Thermostats for Industrial Applications

- Switching range:
  -20 ... +30 °C to 80 ... +130 °C
- Housing material:
  Grey cast iron
- Capillary tube: copper

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Model:
TER

02 / 11-2007

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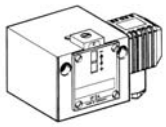
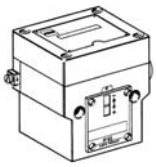
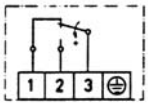
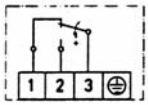
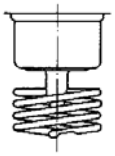
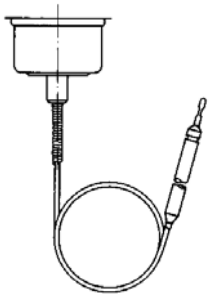
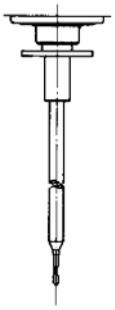
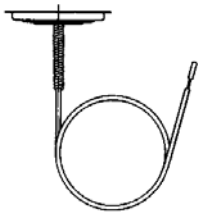
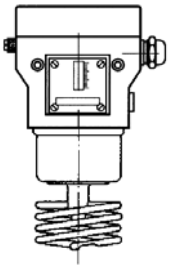
Technical Details

Switching devices	**Normal version** 	**Ex-version** 
Switch housing	Aluminium diecast GD Al Si 12	Aluminium diecast GD Al Si 12
Switching function and connection drawing (applies only for version with microswitch)	Floating change-over contact. With rising temperature switching over single-pole from 3-1 to 3-2 . 	Floating change-over contact. With rising temperature switching over single-pole from 3-1 to 3-2 . 
Switch capacity (applies only for version with microswitch)	8 A at 250 V_{AC} 5 A at 250 V_{AC} inductive 1 A at 24 V_{DC}	3 A at 250 V_{AC} 2 A at 250 V_{AC} inductive 0.1 A at 250 V_{DC} 0.01 A at 250 V_{DC} inductive
Installation position	Vertical or horizontal, preferably vertical	Vertical
Protection (in vertical position)	IP 54 (on request IP 65 by ZF 351)	IP 65
Type of protection	-	Ex II 2 GD EEx de IIC T6 IP65 T80 °C
PTB-approval	-	PTB 04ATEX 1067
Electrical connection	Plug connection to DIN 43650	Terminal connection
Cable entry	Pg 11	Pg 11
Ambient temperature	-15 to +70 °C	-15 to +60 °C
Switch point	Adjustable on the spindle.	Adjustable on the spindle after the terminal box lid is removed.
Switching difference	Adjustable or not adjustable (see type overview)	Not adjustable
Medium temperature	Max. 70 °C, short time 85 °C	Max. 60 °C
Vibration strength	Up to 4 g no noteworth deviations. The switching difference is reduced slightly at higher accelerations. Use able 25 g not permissible.	
Insulations values	Overvoltage category III, contamination class 3, reference surge voltage 4000 V. The confirmity to DIN VDE 0110 (01.89) is confirmed.	

Sensor systems

Room-sensor	Capillary tube sensor	Rod sensor	Air duct sensor	Frost-protection sensor
				
TER-TRM	TER-TAM	TER-TX + R10		

Temperature monitoring in explosion-endangered areas

 Ex-Zone 1 or 2	Temperature switches with special equipment can also be used in the Ex area ≥ Zone 1. **Thermostats with pressure-proof encapsulated switching device.** **Type of protection** **II 2 GD EEx de IIC T6 IP65 T80 °C**	The thermostat in pressure-proof encapsuluation can be used directly in the Ex area (≥ Zone 1). Maximum switching voltage, switch capacity and ambient temperature must be taken into account and the rules for the installation in the Ex area must be observed. Al thermostats can be equipped with Ex switching mechanisms. Nevertheless, special circuits as well as versions with adjustable switching differences are not possible.

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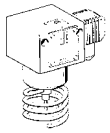
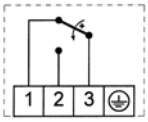
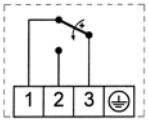
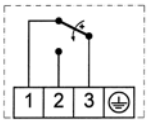
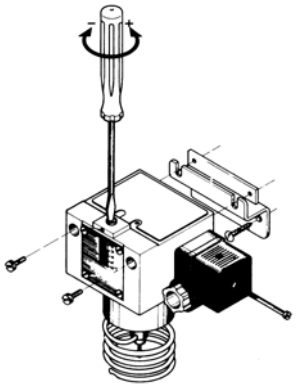
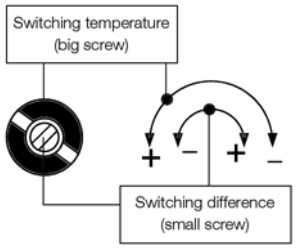
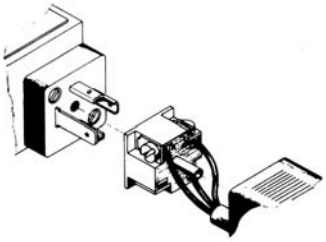
Switch units / additional functions / connection diagrams

Plug connection	Description	Connection diagram
	**Normal version** Microswitch, single pole changeover	
213	**Gilded contacts** with little transition resistance (e.g. for low tension). Cannot be supplied with adjustable switching differential	
218	**Plug connector with position indication** 12 V - 240 $V_{AC/DC}$	
301	**Terminal connection housing** Protection IP 65	
351	**Protection IP 65** and switch housing **with surface protection** (terminal connection housing)	
970 **971**	**Switch point adjustment according to the customer requirement** **Adjustment and sealing according to the customer requirement**	

In case that one of the a. m. options are needed, please add the above suffix to the ordering code.

General technical information

Adjustment of the thermostats	**Adjustment to the lower switching point** The desired value x_s corresponds to the lower switching point (on falling temperature), the upper switching point x_o (on rising temperature) is higher by the switching difference x_d.
Setting the switching temperature (desired value setting) 	The grub screw located above the scale is to be slackened off approx. 2 turns before making an adjustment and tightened up again after setting. The switching temperature is set by the spindle. The set switching temperature can be read off on the scale. Slight variations between the set value and the switching point are inevitable due to the tolerances and spreads in the characteristics of the sensors and springs, also to friction in the moving parts of the switch. The thermostats are as a rule set in such a way the desired value setting and the actual switching temperature coincide best in the middle range. Any possible divergences are uniformly distributed to either side. **Turning to right:** **low switching temperature** **Turning to left:** **high switching temperature**
Changing the switching difference (only on switching units TRMV...) 	The switching difference is changed by turning the threaded rod inside the setting spindle. The lower switching point is not changed by adjusting the difference, only the upper switching point is shifted by the amount of the difference. One revolution of the difference screw varies the switching difference by approximately ¼ of the total differential range. **Bear in mind when making the adjustment:** **Switching temperature:** Turning to right: lower switching point Turning to left: higher switching point **Switching difference:** Turning to right: larger difference Turning to left: smaler difference
Electrical connection 	Plug connection according to DIN 43650. Cable entry Pg 11, max. cable diameter 10 mm. Cable outlet possible in 4 directions - spaced 90° apart.
Mounting position	Preference is to be given, if possible, to the vertical mounting position. **Protection IP 54** is guaranted in accordance with the conditions of DIN 40050 **for vertical mounting**. The type of protection may be changed by a different mounting position.
Outdoor installation of the instruments	The thermostats can also be installed outdoor, if they are mounted in a vertical position. On temperatures below 0 °C take care that there can form no condensation at the sensor and inside the housing.

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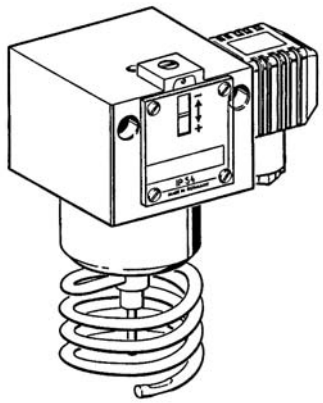
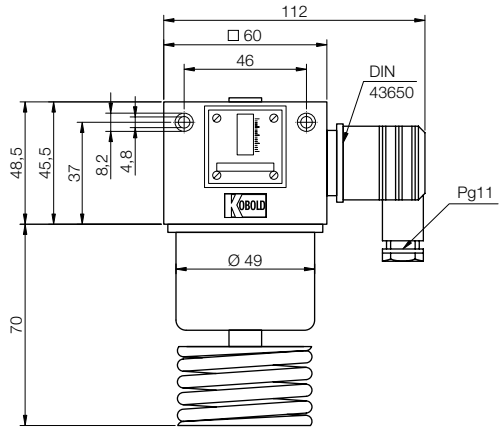


Description

KOBOLD room thermostats are suitable for industrial plant, for greenhouses, cowsheeds and warehouses, also for monitoring the maximum temperature in switchgear cabinets and relay stations. Room thermostats are supplied with TER-H 1 wall bracket.

Dimensions



Technical Details (not for Ex-versions)

Housing:	Die-cast metal GD Al Si 12 to DIN 1725, Resistant to ammonian steam and seawater
Mounting position:	optional
Max. ambient temperature:	70 °C (60 °C on Ex-versions)
Max. temperature at the sensor:	70 °C
Contact comlement:	Single-pole changeover
Protection:	IP 54 to DIN 40050 (in the case of vertical mounting)
Installation:	with TER-H 1 support bracket or with 2 screws (Ø 4 mm) bulk-head mounting
Adjustment:	scale value corresponds with the lower switching point (with falling temperature), the upper switching point is higher by the switching differential
Plug connection:	by means of obliquely angled plug to DIN 43650 (3-pole + earth contact), cable entry Pg 11, max. cable diameter 10 mm. Cable outlet possible in 4 directions (spaced 90° apart)
Switching temperature:	adjustable from outside with screw-driver
Switching difference:	not adjustable on TER-TRM adjustable on TER-TRMV for values see summary of types

Order Details: (Example: **TER-TRM 022**)

Model	Range of adjustment	Switching difference (mean value)
TER-TRM 022	-20 to +20 °C	1.0 K (fixed)
TER-TRM 40	0 to +40 °C	1.0 K (fixed)
TER-TRM 150	+10 to +50 °C	1.0 K (fixed)
TER-TRMV 40	0 to +40 °C	3 - 10 K (adjustable)
TER-TRMV 150	+10 to +50 °C	3 - 10 K (adjustable)

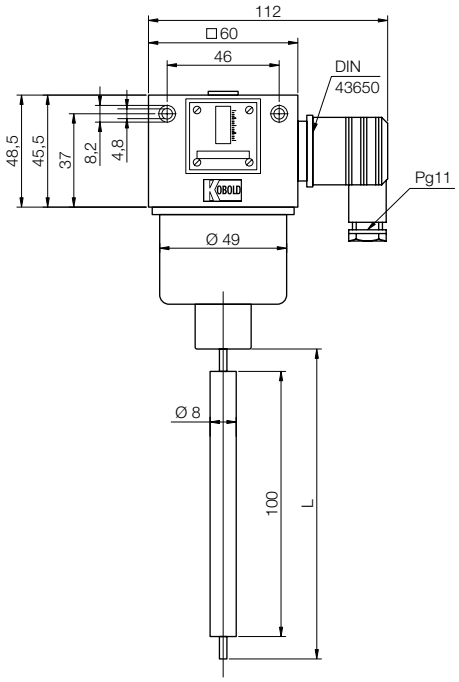
Type of protection Ex II 2 GD EEx de IIC T6 IP65 T80 °C

Model	Range of adjustment	Switching difference (mean value)	Max. permissible temperature at sensor
TER-EX-TRM 022	-20 / +20 °C	1.0 K (fixed)	70 °C
TER-EX-TRM 40	0 / +40 °C	1.0 K (fixed)	70 °C
TER-EX-TRM 150	+10 / +50 °C	1.0 K (fixed)	70 °C

Description

The KOBOLD rod thermostats can be installed as immersion thermostats in pipelines and containers and for monitoring temperature in air ducts. The suitable immersion tube has to be chosen according to the application.
(Immersion tubes see page 34).

Dimensions



Technical Details (not for Ex-versions)

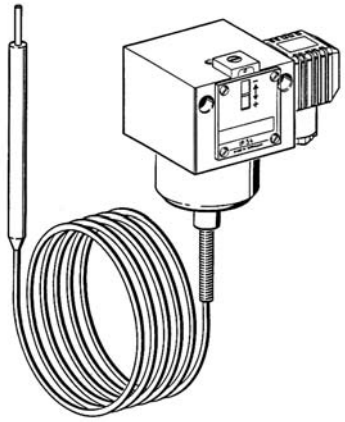
Housing:	Die-cast metal GD Al Si 12 to DIN 1725
Mounting position:	optional
Max. ambient temperature at the switching device:	70 °C (60 °C on Ex-versions)
Max. temperature at the sensor:	see table
Contact comlement:	Single-pole changeover
Protection:	IP 54 to DIN 40050 (in the case of vertical mounting)
Adjustment:	Scale value corresponds with the lower switching point (with falling temperature), the upper switching point is higher by the switching differential
Plug connection:	By means of obliquely angled plug to DIN 43650 (3-pole + earth contact), cable entry Pg 11, max. cable diameter 10 mm. Cable outlet possible in 4 directions (spaced 90° apart); Plug is included
Switching temperature:	Adjustable from outside with screw-driver
Switching difference:	Not adjustable for values see summary of types
Immersion tubes:	see accessories (page 34)

Order Details: (Example: **TER-TX 023**)

Model	Range of adjustment	Immersion depth	Switching difference (mean value)	Max. permissible temperature at sensor
TER-TX 023	-20 to +30 °C	135 mm	1.5 K	110 °C
TER-TX 150	+10 to +50 °C	135 mm	1.5 K	110 °C
TER-TX 490	+40 to +90 °C	135 mm	2.5 K	125 °C
TER-TX 813	+80 to +130 °C	135 mm	4.0 K	150 °C
TER-TXB 023	-20 to +30 °C	220 mm	1.5 K	110 °C
TER-TXB 150	+10 to +50 °C	220 mm	1.5 K	110 °C
TER-TXB 490	+40 to +90 °C	220 mm	2.5 K	125 °C
TER-TXB 813	+80 to +130 °C	220 mm	4.0 K	150 °C

Type of protection Ex II 2 GD EEx de IIC T6 IP65 T80 °C

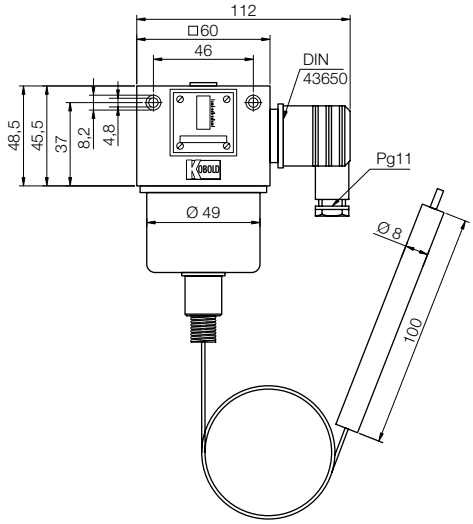
Model	Range of adjustment	Immersion depth	Switching difference (mean value)	Max. permissible temperature at sensor
TER-Ex-TX 023	-20 to +30 °C	135 mm	1.5 K	110 °C
TER-Ex-TX 150	+10 to +50 °C	135 mm	1.5 K	110 °C
TER-Ex-TX 490	+40 to +90 °C	135 mm	2.5 K	125 °C
TER-Ex-TXB 023	-20 to +30 °C	220 mm	1.5 K	110 °C
TER-Ex-TXB 150	+10 to +50 °C	220 mm	1.5 K	110 °C
TER-Ex-TXB 490	+40 to +90 °C	220 mm	2.5 K	125 °C



Description

The sensor cartridge at the end of the capillary tube is the actual active (temperature-sensitive) part of the sensor. Changes in temperature on the capillary tube have no effect on the switching point. Pressuretight installation of the sensor in pressure vessels of all kinds is possible with the aid of immersion tubes. (Immersion tubes see page 34).

Dimensions



Technical Details (not for Ex-versions)

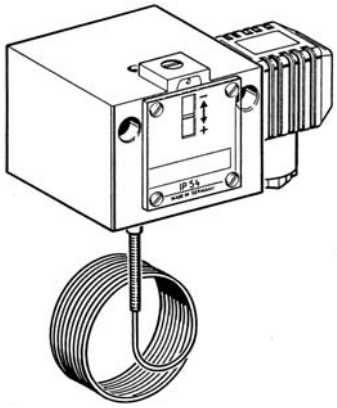
Housing:	Die-cast metal GD Al Si 12 to DIN 1725
Mounting position:	optional
Max. ambient temperature at the switching unit:	70 °C (60 °C on Ex-versions)
Capillary tube:	Cu-Capillary tube, 1.5 m long, other capillary tube lengths are not available
Sensor cartridge:	Ø 8 mm, length 100 mm, material: Cu
Contact comlement:	single-pole changeover
Protection:	IP 54 to DIN 40050 (in the case of vertical mounting)
Installation:	temperature sensor with or without immersion tube in vessels, air ducts etc. switching unit with 2 screws (Ø 4 mm) bulkhead mounting
Adjustment:	scale value corresponds with the lower switching point (with falling temperature), the upper switching point is higher by the switching differential
Plug connection:	by means of obliquely angled plug to DIN 43650 (see the other thermostats)
Switching temperature:	adjustable by means of screwdriver on setting spindle (accessible after removing terminal box cover)
Switching difference:	not adjustable
Immersion tubes:	see accessories (page 34)

Order Details:

Model	Range of adjustment	Switching difference (mean value)	Max. permissible temperature at sensor
TER-TAM 022	-20 to +20 °C	1.5 K	110 °C
TER-TAM 150	+10 to +50 °C	1.5 K	110 °C
TER-TAM 490	+40 to +90 °C	2.0 K	125 °C
TER-TAM 813	+80 to +130 °C	2.0 K	150 °C

Type of protection Ex II 2 GD EEx de IIC T6 IP65 T80 °C

Model	Range of adjustment	Switching difference (mean value)	Max. permissible temperature at sensor
TER-Ex-TAM 022	-20 to +20 °C	1.5 K	110 °C
TER-Ex-TAM 150	+10 to +50 °C	1.5 K	110 °C
TER-Ex-TAM 490	+40 to +90 °C	2.0 K	125 °C
TER-Ex-TAM 813	+80 to +130 °C	2.0 K	150 °C



Description

Frost protection thermostats reliably monitor the temperature in hot water-heated air heaters. If the temperature falls below the set value, the thermostat switches off. A visual or audible »frost hazar« alarm can be switched on at the same time. A fixed stop on the setting spindle at 3 °C prevents the thermostat from being set below the freezing point due to inexpert adjustment.
If the capillary tube is damaged or broken, the frost protection thermostats reliaby switch off towards the safe side (e. g. fan off) irrespective of the temperature at the sensor.

Mode of operation

The TER-FT models with 3 m or 6 m capillary tube detect the temperature over the whole length of the capillary tube and are therefore used to monitor the surface of the whole air heater. If the capillary tube is undercooled at any point, the thermostat switches off.
The frost protection thermostats with reclose prevention (switching units 206) break the circuit at the set value as the temperature falls. The switching state adopted is mechanically latched against automatically switching on again. The latch can only be released again by actuating the unlatching button after the temperature has risen again by approx. 8 °C.

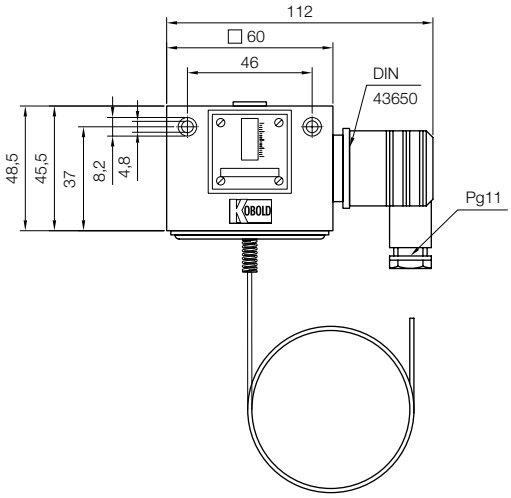
Note:

In the case of TER-FT models care is to be taken to ensure that the ambient temperature at the switching unit does not fall below the set switching point. Also, parts of the capillary tube outside the air heater are not to be lead in areas the temperature of which can fall below the set switching point. Both can lead to premature switch-off.

Technical Details (not for Ex-versions)

Housing:	Die-cast metal GD Al Si 12 to DIN 1725
Sensor:	Cu-capillary tube
Max. ambient temperature at the switching unit:	70 °C (60 °C on Ex-versions)
Contact comlement:	single-pole changeover
Protection:	IP 54 to DIN 40050 (in the case of vertical mounting)
Switching difference:	Permanently set in the factory to approx. 4 K
Adjustment:	Scale value corresponds with the lower switching point (with falling temperature), the upper switching point is higher by the switching differential
Plug connection:	By means of obliquely angled plug to DIN 43650 (3-pole + earth contact), cable entry Pg 11, max. cable diameter 10 mm. Cable outlet possible in 4 directions (spaced 90° apart); plug is included

Dimensions



Order Details:

Model	Model with reclose prevention	Range of adjustment	Max. permissible temperature at sensor	Version
TER-FT 015	TER-FT 015-206	4 - 15 °C	200 °C	6 m capillary tube
TER-FTB 015	TER-FTB 015-206	4 - 15 °C	200 °C	3 m capillary tube

Type of protection Ex II 2 GD EEx de IIC T6 IP65 T80 °C

Model	Range of adjustment	Max. permissible temperature at sensor	Version
TER-Ex-FT 015	4 - 15 °C	130 °C	6 m capillary tube
TER-Ex-FTB 015	4 - 15 °C	130 °C	3 m capillary tube

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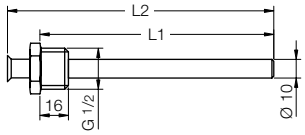
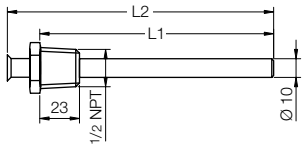
Thermowells

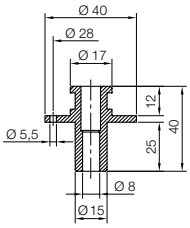
Thermowells G ½, internal Ø 8 mm



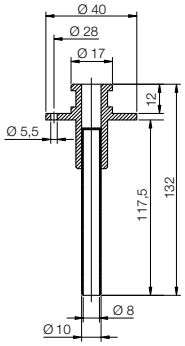
Thermowells ½ NPT, internal Ø 8 mm

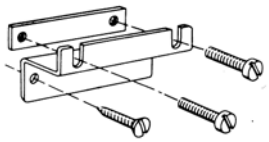


TER-R 6

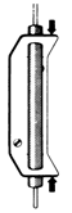


TER-R 7

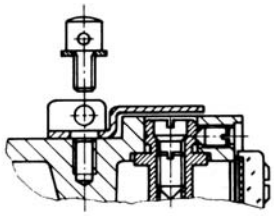


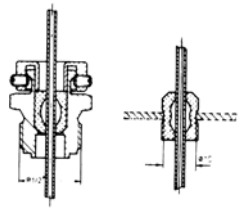


TER-H 2



TER-H 3





Model	Immersion depth L_1 [mm]	Overall length L_2 [mm]	Suitable for
Nickel-plated brass type, G ½, max. permissible pressure: 25 bar			
TER-R 1 / Ms	135	151	TER-TAM...
TER-R 2 / Ms	220	236	
TER-R 3 / Ms	500	516	
TER-R 10 / Ms	135	-	TER-TX...
TER-R 20 / Ms	220	-	
Stainless steel type (1.4571 + 1.4401), G ½, max. permissible pressure: 63 bar			
TER-R 1 / Nst	135	151	TER-TAM...
TER-R 2 / Nst	220	236	
TER-R 10 / Nst	135	-	TER-TX...
TER-R 20 / Nst	220	-	
Nickel-plated brass type, ½ NPT, max. permissible pressure: 25 bar			
TER-RN 1 / Ms	135	151	TER-TAM...
TER-RN 2 / Ms	220	236	
TER-RN 10 / Ms	135	151	TER-TX...
TER-RN 20 / Ms	220	236	
Stainless steel type (1.4571 + 1.4401), ½ NPT, max. permissible pressure: 63 bar			
TER-RN 1 / Nst	135	151	TER-TAM...
TER-RN 2 / Nst	220	236	
TER-RN 10 / Nst	135	151	TER-TX...
TER-RN 20 / Nst	220	236	

Thermowells with fixing flange for air ducts

Material: steel, chromated

TER-R 6	Immersion depth 135 mm	TER-TX...
TER-R 7	Immersion depth 220 mm	

Wall bracket model TER-H 1
including fixing screws and plugs (Ø 6 mm).
Included as standard with model TRM thermostats.

Wall bracket model TER-H 2
for fixing the sensor cartridges of capillary tube thermostats.
Suitable for all TER-TAM... capillary tube thermostats.

Capillary tube holder model TER-H 3
to attach the capillary tube of frost protection thermostats to the frame of the air heater (5 off packed in bag).
Suitable for TER-FT.... frost protection thermostats

Sealing, model TER-P 2
consisting of cover plate and screw for covering and adjusting screws.

Heat conducting compound model TER-WLP 1
to improve the transfer of heat, e. g. in the case of contact thermostats.
Approx. 0.5 cm³ in handy dispenser.

Capillary tube bushing, model TER-R 4
with 3 mm capillary tube screw in thread G ½.
suitable for all models TER-TAM.. and TER-FT...

Capillary tube bushing, model TER-R 5
Rubber plug for 3 mm capillary tube, bore diameter 10 mm.
Not pressure-tight, (5 pcs. packed in bag).
suitable for all models TER-TAM.. and TER-FT...