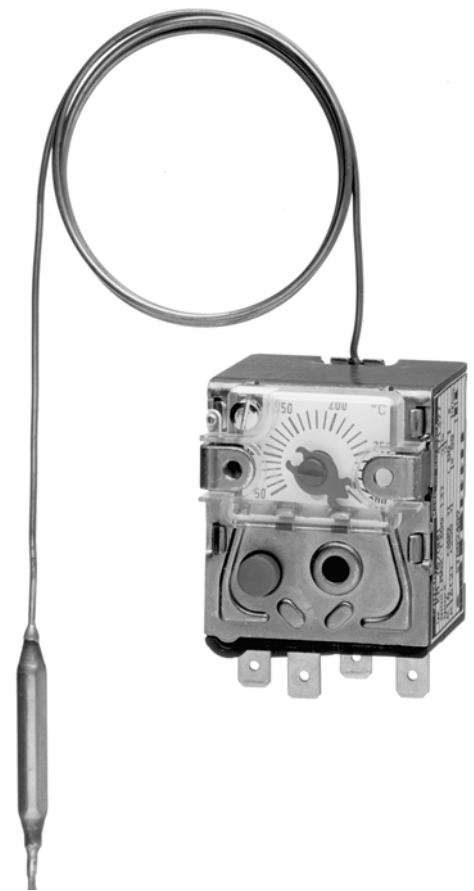


# **KM-70** Panel-mounting Thermostat



**B 60.2045.0**  
Operating Instructions



2008-10-24/00073778



Please read these Operating Instructions before commissioning the instrument. Keep the manual in a place that is accessible to all users at all times. Please assist us to improve these operating instructions, where necessary. Your comments will be appreciated.

Phone +49 661 6003-0

Fax +49 661 6003-607



All necessary settings and, where appropriate, alterations inside the instrument are described in these operating instructions. However, if any difficulties should still arise during commissioning, you are asked not to carry out any unauthorized manipulations on the unit. You could endanger your rights under the instrument warranty! Please contact the nearest subsidiary or the head office in such a case.

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<b>1</b>	<b>Introduction</b> .....	<b>5</b>
<b>1.1</b>	<b>Typographical conventions</b> .....	<b>5</b>
1.1.1	Warning signs .....	5
1.1.2	Note signs .....	5
<b>1.2</b>	<b>Application</b> .....	<b>6</b>
<b>1.3</b>	<b>Marking</b> .....	<b>6</b>
<b>1.4</b>	<b>Safety notes</b> .....	<b>6</b>
<b>2</b>	<b>Instrument identification</b> .....	<b>7</b>
<b>2.1</b>	<b>Nameplate</b> .....	<b>7</b>
<b>2.2</b>	<b>Type designation</b> .....	<b>7</b>
<b>3</b>	<b>Mounting</b> .....	<b>8</b>
<b>3.1</b>	<b>Dimensions</b> .....	<b>8</b>
<b>3.2</b>	<b>Fixing the panel-mounting thermostat</b> .....	<b>9</b>
3.2.1	Mounting the switch head .....	9
<b>3.3</b>	<b>Capillary / temperature probe / pocket</b> .....	<b>9</b>
3.3.1	General .....	9
3.3.2	Approved probes and pockets .....	10
<b>3.4</b>	<b>Permissible loading on the pocket</b> .....	<b>13</b>
3.4.1	Pockets U, US, E and ES .....	13
<b>4</b>	<b>Installation</b> .....	<b>17</b>
<b>4.1</b>	<b>Regulations and notes</b> .....	<b>17</b>
4.1.1	Electrical connection .....	17
<b>5</b>	<b>Settings</b> .....	<b>19</b>
<b>5.1</b>	<b>Limit setting</b> .....	<b>19</b>
<b>5.2</b>	<b>Resetting the protection temperature limiter (STB)</b> .....	<b>19</b>
<b>5.3</b>	<b>Limit locking</b> .....	<b>20</b>
<b>5.4</b>	<b>Self-monitoring</b> .....	<b>20</b>
5.4.1	Response to a measurement system fracture .....	20
5.4.2	Response to low temperature .....	20
<b>6</b>	<b>Instrument description</b> .....	<b>21</b>
<b>6.1</b>	<b>Technical data</b> .....	<b>21</b>

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## EU Konformitätserklärung

EU Declaration of Conformity / Déclaration CE de conformité

**Dokument-Nr.** CE 205  
*Document No. / Document n°*

**Hersteller** JUMO GmbH & Co. KG  
*Manufacturer / Etabli par*

**Anschrift** Moltkestr. 13 - 31  
*Address / Adresse* 36039 Fulda

**Produkt** Beschreibung Einbauthermostat  
*Product / Produit* Typ/ Serie KM-..  
Typenblatt-Nr. 60.2045

**Wir erklären in alleiniger Verantwortung, dass das bezeichnete Produkt die Schutzanforderungen der Europäischen Richtlinien erfüllt.**

*We hereby declare in sole responsibility that the designated product fulfills the safety requirements of the European directives.  
Nous déclarons sous notre seule responsabilité que le produit remplit les directives européennes.*

**Datum der Erstanbringung des CE-Zeichens auf dem Produkt**  
*Date of first application of the CE mark to the product  
Date de 1ère application du sigle CE sur le produit*

**Richtlinie**  
*Directive / Directive*

89/336/EWG	[EMV-Richtlinie]		05.1996
73/23/EWG	[Niederspannungs-Richtlinie]		05.1996
97/23/EG	[Druckgeräterichtlinie, Modul B+D]	Kategorie IV	11.2002
90/396/EG	[Gasgeräte-Richtlinie]		12.1996

**Angewendete Normen**

*Standards applied / Normes appliquées*

EN 61 326	Ausgabe: 05.2001
EN 60 730-1	Ausgabe: 03.2002
VDE 0631	Ausgabe: 12.1983
DIN 3440	Ausgabe: 07.1984
AD 2000 Merkblätter	Ausgabe: 10.2000

**Anerkannte Qualitätssicherungssysteme der Produktion**

*Recognized quality assurance systems used in production / Organisme notifié agréé*

nach EU-Richtlinie 94/9/EG / EU Directive 94/9/EC / Directive européenne 94/9/CE  
*to / suivant* TÜV Hannover, Am TÜV 1, D 30519 Hannover, Germany  
Kennnummer 0032, Mitteilungsnummer TÜV 99 ATEX 1454 Q.  
*Identification No. 0032, Notification No. TÜV 99 ATEX 1454 Q / N° d'identification 0032, N° de signification TÜV 99 ATEX 1454 Q*

nach EU-Richtlinie 97/23/EG Modul D / EU Directive 97/23/EC Module D / Directive européenne 97/23/CE module D  
*to / suivant* TÜV Industrie Service GmbH, D 68167 Mannheim, Germany  
Kennnummer 0036, Zertifikat-Nr. DGR-0036-QS-179-02  
*Identification No. 0036, Certificate No. DGR-0036-QS-179-02 / N° d'identification 0036, N° de certificat DGR-0036-QS-179-02*

**Aussteller:**  
*Issued by: / Etabli par:*

*Firma / Company / Société*  
JUMO GmbH & Co. KG, Fulda

**Ort, Datum:**  
*Place, date: / Lieu, date:*

Fulda, 2006-06-22

**Rechtsverbindliche Unterschrift**  
*Legally binding signature  
Signature juridiquement valable*

\_\_\_\_\_  
Geschäftsbereichsleitung Verkauf und Produktion  
*Head of Division Sales and Production  
Direction du département Ventes et Production*  
ppa. Wolfgang Vogl

## 1.1 Typographical conventions

### 1.1.1 Warning signs



---

#### **Danger**

This symbol is used when there may be **danger to personnel** if the instructions are ignored or not followed correctly.



---

#### **Caution**

This symbol is used when there may be **damage to equipment** if the instructions are ignored or not followed correctly.

### 1.1.2 Note signs



---

#### **Note**

This symbol is used when your **special attention** is drawn to a remark.



---

#### **Reference**

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

abc<sup>1</sup>

---

#### **Footnote**

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

A marker in the text and the footnote text.

The markers in the text are arranged as continuous superscript numbers.

The footnote text (in smaller typeface) is placed at the bottom of the page and starts with a superscript number.

\*

---

#### **Action**

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

The individual steps are marked by this asterisk, e. g.

\* Select setpoint

---

# 1 Introduction

---

## 1.2 Application

---

Panel-mounting thermostats in the KM series are suitable for monitoring heat generators, boilers, heat exchangers and pumps in HVAC engineering.

---



---

Cutting through or kinking the capillary of the KM series panel-mounting thermostat will lead to permanent instrument failure!

---

## 1.3 Marking

---

### Version to DIN 3440:

STB = protection temperature limiter

Panel-mounting thermostats in the KM series comply with VDE 0631.

---

### Type examination to:

- DIN 3440
  - Pressure Equipment Directive 97/23/EC
  - DVGW Gas Appliances Directive 90/396/EEC
- 

## 1.4 Safety notes



---

Filling liquid may escape in the event of a system fracture.

---

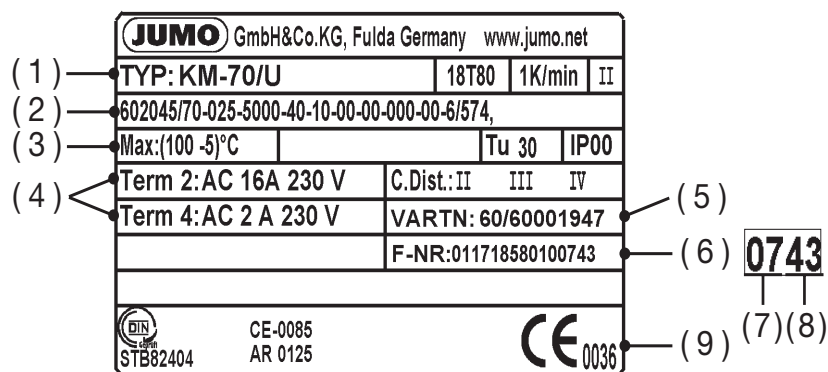
Physical and toxicological properties of the substances that may leak in the event of a system fracture:

Control range with end of scale °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 – 0.8	yes	yes	1	no
≥ +200°C ≤ +350	no	+490	- -	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.

## 2 Instrument identification

### 2.1 Nameplate



- (1) Type / permissible ambient temperature
- (2) Type code
- (3) Limit / Ambient temperature  
at which this thermostat was calibrated (option) / protection rating
- (4) Contact rating
- (5) Approval mark
- (6) Sales number
- (7) Production number
- (8) Week of production
- (9) Year of production

### 2.2 Type designation

#### Type designation

KM-70/ . Panel-mounting thermostat with microswitch,  
with capillary, standard mounting A (plain cylindrical probe),  
protection temperature limiter (STB),  
with lock-out

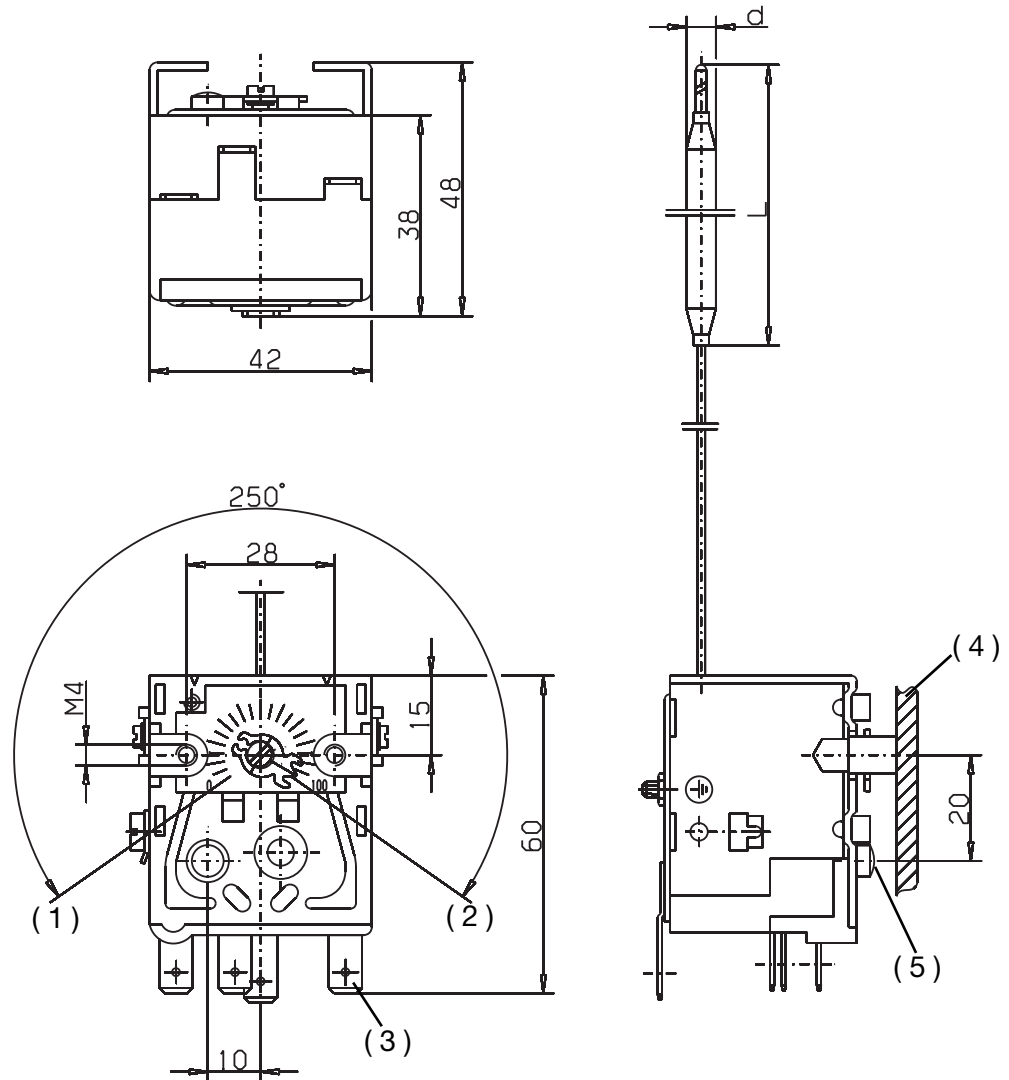
/O (n.c.) break contact  
/U changeover contact

# 3 Mounting

---

## 3.1 Dimensions

KM-70



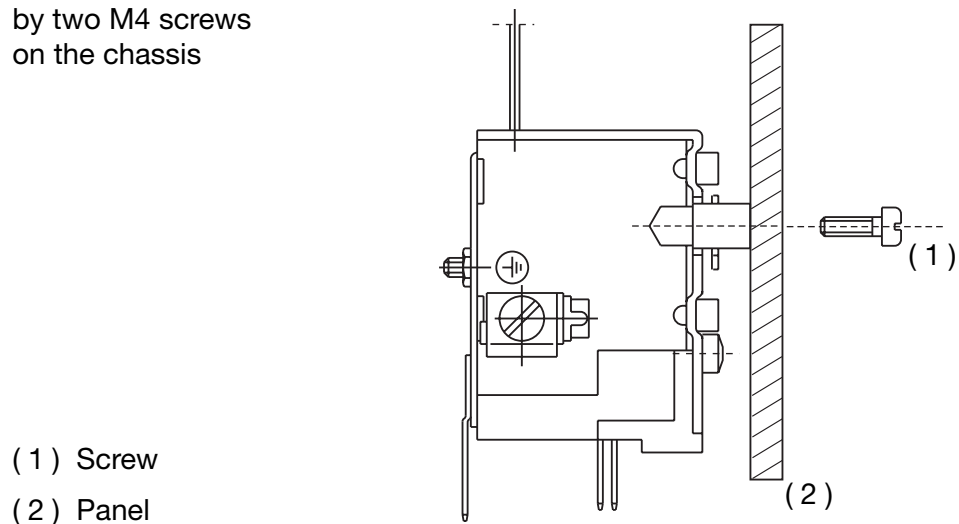
- (1) Start of scale
  - (2) End of scale
  - (3) Faston connectors, A 6.3 x 0.6, DIN 46244
  - (4) Panel
  - (5) Reset knob
-

## 3.2 Fixing the panel-mounting thermostat

Operating position unrestricted

### 3.2.1 Mounting the switch head

by two M4 screws on the chassis



## 3.3 Capillary / temperature probe / pocket

### 3.3.1 General



Cutting through or kinking the capillary of the panel-mounting thermostat will lead to permanent instrument failure!

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

The temperature probe must be installed in a JUMO pocket, otherwise the approval of the panel-mounting thermostat becomes invalid.



The temperature probe must be completely immersed in the medium to be measured.

Temperature probes and pockets must **not** come into contact with the walls of the container or pipe.

To ensure their overall accuracy, the thermostats must only be used together with the pockets supplied by the factory.

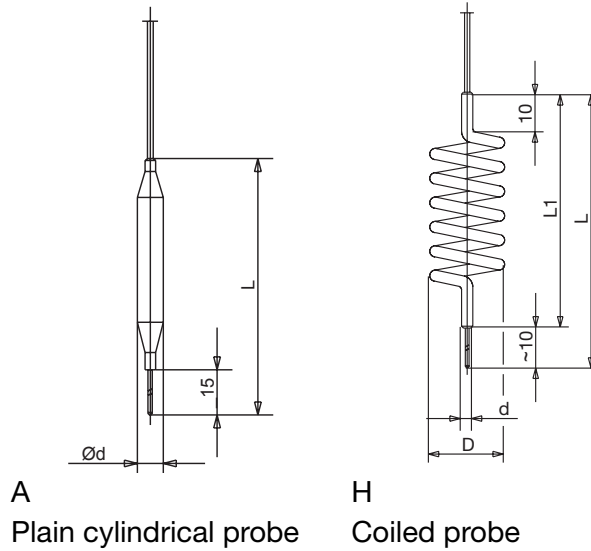
Pockets with diameter  $D = 10$  mm may only be fitted with probes with diameter  $d = 8$  mm.

For operation in air, probe mounting A (without pocket) must be chosen.

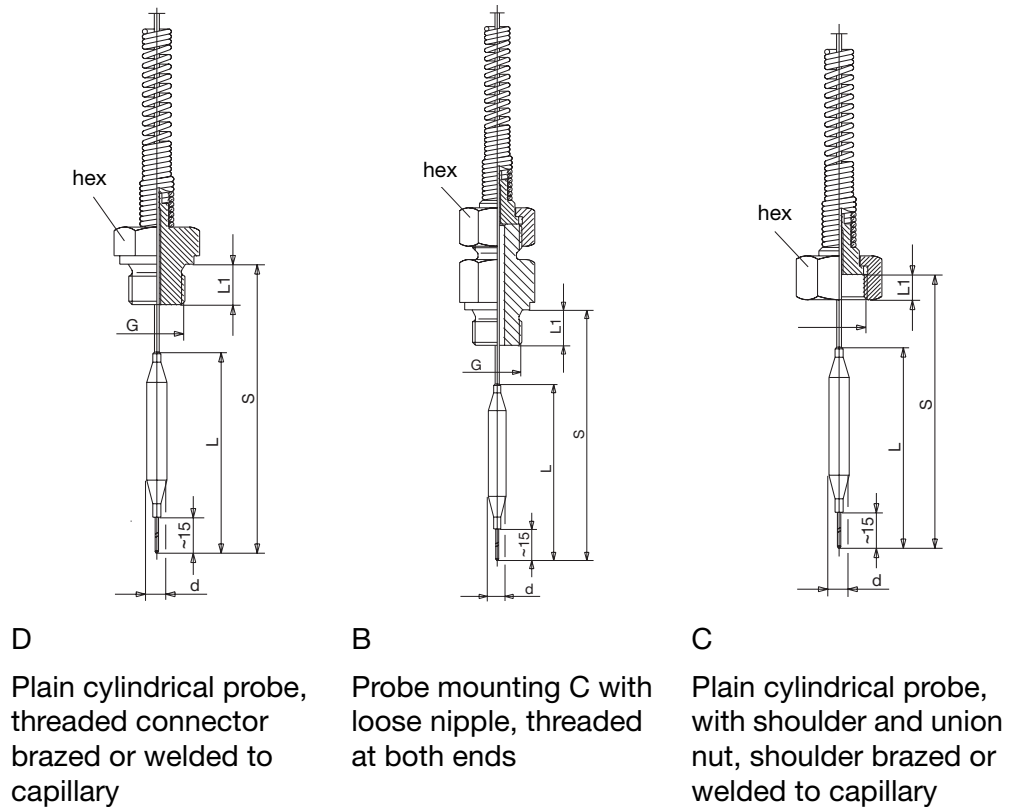
# 3 Mounting

## 3.3.2 Approved probes and pockets

Forms  
A and H

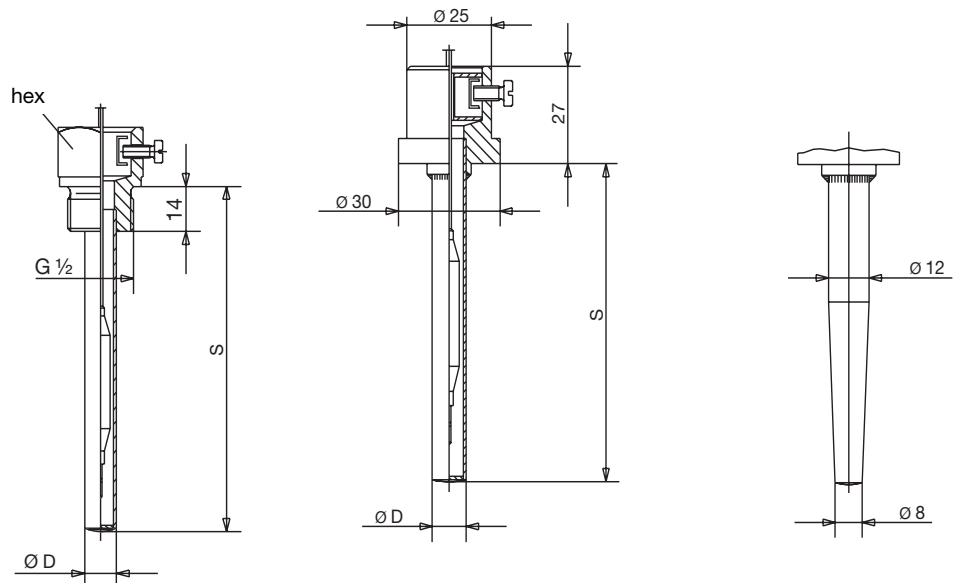


Forms  
D, B and C



# 3 Mounting

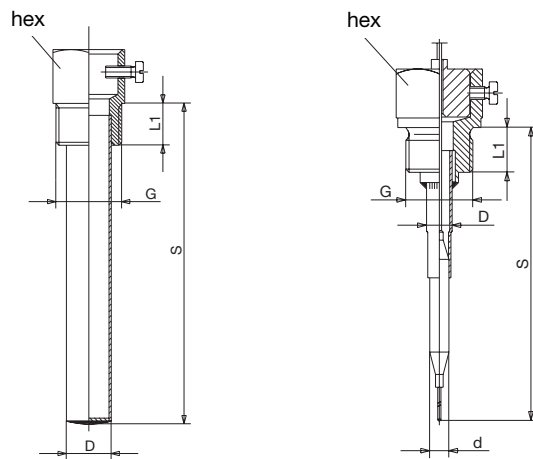
## Forms U and US



**U**  
Screw-in pocket with screw-in spigot Form A to DIN 3852/2, with fixing screw

**US**  
Weld-in pocket with fixing screw and clip

## Forms UH and UO

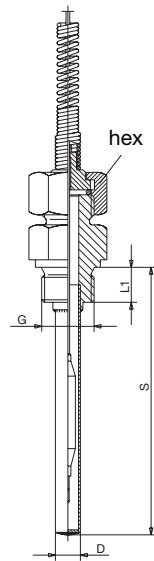


**UH**  
Screw-in pocket with fixing screw, for hemp sealing (no sealing shoulder) for temperatures up to 110°C

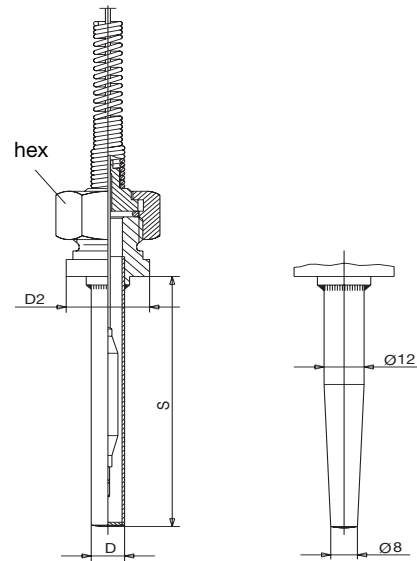
**UO**  
Screw-in pocket open at end, with fixing screw

# 3 Mounting

## Forms E and ES

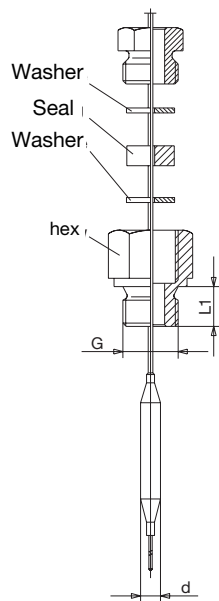


**E**  
Screw-in pocket, with screw-in spigot Form A to DIN 3852/2, pocket secured with union nut, probe mounting C

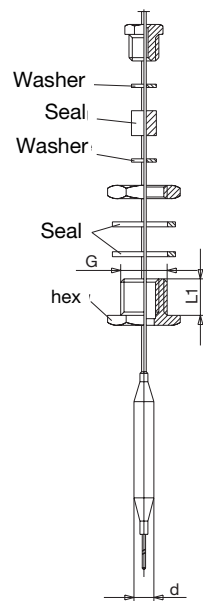


**ES**  
Weld-in pocket with welding shoulder, pocket secured with union nut, probe mounting C

## Forms Q and V



**Q**  
Double thread for retrofitting on capillary. Max. probe temperature +200°C. Oil-resistant seal.



**V**  
Sealing gland for retrofitting on capillary. Max. probe temperature +200°C. Oil-resistant seal.

## 3.4 Permissible loading on the pocket

### 3.4.1 Pockets U, US, E and ES

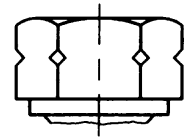


The values given below refer to the maximum loading on the probe mounting concerned. The maximum pressure that can be sealed depends on the installation conditions and may possibly be lower.

#### 3.4.1.1 Steel pockets U, US, E and ES

##### Materials

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



##### Loading

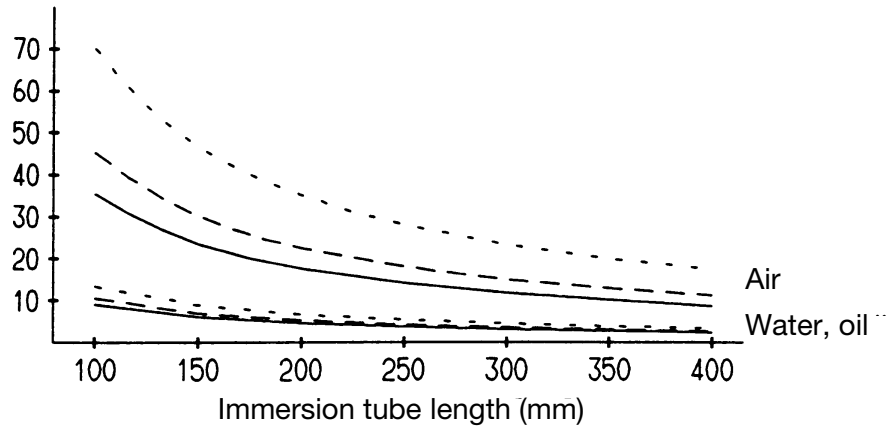
Temperature	Tube diameter D		
	8 x 0.75 mm or conical	10 x 0.75 mm	15 x 0.75 mm
	Max. permissible pressure		
100°C	89 bar	72 bar	48
150°C	83 bar	67 bar	45
200°C	78 bar	63 bar	42
300°C	59 bar	47 bar	32
350°C	50 bar	40 bar	27

# 3 Mounting

**Permissible incident flow velocity**

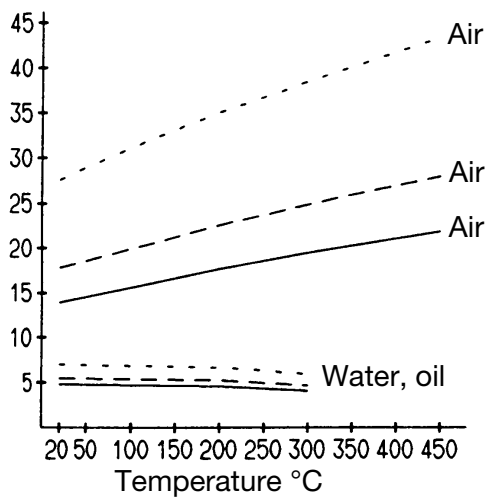
Temperature: +200°C  
 Thermal medium: air, water, oil  
 Tube diameter D: \_\_\_\_\_ 8 mm  
 - - - - - 10 mm  
 ..... 15 mm

Permissible incident flow velocity “v” at the maximum permissible pressure loading and different immersion tube lengths S.



Permissible incident flow velocity “v” at the maximum permissible pressure loading and different immersion tube temperatures “t”.

Material: ST35.8 I  
 Immersion tube length “s”: 200 mm  
 Thermal medium: air, water, oil  
 Tube diameter D: \_\_\_\_\_ 8 mm  
 - - - - - 10 mm  
 ..... 15 mm



## 3 Mounting

### 3.4.1.2 Stainless steel pockets U, US, E and ES

#### Loading

Material of tube and nipple: X 6 CrNiMoTi 17 122			
Temperature	Tube diameter D		
	8 x 0.75 mm or conical	10 x 0.75 mm	15 x 0.75 mm
	Max. 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

### 3.4.1.3 Brass pockets U and E

#### Loading

Material of tube and nipple: CuZn			
Temperature	Tube diameter D		
	8 x 0.75 mm	10 x 0.75 mm	15 x 0.75 mm
	Max. permissible pressure		
100°C	50 bar	40 bar	27 bar
150°C	48 bar	39 bar	26 bar

### 3.4.1.4 Brass pocket UH

#### Loading

Material of tube and nipple: CuZn	
Temperature	Max. permissible pressure
110°C	16 bar

### 3.4.1.5 Probe mountings B, C and D

(probe in direct contact with medium)

Nipple material	CuZn 39	9 SMnPb.28 K	X 6 CrNiMoTi 17 122
Temperature °C	200	300	400

Probe material	dia. mm	Thermostat action: STB
SF-Cu	4 – 10	2 bar
ST 35; 1.4571(V4A)		

### 3 Mounting

---



Forms **A, H, UO, Q, V** may **only** be used in pressure-free media.

---

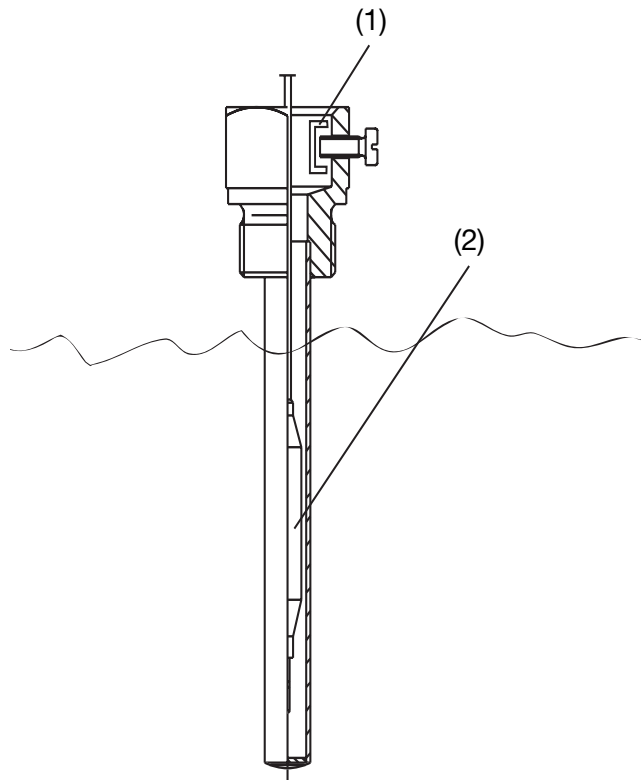


- To ensure their overall accuracy, the thermostats must **only** be used in conjunction with the pockets supplied by the factory.
  - Fitting several probes into a common pocket is only permitted with 2 or 3 cylindrical probes 6 mm dia. and pockets 15 x 0.75 mm.
  - When fitting 2 probes into a pocket, the factory-supplied spring clip must be fitted in the pocket.
  - When used in air, the temperature probe must be used without a pocket.
- 



The temperature probe (2) must be immersed in the medium for its entire length, otherwise there will be appreciable deviations from the switching point.

In the case of probe mountings U, US, UH and UO, the temperature probe is secured in the pocket with a clip (1).



## 4.1 Regulations and notes



- The electrical connection must only be carried out by qualified personnel.
- The choice of cable, the installation and the electrical connection must conform to the requirements of VDE 0100 “Regulations on the Installation of Power Circuits with Nominal Voltages below 1000 V” or the corresponding local requirements.
- If contact with live parts is possible while working on the instrument, it must be completely disconnected from the electrical supply.
- Earth the instrument at the PE terminal to the protective earth conductor. This cable must have at least the same cross-section as used for the supply cables. Earthing cables must be wired in a star configuration to a common earth point that is connected to the protective earth conductor of the electrical supply. Do not loop earthing cables, i.e. do not run them from one instrument to another.
- Apart from faulty installation, incorrect settings on the thermostat can also affect the proper functioning of the subsequent process or lead to damage. Setting up must therefore be restricted to qualified personnel. Please observe the relevant safety regulations for such matters.

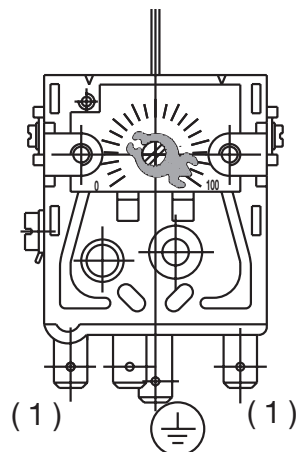
### 4.1.1 Electrical connection

- Terminals and connections suitable for internal conductors
- Connection suitable for fixed wiring
- Cable entry without strain relief
- Protection Class I, covering:
  - switch head including 4000 mm Cu capillary (including probe length)
  - switch head only with CrNi capillary and probe



In the case of probes, capillary types and capillary lengths that are not covered by Protection Class I, the user must take care that the required protection against electric shock is assured.

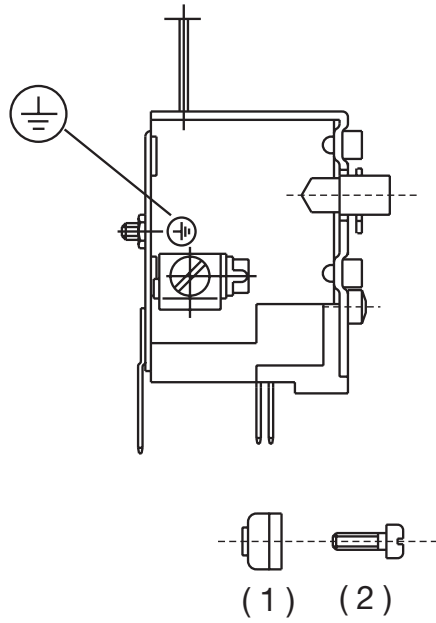
as standard



(1) Faston connector  
(A 6.3 x 0.8 mm, DIN 46 244)

# 4 Installation

Code X



Screw terminals up to 2.5 mm<sup>2</sup> conductor cross-section

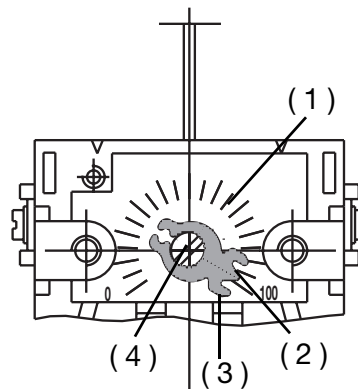
- (1) Clamping block
- (2) Connection screw

## Connection diagrams

<p>Type KM-70 with (n.c.) break contact and lock-out</p>	<p>Type KM-70 with (n.c.) break contact, lock-out and additional signal contact</p>

## 5.1 Limit setting

- \* Adjust the switching point on the limit arm with a screwdriver before fitting the thermostat in position.



- (1) Scale division
- (2) Limit pointer
- (3) Top stop
- (4) Limit arm

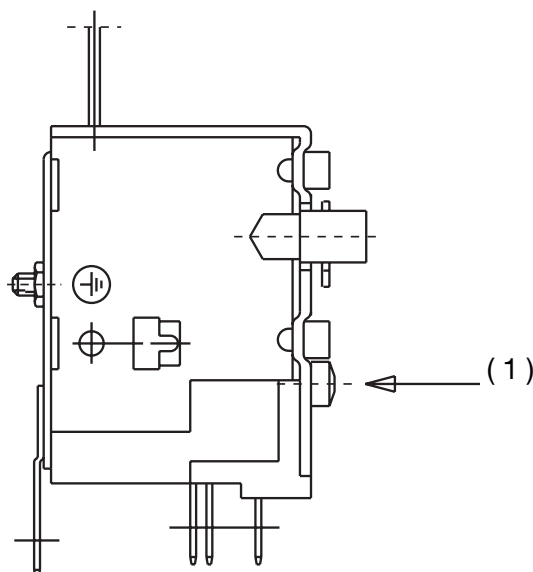
On limit ranges above 120°C, the limit that was set must be locked to prevent re-adjustment.

⇒ Chapter 5.3 “Limit locking”, page 20.



## 5.2 Resetting the protection temperature limiter (STB)

After the temperature has dropped by about 10% of the scale span below the set limit (critical temperature), the microswitch can be reset.

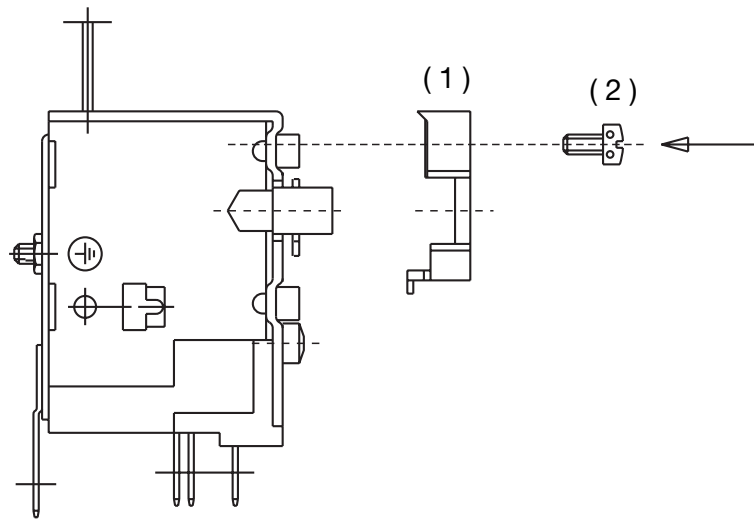


- \* Press the reset button (1), until the microswitch is reset.

## 5 Settings

---

### 5.3 Limit locking



(1) Cover

(2) Lead-sealable screw

---

### 5.4 Self-monitoring

#### 5.4.1 Response to a measurement system fracture

---



A fracture of the measurement system (leakage), will cause the circuit on the STB to open **permanently** and, in addition, the microswitch is locked out.

---

#### 5.4.2 Response to low temperature

---



When the temperature falls below the minimum probe temperature  $-10^{\circ}\text{C}$  (on the STB), the circuit opens automatically.

When the temperature goes above the minimum probe temperature, the STB must be reset manually.

⇒ Chapter 5.2 “Resetting the protection temperature limiter (STB)”, page 19.

---

# 6 Instrument description

## 6.1 Technical data

**Permissible ambient temperature**

	Capillary	Switch head	with end of scale
max.	+80°C	+80°C	
min.	-20°C	+18°C	< 200°C
			≥ 200°C ≤ 350°C

**Permissible probe temperature**

max. end of scale +15%,  
min. -50°C

**Permissible storage temperature**

max. +50°C, min. -50°C

**Housing**

galvanized steel sheet  
cover: heat-resistant plastic

**Connecting cable**

conductor cross-section up to 2.5 mm<sup>2</sup>

**Contact rating**

Type	Contact type	Code	Current ( A )	Voltage
KM-70	U	contact opening on temperature rise	16 16 (2) 0.25	400 V AC 230 V AC p.f. = 1 (0.6) 230 V DC
		contact closing on falling temperature	2 2 0.25	400 V AC 230 V AC 230 V DC
	O	contact opening on temperature rise	16 16 (2) 0.25	400 V AC 230 V AC p.f. = 1 (0.6) 230 V DC

**Contact reliability**

To ensure the maximum switching reliability, we recommend a minimum loading of:

- 100 mA, 24 V AC/DC, with silver contacts (standard)
- 10 mA, 10 V AC/DC, with gold-plated contacts (code "au")

**Rated surge voltage**

2500 V (400 V via the switching contacts) **overvoltage category II**

**Required fusing**

see Contact rating

**Protection**

EN 60 529 - IP00, pollution degree 3

## 6 Instrument description

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

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

in water	in oil	in air / superheated steam
≤ 45 sec	≤ 60 sec	≤ 120 sec

**Mode of operation**

to EN 60 730-1 and EN 60 730-2-9

**STB:** 2 BFHKLP

**Explanation of codes:**

**2** mode of operation type 2

**B** automatic mode of operation with microswitch disconnection

**F** can only be reset with tools

**H** free-release mechanism,  
contacts cannot be prevented from opening

**K** with probe break protection

**L** no auxiliary power required

**P** mode of operation type 2, verified through declared temperature cycling

**Nominal position**

unrestricted

**Weight**

approx. 0. 3 kg

**Capillary/  
probe material**

End of scale	Capillary	Probe
up to +200°C	copper, Mat. Ref. 2.0090 1.5 mm dia.	copper, Mat. Ref. 2.0090 brazed
up to +350°C	copper, Mat. Ref. 2.0090 1.5 mm dia.	st. steel, Mat. Ref. 1.4571 brazed
at extra cost		
up to +350°C	st. steel, Mat. Ref. 1.4571 1.5 mm dia.	st. steel, Mat. Ref. 1.4571 welded

**Minimum bending radius of capillary**

5 mm

**Switching point accuracy**

(in % of scale span;  
referred to the set limit at  $T_A + 22^\circ\text{C}$ )

STB	in upper third of scale	+0 % -5 %
	at scale start	+0 % -10 %

## 6 Instrument description

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### Mean ambient temperature effect

(in % of scale span) referred to limit.

A deviation of the ambient temperature at the switch head and/or capillary from the +22°C calibration ambient temperature will produce a switching point shift:

higher ambient temperature = lower switching point

lower ambient temperature = higher switching point

For temperatures with end of scale:	
< +200°C	≥ +200°C ≤ +350°C
on switch head, % per °C	
0.17%	0.13%
on capillary, % per °C per m length	
0.054	0.11



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