

TSO, TSH: Room thermostats

How energy efficiency is improved

Provides demand-led control of HVAC components.

Areas of application

Intelligent unitary temperature control in residential and business premises for activation of, for example, electric heating systems, burners and cooling equipment.

Features

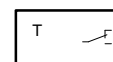
- Variable room temperature as setpoint based on printed temperature scale
- Other versions are available, e.g. for thermal feedback, night set-back, fan switches, switches for heating and cooling
- Suitable for fitting onto walls or recessed junction boxes
- Setpoint adjuster with mechanical min. and max. limits to range

Technical description

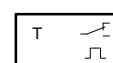
- Housing: 76 × 76 mm, made of flame-retardant, pure white thermoplastic (RAL 9010)
- Base made of black thermoplastic with membrane sensor and contact system
- Cable inlet at rear; screw terminals for wire of up to 1.5 mm²
- Switching capacity: up to 10 A



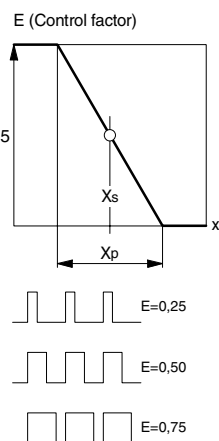
T06804



Y01933



Y01934



B01806

Type	Mode switch	Additional feature ¹⁾	Output for ¹⁾	Voltage	Wiring diagram
Without thermal feedback ²⁾ : switching difference 1.3 K					
TSO 670 F001	–	–	H/C	–	A05777
TSO 672 F001	Heating-Off-Cooling	–	H//C	–	A05779
With thermal feedback ³⁾ : dynamic switching difference 0.5 K					
TSH 670 F002	–	–	H/C	230 V~	A05778
TSH 676 F002	–	N/R	H/C	230 V~	A07877
Power supply 230 V~ ⁴⁾	± 10%, 50/60 Hz		With feedback		
Switch rating 230 V~ TSO 672, 673	10 (2.5) A Cooling: 5 (1.5) A		P-band		approx. 3 K
Switch rating 24 V~ 24 V=	min. 0,2 A max. 1 A		Shortest switching period		approx. 19 min (E = 0.5)
Range	5...30 °C		Ambient temperature		0...50 °C
Night reduction (N/R)	approx. 5 K		Weight		0.11
Time behaviour in air still	17 min		Degree of protection		IP 20 (EN 60529)
moving (0.2 m/s)	13 min		Protection class		II (IEC 60730)
			Wiring diagram		see table of types
			Dimension drawing		M06652
			Fitting instructions		MV 505473

Accessories

0362225 001* Intermediate cover plate, pure white, for fitting onto recessed junction boxes on walls

0303124 000* Recessed junction box (only in conjunction with the cover plate 0362225 001)

^{*)} Dimension drawing or wiring diagram are available under the same number

- 1) N/R= Normal/Reduced for external clock
H/C = Heating or Cooling, depending on the connection; H//C = Heating or Cooling, switchable
- 2) Devices without thermal feedback are pure 2-point controllers. Stated here is the static switching difference, i.e. for very slow changes in temperature. Where temperatures change more quickly, the time constant must be taken into account.
- 3) Devices with thermal feedback are made to pulse by an integrated heating resistor. The control factor falls as the temperature rises, i.e. control is proportional. The pulsing causes a small temperature deviation of ± 0.1...0.5 K, depending on the room's time constant.
- 4) 10% higher voltage results in: a P-band of approx. 4 K; a switching period of 15 min; a reduction of approx. 0.5 K in the actual value.

Operation

A membrane sensor expands in relation to temperature, thereby activating an electric switch. The operating points of the controller are determined by the setpoint and the switching difference.

Without thermal feedback

The contacts change over only when the room temperature has changed by the amount of switching difference. The setpoint equals the upper switching point.

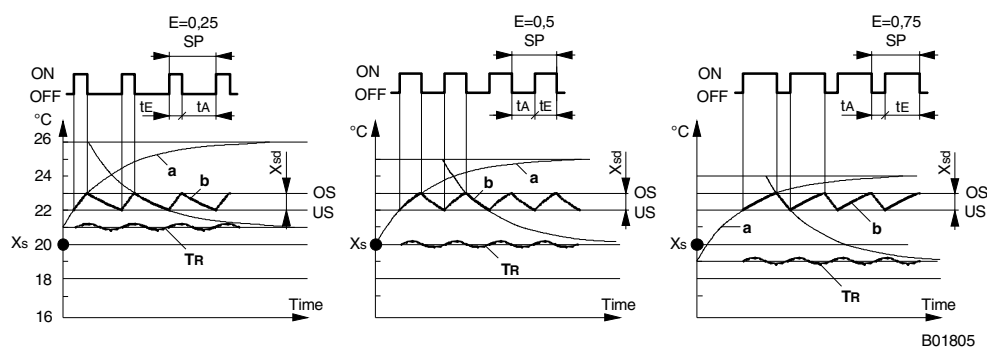
With thermal feedback

To keep the temperature variation in the room as low as possible, the membrane sensor is warmed up in the heating phase by a heating element. The maximum excess temperature of 5.5 K is larger than the switching difference; for this reason, the thermostat switches itself on and off, even when the room temperature remains constant. When the room temperature equals the setpoint, the switching pulses are the same length for both on and off (control factor $E = 0,5$). When the room temperature rises a little, the 'on' pulses become shorter and the 'off' pulses longer. This provides quasi-continuous P-control with a P-band $XP = 3$ K and a maximum remaining control deviation of $XP/2$. Due to the pulse modulation, the room temperature varies by an amount such as that which arises from the shortest switching period (10 minutes ON, 10 minutes OFF). The resultant temperature variation amounts to only 0.1 to 0.5 K, depending on the time constant.

With thermal night setback

In order to reduce the room temperature, the membrane sensor is heated by a small heating element. This causes the temperature level in the housing to increase by about 5 K; the controller reacts by reducing the room temperature accordingly. This 'night setback' can be activated externally via a time-switch.

- On the TSO 625, the night setback can be switched on and off at the controller. A red LED lights up whenever the setback is activated.



Key

X_S	setpoint	t_E	length of time switched on
X_p	P-band	t_A	length of time switched off
X_{Sd}	switching difference	SP	switching period ($t_E + t_A$)
T_R	room temperature	E	control factor (t_E/SP)
OS	upper switching point	a	transient response of thermal feedback
US	lower switching point	b	temperature at membrane sensor

Engineering and fitting notes

The voltage tolerances stated above are necessary because the rating of the feedback heating element is dependent on them to a great extent. An over-voltage of 10% results in: 20% more performance; a P-band of 4 K; a switching period of 15 minutes instead of 19; and a setback in room temperature of 0.5 K.

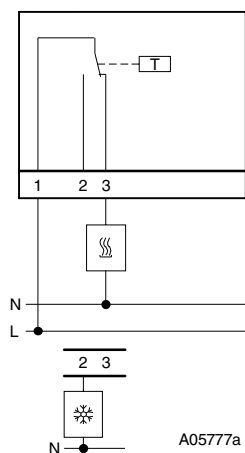
Additional technical data

CE conformity as per	
EMC Directive 73/23/EC	EN 60730-1/ EN 60730-2-9
EMC Directive 89/336/EC	EN 55014 Art. 4.2

Wiring diagrams

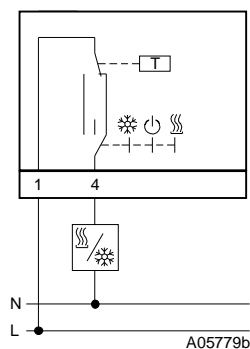
TSO 670

heating or cooling



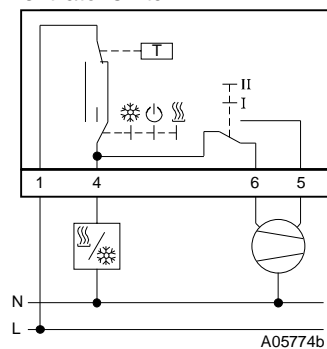
TSO 672

heating-off-cooling



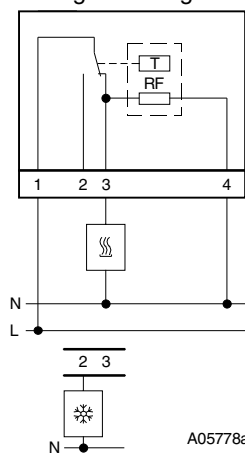
TSO 673

heating-off-cooling,
ventilator switch I-II



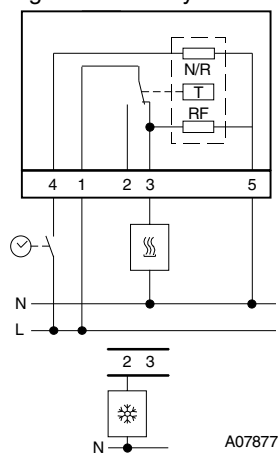
TSH 670

with feedback,
heating or cooling



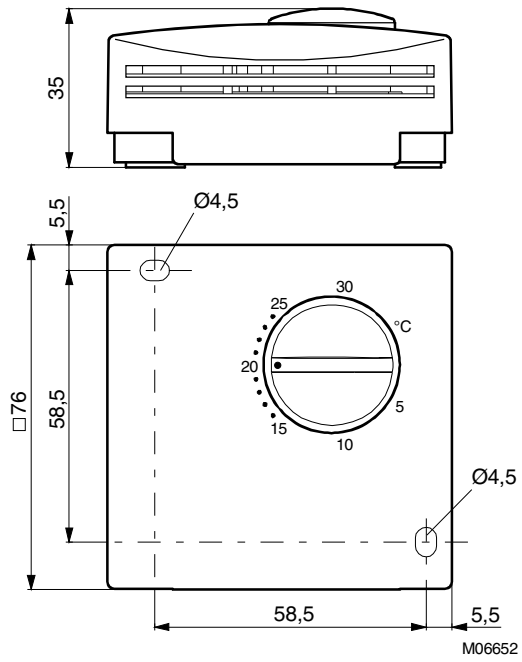
TSH 676

with feedback,
night reduction by clock

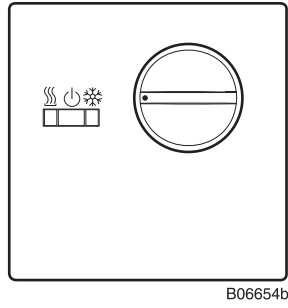


RF thermal feedback
N/R normal/reduced (night reduction)

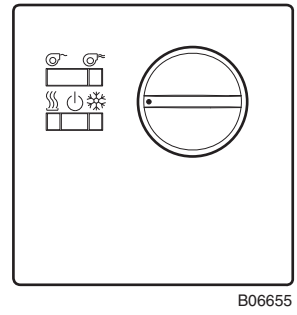
Dimension drawings



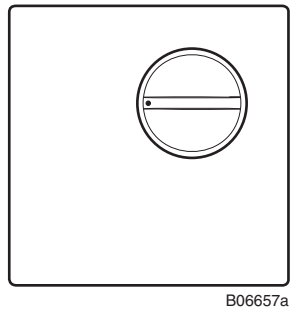
TSO 672



TSO 673

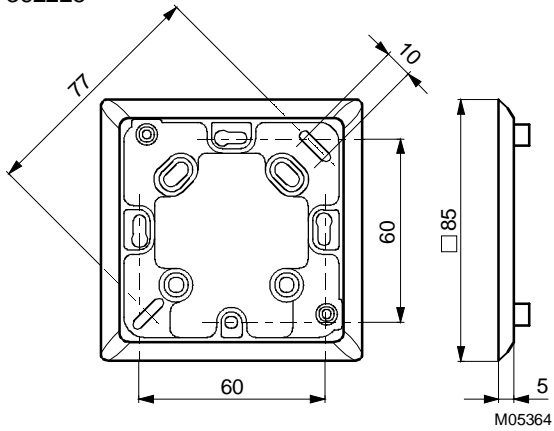


TSO 670
TSH 670, TSH 676



Accessories

362225



303124

