| <b>(3) Indication range (AB)</b>           |  |   |
| 469  | -40 to + 40°C; range -30 to + 30°C   | accuracy 1.5°C  |
| 566  | -30 to + 50°C; range -20 to + 40°C   | accuracy 1.5°C  |
| 643  | -20 to +120°C; range 0 to +100°C   | accuracy 3.0°C  |
| 807  | 0 to + 60°C; range +10 to + 50°C   | accuracy 1.5°C  |
| 810  | 0 to + 80°C; range +10 to + 70°C   | accuracy 1.5°C  |
| 814  | 0 to +100°C; range +10 to + 90°C   | accuracy 1.5°C  |
| 818  | 0 to +120°C; range +20 to +100°C   | accuracy 3.0°C  |
| 921  | +20 to +120°C; range +38 to +104°C   | accuracy 3.0°C  |
| 826  | 0 to +160°C; range +20 to +140°C   | accuracy 3.0°C  |
| 832  | 0 to +200°C; range +20 to +180°C   | accuracy 3.0°C <sup>4</sup>   |
| 834  | 0 to +250°C; range +30 to +220°C   | accuracy 4.0°C <sup>4</sup>   |
| 926  | +50 to +250°C; range +70 to +230°C   | accuracy 3.0°C <sup>4</sup>   |
| 840  | 0 to +300°C; range +30 to +270°C   | accuracy 6.0°C <sup>4</sup>   |
| 927  | +50 to +300°C; range +80 to +270°C   | accuracy 4.0°C <sup>4</sup>   |
| 843  | 0 to +350°C; range +50 to +300°C   | accuracy 6.0°C <sup>4</sup>   |
| 932  | +50 to +350°C; range +80 to +320°C   | accuracy 6.0°C <sup>4</sup>   |
| 848  | 0 to +400°C; range +50 to +350°C   | accuracy 6.0°C <sup>4</sup>   |
| 851  | 0 to +450°C; range +50 to +400°C   | accuracy 6.0°C <sup>4</sup>   |
| 854  | 0 to +500°C; range +50 to +450°C   | accuracy 8.0°C <sup>4</sup>   |
| 858  | 0 to +600°C; range +100 to +500°C  | accuracy 10.0°C <sup>4</sup>  |
| <b>(4) Capillary type (FL)<sup>1</sup></b> |  |   |
| 00   | none (with rigid connection)   |   |
| 02   | FL02 copper capillary with copper braiding, approx. 2.5 mm dia. (up to +300°C top of indication range) |   |
| 11   | FL11 copper capillary with PE sleeve, approx. 3.5 mm dia. (up to +120°C top of indication range)       |   |
| 17   | FL17 stainless steel capillary, 1.5 mm dia.  |   |
| 21   | FL21 copper capillary, 1.0 mm dia. (up to +300°C top of indication range)                              |   |
| <b>(5) Capillary length<sup>1</sup></b>    |  |   |
| 0  | none (with rigid connection)   |   |
| 1000                                       | 1000 mm  |   |
| 2000                                       | 2000 mm  |   |
| 3000                                       | 3000 mm  |   |
| 4000                                       | 4000 mm  |   |
| 5000                                       | 5000 mm  |   |
| ...  | special length (specify in plain text: in 1000 mm steps, maximum length: 10000 mm)                     |   |

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**Order details: Industrial version**

**Contact thermometer-TF, type 608540**

| Order code   | (6) Process connection (PA) <sup>1</sup>   |  |
|--|--|--|
| 750  | TF 01; temperature probe with stepped support tube   |  |
| 752  | TF 11; temperature probe without support tube  |  |
| 843  | TA 02; immersion tube with union nut and loose nipple <sup>2</sup>   |  |
| 161  | TA 03; immersion tube with loose union nut   |  |
| 847  | TA 06; sliding clamp fitting on support tube <sup>2</sup>  |  |
| 311  | TA 20; immersion tube with loose nipple and shoulder <sup>2</sup>  |  |
| 872  | TA 21; immersion tube with loose plug and conical seal   |  |
| 873  | TA 22; immersion tube with loose plug, conical seal and loose nipple <sup>2</sup>  |  |
| 401  | TA 23; immersion tube with plug and spring clip  |  |
| 874  | TA 24; immersion tube with screw fitting, O ring seal and clamping screw <sup>2, 5</sup>   |  |
| 913  | SH 07; screw-in pocket, assembled, with clamping clip and fixing screw <sup>2</sup><br>(with TF 01)  |  |
| 820  | SH 09; weld-in pocket, assembled, with clamping clip and fixing screw<br>(not with FL21 - welding shoulder with steel 1.4515) (with TF 01) |  |
| 876  | SH10; screw-in pocket, assembled <sup>2</sup>  |  |
| 871  | SH11; screw-in pocket, assembled <sup>2</sup>  |  |
| (7) Diameter of process connection (PA) <sup>1</sup> |  |  |
| 6  | 6 mm dia.  |  |
| 8  | 8 mm dia.  |  |
| 10   | 10 mm dia.   |  |
| 12   | 12 mm dia.   |  |
| (8) Thread for process connection (PA) <sup>1</sup>  |  |  |
| 000  | no thread (with TF 01 and TF 11)   |  |
| 103  | G <sup>3/8</sup> (3/8" pipe) thread  |  |
| 104  | G <sup>1/2</sup> (1/2" pipe) thread  |  |
| 105  | G <sup>3/4</sup> (3/4" pipe) thread  |  |
| 106  | G1 (1" pipe) thread  |  |
| 114  | M 10 x 1 thread (with TA 23 and SH 11 only)  |  |



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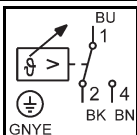
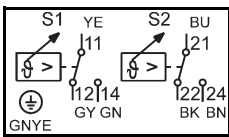
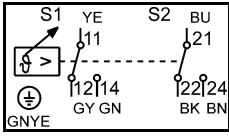
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**Order details: Industrial version**

**Contact thermometer-TF, type 608540**

|                   |  |
|-------------------|--|
| <b>Order code</b> | <b>(9) Material of probe / support tube<sup>1</sup></b>  |
| 26                | stainless steel (CrNi, 1.4571)   |
| 96                | copper (Cu) / brass (CuZn) (up to 200°C)   |
| 95                | stainless steel (CrNi, 1.4571) – probe / brass (CuZn) – support tube (above 250°C)   |
|                   | <b>(10) Material of process connection (PA)<sup>1</sup></b>  |
| 00                | none (TF01 and TF11 only)  |
| 26                | stainless steel (CrNi, 1.4571)   |
| 46                | brass (CuZn)   |
|                   | <b>(11) Fitting length of process connection (PA)<sup>1</sup> (dimension EL or S)</b>                                      |
| 0                 | minimum fitting length TF 11 (active probe dimension)  |
| 100               | 100 mm   |
| 150               | 150 mm   |
| 200               | 200 mm   |
| ...               | special length (specify in plain text, in 50 mm steps)   |
|                   | <b>(12) Switching output (SA)</b>  |
| 20                | SA 20 one contact                        |
| 21                | SA 21 two contacts                      |
| 22                | SA 22 two contacts - sequential switch  |
|                   | <b>(13) Extra codes (TZ)</b>   |
| 000               | no extra code  |
| 430               | peak-reading pointer   |
| 650               | microswitch 10 (3) A ( 230 V AC/DC +10/-15%, 48 – 63 Hz, p.f. = 1 (0.6))   |
| 518               | stop for upper or lower limit of setpoint adjustment, factory-set  |
| 522               | customized scale   |

**Order code**  
 (1) 608540 / (2) [ ] - (3) [ ] - (4) [ ] - (5) [ ] - (6) [ ] - (7) [ ] - (8) [ ] - (9) [ ] - (10) [ ] - (11) [ ] - (12) [ ] / (13) [ ] , ...

**Order example**  
 608540 / 2280 - 818 - 02 - 2000 - 843 - 8 - 104 - 96 - 46 - 100 - 20 / 000<sup>3</sup>

<sup>1</sup> See data sheet 60.8730 for description and features.  
<sup>2</sup> Screw-in spigot to DIN 3852 Form A.  
<sup>3</sup> List extra codes in sequence, separated by commas.  
<sup>4</sup> Not on styles 02 and 10.  
<sup>5</sup> Material of probe / support tube: styles 02 and 10: stainless steel  
 styles 22 and 23: brass

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## JUMO dTHERM-M

- Digital indicator for panel or surface mounting with integrated 2-wire transmitter
- Stainless steel housing with bayonet lock
- IP65 protection
- Housing size: 100mm dia.

### Brief description

The JUMO dTHERM-M features a 3½-digit LC display with 13 mm digit height and an integrated 2-wire transmitter. The supply for the indicator is provided by wiring it in series into the 4 – 20 mA current loop, so that no additional cables are required.

JUMO-dTHERM-M indicators are universal instruments, either for connection to external Pt100 resistance thermometers or with an integral Pt100, and are used for temperature measurement and indication.



Type 608624/1710

### Technical data

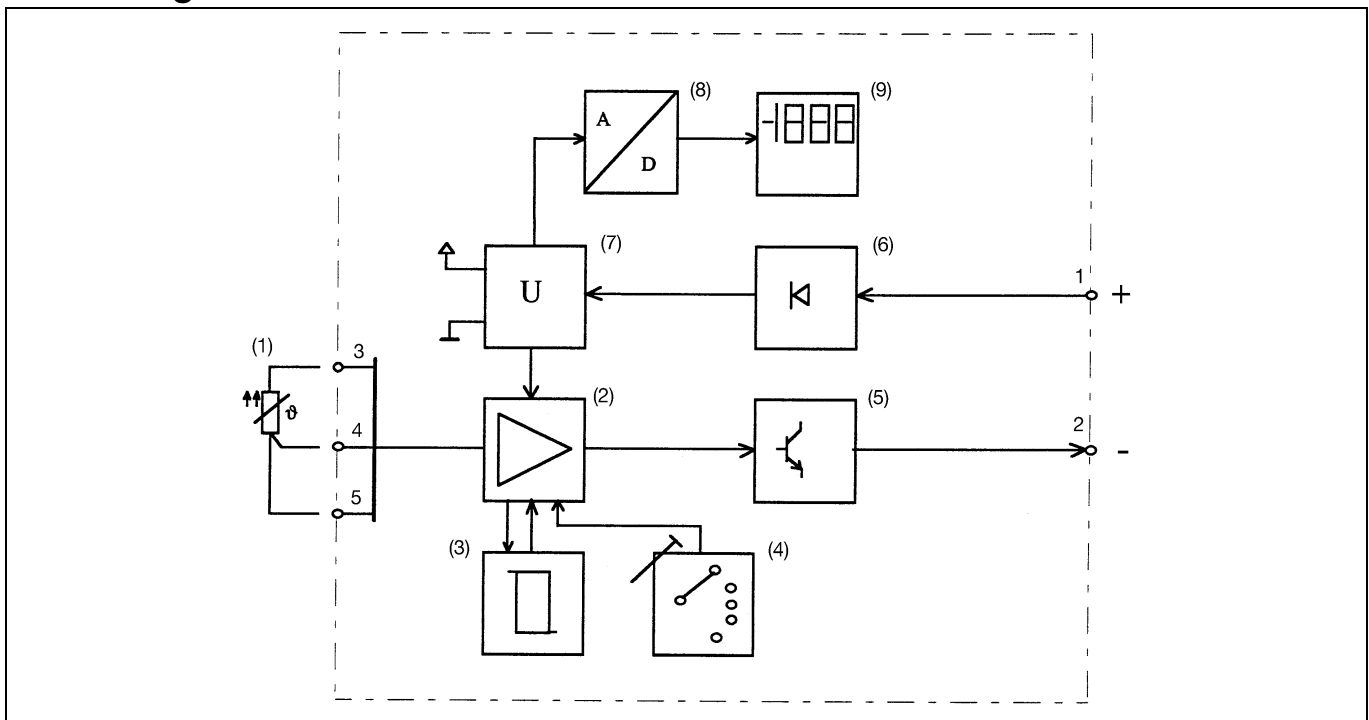
|                                    |   |  |   |
|------------------------------------|---|--|---|
| <b>Housing</b>                     | housing and bezel or flange in stainless steel (1.4301)<br>angle block in aluminium (Style 17)  |  |   |
| <b>Measurement input</b>           | Pt100 resistance thermometer in 3-wire circuit (on Styles 20 and 23). A 2-wire circuit without lead compensation can be implemented via an external link between the terminals 4 and 5. |  |   |
| <b>Display</b>                     | 3½-digit LCD with 13 mm digit height  |  |   |
| <b>Transfer characteristic</b>     | linear with temperature   |  |   |
| <b>Linearity error</b>             | ≤ 0.2% of full scale  |  |   |
| <b>Calibration accuracy</b>        | ≤ 0.5% of full scale  |  |   |
| <b>Indication accuracy</b>         | ≤ 0.2% of full scale ±1 digit   |  |   |
| <b>Display format</b>              | 1 °C (0.1 °C with extra code 465)   |  |   |
| <b>Supply</b>                      | 12 – 30 V DC  |  |   |
| <b>Max. current drawn</b>          | approx. 30 mA   |  |   |
| <b>Supply voltage error</b>        | ≤ 0.02% of span per volt (deviation from 24 V DC)   |  |   |
| <b>Output signal</b>               | 4 – 20 mA   |  |   |
| <b>Burden (R<sub>b</sub>)</b>      | R <sub>b</sub> ≤ (U <sub>b</sub> - 12 V) / 20 mA  |  |   |
| <b>Burden error</b>                | ≤ ±0.02% of span per 100 Ω burden   |  |   |
| <b>Probe break/short-circuit</b>   | current output < 2.5 mA, displayed value below start of range   |  |   |
|                                    | <b>Style 01</b>   | <b>Style 20, 23</b>                              | <b>Style 10, 17</b>   |
| <b>Electrical connection</b>       | connection for one cable<br><br>connection with earth terminal;<br>gland for 6.5 to 13 mm cable diameter;<br>conductor cross-section up to 2.5 mm <sup>2</sup>                          | connection for two cables<br>with 3 to 5 mm dia. | connection for one cable;<br>terminal box to DIN 43650<br>(connector); gland for 6 to 8 mm<br>cable diameter; conductor cross-<br>section up to 1.5 mm <sup>2</sup> |
|                                    | All input and output cables without connection to the mains supply must be arranged as twisted and screened cables. Ground the screen on the instrument side to the potential earth.    |  |   |
| <b>Operating temperature range</b> | 0 to +60°C (temperature at the housing)   |  |   |
| <b>Storage temperature range</b>   | 0 to +60°C  |  |   |
| <b>Ambient temperature effect</b>  | referred to the deviation from the +23°C reference value  |  |   |
| <b>Display</b>                     | ≤ 0.2% / 10 °C temperature change   |  |   |
| <b>Current output</b>              | ≤ 0.1% / 10 °C temperature change   |  |   |
| <b>EMC</b>                         | EN 61326  |  |   |
| <b>Interference emission</b>       | Class B   |  |   |
| <b>Interference immunity</b>       | to general requirements   |  |   |
| <b>Protection</b>                  | IP65 as per EN 60529  |  |   |
| <b>Time constant</b>               | T <sub>0.632</sub> approx. 19sec (measured in agitated water with a 10 mm dia. probe)   |  |   |



## Connection diagram

|  |   |
|--|---|
|  | Supply 12 – 30 V DC<br>Current output 4 – 20 mA   |
|  | Resistance thermometer in 3-wire circuit on Styles 20 and 23<br><br>or                                      |
|  | Resistance thermometer in 2-wire circuit via an external link on Styles 20 and 23<br>(note lead resistance) |
|  | PE conductor  |

## Block diagram



## Function

The transmitter converts the temperature-dependent change in resistance of a Pt100 resistance thermometer into a proportional DC current signal. The resistance thermometer (1) can be connected in 2- or 3-wire circuit. The amplifier stage (2) drives the output stage (5) which supplies the proportional 4 – 20mA DC current.

On probe break or short-circuit, a comparator (3) is activated, which switches the output signal over to Low level. Solder links and potentiometers (4) are used for the range settings.

The diode (6) serves as a reverse-polarity protection. The controller (7) provides the supply to the individual stages.

The 4 – 20 mA current signal is digitized in the A/D converter (8) and displayed as a temperature value on the LCD (9).

## Accessories

|                           |   |
|---------------------------|---|
| <b>Power supply units</b> | to data sheet 70.7500 (1- or 4-way).  |
| <b>Temperature probe</b>  | On instruments with an external Pt100 resistance thermometer (Styles 20 and 23), temperature probes to data sheets 90.2105 and 90.2005 can be used. |

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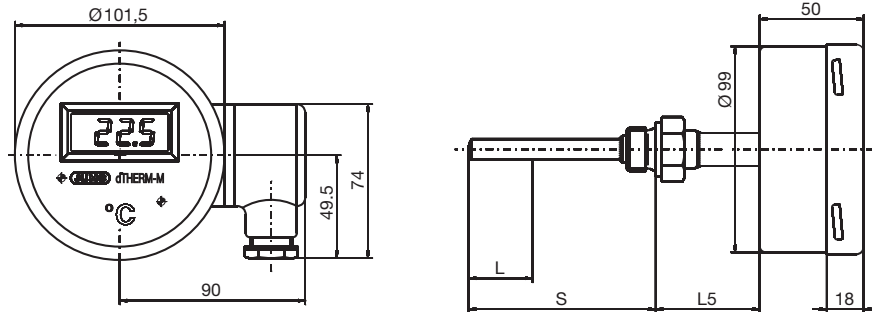
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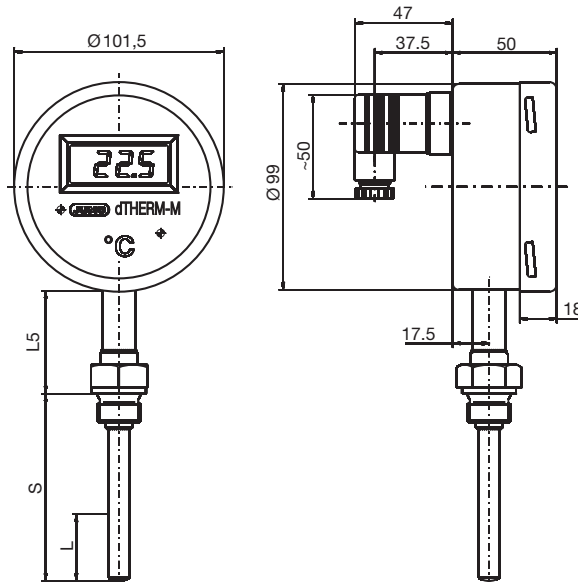


## Dimensions

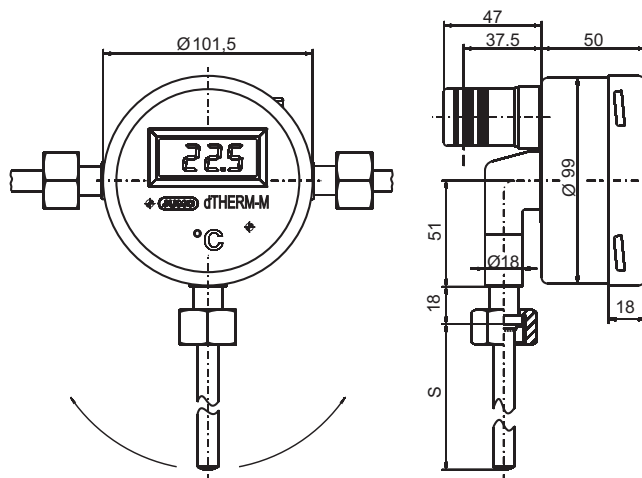
Type: 608624/0110



Type: 608624/1010



Type: 608624/1710



Probe mounting can be rotated through  $\pm 90^\circ$

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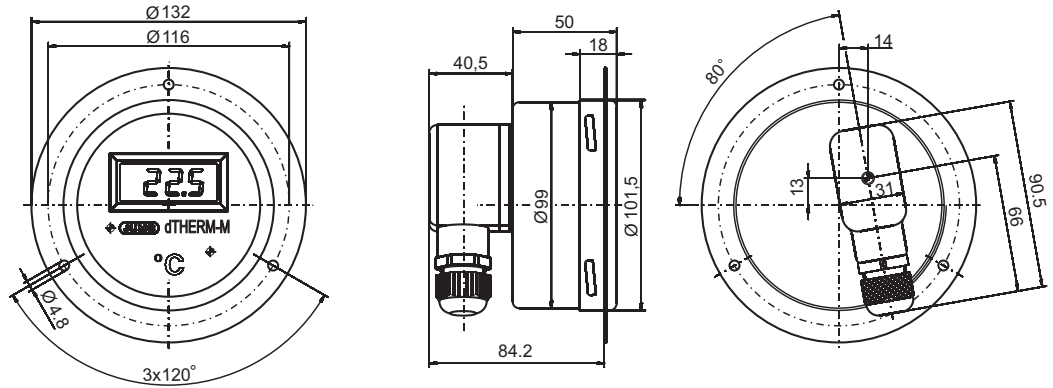
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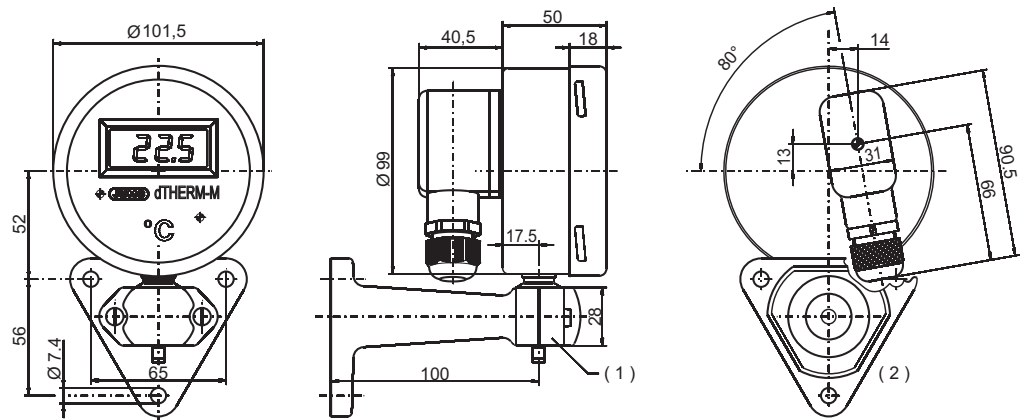


## Dimensions

Type: 608624/2010



Type: 608624/2310



- (1) Spigot 26 mm dia.
- (2) Instrument mounting to DIN 16281

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Probe mountings TA

| Version     | Dimensional drawing | Description   |
|-------------|---------------------|---|
| 010<br>TA01 |                     | Immersion tube with shoulder<br><br>* Housing connection                      |
| 844<br>TA02 |                     | Immersion tube with union nut and loose nipple; screw-in spigot <sup>1)</sup> |
| 845<br>TA03 |                     | Immersion tube with loose union nut   |
| 841<br>TA04 |                     | Immersion tube with fixed hexagon screw-in spigot <sup>1)</sup>               |
| 847<br>TA06 |                     | Immersion tube with sliding clamping thread; screw-in spigot <sup>1)</sup>    |
| 842<br>TA20 |                     | Immersion tube with loose nipple and shoulder; screw-in spigot <sup>1)</sup>  |

<sup>1)</sup> Screw-in spigot to DIN 3852 Form A  
<sup>2)</sup> Housing connection not applicable on Style 17

Dimensions of process connection on Styles 01 and 10

| Pipe thread G                   | a/f | L <sub>1</sub> | L <sub>2</sub> | L <sub>3</sub> | L <sub>5</sub><br>TA01 | L <sub>5</sub><br>TA02 | L <sub>5</sub><br>TA03 | L <sub>5</sub><br>TA04 | L <sub>5</sub><br>TA06 | L <sub>5</sub><br>TA20 |
|---------------------------------|-----|----------------|----------------|----------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| G <sup>1</sup> / <sub>2</sub> A | 27  | 14             | 25             | 10             | -                      | 67                     | 42                     | 40.5                   | 50.5                   | 50                     |
| G <sup>3</sup> / <sub>4</sub> A | 32  | 16             | 29             | 11             | -                      | 71                     | 42                     | 40.5                   | 50.5                   | 50                     |
| Ø16 mm                          | -   | -              | -              | -              | 32                     | -                      | -                      | -                      | -                      | -                      |

Dimensions of process connection on Style 17

| Pipe thread G                   | a/f | L <sub>1</sub> | L <sub>2</sub> | L <sub>3</sub> | L <sub>13</sub><br>TA01 | L <sub>13</sub><br>TA02 | L <sub>13</sub><br>TA03 | L <sub>13</sub><br>TA04 | L <sub>13</sub><br>TA06 | L <sub>13</sub><br>TA20 |
|---------------------------------|-----|----------------|----------------|----------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| G <sup>1</sup> / <sub>2</sub> A | 27  | 14             | 25             | 10             | -                       | 43                      | 18                      | 18                      | 50                      | -                       |
| G <sup>3</sup> / <sub>4</sub> A | 32  | 16             | 29             | 11             | -                       | 47                      | 18                      | 18                      | 50                      | -                       |
| Ø 16 mm                         | -   | -              | -              | -              | 18.5                    | -                       | -                       | -                       | -                       | -                       |

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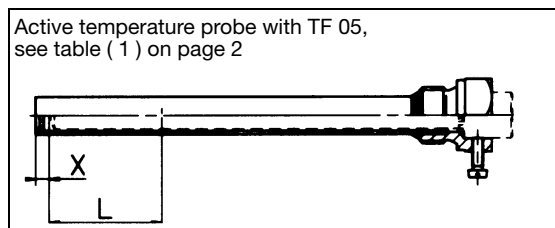
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**Pockets (SH)**

| Pocket       | Dimensional drawing | Description   | Versions      |          |      |      |      |          | Material          |       |                           | suitable for |       |
|--------------|---------------------|---|---------------|----------|------|------|------|----------|-------------------|-------|---------------------------|--------------|-------|
|              |                     |   | Pipe thread G |          |      |      |      |          | CuZn <sup>3</sup> | steel | stainless steel<br>1.4571 |              |       |
| SH           |                     |   | Ø D (SH)      | Ø d (TF) | 3/8" | 1/2" | 3/4" | 1/2" NPT |                   |       |                           |              |       |
| 891<br>SH 05 | X ~ 4 mm<br>        | screw-in pocket assembled, screw-in spigot <sup>1</sup>                     | 12            | 10       | ○    | ○    |      |          | ○                 |       |                           |              | TA 03 |
|              |                     |   | 14            | 10       | m    | m    |      |          |                   | m     | m                         |              |       |
|              | X ~ 4 mm<br>        | screw-in pocket, assembled  | 14            | 10       |      |      |      | m        |                   |       | m                         |              |       |
| 913<br>SH 07 | X ~ 1 mm<br>        | screw-in pocket, assembled, with fixing screw, screw-in spigot <sup>1</sup> | 12            | 10       | m    | m    | m    |          |                   | m     |                           |              | TA 01 |
|              |                     |   | 14            | 10       | m    | m    | m    |          |                   | m     | m                         |              |       |
|              | X ~ 1 mm<br>        | screw-in pocket, assembled, with fixing screw                               | 14            | 10       |      |      |      | m        |                   |       | m                         | m            |       |



Active temperature probe with TF 05, see table ( 1 ) on page 2

Other pockets and threads on request  
 ○ available  
<sup>1</sup> screw-in spigot to DIN 3852 Form A

Please specify dimension EL when ordering!

|                             |    |    |    |     |     |     |     |           |
|-----------------------------|----|----|----|-----|-----|-----|-----|-----------|
| EL (standard lengths in mm) | 50 | 63 | 80 | 100 | 150 | 200 | 300 | 1000 max. |
|-----------------------------|----|----|----|-----|-----|-----|-----|-----------|

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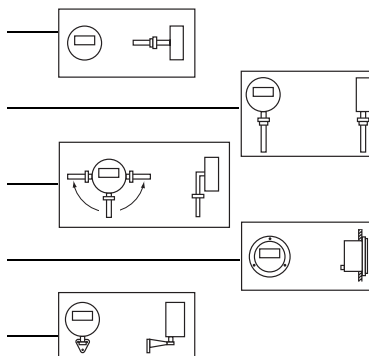
## Order details

### Digital indicator, Type 608624

| Order code | (1) Basic type                                       |
|------------|--|
| 608624     | Digital indicator with integrated 2-wire transmitter |

#### (2) Basic type extensions

|      |                                      |
|------|--------------------------------------|
| 0110 | Style: 01; housing size: 100 mm dia. |
| 1010 | Style: 10; housing size: 100 mm dia. |
| 1710 | Style: 17; housing size: 100 mm dia. |
| 2010 | Style: 20; housing size: 100 mm dia. |
| 2310 | Style: 23; housing size: 100 mm dia. |



#### (3) Range (MB)

|     |               |
|-----|---------------|
| 357 | -50 to + 50°C |
| 814 | 0 to +100°C   |
| 818 | 0 to +120°C   |
| 826 | 0 to +160°C   |
| 832 | 0 to +200°C   |
| 380 | -50 to +200°C |
| 848 | 0 to +400°C   |
| 858 | 0 to +600°C   |

#### (4) Process connection (PA)<sup>1</sup>

|     |   |  |
|-----|---|--|
| 000 | none (Styles 20 and 23)   |  |
| 010 | TA 01; immersion tube with shoulder   |  |
| 844 | TA 02; immersion tube with union nut and loose nipple <sup>1</sup>                        |  |
| 845 | TA 03; immersion tube with loose union nut  |  |
| 841 | TA 04; immersion tube with fixed hexagon screw-in spigot <sup>1</sup>                     |  |
| 847 | TA 06; immersion tube with sliding clamping thread <sup>1</sup>                           |  |
| 842 | TA 20; immersion tube with loose nipple and shoulder <sup>1</sup><br>(not for Style 17)   |  |
| 891 | SH 05; screw-in pocket, assembled <sup>1, 2</sup>   |  |
| 913 | SH 07; screw-in pocket, assembled,<br>with clamping clip and fixing screw <sup>1, 2</sup> |  |

#### (5) Diameter of process connection (PA)<sup>1</sup>

|    |  |
|----|--|
| 0  | none (Styles 20 and 23)                        |
| 6  | 6 mm dia. (only with TA 02 and TA 03)          |
| 10 | 10 mm dia.                                     |
| 14 | 14 mm dia. (only SH 05 and SH 07) <sup>2</sup> |



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## Order details

### Digital indicator, Type 608624

#### Order code

|     | (6) Thread for process connection (PA) <sup>1</sup>                      |
|-----|--|
| 000 | no thread (on TA 01, Style 20 and Style 23)                              |
| 104 | G <sup>1</sup> / <sub>2</sub> thread                                     |
| 105 | G <sup>3</sup> / <sub>4</sub> thread                                     |
|     | (7) Material of process connection (PA) <sup>1</sup>                     |
| 00  | none (Style 20 and Style 23)   |
| 26  | stainless steel (CrNi, 1.4571)   |
|     | (8) Fitting length of process connection (PA) <sup>1</sup> (dimension S) |
| 0   | none (Style 20 and Style 23)   |
| 50  | 50 mm  |
| 100 | 100 mm   |
| 150 | 150 mm   |
| 200 | 200 mm   |
| ... | special length (specify in plain text, in 50 mm steps)                   |
|     | (9) Extra codes (TZ)   |
| 000 | no extra code  |
| 465 | display format 0.1 °C/digit (up to 160°C)                                |
| 522 | customized front panel   |

Special versions on request!

#### Order code

(1) 608624 / (2) ..... - (3) ... - (4) ... - (5) .. - (6) ... - (7) .. - (8) ... / (9) ..... , ...

#### Order example

608624 / 1710 - 818 - 845 - 10 - 104 - 26 - 100 / 000<sup>3</sup>

<sup>1</sup> Screw-in spigot to DIN 3852 Form A.

<sup>2</sup> See Data Sheet 60.8730 for description and features.

<sup>3</sup> List extra codes in sequence, separated by commas.

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# Process Connections for Dial Thermometers

- Temperature probes (TF)
- Process connections (TA)
- Pockets (SH)



## Temperature probes (TF)

| Type         | Dimensional drawing | Description  | Material         | Probe dia. Ø d (mm) | For use with type                               | Active probe length L (mm) |     |     |     |     |     |     |     |     |     |     |     |     |
|--------------|---------------------|--|------------------|---------------------|---|----------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|              |                     |  |                  |                     |   | Indication range °C        |     |     |     |     |     |     |     |     |     |     |     |     |
|              |                     |  |                  |                     |   | 60                         | 80  | 100 | 120 | 140 | 160 | 200 | 250 | 300 | 350 | 400 | 500 | 600 |
| 750<br>TF 01 |                     | Temperature probe with shouldered support tube (S <sub>1</sub> min. 50 mm) | Cu (copper)      | 6                   | 6082 ..   | 140                        | 105 | 85  | 70  | 60  | 55  | 45  | -   | -   | -   | -   | -   | -   |
|              |                     |  |                  | 8                   | 6084 ..<br>6085 ..                              | 75                         | 55  | 45  | 40  | 35  | 30  | 25  | -   | -   | -   | -   | -   | -   |
|              |                     |  | CuZn (brass)     | 6                   | 6082 ..   | 140                        | 105 | 85  | 70  | 60  | 55  | 45  | 40  | 35  | 30  | -   | -   | -   |
|              |                     |  |                  | 8                   | 6084 ..<br>6085 ..                              | 75                         | 55  | 45  | 40  | 35  | 30  | 25  | 25  | 20  | 20  | 130 | 180 | 180 |
|              |                     |  | CrNi (st. steel) | 10                  |   | -                          | -   | -   | -   | -   | -   | -   | -   | -   | -   | 100 | 100 | 100 |
| 752<br>TF 11 |                     | Temperature probe without support tube                                     | Cu (copper)      | 6                   | 6082 ..   | 140                        | 105 | 85  | 70  | 60  | 55  | 45  | -   | -   | -   | -   | -   | -   |
|              |                     |  |                  | 8                   | 6084 ..<br>6085 ..                              | 75                         | 55  | 45  | 40  | 35  | 30  | 25  | -   | -   | -   | -   | -   | -   |
|              |                     |  | CuZn (brass)     | 6                   | 6082 ..   | 140                        | 105 | 85  | 70  | 60  | 55  | 45  | 40  | 35  | 30  | -   | -   | -   |
|              |                     |  |                  | 8                   | 6084 ..<br>6085 ..                              | 75                         | 55  | 45  | 40  | 35  | 30  | 25  | 25  | 20  | 20  | 130 | 180 | 180 |
|              |                     |  | CrNi (st. steel) | 10                  |   | -                          | -   | -   | -   | -   | -   | -   | -   | -   | -   | 100 | 100 | 100 |
| 753<br>TF 05 |                     | Temperature probe with plain support tube                                  | CrNi (st. steel) | 6                   | 6082 ..   | 140                        | 105 | 85  | 70  | 60  | 55  | 45  | 40  | 35  | 30  | -   | -   | -   |
|              |                     |  |                  | 8                   | 6084 ..   | 75                         | 55  | 45  | 40  | 35  | 30  | 25  | 25  | 20  | 20  | 130 | 180 | 180 |
|              |                     |  |                  | 10                  | 6085 ..   | -                          | -   | -   | -   | -   | -   | -   | -   | -   | -   | -   | 100 | 100 |
|              |                     |  | CuZn (brass)     | 10                  | 608001/01-...<br>608001/18-...                  | 65                         | 60  | 45  | 40  | 65  | 50  | 45  | -   | -   | -   | -   | -   | -   |
|              |                     |  |                  | 10                  | 608001/01-...<br>608001/18-...                  | 120                        | 120 | 80  | 80  | 65  | 50  | 45  | -   | -   | -   | -   | -   | -   |
|              |                     |  | St (steel)       | 10                  | 608001/01-...<br>608001/18-...                  | 65                         | 60  | 45  | 40  | 65  | 50  | 45  | 70  | 55  | 55  | 45  | 30  | -   |
|              |                     |  |                  | 10                  | 608001/01-...<br>608001/18-...                  | 120                        | 120 | 80  | 80  | 65  | 50  | 45  | 70  | 55  | 55  | 45  | 30  | -   |
|              |                     |  | CrNi (st. steel) | 6                   | 608002/01-...<br>608003/01-...                  | 55                         | 85  | 70  | 60  | 55  | 50  | 45  | 100 | 75  | 65  | 65  | 45  | -   |
|              |                     |  |                  |                     | 608002/18-...<br>608003/10-...                  | 115                        | 85  | 70  | 60  | 55  | 50  | 45  | 100 | 75  | 65  | 65  | 45  | -   |
|              |                     |  |                  |                     | 608001/01-...<br>608002/01-...<br>608003/01-... | 65                         | 60  | 45  | 40  | 65  | 50  | 45  | 70  | 55  | 55  | 45  | 25  | -   |
|              | 10                  | 608001/18-...<br>608002/18-...<br>608003/18-...                            | 120              | 120                 | 80  | 80                         | 65  | 50  | 45  | 70  | 55  | 55  | 45  | 25  | -   |     |     |     |

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**Process connections (TA)**

| Type                  | Description   | Dimensional drawing | For use with type  | Note        | Screw fitting |            |                  |               |       |       | Suitable for TF |        |           |       |
|-----------------------|---|---------------------|--|-------------|---------------|------------|------------------|---------------|-------|-------|-----------------|--------|-----------|-------|
|                       |   |                     |  |             | Material      |            |                  | Pipe thread G |       |       |                 |        |           |       |
|                       |   |                     |  |             | CuZn (brass)  | St (steel) | CrNi (st. steel) | G 3/8         | G 1/2 | G 3/4 |                 | M 10x1 | 1/2-14NPT |       |
| 010<br>TA 01          | Immersion tube with shoulder                                |                     | 608001/0150-...<br>608001/0163-...<br>608001/0180-...<br>608001/0110-... | up to 200°C | ●             |            |                  |               |       |       |                 |        | TF 05     |       |
|                       |   |                     | 608001/0116-...<br>608001/18-...   | up to 200°C | ●             |            |                  |               |       |       |                 |        |           |       |
|                       |   |                     | 608001/...   | from 250°C  |               |            | ●                |               |       |       |                 |        |           |       |
|                       |   |                     | 608002/...<br>608003/...<br>608624/...                                   |             |               |            | ●                |               |       |       |                 |        |           |       |
|                       |   |                     |  |             |               |            |                  |               |       |       |                 |        |           |       |
| 843<br>(844)<br>TA 02 | Immersion tube with union nut and loose nipple <sup>1</sup> |                     | 608001/...   |             | ●             | ●          | ●                | ●             | ●     | ●     |                 |        | TF 05     |       |
|                       |   |                     | 608001/...<br>608002/...<br>608003/...                                   |             |               |            | ●                | ●             | ●     |       | ●               |        |           |       |
|                       |   |                     | 608624/...   |             |               |            |                  | ●             | ●     |       |                 |        |           |       |
|                       |   |                     | 6082...<br>6084...<br>6085..   |             | ●             | ●          | ●                | ●             | ●     |       |                 |        |           | TF 01 |
| 161<br>(845)<br>TA 03 | Immersion tube with loose union nut                         |                     | 608001/...   |             | ●             | ●          | ●                | ●             | ●     | ●     |                 |        | TF 05     |       |
|                       |   |                     | 608002/...<br>608003/...   |             |               |            | ●                | ●             | ●     |       |                 |        |           |       |
|                       |   |                     | 608624/...   |             |               |            |                  | ●             | ●     |       |                 |        |           |       |
|                       |   |                     | 6082...<br>6084...<br>6085..   |             | ●             | ●          | ●                | ●             | ●     |       |                 |        |           | TF 01 |

<sup>1</sup>Screw-in spigot to DIN 3852 Form A



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**Process connections (TA)**

| Type            | Description  | Dimensional drawing | For use with type                        | Note                                    | Screw fitting |            |                  |                                   |                                   |                                   | Suitable for TF |           |       |
|-----------------|--|---------------------|--|---|---------------|------------|------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------|-----------|-------|
|                 |  |                     |  |   | Material      |            |                  | Pipe thread G                     |                                   |                                   |                 |           |       |
|                 |  |                     |  |   | CuZn (brass)  | St (steel) | CrNi (st. steel) | G 3/8                             | G 1/2                             | G 3/4                             | M 10x1          | 1/2-14NPT |       |
| 872 (403) TA 21 | Immersion tube with loose plug and conical seal                            |                     | 608201/...<br>608202/...<br>6085...      | with rigid imm. tube mounting CuZn only | ●             |            | ●                | ●                                 |                                   |                                   |                 |           | TF 01 |
| 873 (351) TA 22 | Immersion tube with loose plug, conical seal and loose nipple <sup>1</sup> |                     | 608201/...<br>608202/...<br>6085...      | with rigid imm. tube mounting CuZn only | ●             |            | ●                | ●<br>L <sub>1</sub> =12<br>a/f=22 | ●<br>L <sub>1</sub> =14<br>a/f=27 | ●<br>L <sub>1</sub> =16<br>a/f=32 |                 |           | TF 01 |
| 401 TA 23       | Immersion tube with plug and spring clip                                   |                     | 608201/...<br>608202/...<br>6085...      |   | ●             |            |                  |                                   |                                   |                                   | ●               |           | TF 01 |
| 874 TA 24       | Immersion tube with screw fitting, O ring seal and clamping screw          |                     | 608005/...<br>608540/1080<br>608540/0280 |   | ●             |            |                  | ●<br>L <sub>1</sub> =14<br>a/f=27 | ●<br>L <sub>1</sub> =16<br>a/f=27 |                                   |                 |           | TF 05 |
|                 |  |                     | 608540/2280<br>608540/2380               |   |               |            |                  |                                   |                                   |                                   |                 |           |       |
| 848 TA 25       | Sliding clamp fitting on capillary <sup>1</sup>                            |                     | 608201/...<br>608202/...                 | only with FL 17 and FL 21 up to 250°C   | ●             |            | ●                | ●<br>L <sub>1</sub> =12<br>a/f=22 | ●<br>L <sub>1</sub> =14<br>a/f=27 |                                   |                 |           | TF 11 |

<sup>1</sup>Screw-in spigot to DIN 3852 Form A

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**Pockets (SH)**

| Type      | Description   | Dimensional drawing | dia. Ø D (SH) | dia. Ø d (TF) | Screw fitting |            |                  |               |       |  |  |   | Suitable for                                       |                         |
|-----------|---|---------------------|---------------|---------------|---------------|------------|------------------|---------------|-------|--|--|---|--|-------------------------|
|           |   |                     |               |               | Material      |            |                  | Pipe thread G |       |  |  |   |  |                         |
|           |   |                     |               |               | CuZn (brass)  | St (steel) | CrNi (st. steel) | G 3/8         | G 1/2 | G 3/4  | 1/2-14NPT  |   |  |                         |
| 858 SH 04 | Screw-in pocket, machined from solid, to DIN 43772 T2-Form 9 <sup>1</sup> .<br>Steel: Mat.Ref. 1.5415 |                     | 17            | 10            |               | ●          | ●                |               |       | ●  | ●  |   |  | TA 03                   |
|           |   |                     |               |               |               |            |                  |               |       | L <sub>1</sub> =14<br>L <sub>2</sub> =25<br>a/f=27 | L <sub>1</sub> =16<br>L <sub>2</sub> =29<br>a/f=32 |   |  |                         |
| 891 SH 05 | Screw-in pocket, assembled <sup>1</sup>   |                     | 12            | 10            | ●             |            |                  |               |       | ●  | ●  |   |  | TA 03                   |
|           |   |                     | 14            | 10            |               | ●          | ●                |               |       | ●  | ●  |   |  |                         |
|           |   |                     | 14            | 10            |               |            | ●                |               |       |  |  | ● | L <sub>1</sub> =20<br>L <sub>2</sub> =25<br>a/f=27 |                         |
| 913 SH 07 | Screw-in pocket assembled, with fixing screw <sup>1</sup>   |                     | 8             | 6             | ●             |            | ●                |               |       | ●  | ●  | ● |  | TA 01<br>TF 01<br>TF 11 |
|           |   |                     | 10            | 8             | ●             |            | ●                |               |       | ●  | ●  | ● |  |                         |
|           |   |                     | 12            | 10            | ●             |            |                  |               |       | ●  | ●  | ● |  |                         |
|           |   |                     | 14            | 10            |               | ●          | ●                |               |       | ●  | ●  | ● | L <sub>1</sub> =20<br>a/f=27                       |                         |
| 820 SH 09 | Weld-in pocket, assembled, with fixing screw.<br>Welding shoulder for steel, Mat.Ref. 1.5415.         |                     | 8             | 6             |               | ●          | ●                |               |       |  |  |   |  | TA 01<br>TF 01<br>TF 11 |
|           |   |                     | 10            | 8             |               | ●          | ●                |               |       |  |  |   |  |                         |
|           |   |                     | 14            | 10            |               | ●          | ●                |               |       |  |  |   |  |                         |
| 876 SH 10 | Screw-in pocket, assembled <sup>1</sup>   |                     | 8             | 6             | ●             |            | ●                |               |       | ●  | ●  | ● |  | TA 21                   |
|           |   |                     | 10            | 8             | ●             |            | ●                |               |       | ●  | ●  | ● |  |                         |
| 871 SH 11 | Screw-in pocket, assembled <sup>1</sup>   |                     | 10            | 8             | ●             |            | ●                |               |       | ●  | ●  |   |  | TA 23                   |

<sup>1</sup>Screw-in spigot to DIN 3852 Form A

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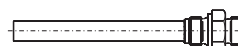
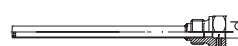
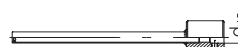


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## Order details

### Pockets for dial thermometers, type 608730

| Order code | (1) Basic type  |  |
|------------|---|--|
| 608730     | Pockets for dial thermometers   |  |
|            | <b>(2) Basic type extensions</b>  |  |
| 858        | SH 04 Screw-in pocket, machined from solid, to DIN 43772 T2 - Form 9; Screw-in spigot to DIN 3852 Form A. |  |
| 891        | SH 05 Screw-in pocket, assembled; Screw-in spigot to DIN 3852 Form A.                                     |  |
| 913        | SH 07 Screw-in pocket, assembled, with fixing screw; Screw-in spigot to DIN 3852 Form A.                  |  |
| 820        | SH 09 Weld-in pocket, assembled, with fixing screw  |  |
| 876        | SH 10 Screw-in pocket, assembled; Screw-in spigot to DIN 3852 Form A.                                     |  |
| 871        | SH 11 Screw-in pocket, assembled; Screw-in spigot to DIN 3852 Form A.                                     |  |
|            | <b>(3) External diameter D</b>  |  |
| 8          | 8 mm  |  |
| 10         | 10 mm   |  |
| 12         | 12 mm   |  |
| 14         | 14 mm   |  |
| 17         | 17 mm   |  |
|            | <b>(4) Material</b>   |  |
| 46         | brass (CuZn)  |  |
| 01         | steel (St)  |  |
| 26         | stainless steel (CrNi)  |  |
|            | <b>(5) Thread G</b>   |  |
| 000        | none (SH 09 only)   |  |
| 103        | G 3/8 (3/8" pipe)   |  |
| 105        | G 3/4 (3/4" pipe)   |  |
| 104        | G 1/2 (1/2" pipe)   |  |
| 144        | 1/2-14NPT   |  |
| 114        | M 10 x 1 (SH 11 only)   |  |
|            | <b>(6) Shoulder diameter d<sub>15</sub></b>   |  |
| 000        | none (SH 04, SH 05, SH 10, SH 11 only)  |  |
| 10,3       | 10.3 mm   |  |
| 16.3       | 16.3 mm (types 608001, 608002, 608003, 608624)  |  |
|            | <b>(7) Fitting length EL</b>  |  |
| 50         | 50 mm   |  |
| 63         | 63 mm   |  |
| 80         | 80 mm   |  |
| 100        | 100 mm  |  |
| 130        | 130 mm  |  |
| 150        | 150 mm  |  |
| 200        | 200 mm  |  |
| 250        | 250 mm  |  |
| 300        | 300 mm  |  |
| ...        | special length (details in plain text, in 50 mm steps)  |  |

#### Order code

(1) / (2) - (3) - (4) - (5) - (6) - (7)  
 608730 / ... - .. - .. - ... - ... - ...

#### Order example

608730 / 891 - 14 - 26 - 104 - 000 - 150

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## Timers

- with mechanical drive or synchronous motor
- with acoustic signal and two contacts
- housing size: 60 mm dia.  
bezel sizes: 72 x 72 mm and 96 x 96 mm

### Brief description

#### Timers with mechanical drive and acoustic signal (switch function 00)

Turning the selector knob winds up the clockwork mechanism. At the end of the pre-set time, there is an acoustic signal.

#### Timer with mechanical drive and two changeover contacts (switch function 26)

Turning the selector knob winds up the clockwork mechanism. At the end of the pre-set time, electrical equipment and installations can be switched on/off or over. In addition, acoustic or optical signals can be operated through a contact.

After the set time has elapsed, contacts I and II change over and, at the same time, the selector knob returns to its start position.

#### Timer with synchronous motor and two contacts (switch function 24 and 25)

Turning the selector knob will switch on the synchronous motor of the timer and pre-select the time. During the set time, or after it has elapsed, electrical equipment and installations can be switched on/off or over. In addition, acoustic or optical signals can be operated through a contact.

#### Switch function 24

After the set time has elapsed, contacts I and III change over (contact II opens). Contacts I and III must be returned manually to the start position, by turning the selector knob from "0" to "Off" (contact II remains open).

#### Switch function 25

90 sec before the end of the pre-set time, contact II will be closed for approx. 90 sec. After the set time has elapsed, contacts I and II are opened (automatic signal switch-off for contact II).



Type 608901/5172



Type 608901/5272



Type 608901/5460



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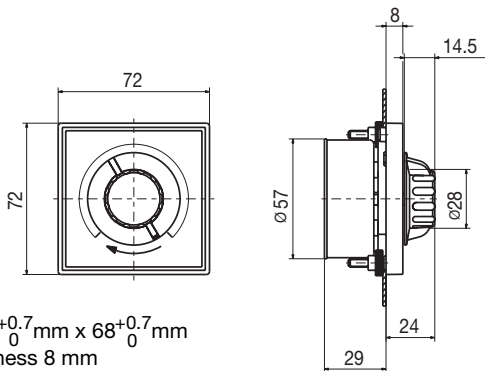


## Technical data

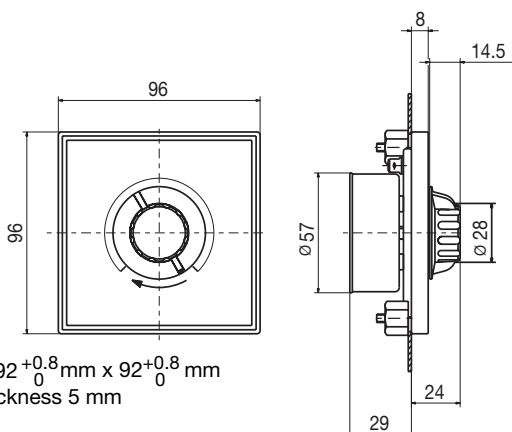
|   | Basic type extension<br>5172 and 5196   | Basic type extension<br>5272 and 5296                  | Basic type extension<br>5460                             |
|---|---|--|--|
| <b>Housing</b>                                | black plastic   |  | --   |
| <b>Housing mounting</b>                       | from the back, with bracket   |  | front  |
| <b>Scale</b>                                  | white, black lettering  |  |  |
| <b>Timer setting</b>                          | By selector knob on the front window. Minimum setting angle 30°. Very short times can be selected by moving the knob beyond the desired setting and then turning it back again. Timer setting by: |  |  |
| <b>Time marking</b>                           | black knob with plastic flange<br>by arrow on flange  | black knob with aluminium disc in center<br>by pointer |  |
| <b>Baseplate</b>                              | housing size 72 x 72 mm: plastic<br>housing size 96 x 96 mm: sheet steel, zinc-plated   |  | sheet steel, zinc-plated                                 |
| <b>Bezel</b>                                  | plastic   |  | stainless steel, electro-polished,<br>for front mounting |
| <b>Electrical contact connection rating</b>   | faston connector A 6.3 x 0.8 to DIN 46244   |  |  |
| <b>operating voltage of synchronous motor</b> | 16 (4) A, 230V AC +10/-15%, 48 – 63Hz, p.f. = 1 (0.6)<br>10 (2) A, 380V AC +10/-15%, 48 – 63Hz, p.f. = 1 (0.6)  |  |  |
| <b>Limit temperatures</b>                     | 230V AC, 50 Hz  |  |  |
| <b>Nominal position (NL)</b>                  | Permissible ambient temperature -20 to +80°C<br>unrestricted  |  |  |
|   | Switch function 00  | Switch function 24                                     | Switch function 25                                       |
| <b>Scale span</b> °↺                          | 270   | 300 + 30   | 300  |
| <b>Deviation (minutes)</b>                    |   |  |  |
| 30 min  | --  | --   | ± 1.5  |
| 60 min  | ± 0.5   | ± 2.0  | ± 3.0  |

## Dimensions

Type: 608901/5172-00



Type: 608901/5196-00



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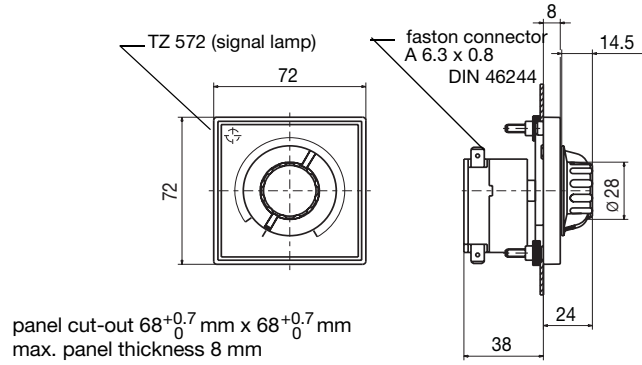
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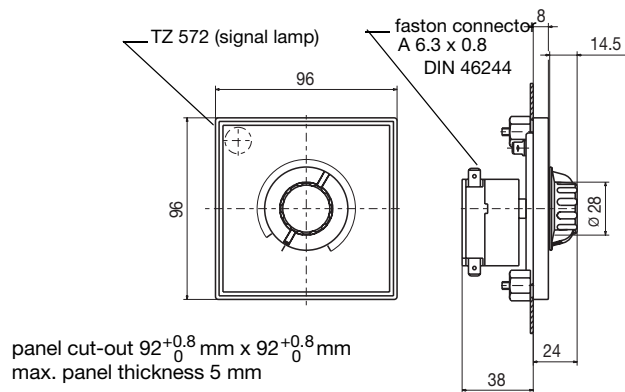


## Dimensions

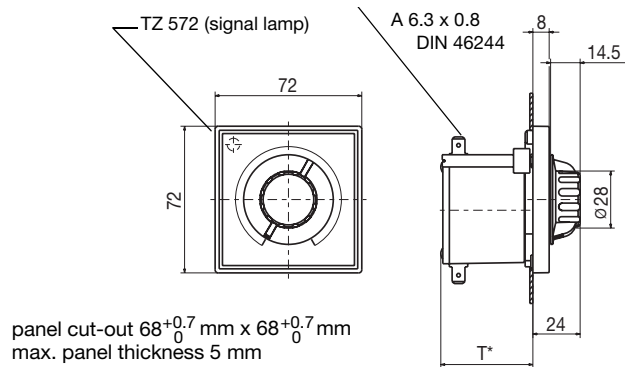
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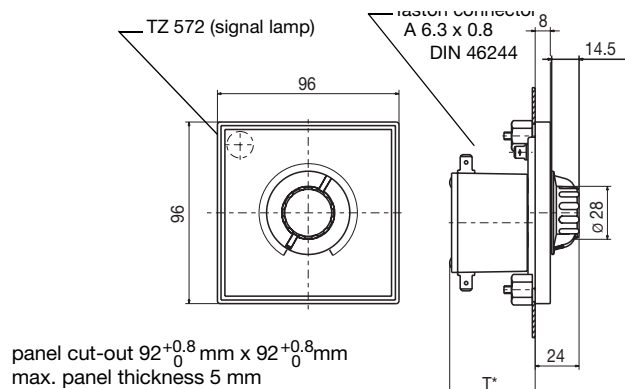
Type: 608901/5196-26



Type: 608901/5172-24  
 608901/5172-25



Type: 608901/5196-24  
 608901/5196-25



| * Switch function | T (mm) |
|-------------------|--------|
| 24                | 56     |
| 25                | 45     |

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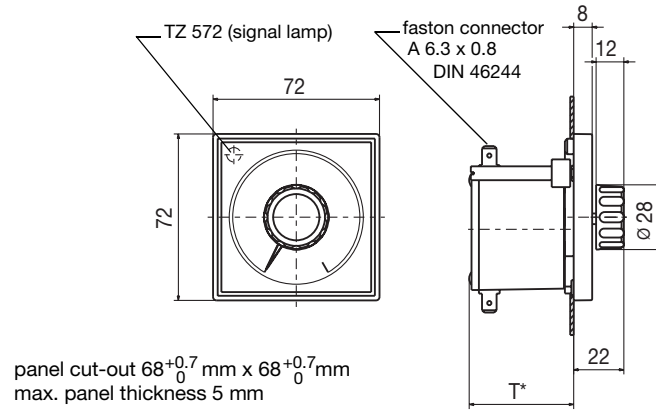
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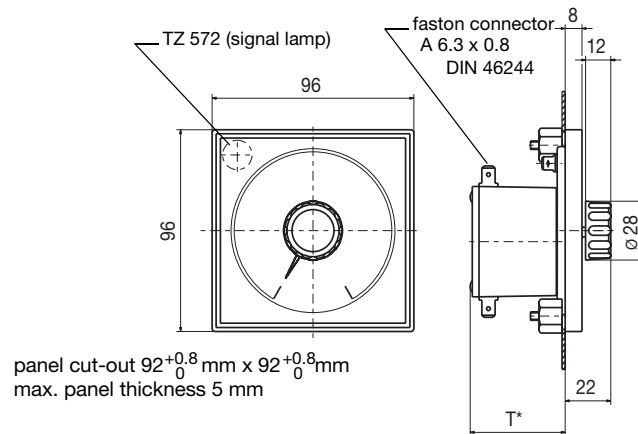


## Dimensions

Type: 608901/5272-24  
 608901/5272-25

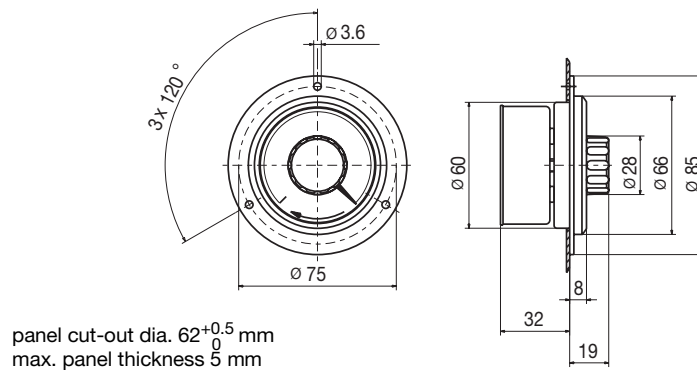


Type: 608901/5296-24  
 608901/5296-25



| * Switch function | T (mm) |
|-------------------|--------|
| 24                | 56     |
| 25                | 45     |

Type: 608901/5460-00



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## Order details Timers Type 608901

|                                 |   | (1) Basic type |  |      | Preis EUR |
|---------------------------------|---|----------------|--|------|-----------|
|                                 |   | 608901         | timer, mechanical  |      |           |
|                                 |   | 608901         | timer, with synchronous motor                              |      |           |
| <b>(2) Basic type extension</b> |   |                |  |      |           |
| X                               | X | 5172           | style: 51; housing size: 72 x 72 mm                        |      |           |
| X                               | X | 5196           | style: 51; housing size: 96 x 96 mm                        |      |           |
|                                 | X | 5272           | style: 52; housing size: 72 x 72 mm                        |      |           |
|                                 | X | 5296           | style: 52; housing size: 96 x 96 mm                        |      |           |
|                                 | X | 5460           | style: 54; housing size: 60 mm dia.                        |      |           |
| <b>(3) Switch function</b>      |   |                |  |      |           |
|                                 | X | 00             | acoustic signal  |      |           |
|                                 | X | 24             | 2 changeover contacts and manual signal switch-off         | <br> |           |
|                                 | X | 25             | 2 make (n.o) contacts                                      | <br> |           |
|                                 | X | 26             | 2 changeover contacts (style 51 only)                      | <br> |           |
| <b>(4) Running time</b>         |   |                |  |      |           |
|                                 | X | 30             | 30 minutes (switch function 26 only)                       |      |           |
|                                 | X | 60             | 60 minutes   |      |           |
| <b>(5) Extra codes</b>          |   |                |  |      |           |
|                                 | X | 000            | no extra code  |      |           |
|                                 | X | 410            | metal bezel, black (not on style 54)                       |      |           |
|                                 | X | 411            | metal bezel  |      |           |
|                                 | X | 572            | signal lamp (not on style 54; not with switch function 00) |      |           |
|                                 | X | 521            | black scale, white lettering                               |      |           |
|                                 | X | 522            | scale to customer specification                            |      |           |
|                                 | X | 480            | gray knob (style 51 only)                                  |      |           |

**Order code**

(1) / (2) - (3) - (4) / (5) , ...  
 608901 / ... - .. - .. / ... , ...

**Order example**

608901 / 5196 - 25 - 60 / 000<sup>1</sup>

<sup>1</sup> List extra codes in sequence, separated by commas.