

# AMTHF

## Surface-Mounted Thermostats with 2, 3, or 4 Single-Pole Snap-Action Switches



Type AMTHFs-13



Type AMTHFf-13

Operating manual

60305100T90Z001K000

V2.00/EN/00653398

**JUMO**



Read this operating manual before putting the device into service. Keep the operating manual in a place that is accessible to all users at all times. Please assist us in improving this operating manual. Your comments are highly appreciated.



Should difficulties arise during startup, please do not use or the manipulate the device in an unauthorized manner as the warranty claim will become void. Please contact the supplier or the company headquarters.

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# 1 Introduction

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## 1.1 Typographical conventions

### 1.1.1 Warning symbols



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**Caution**

This symbol is used when **personal injury** may occur if the instructions are disregarded or not followed correctly.

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**Caution**

This symbol is used when **damage to devices** may occur if the instructions are disregarded or not followed correctly.

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### 1.1.2 Note symbols



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**Note**

This symbol is used to indicate **particularly important information**.

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**Reference**

This symbol refers to **further information** in other chapters or sections.

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abc<sup>1</sup>

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**Footnote**

Footnotes are remarks that **refer to** specific parts of the text. Footnotes consist of two parts:

An identification marking in the text and the footnote text.

The identification marking in the text is arranged as continuous superscript numbers.

The footnote text appears at the bottom of the page and begins with a superscript number.

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**Action instruction**

This symbol indicates that an **action to be performed** is described.

The individual steps are indicated by asterisks, for example:

\* Opening the case

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# 1 Introduction

## 1.2 Use

AMTHF surface-mounted thermostats monitor and control temperatures in heat-generating plants and HVAC applications.



Severing or bending of the capillary of the surface-mounted thermostats from the AMTHF series leads to permanent failure of the device.

## 1.3 Identification marking

Version according to DIN EN 14597 as:

TR = Temperature controller  
TW = Temperature monitor

AMTHF surface-mounted thermostats comply with DIN EN 60730 (VDE 0631).

## 1.4 Safety information



- Severing or bending of the capillary leads to permanent failure of the device.
- Maintain a bending radius of  $\geq 5$  mm when laying the capillary.
- Filling fluid may leak out in the event of a measuring system break.

Physical and toxicological features of the expansion medium that could escape in the event of a measuring system break:

Control range with scale limit value °C	Hazardous reaction	Fire and explosion hazard		Hazardous to water	Toxicological specifications		
		Ignition temperature °C	Explosion limit Vol. %		Irritant	Hazardous to health	Toxic
< +200	No	+355	0.6 - 8	Yes	Yes	1	No
$\geq +200 \leq +350$	No	+490	- -	Yes	Yes	1	No
Gas-filled							
$> +350 \leq +500$	No						

<sup>1</sup> At present, no limiting statement concerning health hazards in the event of short-term exposure and low concentration, for example, in the event of a measuring system break, has been made by a health authority.

## 2 Identifying the device

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### 2.1 Nameplate (sample)

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<b>JUMO</b> GmbH&Co.KG, Fulda Germany <a href="http://www.jumo.net">www.jumo.net</a>			
(1) —	TYP: AMTHF-13	T80	1K/min II
(2) —	603051/0013		
	0..100°C	Tu	IP54
(3) —	Term 2: AC 16(3)A 230 V	C.Dist.: II +30 III	IV
	Term 4: AC 8(1.5)A 230 V	VARTN: 60/00653408	
		F-NR:021445670101547	
		<b>CE</b>	

- (1) Type / max. housing temperature / protection type
  - (2) Order code
  - (3) Switching capacity / control range
  - (4) Week of production
  - (5) Fabrication number
  - (6) Year of production
  - (7) Approval mark
-

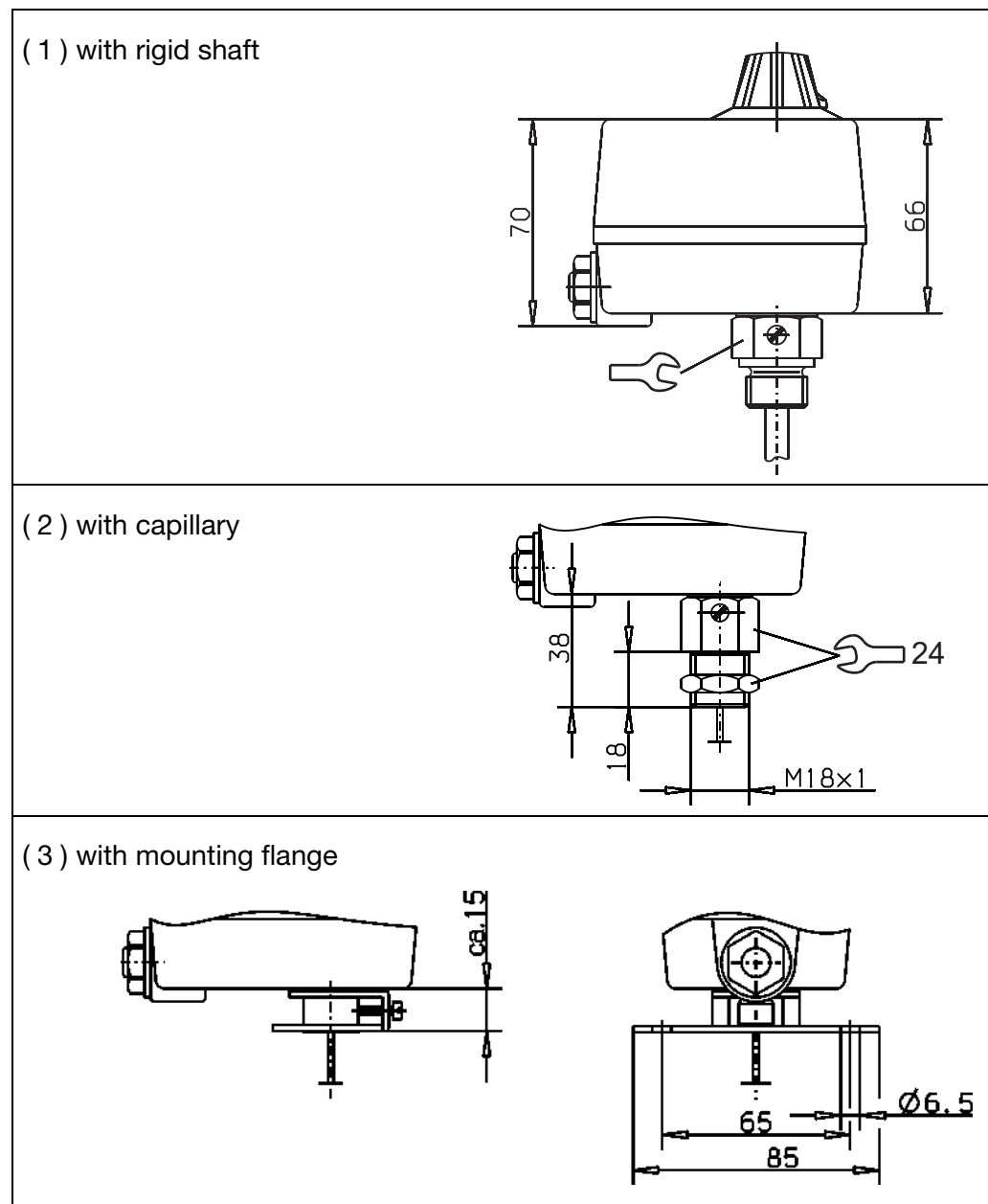
## 3.1 General information

Installation position according to DIN 16257, NL 0...NL 90

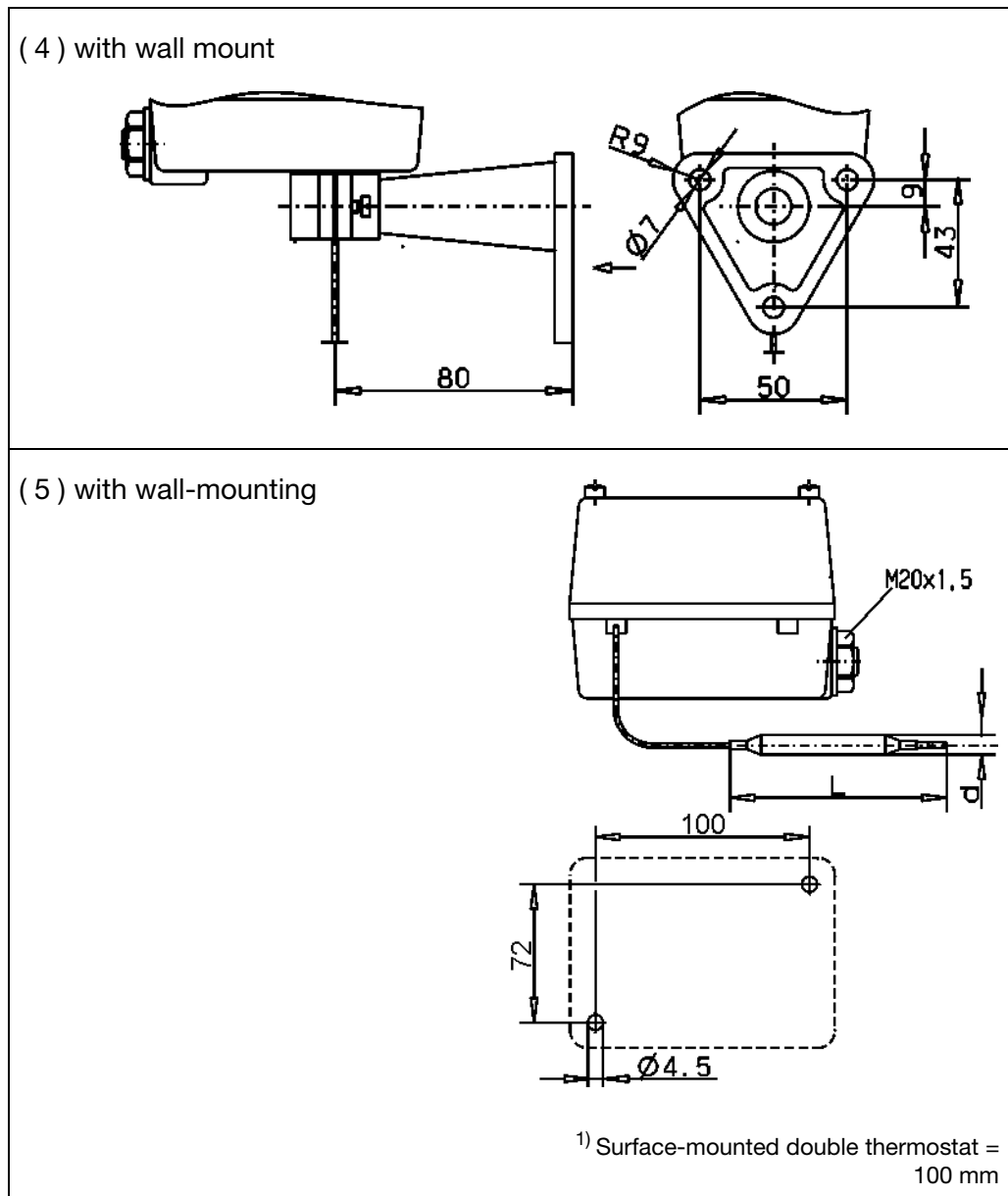
## 3.2 Opening the housing

1. Loosen cover screws
2. Remove the upper part of the housing

## 3.3 Mounting the switching head



### 3 Mounting



### 3.4 Mounting the thermostat

Operating  
position

Installation position according to DIN 16257, NL 0...NL 90



### 3.5 Capillary / temperature probe / thermowell

#### 3.5.1 General information



Severing or bending of the capillary leads to permanent failure of the device.

The minimum admissible bending radius of the capillary is 5 mm.

The temperature probe must be completely immersed in the measurement medium. The temperature probe or protection tube should **not** touch the container or tube walls.

In order to guarantee general response accuracy, only use the devices with the default-supplied thermowells (diameter  $D = 8$  mm or  $D = 10$  mm).

Only one probe with a diameter of  $d = 8$  mm may be used in thermowells with a diameter of  $D = 10$  mm.

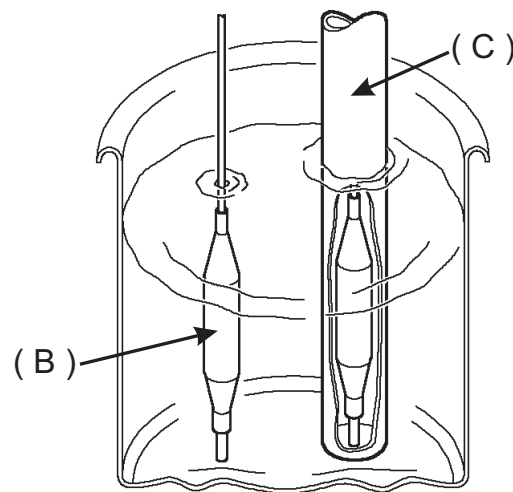
Multiple assignment of thermowells with 2 or 3 cylindrical probes with a diameter of  $D = 6$  mm and thermowells of  $15 \times 0.75$  mm are admissible.

When assigning 2 probes, the default-supplied pressure spring must be installed in the thermowell.

When used in air, connection type "10" (without thermowell) must be selected.

For thermowells 22, 41, 42, and 45 made of material St35.8 I, the admissible operating time is limited to 200,000 hours in operating temperatures over  $+420$  °C. TRD 508

must be observed for application in this area.



( B ) Temperature probe

( C ) Protection tube

#### 3.5.2 Admissible probes and thermowells

See current data sheet 606710

# 3 Mounting

## 3.6 Admissible capacity on the thermowell

### 3.6.1 Thermowells 20, 22/23, 40, and 41/42



The following values describe the maximum capacity of the relevant connection type. The maximum sealable pressure depends on the insertion conditions and may be lower under certain circumstances.

#### 3.6.1.1 Thermowells made of steel 22, 23, 32, 41, 42, and 45

**Materials**  
 Tube: St35.8 I  
 Screw-in nipple up to 300 °C: Steel 1.0038  
 Weld-in nipple: Steel 1.5415

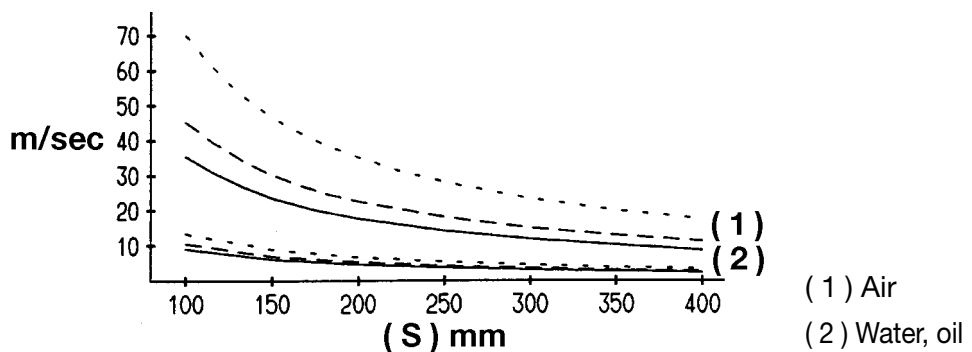
#### Capacity

Temperature	Pipe diameter "D"		
	8 x 0.75 mm or conical	10 x 0.75 mm	15 x 0.75 mm
	Maximum admissible 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

#### Admissible inflow velocity

Material: St35.8 I  
 Temperature: +200 °C  
 Heat transfer: Air ( 1 )  
 Water, oil ( 2 )  
 Pipe diameter "D": \_\_\_\_\_ 8 mm  
 - - - - - 10 mm  
 . . . . . 15 mm

Admissible inflow velocity [m/s] for maximum admissible pressure load and different immersion tube length "S"

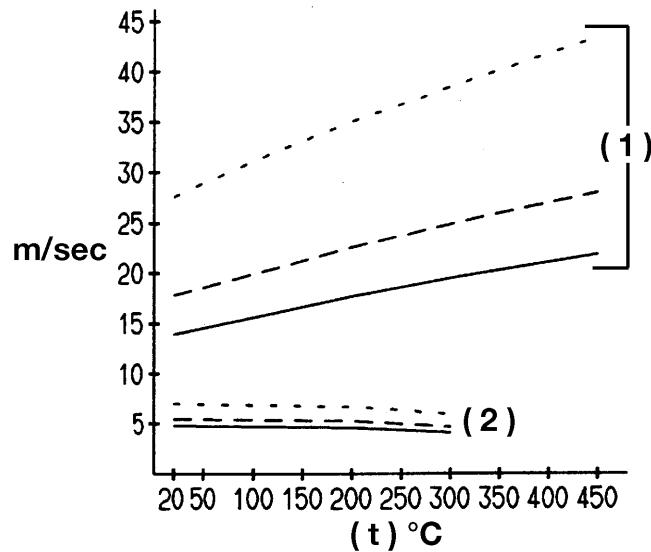


### 3 Mounting

**Admissible inflow velocity**

Admissible inflow velocity [m/s] for maximum admissible pressure load and different immersion tube temperature "t".

Material: St35.8 I  
 Immersion tube length "s": 200 mm  
 Heat transfer: Air  
 Water, oil  
 Pipe diameter "D": \_\_\_\_\_ 8 mm  
 - - - - - 10 mm  
 . . . . . 15 mm



( 1 ) Air  
 ( 2 ) Water, oil

**3.6.1.2 Thermowells made of stainless steel 20, 22, 40, and 41/42**

**Capacity**

Tube and nipple material: stainless steel (1.4571)			
Temperature	Pipe diameter "D"		
	8 x 0.75 mm or conical	10 x 0.75 mm	15 x 0.75 mm
Maximum admissible 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

### 3 Mounting

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#### 3.6.1.3 Thermowells made of brass 20 and 40

##### Capacity

Tube and nipple material: CuZn			
Temperature	Pipe diameter "D"		
	8 x 0.75 mm	10 x 0.75 mm	15 x 0.75 mm
	Maximum admissible pressure		
100 °C	50 bar	40 bar	27 bar
150 °C	48 bar	39 bar	26 bar

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#### 3.6.1.4 Probe connections 50, 52, and 54

Nipple material	CuZn	Steel (1.0038)	Stainless steel (1.4571)
Temperature °C	200	300	400

Probe material	Ø mm	Device function
		TR, TW
Cu-DHP	4	6 bar
	5	5 bar
	6	4 bar
	7	3 bar
	8	3 bar
	9	3 bar
	10	3 bar
St35 / 1.4571	4 - 10	10 bar

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**Design types 10, 15, 21, 60, and 65** may only be used in **depressurized media**.

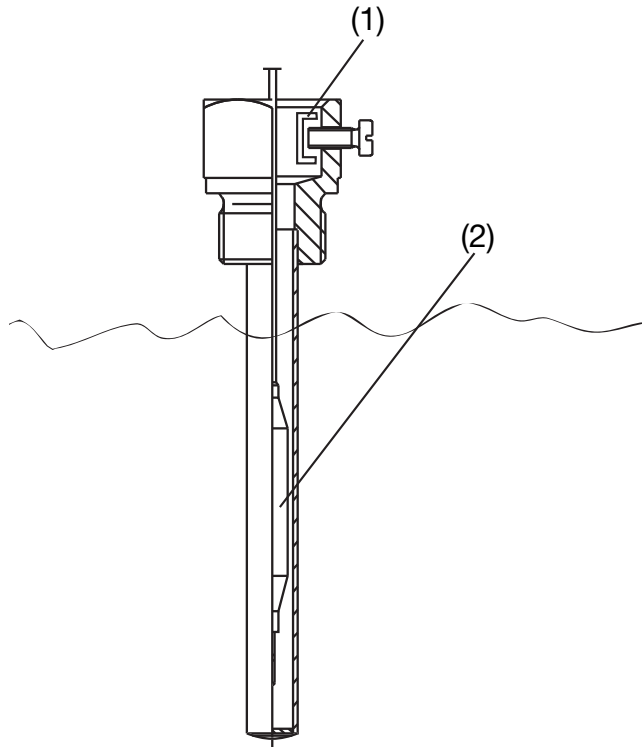
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## 3 Mounting



The temperature probe ( 2 ) must be completely immersed in the medium, otherwise greater deviations from the switching point occur.

The temperature probe with clamping piece (1) is mounted in the thermowell for connection types 20, 22/23, and 21.



\* For versions with a capillary, secure probe with clamping bar ( 1 ) to prevent it from sliding out.

### 3.7 Sheath assembly



- The devices must **only** be operated with the correct protection tubes.
- Do **not** use a protection tube when using in air.

Probe Ø	Protection tube Ø	Material
6 mm	08 x 0.75 mm	Brass/Stainless steel
8 mm	10 x 0.75 mm	Brass/Stainless steel

## 4 Installation

### 4.1 Regulations and notes



- The electrical connection must only be carried out by qualified personnel.
- The choice of cable material, the installation, and the electrical connection of the device must conform to the requirements of VDE 0100 "Regulations on the Installation of Power Circuits with Nominal Voltages below 1000 V" or the appropriate local regulations.
- The device must be completely disconnected from the mains voltage if contact with live parts may occur during work on the equipment.
- Ground the device at the PE terminal with the protection conductor. This cable must have a cross section that is at least as large as the supply cables. Ground cables must be wired in a star configuration to a common grounding point that is connected to the protective conductor of the voltage supply. Do not perform loophroughs on grounding cables, that is, do not run them from one device to another.
- In addition to a faulty installation, incorrectly set values on the thermostat could also impair the correct function of the subsequent process or lead to other damage. The setup must therefore be restricted to qualified personnel. Please observe the corresponding safety regulations in this context.

### 4.2 Electrical connection

- Terminals and connections are suitable for internal conductors
- The connection is suitable for cables that are permanently positioned
- Cable routing is performed without strain relief

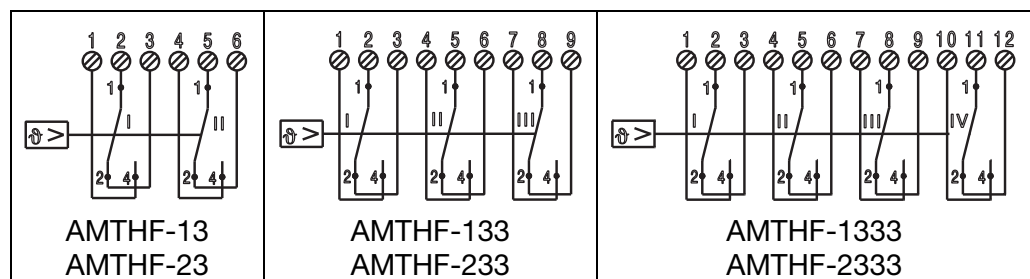


- The device complies with protection rating I.

#### Capillary tube without protection conductor function.

The user is responsible for the necessary protection of the probe and capillary cable against electric shock.

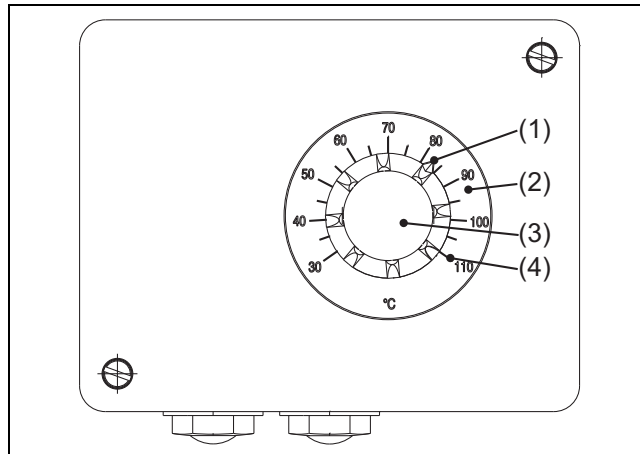
### 4.3 Wiring diagrams



## 5 Adjustments

### 5.1 Setpoint value adjustment

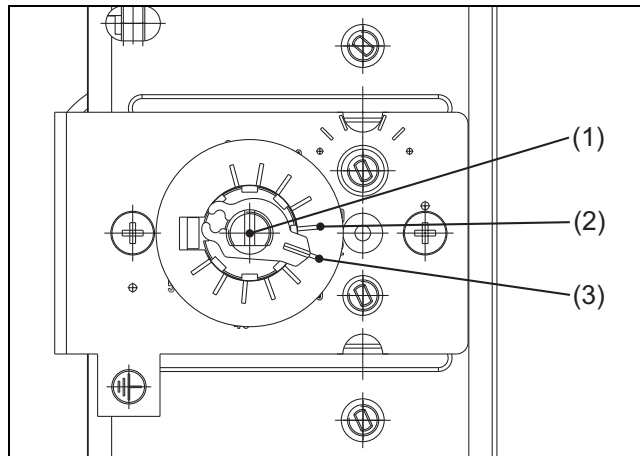
#### Temperature controller



- ( 1 ) Setpoint value indicator
- ( 2 ) Outer scale
- ( 3 ) Setpoint adjuster
- ( 4 ) Scale graduation

\* Turn setpoint adjuster by hand via the outer scale

#### Temperature monitor



- ( 1 ) Setpoint adjuster
- ( 2 ) Scale graduation
- ( 3 ) Setpoint value indicator

\* Adjust setpoint adjuster with screwdriver via the internal scale

## 6 Device description

### 6.1 Technical data

**Admissible ambient temperature**

	Capillary	Switching head	For scale limit value
	TR, TW	TR, TW	
Max.	See nameplate		
Min.	-40 °C	-20 °C	< 200 °C
	-20 °C		≥ 200 °C ≤ 350 °C
	-40 °C		> 350 °C ≤ 500 °C

**Admissible probe temperature**

Max.: Scale limit value +15 %,  
(for scale limit value between +90 °C and 120 °C = min. 25 K)  
Min. -50 °C

**Admissible storage temperature**

Max. +50 °C, min. -50 °C

**Housing**

Housing lid: Polycarbonate, shock-resistant  
Housing bottom section: Die-cast aluminum, painted

**Switching element**

Type AMTHF-....	Description
	2, 3, or 4 single-pole snap-action switches
13, 133, 1333, 23, 233, 2333	With changeover contact

**Maximum switching capacity**

Type AMTHF-...	Switching differential %	Current		Voltage
		Terminal 2	Terminal 4	
13, 133, 1333, 23, 233, 2333	2.5 / 5 / 7 / 10	10 A	2 A	AC 400 V +10 %
1, 2, 3, 20, 30	2.5 / 5 / 6 / 7 / 10	16(3)	8(1.5) A	AC 230 V +10 % cos φ = 1 (0.6)
		0.25 A	0.25 A	DC 230 V +10 %
1, 2, 3, 20, 30	1 / 3	6(2)		AC 230 V +10 % cos φ = 1 (0.6)
		0.25 A		DC 230 V +10 %

**Contact reliability:**

To ensure a high switching reliability, we recommend a minimum load of:

- AC / DC = 24 V, 100 mA with silver contacts (standard)
- AC / DC 10 V, 5 mA for gold-plated contacts (extra code "702"):

**Rated surge voltage:**

2500 V (via the switching contacts 400 V)

**Overvoltage category II**

**Required fuse protection:**

See maximum switching current



## 6 Device description

**Switching point accuracy** (in % from the scale range; referring to the setpoint or limit value at  $T_U + 22\text{ °C}$ , with increasing temperature)

Type AMTHF-...	Switching differential in %		Switching point accuracy in %	
	Liquid-filled	Gas-filled	In the upper third of the scale or limit value	At the scale begin- ning
13, 133, 1333, 23, 233, 2333	1 / 2.5 5 7	-- 3 / 5 6 / 10	± 1.5 ± 3. ± 4.	± 4 ± 5 ± 6

**Protection type** EN 60 529 - IP 54  
Pollution degree 2

**Operating medium** Water, oil, air, superheated steam

**Time constant**  
 $t_{0.632}$

In water	In oil	In air / superheated steam
≤ 45 s	≤ 60 s	≤ 120 s

**Mode of operation** According to EN 60 730-1, DIN EN 60 730-2-9, and DIN EN 14597  
**TR, TW** 2 BL

**Description of abbreviations:**

**2** Mode of operation, type 2

**B** Automatic mode of operation with micro switch-off

**L** No auxiliary energy required

**Rated position** Installation position according to DIN 16257, NL 0...NL 90

**Weight** Approx. 0.5 kg

**Capillary and probe material**

Scale limit value	Capillary	Probe
Up to +200 °C	Copper, material-no.: Cu-DHP Ø 1.5 mm	Copper, material-no.: Cu-DHP hard soldered
Up to +350 °C	Copper, material-no.: Cu-DHP Ø 1.5 mm	Stainless steel, material-no.: 1.4541 hard soldered
Up to +500 °C	Stainless steel Ø 1.5 mm	Stainless steel, material-no.: 1.4571 welded
Available at extra cost		
Up to +350 °C	Stainless steel Ø 1.5 mm	Stainless steel, material-no.: 1.4571 welded

## 6 Device description

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**Minimum bending radius of the capillary**

5 mm

**Medium ambient temperature influence**

(In % from the scale range) referring to the limit value.

When the ambient temperature on the switching head and / or capillary deviates from the calibration ambient temperature of +22 °C, a switching point offset occurs.

Higher ambient temperature = lower switching point

Lower ambient temperature = higher switching point

For temperatures with scale limit value / 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 influence on the switching head in %/K							
0.15	0.26	0.34	0.12	0.21	0.12	0.17	0.24
Ambient temperature influence on the capillary in %/m							
0.05 K·m		0.09 K·m		0.04 K·m		0.05 K·m	

**Temperature compensation**  
(extra code "707")

For detailed specifications, please refer to the graphic diagram in data sheet 602021.





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