**TB/TC, /TI, /TO Thermistor Temperature Sensors**

**Description**

A range of low cost thermistor sensors comprising insertion, clamp-on, and outside air versions. A quick-release lid makes the TB/T.. range easy to install.

The insertion sensor may be used for duct or immersion purposes. It has a 6 mm diameter brass probe which is suitable for retrofit immersion applications and will fit most existing pockets (universal fitting kit option). Brass and stainless steel pockets are available. A foam gasket is fitted, and an adjustable depth flange option is available for its use as a duct sensor, enabling the insertion depth to be adjusted.

**Features**

- Low cost
- High quality thermistors
- Brass probes
- M20 conduit entry with M16 cable gland
- IP67 housing
- Quarter turn quick release lid
- Easy to wire
- Universal fitting kit option for retrofit of immersion sensors
- Adjustable insertion depth flange option for duct sensors

**Physical**

<table>
<thead>
<tr>
<th>Insertion sensors (duct/immersion)</th>
<th>Outside air sensor (TB/TO)</th>
<th>Clamp-on sensor (TB/TC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(TB/TI) 400 mm (15.75&quot;) (TB/TI/L)</td>
<td>57 mm (2.24&quot;)</td>
<td>M16 gland 105 mm (4.13&quot;)</td>
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<tr>
<td>6 mm (0.24&quot;)</td>
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<tr>
<td>domed brass probe</td>
<td></td>
<td>2 m (6' 6&quot;) cable</td>
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<tr>
<td>foam gasket fitted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjustable Depth Flange (ACC/DF)</td>
<td>Universal Fitting Kit (ACC/UF)</td>
<td>Pockets</td>
</tr>
<tr>
<td>adjustable insertion depth for duct sensor use</td>
<td>for immersion sensor use in existing pockets</td>
<td>Brass (WB150), Stainless Steel (WS150)</td>
</tr>
<tr>
<td>50 mm (1.97&quot;)</td>
<td></td>
<td>Ø8 mm (0.31&quot;)</td>
</tr>
<tr>
<td>6 mm compression fitting</td>
<td></td>
<td>135 mm (5.31&quot;)</td>
</tr>
<tr>
<td>3 x 4 mm diam. holes on a 30 mm (1.18&quot;) PCD (Pitch Circle Diameter)</td>
<td></td>
<td>14 mm (0.53&quot;)</td>
</tr>
</tbody>
</table>

**TB/TC, /TI, /TO Thermistor Temperature Sensors Data Sheet TA200724 Issue 4, 10-Aug-2015.**
INSTALLATION

TB/TC

Sensor Head

Choose an accessible location for the sensor head, where the element will make good contact with the surface that is to be measured. The probe temperature range is -40 °C to +100 °C (-40 °F to +212 °F). However the sensor’s measurement range is -30 °C to +100 °C (-22 °F to +212 °F).

Strap the sensor head to the pipe using the jubilee clip provided. Wrap the clip around the pipe, pass the sensor head under the strap, and tighten the screw (as shown). Ensure that good contact is made between the sensor head and the surface. Where possible use a thermally conductive paste to ensure a good thermal contact and apply any insulation over both sensing element and pipe.

Junction Box

The junction box should be mounted on a flat surface. Choose a position which is a maximum of 2 m (6½') away from the sensor head. The permitted ambient temperature range is -40 °C to +50 °C (-40 °F to +122 °F). Avoid direct contact with steam.

Screw the junction box in position using suitable wall plugs if required and 2 off No. 6 (M3.5) screws, (85 mm, 3.35” fixing centres).

TB/TI

Mechanical

The probe temperature range is -40 °C to +110 °C (-40 °F to +230 °F); the box range is -40 °C to +50 °C (-40 °F to 122 °F). However the sensor’s measurement range is -30 °C to +110 °C (-22 °F to +230 °F).

Use as a Duct Sensor

Choose a location where the sensor probe will lie in the airstream to be measured.

Sensor with optional flange
If the depth of the probe is to be adjusted, then the sensor must be mounted using the optional flange. Drill a 7 mm (0.28”) diameter hole in the duct and use the mounting flange to mark the position of the 3 fixing holes. Drill the 3 pilot holes and mount flange with 3 off No. 6 x 3/4 S/S screws.

Insert the sensor probe through the flange into the duct to desired depth and tighten the compression fitting.

Sensor direct onto the duct
If the depth of the probe is not to be adjusted then the sensor can be mounted directly on to the duct. Drill a 7 mm diameter hole in the duct and mark the position of the 2 mounting holes with 85 mm (3.35”) mounting centres. Drill 2 pilot holes in the positions marked. Insert the sensor probe into the duct, and screw to the duct with 2 off No. 6 x 3/4 S/S screws.

Use as an Immersion Sensor

New Pocket

Choose an accessible location for the sensor pocket where it will lie in the liquid to be measured. Ensure no stratification in the liquid flow being measured (e.g. downstream of mixing valves or junctions). If used for chilled water ensure pocket is sealed around probe or fill pocket with thermally conducting oil to avoid the build up of condensation in bottom of pocket.

Note that the Brass (WB150) and Stainless Steel (WS150) pockets are not suitable for use in a chlorine rich environment.

Screw the pocket into a ½” BSPT threaded boss using M24 spanner. Apply sealant to boss thread. If the boss is threaded incorrectly, an adaptor should be used.

Slide sensor probe into pocket against spring compression with the cable entry at the desired angle.

Ensure that the end of the probe is hard against the end of the pocket.
Retrofit to existing pocket

The Universal Fitting Kit enables sensor to be mounted in a number of different pocket types.

Adjust position of brass bush on probe so that probe inserts fully into pocket using 2 mm hexagonal socket key to adjust grub screw.

For pockets with a clip retaining groove simply insert probe into pocket and pull the metal clip over the top of the pocket to engage in the groove.

For pockets which hold sensor by a grub screw, tighten pocket grub screw onto brass bush. If necessary, spring and clip can be removed.

TB/TO

Mechanical

Choose an accessible location on a north facing wall (unless in the southern hemisphere), ensuring that the sensor is sited away from direct sunlight, and any heat sources which may come from the building - e.g. heating flues, open windows etc. Do not install the sensor in a location where it will be exposed to temperatures outside the box’s temperature range (-40 °C to +50 °C, -40 °F to 122 °F). However the sensor’s measurement range is -30 °C to +50 °C (-22 °F to +122 °F).

Mark the position of the 2 mounting holes with 85 mm (3.35") mounting centres. Drill holes in the positions marked. Mount the sensor on the wall using suitable wall plugs and 2 off No 6 screws.

CONNECTIONS

Electrical

Connect to the IQ controller is as below:

1. Remove quarter turn quick release lid.
2. Insert cable through cable gland and connect signal wires as shown using either polarity.
3. The cable screen should be terminated at the controller.

Full installation details are given in the individual installation instructions numbered as follows:

- TB/TO Outside Air Thermistor Temperature Sensor Installation Instructions - (TG200725)
- TB/TC Clamp-on Thermistor Temperature Sensor Installation Instructions - (TG200726)
- TB/TI Insertion Thermistor Temperature Sensor Installation Instructions - (TG200727)

ORDER CODES

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>TB/TO</td>
<td>Outside Air Thermistor Temperature Sensor</td>
</tr>
<tr>
<td>TB/TI/S</td>
<td>Insertion Thermistor Temperature Sensor (for duct or immersion use) with foam gasket fitted (short - 150 mm, 5.91&quot;)</td>
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<tr>
<td>TB/TI/L</td>
<td>Insertion Thermistor Temperature Sensor (for duct use) with foam gasket fitted (long - 400 mm, 15.75&quot;)</td>
</tr>
<tr>
<td>TB/TC</td>
<td>Clamp-on Thermistor Temperature Sensor supplied with jubilee clip</td>
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<tr>
<td>WS150</td>
<td>6 mm stainless steel pocket for TB/TI (immersion use)</td>
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<tr>
<td>WB150</td>
<td>6 mm brass pocket for TB/TI (immersion use)</td>
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<tr>
<td>ACC/UF</td>
<td>Universal fitting kit (retrofit to existing pockets) for TB/TI (immersion use)</td>
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<td>ACC/DF</td>
<td>Adjustable depth flange for TB/TI (duct use)</td>
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<td>TB/TI-S/BOX12</td>
<td>Pack of 12 TB/TI/S</td>
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<tr>
<td>TB/TI-L/BOX12</td>
<td>Pack of 12 TB/TI/L</td>
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</tbody>
</table>

DISPOSAL

WEEE Directive:

At the end of their useful life the packaging and product should be disposed of by a suitable recycling centre. Do not dispose of with normal household waste.

Do not burn.
SPECIFICATIONS

Sensing element: Thermistor 10 kΩ at 25 °C

Thermistor accuracy:
-10 °C to +40 °C: ±0.43 °C (14 °F to +104 °F, ±0.77 °F)
-30 °C to +50 °C: ±0.59 °C (-22 °F to +122 °F, ±1.06 °F)
-30 °C to +100 °C: ±1.11 °C (-22 °F to +212 °F, ±2.0 °F)
-30 °C to +110 °C: ±1.28 °C (-22 °F to +230 °F, ±2.30 °F)

Ambient limits:
-30 °C to +110 °C
-30 °C to +100 °C

Humidity: 0 to 95 %RH

Measurement ranges:
/TTC: -30 °C to +50 °C (-22 °F to +122 °F)
/TC: -30 °C to +100 °C (-22 °F to +212 °F)
/TI: -30 °C to +110 °C (-22 °F to +230 °F)

Cable entry: M20 conduit with M16 cable gland

Connections: 1 part screw terminals for 0.5 to 2.5 mm² cross section (20 to 14 AWG) cable

Pockets:
- WB150: Max pressure 13 bar
- WS150: Maximum pressure 25 bar

Dimensions:
- /TC: 57 mm (2.24") x 117 mm (4.61") max diameter, cable 2 m (6'6")
- /TO: 57 mm (2.24") x 102 mm (4.02") max diameter
- /TI: (box)57 mm (2.24") x 105 mm (4.13"), /S probe 150 mm (5.91") x 6 mm (0.24")
- /L probe 400 mm (15.75") x 6 mm (0.24")
- /S probe 150 mm (5.91") x 6 mm (0.24")

Material:
- Impact resistant ABS

Enclosure:
- /TI, /TO probes: Brass
- /TC probe: Plated copper
- WB150: Pocket, stainless steel
- WB150: Pocket, brass

Environmental Protection: IP67 (NEMA6)

EMC:
- EN61326-1:2006
- WB150: Maximum pressure 13 bar
- WS150: Maximum pressure 25 bar

Input channels and sensor scaling:

For IQ controllers link input channel for thermistor, T, and set up the sensor type scaling; the recommended method of setting the sensor type scaling is to use SET.

For all IQ2 series controllers with firmware of version 2.1 or greater, or IQ3/4 series controllers, one of the following SET Unique Sensor References should be used:

- Thermistor TBTO: (-10 °C to +40 °C)
- Thermistor TBTO F: (+14 °F to +104 °F)
- Thermistor TBTC: (-30 °C to +100 °C)
- Thermistor TBTC F: (-22 °F to +212 °F)
- Thermistor TBTI: (-30 °C to +110 °C)
- Thermistor TBTI F: (-22 °F to +230 °F)

Alternatively use sensor scaling mode 5, characterise, and enter the scaling manually as defined in the tables below. Note that for IQ3/4 the scaling mode and exponent (E) don't need to be set up.

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For all other IQ controllers see the Sensor Scaling Reference Card, TB100521A.