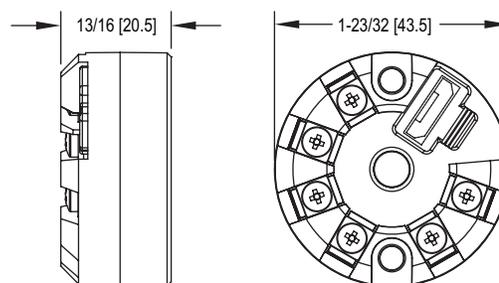




## Model TBU-00 Temperature Transmitter

### Specifications - Installation and Operating Instructions



The **Model TBU-00 Temperature Transmitter** is a high precision temperature transmitter designed to easily mount in most temperature sensor instrument enclosures. The universal input reduces inventory while the micro-USB port facilitates easy configuration, and calibration in the lab or in the field. The versatile TBU model allows for selection and configuration of input type, measurement range, and calibration. The output can be set as either direct 4 to 20 mA, or reverse 20 to 4 mA, through easy to use configuration software.

#### Configuration

During the setup, the transmitter is powered by the USB, and does not require an external power supply. See Figure 1. The transmitter setup can also be made by connecting it to the loop using the loop power supply. There is no electrical insulation between the transmitter and the communication port (interface), therefore do not configure the transmitter when it is connected to the process.

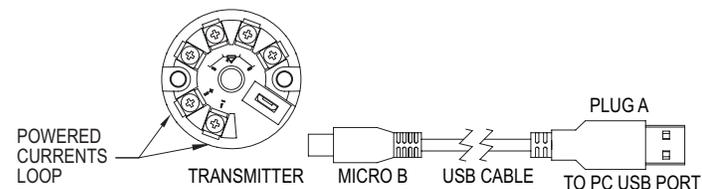


Figure 1: USB cable connections

#### FACTORY SETTING AND CONFIGURATION

When the transmitter is used with the factory setting, no further action is required and the transmitter is ready to be installed. Changes to the configuration are possible through the TBU software, provided free of charge on the Dwyer website. The factory setting for the TBU is for a Pt100 3-wire sensor with a range of 0 to 100°C with 0°C zero correction and an output of 4 to 20 mA.

#### CAUTION

The USB communication port (micro-USB) of the TBU-00 is not electrically insulated from the transmitters input. Connection while equipment is powered may result in equipment damage.

After these connections, the user must run the TBU software. See Figure 2 for software screen.

The fields in the software screen pictured in Figure 2 mean:

- General Information:** This field shows information that identifies the transmitter. This information could be sent to Dwyer Instruments when additional technical assistance is requested.
- Sensor:** Select the type of sensor to be used.
- Measuring Range:** Sets the measurement range of the transmitter.  
**Lower Range Limit:** Equivalent temperature for a current of 4 mA.  
**Upper Range Limit:** Equivalent temperature for a current of 20 mA.  
**Sensor Range:** The values chosen cannot exceed the range of the sensor.  
**Minimum Range:** Do not set a lower band (span) than the minimum range indicated.
- Sensor Failure:** Establishes the output behavior when the transmitter indicates a failure.  
**Minimum:** Output current goes to < 3.6 mA (down-scale), typically used for refrigeration.  
**Maximum:** Output current goes to > 22.0 mA (up-scale), typically used for heating.
- Zero Offset:** Offset allowing for small deviations presented in the transmitter output.
- Send Configuration:** Once set, the setup will be uploaded to the transmitter.
- Read Configuration:** Reads the current setup in the connected transmitter.

#### SPECIFICATIONS

**Input:** Thermocouples J, K, R, S, T, N, E, and B; 2, 3, or 4 wire Pt100 RTD, 2 or 3 wire Pt1000 RTD, 2 wire NTC thermistor, or 0 to 50 mV voltage.

**Output:** Linearized 4 to 20 mA, 2 wire or 20 to 4 mA loop powered.

**Transmitter Type:** 2, 3, or 4 wire.

**Temperature Limits:** -40°F to 185°F (-40 to 85°C).

**Power Requirements:** 10 to 35 VDC.

**Accuracy:** See chart below.

**Temperature Drift:** < ±0.16% / 25°C.

**Response Time:** 1.6 s, typical.

**Weight:** 1.4 oz (40 g).

**Agency Approvals:** CE.

#### ACCURACY CHART

Input Type	Max. Temperature Range	Min. Temperature Range	Accuracy (Typical)
Voltage	0 to 50 mV	5 mV	±0.1% FS
Thermocouple J	-148 to 1400°F (-100 to 760°C)	212°F (100°C)	±0.1% FS
Thermocouple K	-238 to 2498°F (-150 to 1370°C)	212°F (100°C)	±0.1% FS
Thermocouple R/S	-58 to 3200°F (-50 to 1760°C)	752°F (400°C)	±0.1% FS
Thermocouple T	-256 to 752°F (-160 to 400°C)	212°F (100°C)	±0.1% FS
Thermocouple N	-454 to 2372°F (-270 to 1300°C)	212°F (100°C)	±0.1% FS
Thermocouple E	-130 to 1328°F (-90 to 720°C)	212°F (100°C)	±0.1% FS
Thermocouple B	932 to 3308°F (500 to 1820°C)	752°F (400°C)	±0.1% FS
Pt100/Pt1000 RTDs	-328 to 1202°F (-200 to 650°C)	104°F (40°C)	±0.13% FS
NTC Thermistor	-22 to 248°F (-30 to 120°C)	104°F (40°C)	±0.3°C

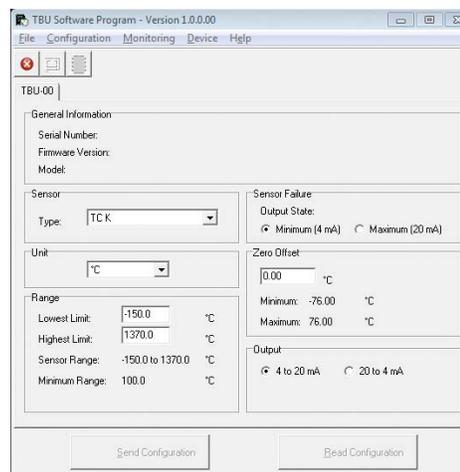


Figure 2: Software screenshot

**MECHANICAL INSTALLATION**

The TBU-00 transmitter is suitable to be installed in instrument enclosures. Vibrations, moisture, extreme temperatures, electro-magnetic interference, high voltage, and other interferences can permanently damage the unit, and could cause an error in the measured value.

**ELECTRICAL INSTALLATION**

Recommended wire size: 26 AWG to 16 AWG (0.14 to 1.5 mm<sup>2</sup>).  
 Recommended terminal torque: 7.08 in-lbf (0.8 Nm).

**RECOMMENDATIONS FOR INSTALLATION**

Separate signal lines from facility power lines. The use of grounded conduit is recommended.

The instrument must be powered from the instrumentation power supply circuit. Transient suppression should be used with inductive loads such as contact coils and solenoids.

**ELECTRICAL CONNECTIONS**

The figures below shows the electrical connections required. Terminals 3, 4, 5 and 6 are dedicated to the sensor connection. **LOAD** represents the 4 to 20 mA current measuring device (indicator, controller, recorder, etc.).

**Note:** When using a Pt100Ω 2-wire RTD, terminals 3 and 4 must be interconnected, according to Figure 3 below. The Pt100 wire length should be less than 12 in (30 cm) to maintain the measurement error within specifications (electrical resistance).

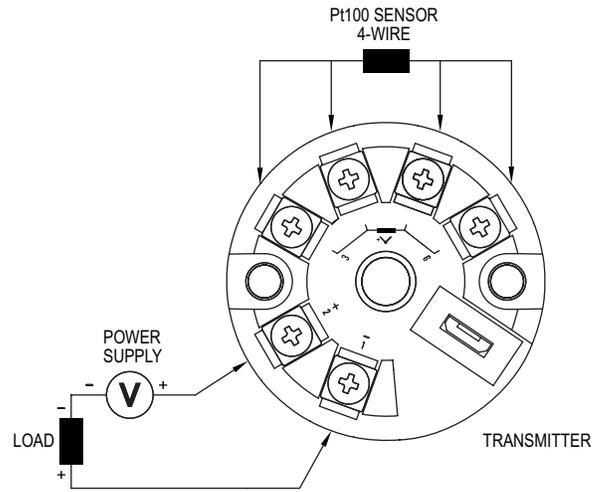


Figure 5: Pt100 4-wire

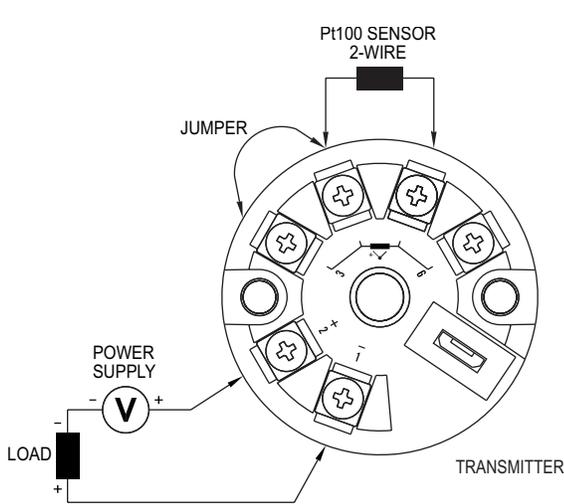


Figure 3: Pt100 2-wire

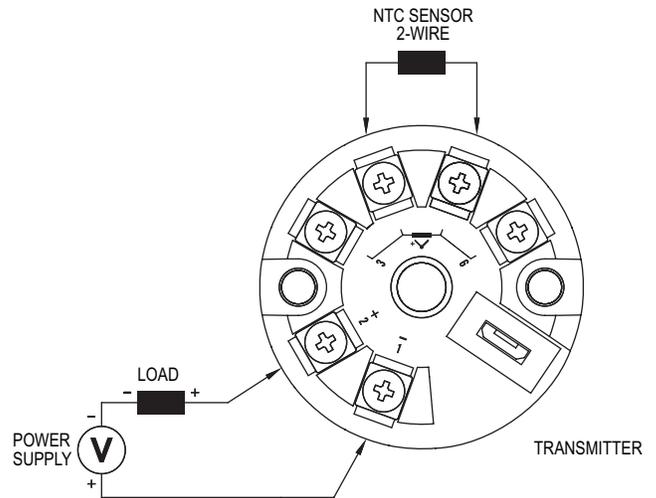


Figure 6: NTC 2-wire

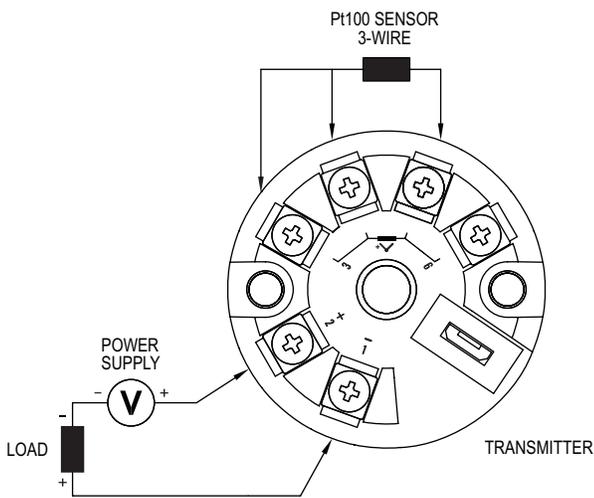


Figure 4: Pt100 3-wire

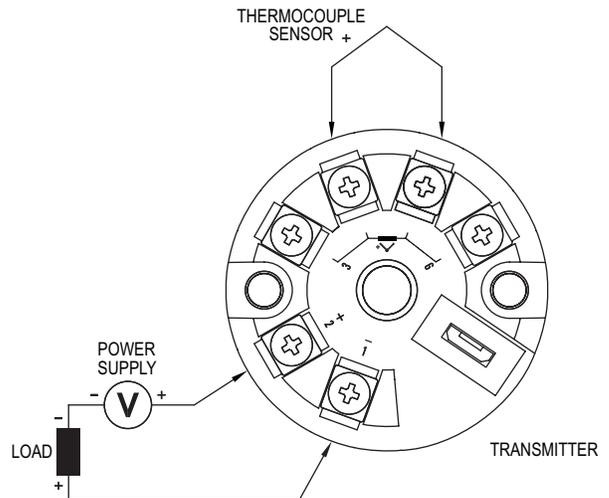


Figure 7: Thermocouples

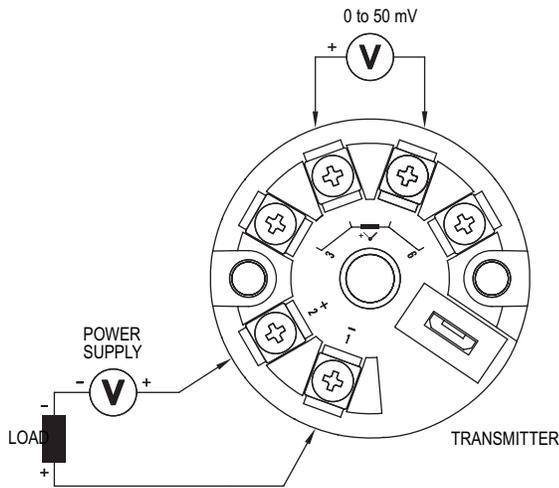


Figure 8: Voltage (0 to 50 mV)

### OPERATION

The sensor offset can be changed through the TBU-00 software. The USB cable may be connected to the transmitter without causing any measurement errors. See item 5 Zero Offset on the first page of this manual.

The user must choose the most suitable sensor and range to the process. The selected range must not exceed the maximum range of measurement defined for the sensor and should not be smaller than the minimum range for the same sensor.

**Note:** The transmitter accuracy is based on the maximum range of the sensor used, even when a narrower range is programmed.

### Example:

- The Pt100 sensor in the range 0 to 100°C and accuracy of 0.12%, the maximum error will be 1.02°C (0.12% of 850 °C )
- The Pt100 sensor in the range of 500 to 600°C and accuracy of 0.19%, the maximum error will be 1.61°C (0.19% of the 850°C )

**Note:** When the measurements are made at the transmitter, ensure the Pt100 excitation current required by the calibrator is compatible with the Pt100 excitation current used in the transmitter: 0.8 mA.

### SAFETY INFORMATION

Any control system design should take into account that any part of the system has the potential to fail. This product is not a protection or safety device and its alarms are not intended to protect against product failures. Independent safety devices should always be provided if personnel or property are at risk.

Product performance and specifications may be affected by its environment and installation. It's the responsibility of the user to assure proper grounding, shielding, cable routing, and electrical noise filtering are in accordance with local regulations, EMC standards, and good installation practices.

### SUPPORT

This product contains no serviceable parts inside. For troubleshooting, visit our frequently asked questions at [www.dwyer-inst.com](http://www.dwyer-inst.com) or contact our technical support team at 1-800-872-9141.

### MAINTENANCE/REPAIR

Upon final installation of the Model TBU, no routine maintenance is required. The Model TBU is not field serviceable and is not possible to repair the unit. Field repair should not be attempted and may void warranty.

### 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.

