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# Panel-mounted Thermostat

## EM Series

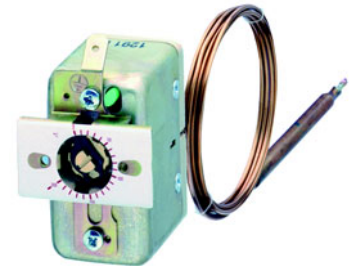
### Special features

- Safety temperature monitor STW (STB)
- Safety temperature limiter STB
- Tested according to DIN EN 14597 and the Pressure Equipment Directive 97/23/EC

### Brief description

Panel-mounted thermostats are used to monitor thermal processes. The devices are available as safety temperature monitor STW (STB) and safety temperature limiter STB. In the event of a malfunction, the STB switches the monitored machine to a safe operating status.

Panel-mounted thermostats operate according to the fluid expansion principle • a microswitch is used as the electrical switching element.



### Switching function

#### Safety temperature monitor STW (STB)

If the temperature on the temperature probe exceeds the setpoint value, the microswitch is activated by the transmission mechanics and the electrical circuit is opened or closed. If the temperature falls below the selected setpoint (by the amount of the switching differential), the microswitch is reset to its initial position.

#### Restart lock of the safety temperature limiter STB

If the temperature on the temperature probe exceeds the set limit value, the electrical circuit is opened and the microswitch is mechanically locked. The microswitch can be manually unlocked once the temperature has dropped by approx. 10 °C.

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

If the measuring system is destroyed (i.e. if the expansion fluid leaks), the pressure in the diaphragm of the STB drops and permanently opens the electrical circuit. Unlocking is then no longer possible. When the probe has cooled down to a temperature below approx. -20 °C, the electrical circuit is also opened. However, it automatically closes again when the temperature rises.

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

The activation lock required by DIN EN 14597 must be warranted by the following circuit diagram. The circuit diagram must comply with DIN EN 50156.

### Approvals/approval marks (see "Technical Data")



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## Technical data

### General information

#### Limit value range, limit value range setting, and temperature probe

Type	Limit value range Limit value setting °C	Max. allowable probe temperature °C	Limit value tolerance °C	Probe length, dimension "L" for probe Ø "d" = 6 mm mm
EM-20-E	+40 to +110	+135	+0/-90	72
	+100 to +150	+173	+0/-80	85
	+110 to +170	+195	+0/-90	72
	+180 to +250	+288	+0/-13	60
	+230 to +300	+345	+0/-14	60
	Limit value setting done prior to mounting with a screwdriver at the limit value knob.			
EM-30-E	Optional limit value +20 to +300 Permanently factory-set	Limit value +15 %		
EM-80	Optional limit value +60 to +180 Permanently factory-set	Limit value +15 %	+0/-5	84

#### Capillary and temperature probe

Type	Scale limit value	Capillary	Temperature probe	Notes
EM- . .	Up to 200 °C	Copper (Cu) ø 1.5 mm Material no. Cu-DHP	Copper (Cu) Material No. Cu-DHP Hard soldered	--
	Up to 300 °C	Copper (Cu) ø 1.5 mm Material no. Cu-DHP	Stainless steel (CrNi) Material No. 1.4571 Hard soldered	--
	Up to 300 °C	Stainless steel (CrNi) ø 1.5 mm Material no. 1.4571	Stainless steel (CrNi) Material no. 1.4571 welded	Available at extra cost
Capillary length	Standard: 1000 mm, max. 5000 mm			
Min. bending radius of the capillary	5 mm			

### Electrical data

Switching element: Single-pole snap-action switch	Type EM-20-E Type EM-30-E	Type EM-80 Standard	Type EM-80 with extra code "U"
	Microswitch with changeover contact	Microswitch with N/C contact and restart lock	Microswitch with N/C contact, restart lock, and additional signal contact
Max. switching capacity	Type	N/C contact, terminal 2	N/O contact, terminal 4
	EM-20-E EM-30-E EM-80/U	AC 230 V +10 %, 10 (2) A, cos φ = 1 (0.6) DC 230 V +10 %, 0.25A	AC 230 V +10 %, 2 (0.4) A, cos φ = 1 (0.6) DC 230 V +10 %, 0.25A
	EM-80		--
	Extra code "U"	Microswitch with gold plating, AC / DC 24 V, 0.1 A	
Contact reliability	To ensure a high switching reliability, we recommend a minimum load of: For silver contacts: AC / DC = 24 V, 20 mA		
	For gold-plated contacts (extra code "au"): AC / DC = 5 V, 5 mA		
Rating surge voltage	1500 V (via the switching contacts 400 V)		
Overtoltage category	II		
Required fuse rating	See max. switching capacity		

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Electrical connection	Standard	Tab connector A 6.3 x 0.8 DIN 46244	
	Extra code X	Screw connection up to 2.5 mm <sup>2</sup> conductor cross section (available at extra cost) – also suitable for retrofitting –	
Switching differential in % from the limit value range	Switching function	Rated value	Possible actual value
	STW (STB)	7	7-8

Mid ambient temperature influence	(In % from the scale range) referring to the limit value. Deviation of the ambient temperature at the switching head and/or capillary from the +22 °C calibration ambient temperature produces a switching head offset. Higher ambient temperature = lower switching point Lower ambient temperature = higher switching point		
	For temperatures with scale limit value / limit value		
STW (STB)	< +200 °C	≥ +200 °C ≤ +350 °C	
	Switching differential in %		
	7	7	
	Ambient temperature influence on the switching head in %/°C		
0.43	0.35		
Ambient temperature influence on the capillary in %/m			
0.09 · °C · m	0.07 · °C · m		
STB	Ambient temperature influence on the switching head: 0.35 °C/°C		
	Ambient temperature influence on the capillary in °C/m 0.07 °C/°C·m		

Temperature compensation	Extra code "TK" For detailed information please refer to the graphical diagram on page 5.
Allowable storage temperature	-50 to +50 °C
Allowable ambient temperature when in use on the switching head and capillary	Max. +80 °C Min. +18 °C (0 °C for extra code "TK")
Rated position (NL)	Any

**Switching head**

Case material	Sheet steel, galvanized
Mounting	Extra code b1 with 2 M4 screws, spaced 28 mm Extra code b2 with 2 M3 screws, spaced 33 mm Extra code b3 with 2 M3 screws, spaced 22 mm (standard for EM-20-E and EM-30-E) Extra code b7, central mounting M10 x 1 with acorn nut (only for STB, standard for EM-80)
Protection type	EN 60 529-IP 00
Weight	Approx. 0.3 kg

**Process connection<sup>a</sup>**

EM series with capillary	Plain cylindrical probe "10" (standard)	
	Screw-in thermowell "20" (upon request)	
	Screw-in sleeve with screw-in spigot G 1/2 form A according to DIN 3852/2 and clamping piece with fixing screw for securing the probe	
Material	Thermowell	Up to +150 °C CuZn as a standard Over +150 °C CrNi
Insertion length S	Standard lengths: 100, 120, 150, 200, or 300 mm (different lengths upon request)	
Immersion tube Ø	D = 8 mm	

<sup>a</sup> For different process connections and thermowells refer to data sheet 606710.

**Note:** Physical and toxicological properties of the expansion medium that may escape in the event of a measuring system failure.

Control range with scale limit value	Hazardous reactions	Fire and explosion hazard		Hazardous to water	Information about toxicology		
		Ignition temperature	Explosion limit		Irritant	Health risks	Toxic
≤ +200 °C	No	+355 °C	0.6 - 8 V %	Yes	Yes	<sup>a</sup>	No

<sup>a</sup> At present, no statement concerning health hazards in the event of short-term and low concentration exposure (e.g. measuring system rupture) has been made by the health authority.

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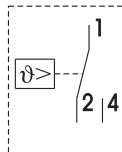
**Approvals / approval marks**

Approval marks	Testing agency	Certificates / certification number	Inspection basics	Valid for
DIN	DIN CERTCO / TÜV <sup>a</sup> Süd	STB 78208	DIN EN 14597	EM-80
		STW (STB) 77508S		EM-20-E
		STW (STB) 77508S		EM-30-E
DGRL	TÜV <sup>a</sup> Süd	IS-TAF-MUC 08 05 73377 020	Pressure Equipment Directive	EM-20-E, EM-30-E, EM-80, EM-80-V
DVGW	DVGW / TÜV <sup>a</sup>	CE-0085AR0124	90/396/EEC	EM-80
UL	UL	E66358 Vol.1 Sec.1	UL 873, CSA-C22.2 No. 24	EM-80, EM-80-TK
		MH45736 Vol.1 Sec.2	UL 353, CSA-C22.2 No. 24	EM-80
VDE	VDE Offenbach	40012320	DIN EN 60730	EM-20-E, EM-30-F
		40012311		EM-80

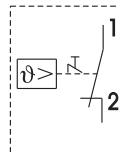
<sup>a</sup> German Technical Inspection Agency

**Connection diagrams**

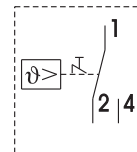
EM-20-E  
EM-30-E



EM-80



EM-80/U



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## Dimensions

<p><b>EM-80</b> with central mounting (standard)</p>		<p>(1) + (2) = standard: Tab connector A 6.3 x 0.8 mm (DIN 46244)        (4) = only for extra code /U: Tab connector A 6.3 x 0.8 mm (DIN 46244)</p>												
<p><b>EM-20-E</b> <b>EM-30-E</b> <b>EM-80</b> with fixing brackets</p>		<table border="1"> <thead> <tr> <th>Abbreviation</th> <th>B</th> <th>G</th> </tr> </thead> <tbody> <tr> <td>b1</td> <td>28</td> <td>M4</td> </tr> <tr> <td>b2</td> <td>33</td> <td>M3</td> </tr> <tr> <td>b3</td> <td>22</td> <td>M3</td> </tr> </tbody> </table>	Abbreviation	B	G	b1	28	M4	b2	33	M3	b3	22	M3
Abbreviation	B	G												
b1	28	M4												
b2	33	M3												
b3	22	M3												

<p><b>Temperature compensation (TK)</b>        If changes occur to the switching head temperature in relation to the calibration ambient temperature (= 22 °C), a switching point deviation occurs. For highly fluctuating ambient temperatures, we recommend the use of thermostats with temperature compensation (extra code TK)</p>	<p><b>EM-.. "without" temperature compensation</b>        Switching point deviation depends on the ambient temperature at the switching head taking the probe temperature into account.</p>	<p><b>EM-../TK "with" temperature compensation</b>        Switching point deviation depends on the ambient temperature at the switching head taking the probe temperature into account. The temperature influence on the capillary is not yet taken into account and can result in an additional error of approx. 0.07 °C/°C·m.</p>
<p>(A) = Switching point deviation (B) = Probe temperature in °C (C) = Ambient temperature in °C</p>		

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## Stock versions

Sales no.	Type	Limit value °C	Capillary mm	Process connection	Probe Ø x length mm
60/60000775	EM-80	+110	1000	Plain cylindrical probe 10	6 x ~ 84
60/60000753	EM-80	+95			

(Delivery within 3 working days after receipt of order)

## Order details

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

- Order code** (1) **Basic type**  
 602026 Panel-mounted thermostat, EM series
- (2) **Basic type extensions**  
 20 EM-20-E Safety temperature monitor, limit value adjustable<sup>a</sup>  
 30 EM-30-E Safety temperature monitor, limit value permanently set  
 80 EM-80 Safety temperature limiter, limit value permanently set
- (3) **Limit value ranges for EM-20-E STW (STB)**  
 000 For permanently set limit value (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
- (4) **Permanently set limit values for EM-30-E and EM-80**  
 000 For adjustable limit value range  
 ... Specified in °C
- (5) **Capillary length**  
 1000 1000 mm  
 2000 2000 mm  
 3000 3000 mm  
 4000 4000 mm  
 5000 5000 mm  
 .... (Special length, specified in mm, min. 500 mm, max. 5000 mm)
- (6) **Capillary material**  
 40 Cu (Copper)  
 20 CrNi (Stainless steel 1.4571)
- (7) **Process connection**  
 10 Plain cylindrical probe   
 20 Screw-in sleeve 
- (8) **Thread of process connection**  
 00 Without thread (process connection "10")  
 13 External thread G 1/2

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**( 9 ) Material of process connection**

00 Only with process connection "10"  
 46 CuZn (Brass)  
 20 CrNi (Stainless steel 1.4571)

**( 10 ) Fitting length "S" (immersion tube length)**

000 Without thermowell  
 100 100 mm  
 120 120 mm  
 150 150 mm  
 200 200 mm  
 300 300 mm  
 ... (Special length, specification in mm)

**( 11 ) Diameter "D" (immersion tube diameter)**

00 Without thermowell  
 8 8 mm

**( 12 ) Diameter "d" (probe diameter)**

00 Without thermowell  
 6 6 mm

**( 11 ) Extra codes**

000 Without extra codes  
 574 "U" STB with N/C contact, restart lock, and additional signal contact  
 702 "au" Snap-action switch with gold plating (cannot be combined with extra code "U")  
 699 "X" Screw-connection with 2.5 mm<sup>2</sup> conductor cross section  
 704 "b1" Switching head mounting with 2 M4 screws, spaced 28 mm  
 705 "b2" Switching head mounting with 2 M3 screws, spaced 33 mm  
 706 "b3" Switching head mounting with 2 M3 screws, spaced 22 mm  
 710 "b7" Central mounting with acorn nut (only for STB)  
 707 "TK" Temperature compensation

<sup>a</sup> Different control / limit ranges upon request

**Order code**      ( 1 )    ( 2 )    ( 3 )    ( 4 )    ( 5 )    ( 6 )    ( 7 )    ( 8 )    ( 9 )    ( 10 )    ( 11 )    ( 8 )  
 602026 / [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] / [ ] , ...  
**Order example**    602026 / 80 - 000 - 120 - 2000 - 40 - 10 - 00 - 00 - 000 - 00 / 000<sup>a</sup> , ...

<sup>a</sup> State extra codes one after another, separated by commas