Dwyer®
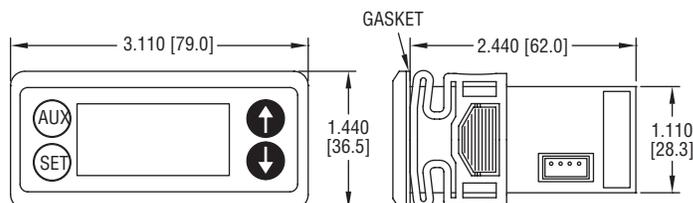
Series TST Digital Temperature Switch

Specifications - Installation and Operating Instructions

Panel cutout 2-51/64˝ x 1-9/64˝ (71 x 29 mm)

The **Series TST Digital Temperature Switch** is designed with many heating and cooling applications in mind. It accepts either PTC or NTC temperature probe types and features 23 parameters including set point, hysteresis, cycle time, and ambient probe adjustment for precise control. Programming performed by either the front keypad or the TS2-K programming key. Standard features include capacitive touch buttons, Modbus® communication, temperature alarms with internal buzzer, and password protected parameter settings.

MODEL CHART	
Model	**Supply Power**
TST-011	115 VAC
TST-021	230 VAC
TST-031	12 VAC/VDC
TST-041	24 VAC/VDC

INSTALLATION

Note: Unit must be mounted away from vibration, impacts, water and corrosive gases.
• Cut hole in panel 2.80 x 1.14 inches (71 x 29 mm).
• Use the included gasket, or apply silicone around the parameter of the hole to prevent leakage.
• Insert the unit into the hole in panel.
• Slide removable fitting clips onto unit from back until secure to panel.
• Wire the unit per the wiring diagram on the product label or by figures below. Avoid installing temperature probe wiring in the proximity of power cables.
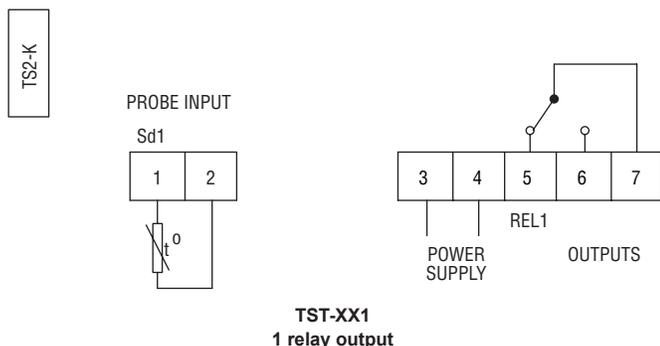
SPECIFICATIONS
Probe Range: PTC: -58 to 302°F (-50 to 150°C); NTC: -58 to 230°F (-50 to 110°C).
Input: PTC (1000 Ω @ 25°C) or NTC (10 KΩ @ 25°C) thermistor.
Output: SPDT relay rated 16 A @ 240 VAC resistive, 10 FLA, 60 LRA.
Horsepower Rating (HP): 1 HP.
Control Type: On/Off.
Power Requirements: 115 VAC, 230 VAC, 24 VAC/VDC, or 12 VAC/VDC.
Power Consumption: 4 VA @ 115/230 VAC; 1.5 VA @ 12/24 VAC/VDC.
Accuracy: ±1% FS.
Display: 3-digit, plus sign.
Resolution: 0.1°.
Memory Backup: Nonvolatile memory.
Ambient Temperature: 32 to 131°F (0 to 55°C).
Storage Temperature: -4 to 176°F (-20 to 80°C).
Weight: 115 and 230 V models: 7.2 oz (204 g); 12 and 24 V models: 4.8 oz (136 g).
Front Panel Rating: IP65.
Agency Approvals: CE, cURus.

Wiring Diagram

**TST-XX1
1 relay output**

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List of Parameters

	Description	Units	Range
SP	Set point	Degrees	r1 to r2
r0	Differential or hysteresis	Degrees	1 to 20
r1	Lower limit for SP	Degrees	-58 to r2
r2	Higher limit for SP	Degrees	r1 to 302
d0	Control type	Option	Ht / Co
d2	Defrosting duration	Minutes	0 to 59
d8	Defrosting interval time	Hours	0 to 24
c0	Minimum stopping time	Minutes	0 to 59
c1	Cool cycle duration	Hours	0 to 24
c2	ON time of fault cycle	Minutes	0 to 999
c3	OFF time of fault cycle	Minutes	0 to 999
A0	Alarm differential or hysteresis	Degrees	1 to 20
A1	Maximum alarm temperature	Degrees	1 to 90
A2	Minimum alarm temperature	Degrees	1 to 90
A7	Alarm time validation	Minutes	0 to 999
P0	Temperature Scale	Option	0°C / 0°F
P1	Ambient Probe Adjustment	Degrees	-10 to 10
P4	Decimal Point	Option	Yes or No
H0	Factory Settings	Option	0
H4	Address	Numeric	0 to 999
H5	Access code to parameters	Numeric	0 to 255
H6	Probe type	Option	PTC or NTC
t0	Maximum displayed temperature	Degrees	-58 to 302

Parameter Descriptions

SP = Set Point. Temperature wished to regulate the machine. Can vary from r1 to r2.
r0 = Set Point Differential.
r1 = Lower Set Point Limit.
r2 = Upper Set Point Limit.
d0 = Control Type. Ht = Heating control; Co = Cooling control. Heating: If the temperature is $\geq$ SP, then the load is disconnected. If the temperature is $\leq$ SP-r0, then the load is connected. Cooling: If the temperature is $\leq$ SP, then the load is disconnected. If the temperature is $\geq$ SP+r0, then the load is connected.
d2 = Defrost Duration. If d2 = 0, then defrosting will not start.
d8 = Defrost Period, in hours. If d8 = 0, then defrosting will not start.
c0 = Minimum Load Off Time.
c1 = Cool Cycle Duration.
c2 = ON Time of Fault Cycle. (See Fault Cycle).
c3 = OFF Time of Fault Cycle. (See Fault Cycle).
A0 = Alarm Differential.
A1 = High Alarm. If temperature is $\geq$ SP+A1, then High Alarm is ON. If temperature is $\leq$ SP+A1-A0, then High Alarm is OFF.
A2 = Low Alarm. If temperature is $\leq$ SP-A2, then Low Alarm is ON. If temperature is $\geq$ SP-A2+A0, then Low Alarm is OFF.
A7 = Alarm Delay. Delay time from when the alarm condition occurs until alarm is activated, in minutes.
P0 = Temperature Scale, °C or °F.
P1 = Ambient Probe Adjustment. Probe reading offset correction, in degrees. If the probe is not placed in the exact point to control, use a standard thermometer to offset the measured temperature..
P4 = Decimal Point. Display decimal point in normal operation. Always present in parameter menus.
H0 = Factory Settings. (See Resetting to Factory Defaults).
H4 = Device Network Address.
H5 = Parameters Access Code. Factory-set as 00.
H6 = Probe Type. PTC or NTC.
t0 = Temperature Display Limit. Maximum temperature shown on the display during defrost, although the real temperature may be higher.

Resetting to Factory Defaults

Access parameter H0 as explained in Parameter Programming and choose configuration 0. Press and hold SET for 2 seconds. The thermostat will reset and the factory default values will be loaded.

Parameter Programming
Note: Set point is the only parameter accessible without access code.

Set Point
- Press SET. SP will appear on the display.
- Press SET again. The set point value is shown on the display and can be modified with the UP and DOWN arrows.
- Press SET to confirm any new values.
- Press SET and DOWN simultaneously to quit programming or wait one minute for the display to automatically exit programming mode.

Protected Parameters
- Press and hold SET for 8 seconds. The access code value 00 is shown on the display.
- Using the UP and DOWN arrows, enter the access code (factory-set code is 00).
- Press SET to enter the code. If correct, the first parameter label will be shown on the display (SP).
- Use the UP and DOWN arrows to move to desired parameter and SET to view parameter value.
- While viewing a parameter value, use the UP and DOWN arrows to modify parameter value. Use SET to enter value and exit parameter. Repeat until all necessary parameters are modified.
- Press SET and DOWN simultaneously to quit programming or wait one minute to automatically exit programming mode.

Activating and Deactivating Manual Defrost Cycle
Press and hold the AUX button for 2 seconds to activate defrosting. Repeat this process to stop the defrosting. If a cool cycle is activated, the defrosting is disabled.

Activating and Deactivating Cool Cycle
Press and hold the DOWN arrow for 8 seconds to activate a continuous cool cycle. Repeat this process to stop the cool cycle. If defrosting is activated, the cool cycle is disabled.

Fault Cycle
If the probe fails, the load is connected for the time set in c2 and then disconnected for the time set in c3. In case of memory error, the load is connected for 5 minutes and then disconnected for 5 minutes.

LED Indication and Display Messages
❄ : Indicates if the load is connected. If continuous cool cycle is being performed, this LED flashes (90% ON, 10% OFF). If the unit is waiting the stopping time value stored in c0 to start a cool cycle the LED flashes (10% ON, 90% OFF).
💧 : Indicates if defrosting is active.
((•)) : Indicates an active alarm. The LED will flash if the alarm is cleared, but the alarm condition persists.

If an alarm or error occurs, the following messages will be shown and an internal buzzer will sound.

ALH	=	High temperature alarm
ALL	=	Low temperature alarm
Er	=	Memory error
oo	=	Open probe error
--	=	Short circuit probe error

The alarm can be cleared and buzzer silenced by pressing the DOWN button. The alarm message will not be shown, but the alarm LED will flash while the alarm condition persists.

MAINTENANCE/REPAIR
Upon final installation of the Series TST no routine maintenance is required. The Series TST is not field serviceable and should be returned if repair is needed. Field repair should not be attempted and may void warranty.

CLEANING & REPAIR
Clean the surface of the display controller with a soft, damp cloth. Never use abrasive detergents, petrol, alcohol, or solvents.

WARRANTY/RETURN
Refer to "Terms and Conditions of Sale" in our catalog and on our website. Contact customer service to receive a Return Goods Authorization number before shipping the product back for repair. Be sure to include a brief description of the problem plus any additional application notes.