



# TS-03

## Surface-Mounting Thermostat with Rigid or Flexible Connection



### Description:

Thermostats belonging to the TS-03 series are universally applicable temperature switches which, according to the mounted evaluating unit, are designed as temperature switches, temperature controllers or temperature limiters. The limiter and switch versions can also be supplied with safety engineering which means that, in the event of a defect in the measuring system in the TS-03, an alarm signal triggers and cannot be reset again. Any contamination in the medium under surveillance with the filling in the TS-03 cannot escape undetected under any circumstances. In this, the principle of measuring is simple but very reliable. A fluid or gas is located within the sensor system of the TS-03 depending on the control range. When the temperature rises the filled medium expands. In turn, a micro-switch is activated by means of a mechanical transmission system on reaching the limiting temperature. Depending on the design as a controller, switch or limiter, this switch acts as a change-over or NC-contact which reverts to the initial position either automatically on returning to normal temperature value or manually by releasing the appropriate button. The TS-03 series is available with a rigid or flexible connection so that they can be directly screw mounted into the process or also installed away from the process. The delivery for thermostats with rigid connection includes suitable brass protection tubes, other materials and lengths are available.

### Features

- / Switch, controller or limiter
- / Optionally with safety engineering
- / Temperatures up to +500°C
- / Gas or fluid-filled
- / Brass, steel or stainless steel protection tube

### Application:

Thermostats belonging to the TS-03 series are used wherever any fluid or gaseous medium needs to be reliably monitored for reaching a limiting temperature. The micro-switch used is capable of processing high degree of switching performance and, therefore, capable of switching pumps, magnetic valves or heating rods directly. Thanks to the wide range of connection variants designed for universal application of brass, steel or stainless steel protection tubes including rigid or flexible versions and the various temperature ranges up to +500°C, the limits for the TS-03 are very far fetched which has enabled the devices to achieve a strong market penetration.



# Versions:

## TS-03 Surface-Mounting Thermostat

**Temperature controller:** If the media temperature at the sensor of the temperature controller exceeds the externally adjustable limiting temperature, the micro-switch is actuated by means of the transmission mechanism and the power circuit gets opened or closed. On dropping below the limit (by hysteresis) the micro-switch is reset automatically to initial position.

**Temperature switch:** If the media temperature at the sensor of the temperature controller exceeds the limiting temperature adjustable internally by means of a screw-driver, the micro-switch is actuated by means of the transmission mechanism and the power circuit gets opened or closed. On dropping below the limit (by hysteresis) the micro-switch is reset automatically to initial position.

**Safety temperature switch:** If the media temperature at the safety temperature switch exceeds the limiting temperature adjustable internally by means of a screw-driver, the micro-switch is actuated by means of the transmission mechanism and the power circuit gets broken or closed. On dropping below the limit (by hysteresis) the micro-switch is reset automatically to initial position. In case of possible damage to the measurement system, that is, if the expansion fluid escapes, the pressure in the diaphragm drops and opens the power circuit continuously. Unlocking will no longer be possible. Similarly, if the sensor cools down to below approx. -20°C the power circuit gets opened. Subsequently, on reaching a temperature above approx. -20°C the power circuit is gets closed automatically.

**Safety temperature limiter:** If the media temperature at the safety temperature limiter exceeds the limiting temperature adjustable internally by means of a screw-driver, the micro-switch is actuated by means of the transmission mechanism and the power circuit gets opened or closed. On dropping below the limit (by hysteresis) the micro-switch is reset automatically to initial position. In case of possible damage to the measurement system, that is, if the expansion fluid escapes, the pressure in the diaphragm drops and interrupts the power circuit continuously. Unlocking will no longer be possible. Similarly, if the sensor cools down below approx. -20°C, the power circuit gets opens. Subsequently, on reaching a temperature above approx. -20°C the safety temperature limiter must be unlocked manually.

# Ordering Codes:

<b>Order number</b>	<b>TS-03.</b> [-][T][R][S][1][6]
<b>TS-03 Surface-Mounting Thermostat</b>	
<b>Version as per table 1 (rigid shaft) or table 2 (flexible cord) /</b>	
[ ][ ][ ][ ][ ] e.g TRS16 for temperature controller, rigid shaft 8 x 100 mm stainless steel, 20...150°C, G1/2"	

# Technical Specifications:

<b>Control ranges /</b>	see tables 1 and 2
<b>Filling /</b>	up to +350°C end value of the control range fluid, above this gaseous
<b>Housing /</b>	cover polycarbonate unbreakable, colour pebble gray RAL 7032, bottom part aluminium pressure casting painted, colour anthracite gray RAL 7015
<b>Capillary material /</b>	up to +350°C end value of the control range copper (CU-DHP), (Ø 1,5 mm) above this stainless steel 1.4571
<b>Sensor material /</b>	up to +200°C end value of the control range copper (CU-DHP), above this up to +350°C end value of the control range stainless steel 1.4571 hard soldered, above this stainless steel 1.4571 welded
<b>Capillary length /</b>	see table 2 (liquid filled – max. 5000 mm)
<b>Bending radius of capillary /</b>	max. 5 mm
<b>Ambient temp. /</b>	max. +80°C
<b>Storage temperature /</b>	-50°C...+80°C
<b>Accuracy /</b>	
TR, TW	± 1.5% in the upper 1/3 of the scale ± 6% at the start of scale
STW, STB	+ 0/-5% in the upper 1/3 of the scale + 0/-10% at the start of scale
<b>Hysteresis /</b>	see tables 1 and 2
<b>Temperature error in rigid connection /</b>	
TR, TW	0.08% / K for operating range: < +200°C 0.06% / K for operating range: > +200°C ≤ +350°C 0.14% / K for operating range: > +350°C ≤ +500°C in deviations of +22°C ambient temperature
STW, STB	0.17% / K for operating range: < +200°C 0.13% / K for operating range: > 200°C < +350°C 0.12% / K for operating range: > +350°C ≤ +500°C in deviations of +22°C ambient temperature



**Additional temperature error in flexible connection /**

TR, TW  
 0.047% / K for operating range: < +200°C  
 0.09% / K for operating range:  
 > +200°C ≤ +350°C  
 0.04% / K for operating range:  
 > +350°C ≤ +500°C  
 in deviations of +22°C  
 ambient temperature,  
 per meter of capillary

STW, STB  
 0.054% / K for operating range: < +200°C  
 0.11% / K for operating range:  
 > +200°C ≤ +350°C  
 0.03% / K for operating range:  
 > +350°C ≤ +500°C  
 in deviations of +22°C ambient  
 temperature, per meter of capillary

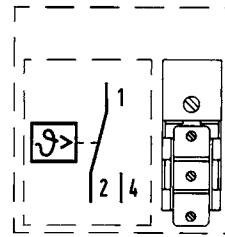
**Process connect. /** see Tables 1 and 2

- Typ A plain cylindrical probe
- Typ U protective sleeve for screw mounting
- Typ UZ protective sleeve for screw mounting with intermediate piece
- Typ UZO protective sleeve for screw mounting with intermediate piece, open
- Typ ES welding sleeve for swivel nut, conical
- Typ EZS welding sleeve for swivel nut with intermediate piece, conical

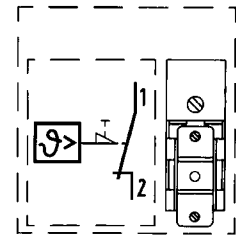
**Rated position /** as per DIN 16 257, NL 0...NL 90

**Weight /** approx. 0.5 kg

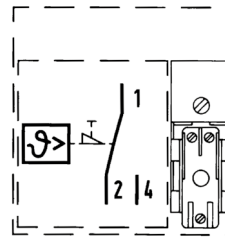
## Electrical Connection:



TR  
 TW  
 STW



STB



STBxS

## Electrical Specifications:

**Connect. element /**

- TR, TW, STW micro-switch with change-over contact
- STB micro-switch with NC-contact and restart lock
- STBxS micro-switch with NC-contact, restart lock and additional signal contact

**Switching load /**

for hysteresis > 2%  
 max. 230 VAC +10%, 10 (2) A, cos Phi = 1 (0.6)  
 or max. 230 VDC +10%, 0.25 A  
 for hysteresis ≤ 2%  
 max. 230 VAC +10%, 6 (1.2) A, cos Phi = 1 (0.6)

**Cable insertion /**

choke nipple M20 x 1.5 for 8...10 mm  
 cable diameter

**Protection class /**

IP54



**Table 1**

Version Code	Shaft	Function	Control range in °C	Hysteresis in %	Process connection	Imm. tube Ø x length [mm]
TRS01	rigid	TR	-10°C .. +40°C	3-4	U G1/2"	8 x 200
TRS03	rigid	TR	0°C .. 50°C	1.5	U G1/2"	15 x 100 CrNi
TRS09	rigid	TR	0°C .. 100°C	3-4	U G1/2"	8 x 120
TRS10	rigid	TR	0°C .. 100°C	3-4	U G1/2"	8 x 120 CrNi
TRS11	rigid	TR	0°C .. 100°C	3-4	U G1/2"	8 x 150
TRS12	rigid	TR	0°C .. 100°C	1.5	U G1/2"	8 x 200
TRS13	rigid	TR	0°C .. 100°C	3-4	U G1/2"	8 x 200
TRS16	rigid	TR	20°C .. 150°C	3-4	U G1/2"	8 x 100
TRS18	rigid	TR	20°C .. 150°C	3-4	U G1/2"	8 x 200
TRS19	rigid	TR	20°C .. 150°C	3-4	U G1/2"	8 x 300
TRS20b	rigid	TR	50°C .. 200°C	3-4	UZ G1/2"	8 x 200 CrNi
TRS21	rigid	TR	50°C .. 300°C	3-4	UZ G1/2"	8 x 150 CrNi
TRS22b	rigid	TR	20°C .. 500°C	5	UZ G1/2"	8 x 200 CrNi
TWS01	rigid	TW	-10°C .. +40°C	3-4	U G1/2"	8 x 200
TWS03	rigid	TW	0°C .. 50°C	1.5	U G1/2"	15 x 100 CrNi
TWS04	rigid	TW	0°C .. 50°C	3-4	U G1/2"	8 x 200
TWS06	rigid	TW	20°C .. 90°C	1.5	U G1/2"	15 x 100
TWS07	rigid	TW	20°C .. 90°C	6-8	U G1/2"	15 x 100
TWS08	rigid	TW	20°C .. 90°C	3-4	U G1/2"	8 x 150
TWS10	rigid	TW	0°C .. 100°C	3-4	U G1/2"	8 x 120
TWS11	rigid	TW	0°C .. 100°C	3-4	U G1/2"	8 x 120 CrNi
TWS12	rigid	TW	0°C .. 100°C	3-4	U G1/2"	8 x 150
TWS13	rigid	TW	0°C .. 100°C	3-4	U G1/2"	8 x 200
TWS14	rigid	TW	0°C .. 100°C	3-4	U G1/2"	8 x 300
TWS16	rigid	TW	20°C .. 150°C	3-4	U G1/2"	8 x 100
TWS17	rigid	TW	20°C .. 150°C	3-4	U G1/2"	8 x 100 CrNi
TWS18	rigid	TW	20°C .. 150°C	3-4	U G1/2"	8 x 200
TWS19	rigid	TW	20°C .. 150°C	3-4	U G1/2"	8 x 200 CrNi
TWS20	rigid	TW	20°C .. 150°C	3-4	U G1/2"	8 x 300
TWS21	rigid	TW	50°C .. 200°C	3-4	UZ G1/2"	8 x 120 CrNi
TWS22	rigid	TW	50°C .. 200°C	3-4	UZ G1/2"	8 x 200 CrNi
TWS25	rigid	TW	50°C .. 300°C	3-4	UZ G1/2"	8 x 150 CrNi
TWS26	rigid	TW	20°C .. 500°C	5	UZ G1/2"	8 x 200 CrNi
STWS01	rigid	STW	20°C .. 150°C	4-6	U G1/2"	8 x 150
STWS02	rigid	STW	50°C .. 300°C	5	UZ G1/2"	8 X 200 CrNi
STWS03	rigid	STW	50°C .. 350°C	4-6	EZS G3/4"	170 steel conical
STWS04	rigid	STW	20°C .. 500°C	7	UZO G1/2"	8 X 200 CrNi
STBS01	rigid	STB	30°C .. 110°C	-	U G1/2"	8 x 150
STBS02	rigid	STB	30°C .. 110°C	-	U G1/2"	8 x 200
STBS03	rigid	STB	30°C .. 110°C	-	U G1/2"	8 x 300
STBS04	rigid	STB	60°C .. 130°C	-	U G1/2"	8 x 150
STBS05	rigid	STB	60°C .. 130°C	-	U G1/2"	8 x 200
STBS06	rigid	STB	20°C .. 150°C	-	U G1/2"	8 x 200
STBS07	rigid	STB	130°C .. 200°C	-	UZ G1/2"	8 x 150 CrNi
STBS08	rigid	STB	130°C .. 200°C	-	UZ G1/2"	8 x 300 CrNi
STBS09	rigid	STB	50°C .. 300°C	-	UZ G1/2"	8 x 200 CrNi
STBS10S	rigid	STB	30°C .. 110°C	-	U G1/2"	8 x 150
STBS11S	rigid	STB	20°C .. 150°C	-	U G1/2"	8 x 200
STBS12S	rigid	STB	50°C .. 300°C	-	UZ G1/2"	8 x 200 CrNi
STBS13S	rigid	STB	50°C .. 350°C	-	EZS G3/4"	170 steel conical
STBS14S	rigid	STB	20°C .. 500°C	-	UZO G1/2"	8 x 200 CrNi
STBS15S	rigid	STB	20°C .. 500°C	-	UZ G1/2"	8 x 200 CrNi



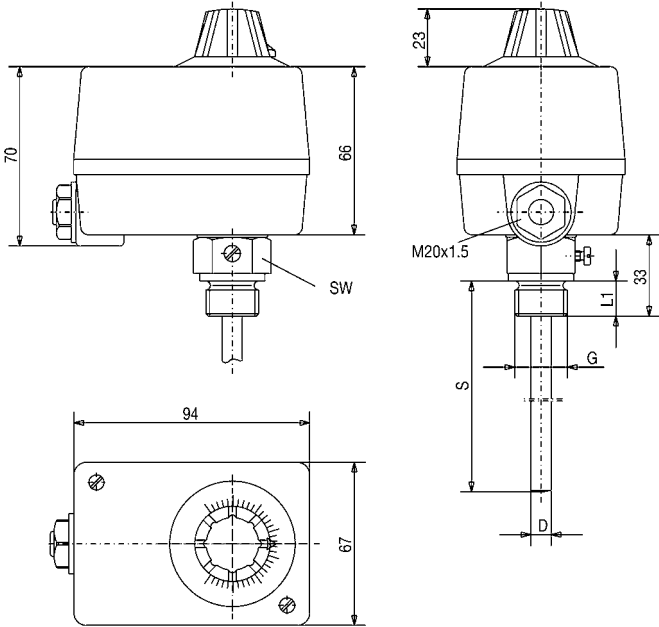
Table 2

Version Code	Shaft	Function	Control range in °C	Hysteresis in %	Capillary in mm	Process connection	Sensor Ø x length [mm]
TRF01	flexible	TR	-10°C...+40°C	3-4	1000	A	6 x 185
TRF04	flexible	TR	0°C...100°C	3-4	1000	A	6 x 107
TRF05	flexible	TR	20°C...150°C	3-4	1000	A	6 x 88
TRF06	flexible	TR	50°C...300°C	3-4	1000	A	6 x 63
TRF07	flexible	TR	20°C...500°C	5	1000	A	6 x 148
TWF01	flexible	TW	0°C...50°C	3-4	1000	A	6 x 185
TWF04	flexible	TW	0°C...100°C	3-4	1000	A	6 x 107
TWF05	flexible	TW	0°C...100°C	3-4	2000	A	6 x 107
TWF06	flexible	TW	20°C...150°C	3-4	1000	A	6 x 88
TWF07	flexible	TW	20°C...150°C	3-4	2000	A	6 x 88
TWF08	flexible	TW	50°C...200°C	3-4	1000	A	6 x 101
TWF10	flexible	TW	50°C...300°C	3-4	1000	A	6 x 63
TWF11	flexible	TW	50°C...300°C	3-4	2000	A	6 x 63
TWF12	flexible	TW	20°C...500°C	5	1000	A	6 x 148
TWF13	flexible	TW	20°C...500°C	5	2000	A	6 x 148
STWF01	flexible	STW	20°C...500°C	7	4000	ES G3/4"	200
STBF02	flexible	STB	30°C...110°C	-	1000	A	6 x 108
STBF03	flexible	STB	30°C...110°C	-	2000	A	6 x 108
STBF05	flexible	STB	20°C...150°C	-	1000	A	6 x 77
STBF06	flexible	STB	20°C...150°C	-	2000	A	6 x 77
STBF07S	flexible	STB	20°C...150°C	-	1000	A	6 x 77
STBF08	flexible	STB	50°C...200°C	-	2000	A	6 x 85
STBF09S	flexible	STB	50°C...200°C	-	1000	A	6 x 85
STBF11	flexible	STB	50°C...300°C	-	1000	A	6 x 55
STBF12	flexible	STB	50°C...300°C	-	2000	A	6 x 55
STBF13S	flexible	STB	50°C...300°C	-	1000	A	6 x 55
STBF14	flexible	STB	20°C...500°C	-	1000	A	6 x 127
STBF15S	flexible	STB	20°C...500°C	-	1000	A	6 x 127
STBF16S	flexible	STB	20°C...500°C	-	2000	A	6 x 127
STBF17S	flexible	STB	20°C...500°C	-	4000	ES G3/4"	200

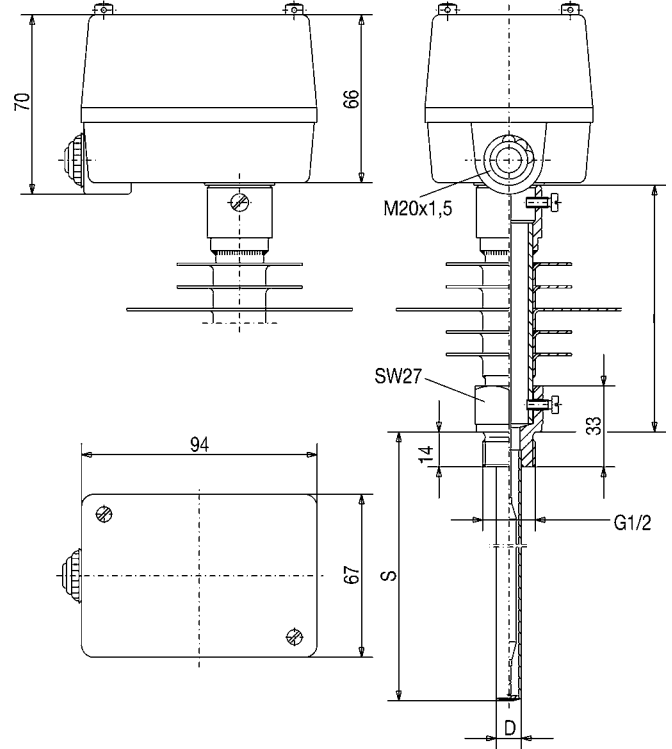


# Dimensions in mm:

TR with sleeve „U“



TW/STW with sleeve „UZ“



STB, flexible, with sleeve „U“

