The **SERIES TSWB** Digital Temperature Switch has a high and a low set point for controlling the water temperature. The low set point can either be manually or automatically reset. This control also has a conductivity probe input. This input supplies 12 VAC to the probe to check for low water condition. There are three relay outputs which can be assigned in the field to the high temperature set point, low temperature set point or the low water level input. The Model TS2-K configuration key can make configuring multiple controls quick and easy.

### Model References

- **Display Color**:
  - 0 = Red
  - 1 = Green

- **Units**:
  - 0 = °F
  - 1 = °C

- **Power Supply**:
  - 1 = 115 VAC
  - 2 = 230 VAC
  - 3 = 12 VAC/VDC
  - 4 = 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.
- Apply silicone (or rubber gasket) around the perimeter of the hole to prevent leakage.
- Insert unit into hole of panel.
- Slide removable fitting clips onto unit from the back until secure to panel.
- Wiring diagram is displayed on the top of the unit.

**Note**: DO NOT INSTALL PROBE CABLE NEAR POWER CABLES.

### Specifications

<table>
<thead>
<tr>
<th>Probe Range</th>
<th>PTC -58 to 302°F (-50°C to 150°C); NTC -58 to 230°F (-50°C to 110°C).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probe Temperature Input</td>
<td>(Selectable by parameter) PTC1000 probes (25°C-1000 Ohm) / NTC.</td>
</tr>
<tr>
<td>Probe Level Input</td>
<td>Conductivity Probe: max Voltage 12 VAC. Sensitivity established from factory at 100KOhm.</td>
</tr>
<tr>
<td>Output</td>
<td>R1 SPST NO Relay Resistive load 5A @ 250 VAC; R2 SPST NC Relay Resistive load 5A @ 250 VAC; R3 SPDT Relay Resistive load 16A @ 240 VAC.</td>
</tr>
<tr>
<td>Horsepower Rating</td>
<td>1HP -- 10FLA, 60LRA 250 VAC.</td>
</tr>
<tr>
<td>Control Type</td>
<td>On/Off.</td>
</tr>
<tr>
<td>Power Requirement</td>
<td>115 VAC ± 10%, 230 VAC ± 10%, 24 VAC/DC ± 10%, 12 VAC/DC ± 10%.</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>4VA (230V/115V) 1.5VA (24V/12V).</td>
</tr>
<tr>
<td>Accuracy</td>
<td>Better than 1% of full scale.</td>
</tr>
<tr>
<td>Display</td>
<td>3-digit, red 1/2&quot; digits.</td>
</tr>
<tr>
<td>Resolution</td>
<td>1° (3 digits).</td>
</tr>
<tr>
<td>Memory Backup</td>
<td>Nonvolatile memory.</td>
</tr>
<tr>
<td>Ambient Operating Temperature</td>
<td>32 to 158°F (-30 to 70°C).</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-4 to 176°F (-30 to 80°C).</td>
</tr>
<tr>
<td>Weight</td>
<td>3.5 oz.</td>
</tr>
<tr>
<td>Front Protection</td>
<td>IP64.</td>
</tr>
<tr>
<td>Agency Approvals</td>
<td>CE, cULus.</td>
</tr>
</tbody>
</table>

### Wiring Diagram

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**PROBE INPUTS**

- **TEMP**: 1
- **CONDUC.**: 2
- **5**: R1
- **6**: R2
- **7**: R30
- **8**: COM
- **9**: R3C
- **10**: Output
- **11**: Power Supply

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**POWER SUPPLY**

- **SUPPLY**: 4, 3, 2

**OUTPUTS**

- **1**: 115 VAC
- **2**: 230 VAC
- **3**: 12 VAC/VDC
- **4**: 24 VAC/VDC

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**DISPLAY**

- **Red (0)**
- **Green (1)**

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**UNITS**

- **°F (0)**
- **°C (1)**
**List of Parameters**

<table>
<thead>
<tr>
<th>Description</th>
<th>Units</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSP</td>
<td>Degrees</td>
<td>r1 to r2</td>
</tr>
<tr>
<td>LSP</td>
<td>Degrees</td>
<td>r3 to r4</td>
</tr>
<tr>
<td>r0h</td>
<td>Degrees</td>
<td>1 to 99</td>
</tr>
<tr>
<td>r1</td>
<td>Degrees</td>
<td>-58 to r2</td>
</tr>
<tr>
<td>r2</td>
<td>Degrees</td>
<td>r1 to 302</td>
</tr>
<tr>
<td>r3</td>
<td>Degrees</td>
<td>-58 to r4</td>
</tr>
<tr>
<td>r4</td>
<td>Degrees</td>
<td>r3 to 302</td>
</tr>
<tr>
<td>t1</td>
<td>Minutes</td>
<td>0 to 999</td>
</tr>
<tr>
<td>A0</td>
<td>Range</td>
<td>Auto/hol/Bot</td>
</tr>
<tr>
<td>Out</td>
<td>Numeric</td>
<td>1 to 7</td>
</tr>
<tr>
<td>P1</td>
<td>Degrees</td>
<td>-30 to 30</td>
</tr>
<tr>
<td>P5</td>
<td>Range</td>
<td>PTC/NTC</td>
</tr>
<tr>
<td>H6</td>
<td>Numeric</td>
<td>0 to 255</td>
</tr>
</tbody>
</table>

**Parameters Descriptions**

HSP = High set point. (variable from r1 to r2).
- Temperature of probe > HSP --> relay excites.
- Temperature of probe < HSP-r0 --> relay de-excites.

LSP = Low set point. (variable from r3 to r4).
- Temperature of probe < LSP --> relay de-excites.
- Temperature of probe > LSP+r0 --> relay excites.

r0h = Differential or hysteresis for HSP.

r1 = Lower value for HSP.

r2 = Higher value for HSP.

r3 = Lower value for LSP.

r4 = Higher value for LSP.

t1 = Time for revalue LSP condition.

**Access to all code protected parameters.**

- Press SET for 8 seconds. The access code value 0 is shown on the display (unit comes with code set at 0 from factory).
- With the UP and DOWN arrows, code can be set to user needs.
- Press SET to enter code. If code correct, the first parameter label is shown on the display (HSP).
- Move to the desired parameter with the UP and DOWN Keys.
- Press SET to view the value on the display.
- The value can be modified with the UP and DOWN arrows.
- Press SET to enter the value and exit.
- Repeat until all necessary parameters are modified.
- Press SET and DOWN at the same time to quit programming or wait one minute and the display will automatically exit programming mode.

*The keyboard code can be reset to ZERO by turning off the controller and turning it on again while keeping the SET pressed.*

**Water Control**

A water level sensor can be connected to the digital input. When the control detects an open signal, the unit is low on water. In this case the water LED on the face of the control lights and the relay given by Out is excited. When the control detects a closed signal, it indicates the presence of water and the water LED is switched off and the correspondent relay is de-excited.

**Default Working**

In case of probe error or memory error:
- the relay output R1 will remain Open.
- the relay output R2 will remain Close.
- the relay output R3 will remain Open.

**LED Indication and Display Messages**

Flame LED indicates the stove is out of wood or corn.
- The water LED indicates the unit is low on water.

In normal operation, the probe temperature will be shown on the display. In case of alarm or error, the following messages can be shown:
- E01 = Memory Error
- 000 = Open Probe Error
- 001 = Short Circuit Probe Error

**MAINTENANCE, CLEANING AND REPAIR**

After final installation of the unit, no routine maintenance is required. Clean the surface of the display controller with a soft and damp cloth. Never use abrasive detergents, petrol, alcohol or solvents. All repairs must be made by authorized personnel.