TSM Series
Temperature Setpoint Module with Digital Display

Features
- Large easy-to-read liquid crystal display (LCD), with LED backlight (white)
- Setpoint range of 0-40ºC in 0.5 K steps
- Choice of 2-10 or 0-10 VDC for both remote temperature setpoint and measured temperature outputs via same jumper setting
- Retains last entered settings on power resumption
- System key is available at TSM-02-xx model only
- External temperature sensor capability
- Direct resistance temperature detector (RTD) output is available

Configurable operating parameters via setup menu for TSM-02-xx Models only
- Choice of ºC or ºF temperature display via parameter setup menu for TSM-02-xx models only
- Field recalibration capability of measured temperature
- High and low setpoint limits
- Choice of constant display of measured temperature or temperature setpoint value

General
The TSM Series temperature setpoint modules are designed for use with DDC air handling and terminal unit controllers. The bi-directional rotating dial enables the room occupant to adjust the working setpoint of the controller within the range of 0 to 40ºC.

A 0(2)-10 VDC output signal proportional to 0-40ºC range is also available to the remote controller as the ambient sensing temperature.

A system key, when available, enables the occupant to switch the mode of operation of the controller in 6 different ways. A corresponding display icon on the LCD shows which relevant mode being in action.

Ordering
To order, specify complete model number.

Figure 1: Dimensions in mm

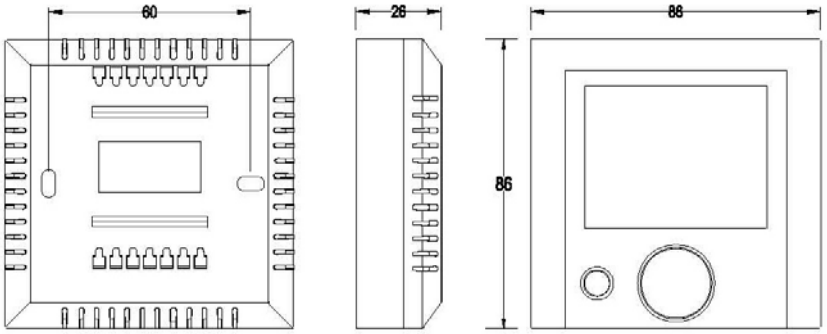
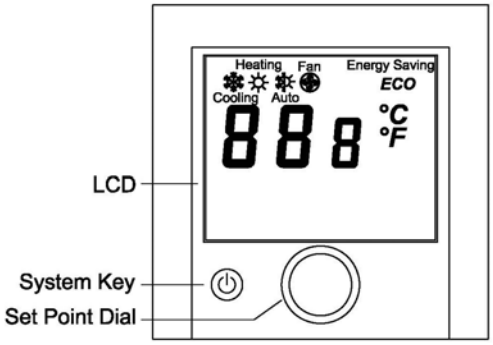


Figure 2: Display Control Unit and LCD Layout



Note: System key is only available at TSM-02-xx model.

Specifications

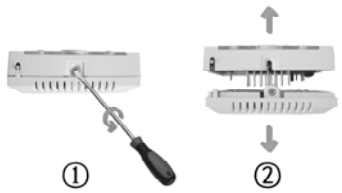
Product model numbers	See Figure 2: Model Number Selection Table
Power requirements	24 V ±15%, 50/60 Hz
Power consumption	1 VA @ 24 VAC
Setpoint value and measured temperature outputs	2-10 or 0-10 VDC, selectable by same jumper
Optional control output	24 VAC @0.3 A
Optional resistance output	NTC thermistor Type 103AT or Pt1000 sensor Type DIN EN60751
Analog output load impedance	Minimum 10,000 Ω
Analog output source impedance	Maximum 1,000 Ω
Temperature display range	0-40°C in 0.5 K increments: accuracy ±1 K (32-99ºF in 0.5 R increments, accuracy ±1 R)
Temperature setpoint range	0-40°C in 0.5 K increments (32-99ºF in 1.0 R increments), initial factory setting 22°C (71°F)
Temperature set point limits	Field adjustable 0-40ºC (32-99ºF) in 1 K increments
Constant display on LCD	Choice of measured temperature or temperature setpoint value
Offset adjustment of temperature indication (field recalibration)	+2, +1, 0, -1 and -2 K (+2, +1, 0, -1 and -2 R) throughout the range, factory setting 0
Sensor sampling time	2 s
Built-in sensing element	NTC thermistor, 10 kΩ @ 25°C, ±1%
Upper and lower comfort setpoint limits	Adjustable 0-40°C (32 to 99ºF)
Enclosure	Material: self-extinguishing, molded ABS
	Finish: off white housing and grey faceplate
Protective class	IP30
Ambient/Storage temperature limits	0 to 50ºC / -30 to 50ºC, 10% to 90% RH non-condensing
Electrical ratings	Thyristor output: 24 V, 0.3 A resistive, 0.3 A inductive, 50/60 Hz
Connectors	Non-removable screw-type terminal blocks and removable wire plugs
Power wires	Wire size 1 mm^2 or 18 AWG solid copper recommended
Sensor and signal wires	22 AWG twisted shielded pair double-insulated cable
Accessories and options	See Figure 5: Accessories and Options
Agency approval	CE Mark compliant to EMC Directive pending
Dimensions	See Figure 1: Dimensions in mm

The performance specifications above are nominal and subject to tolerances and application variables of generally acceptable industry standards. The manufacturer shall not be liable for damages resulting from misapplication or misuse of its products.

Figure 2: Model Number Selection Table

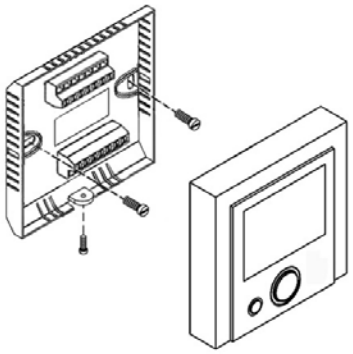
Model Number	0(2)-10 VDC Setpoint Output	0(2)-10 VDC Temperature Output	24 VAC Output	NTC Thermistor Type 103AT Output	Pt1000 SensorType DIN EN60751 Output
TSM-01-00	√	√			
TSM-01-01	√	√		√	
TSM-01-02	√	√			√
TSM-02-00	√	√	√		
TSM-02-01	√	√	√	√	
TSM-02-02	√	√	√		√

Figure 3: Cover Removal Procedure



1. Loosen the fixed screw.
2. Slightly twist the screw driver to crack open the cover from the base.
3. Hold the base firmly with one hand and remove the cover with another hand by pulling away from the base forcibly.

Figure 4: Mounting Details



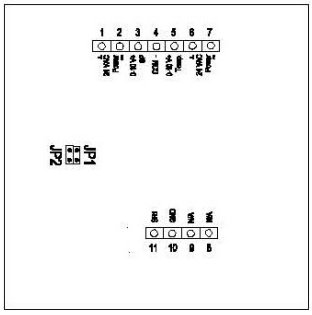
Mounting

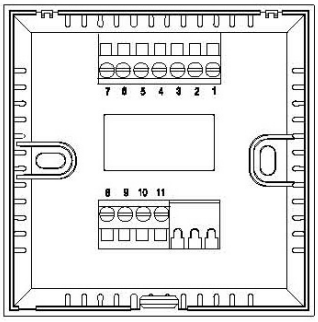
The temperature controller can be surface mounted or secured to a standard European 75 x 75 x 35 mm electrical box. See Figure 4: Mounting Details. Two mounting screws are included.

Figure 5: Accessories

Description	Part No.
Probe-type Temperature Sensor	TE10-1
Duct-mount Temperature Sensor	TE10-2

Figure 6: Wiring Terminals and Jumper Settings





Jumper Settings		
Jumper Number	Jumper in Open Position	Jumper in Closed Position
JP1	With External Sensor	With Built-in Sensor
JP2	For 2-10 VDC Output	For 0-10 VDC Output
Note: Factory setting of JP2 is 0-10 VDC.		

Module Errors Reporting

When the following errors are reported on the LED display unit, these errors will prevent the controller from normal operation and all controller functions will be locked out:

E-1 EEPROM read/write error
E-2* Temperature sensor open-circuited
E-3 Temperature sensor short-circuited

* If jumper JP1 is cut open and external sensor is used, E-2 means the external sensor may have been disconnected from Terminals SR1 and GND. Check the external sensor's connectivity and resistive value. If E-2 error is still reported, return the thermostat to the manufacturer for repair.

When the error E-1 or E-3 is reported or when the error E-2 is reported without jumper JP1 being cut and external sensor being installed, return the thermostat to the manufacturer for repair.

Application Notes

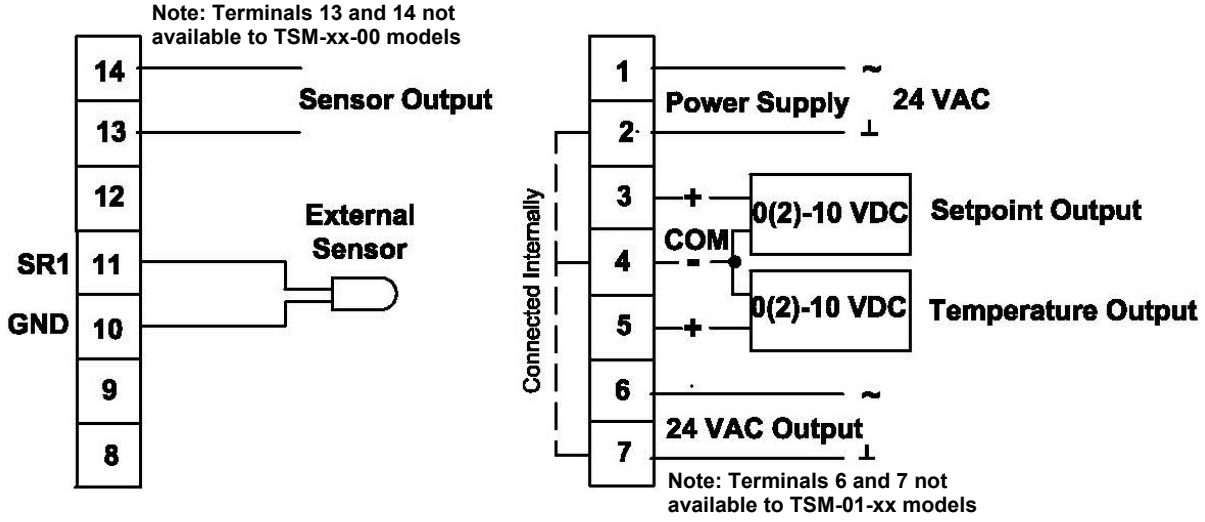
- Move jumper JP1 to open position if external sensor is wired to Terminals 10 and 11.
- Move jumper JP2 to open position if 2-10 VDC proportional output is required.
- 22 or 24 AWG twisted shielded pair double-insulated cable is recommended as external sensor wiring and its length must not exceed 25 m.
- Do not bundle and run power wiring and external sensor wiring in the same conduit.
- When using the external temperature sensor, run the wires away from any electric motors or power wiring. Failure to do so may result in poor module performance due to electrical noise.
- The temperature displayed on the module screen is always a measurement of the built-in or external NTC thermistor sensor.
- When the direct RTD output is connected, recalibration may be required at the receiving controller to show the actual temperature..
- For standard models, It is highly recommended that the 24 VAC power supply is interlocked to the air-conditioning system so that the module is shut down when the air-conditioning system is turned off.

Operation Notes

- LCD displays measured temperature constantly except when setpoint adjustment is being made.
- The backlight will turn on for 5 seconds when the adjustment dial is being rotated.
- Increase or decrease temperature set point by rotating the adjustment dial clockwise or counter-clockwise. During the dial rotation, the LCD shows the set point value.
- When the TSM-02-xx module is first powered up, there will be no LCD display until the system key is pressed momentarily. Meanwhile, the 24 VAC control signal output at Terminals 6 and 7 is turned on.
- Only TSM-02-xx module allows authorized service agent to change the following operating parameters in the field:

Function	Symbol	Description
MCU firmware (software) revision level	0	Appears after entering the setup menu
Choice of temperature engineering unit	1	1-C = ºC (factory setting) 1-F = ºF
Offset adjustment of temperature indication (field recalibration of measured temperature)	3	3 2 = temperature indication plus 2 degrees 3 1 = temperature indication plus 1 degree 3 0 = no offset (factory setting) 3- 1 = temperature indication minus 1 degree 3-2 = temperature indication minus 2 degrees
Choice of display icon to show on-off status	n	n- 1 = none (factory setting) n-2 = cooling n-3 = heating n-4 = auto n-5 = fan n-6 = ECO
Upper comfort setpoint limit setting	E	To set upper occupied set point limit, adjustable between current lower set point limit value and 40°C (99ºF), factory setting 40°C (99ºF). The program is set such that there is always a minimum separation of 4 degrees maintained between the upper occupied set point limit value and the lower set point limit value.
Lower comfort setpoint limit setting	F	To set lower occupied set point limit, adjustable between current upper set point limit value and 0°C (32ºF), factory setting 0°C (32ºF). The program is set such that there is always a minimum separation of 4 degrees maintained between the upper occupied set point limit value and the lower set point limit value.
Choice of constant display of measured temperature or temperature setpoint value	u	u- 1 = constant display of ambient temperature (factory setting) u-2 = constant display of set point value
Restoration of default factory settings	rS	rS 1 = Retain current settings (factory setting) rS2 = Restore default factory settings

Figure 7: Wiring Diagrams



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