



# **TH-4000 Turbidimeter**

## **Operation and Maintenance Manual**

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# TH-4000 Turbidimeter Operation Manual

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# I. OPERATION OF THE TH-4000

## A. Start Up and Installation

1. The TH-4000 will accept any single phase A/C power in the range of 110 to 240 VAC at 50 to 60 Hz. When connecting A/C power to the instrument, it is imperative that the A/C source be well grounded. Insufficient A/C grounding will disrupt proper operation of the instrument.
2. **Sensor Monitor Communication:** Each monitor can be connected to one sensor. The sensor is 24VDC loop powered by the monitor and the sensor provides two 4-20mA signals to the monitor.
3. **Clean Lines:** Ensure that all sample lines are flushed out and clean before feeding sample water to the Turbidimeter.
4. **Sensor Protection:** The sensor should not be exposed directly to extreme temperatures and/or conditions.
5. **Sensor Start Up:** Ensure that the sensor head is clean and allow a few minutes for the reading to stabilize.
6. **Calibration:** The Model TH-4000 Turbidimeters can be calibrated with standard turbidity fluids. The standard can be poured into the flow cell for such span calibrations.
7. **LED Indicators:** The red alarm indicator LED on the front panel will illuminate as long as an alarm condition is present.

## B. Alarms and Output Signals

1. **Acknowledgement of Alarms:** If an alarm condition occurs, the alarm (red) LED will illuminate and the relay will be activated. To acknowledge an alarm (and thereby de-activate [open] the relay contact output) press the  key.

*NOTE: Even after acknowledging the alarm the red LED will remain illuminated until the alarm condition has been removed.*

2. **4-20 mA output channels:** The turbidity sensor has two dedicated 4-20 mA output channels. See Figure 4. AO1 is for channel 1 and AO2 is for channel 2.
3. **Alarm Relay:** The TH-4000 has two alarm relay outputs. These are normally open, non-powered relays. See Figure 4. Relay 1 (NO1/CO1/NC1) is for channel 1 and relay 2 (NO2/CO2/NC2) is for channel 2.

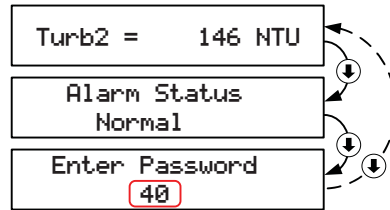
## C. Operation Screens

This section explains the features of the standard operating screens of the TH-4000.

*NOTE: Navigate between the display screens below using the  and  keys. See Figure 1.*

1. **Home Screen:** This screen displays the gas type and reading of the sensor(s).
2. **Status Screen:** This screen shows all present alarm conditions.
3. **Password Screen:** See Section II.A for instructions on this screen and the configuration section.

**FIGURE 1**  
**TH-4000 Operation Mode Screens**



### Status messages

1. **Normal:** Indicates that the sensor reading is above 2 mA and below the high alarm set point.
2. **Alarm:** Indicates that the sensor reading exceeds the high alarm setting. (Meaning that if the alarm setting is at 10.0 NTU, then status will be “Alarm” if the reading is 10.0 NTU or higher.)
3. **Error:** Indicates that the sensor signal is below 2 mA and usually indicates that the sensor is either damaged or not connected.

## II. CONFIGURATION OF PARAMETERS

### Configuration of Sensor Parameters & Calibration of Sensors

Each TH-4000 Turbidimeter will be set up from the factory as per the ordering instructions. However, settings and sensors can be changed using the following procedure.

#### A. Entering Setup:

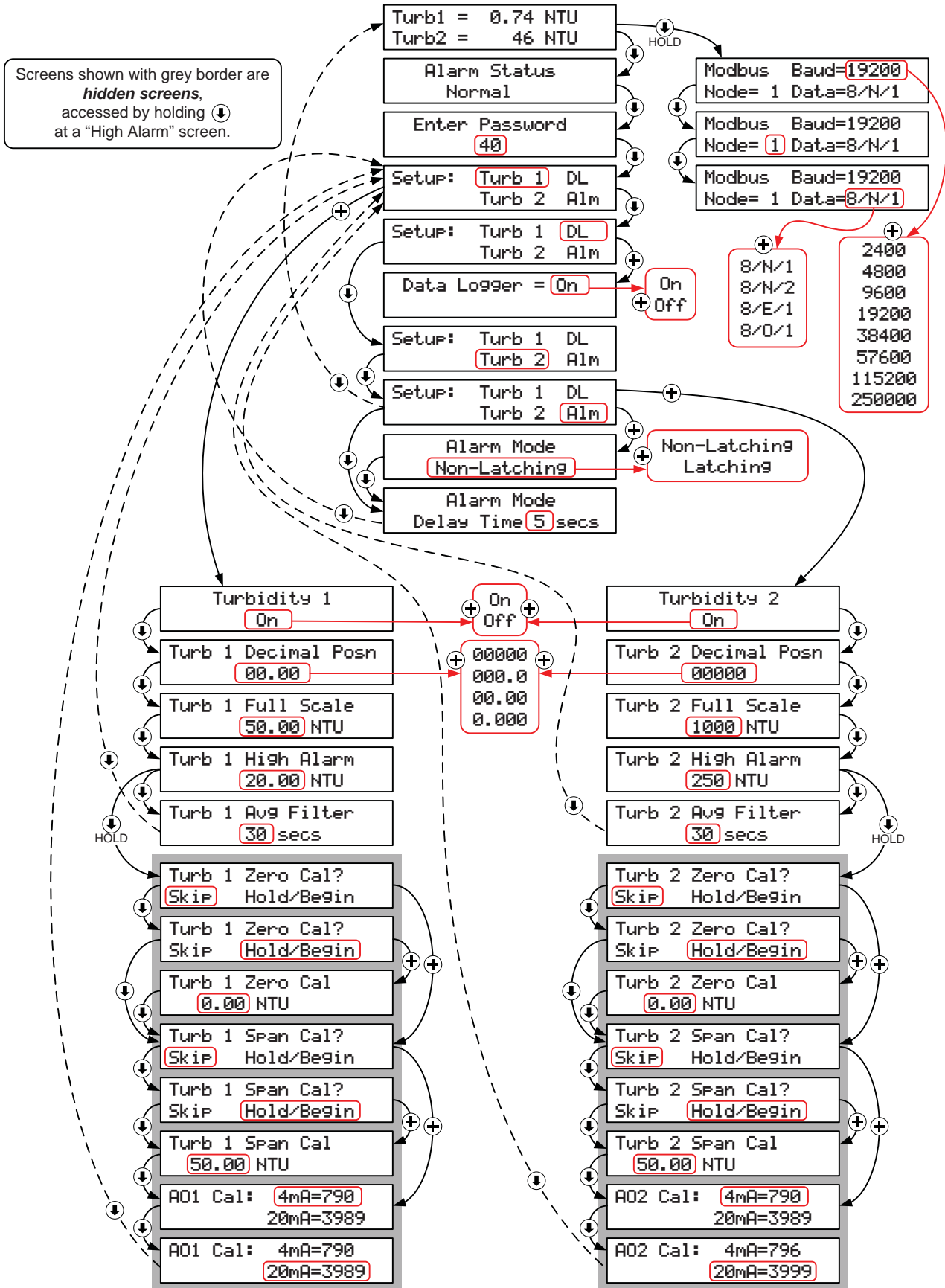
All parameters are set in the password protected setup section.

1. Press the  $\downarrow$  key until the password screen is reached.
2. Use the  $\oplus$  and  $\ominus$  keys to set the password. The password is “40”.
3. Press the  $\downarrow$  key.

#### B. Configuring Each Channel

See Figure 2. The selected channel will flash. Move between the channels with the  $\uparrow$  and  $\downarrow$  keys. When the desired channel is flashing, press the  $\oplus$  key to enter setup for that channel. Setup for each channel is identical.

**FIGURE 2: TH-4000 All Screens**



# III. TROUBLESHOOTING

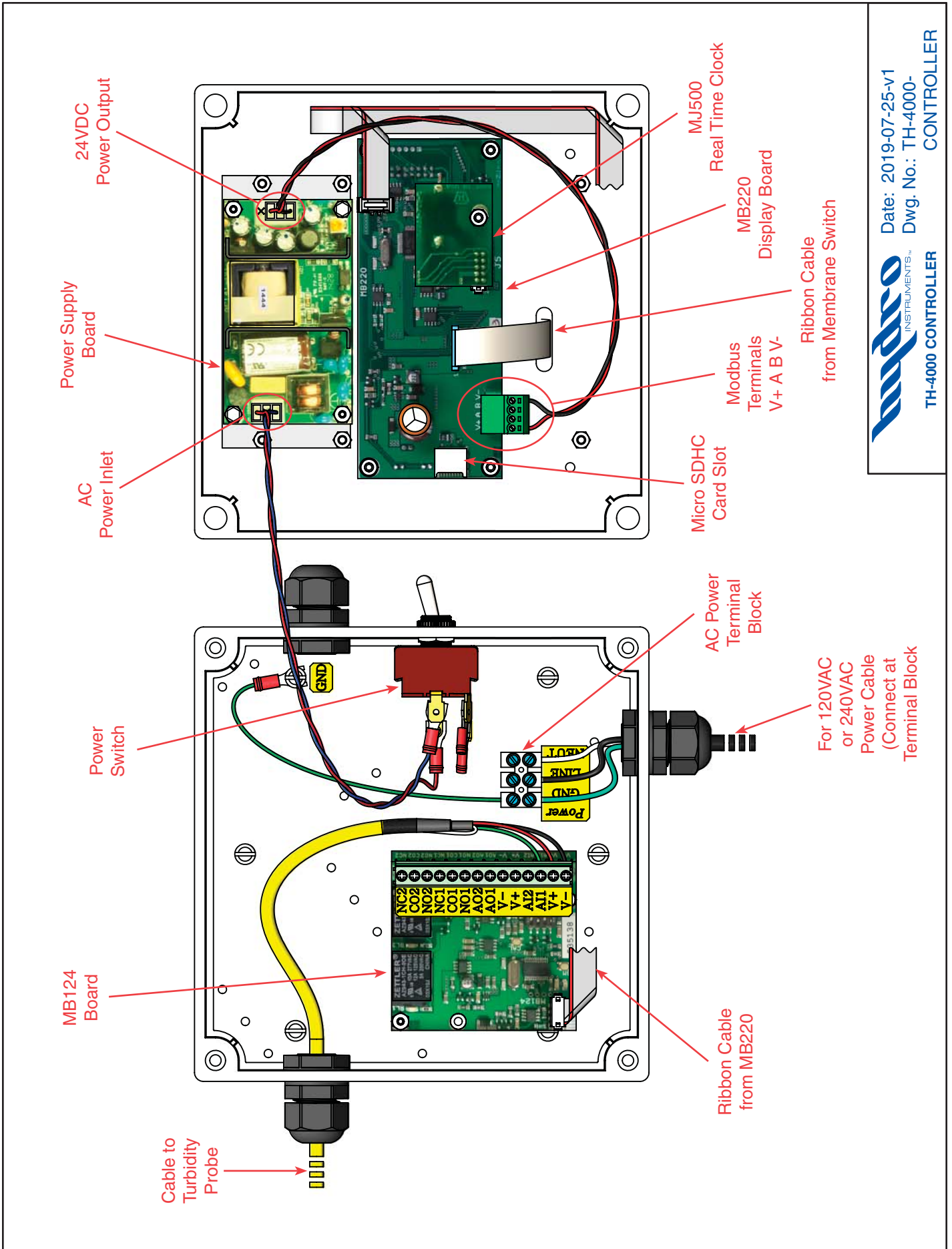
## A. Installation Check – Review the following points first.

**Sensor Installation:** Check that the sensor head and flow cell are clean. Check that the sensor is properly installed in the flow cell and that water is flowing.

## B. Symptoms, Likely Causes, and Suggested Responses

1. **Filter Time:** If the displayed reading is not stable, then the filter time can be increased to eliminate this oscillation.
2. **Span Calibration:** If the span calibration is performed incorrectly, then this will cause the readings to be inaccurate. Unless you intend to perform the span calibration, do not touch the ⊕ and ⊖ keys if you enter the span calibration screen.
3. **Sensor Wiring:** If the display is reading zero and giving an “Alarm Status: Error” message, then the sensor may not be connected to the monitor. Check the wiring at the circuit board in the monitor and inside the sensor enclosure.
4. **Sensor Replacement:** If the sensor is not putting out signals in the range of 4-20mA on channels 1 and 2, then it may be damaged and require replacement. Contact Hydro Instruments or your local sales representative.
5. **4-20 mA Output Calibration:** It is possible that somebody could enter the 4-20mA output calibration screens and change the values without understanding their meaning. This will cause the output 4-20mA signals to be inaccurate.
6. **Damaged Circuit Board:** The circuit boards can be damaged if high voltage is connected to the wrong terminals, by lightning, other power surges, or by corrosion. If you believe that the circuit board is damaged, then contact the factory and your local sales representative.
7. **Damaged Power Supply Board:** The power supply board accepts AC power (110-240 V at 50-60 Hz) and provides 24 VDC power to the main circuit board. If the main circuit board does not have power, then check the DC voltage on the output pins of the power supply board. If it has A/C power coming in, but is not putting out 24 VDC, then it either has a blown fuse or is damaged and requires replacement.
8. **Blown Fuse:** If the power supply board is not putting out 24 VDC, then always check to see if the fuse is blown and replace if necessary.

FIGURE 3: TH-4000 Controller Electronics

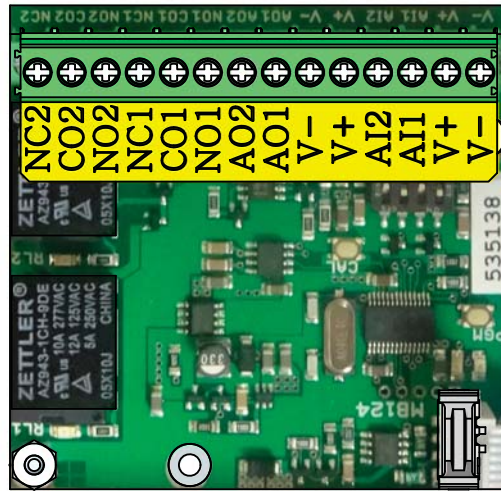



  
**TH-4000 CONTROLLER**

Date: 2019-07-25-v1  
 Dwg. No.: TH-4000-  
**CONTROLLER**

**FIGURE 4: TH-4000 Circuit Board MB124**

**MB124 BOARD**



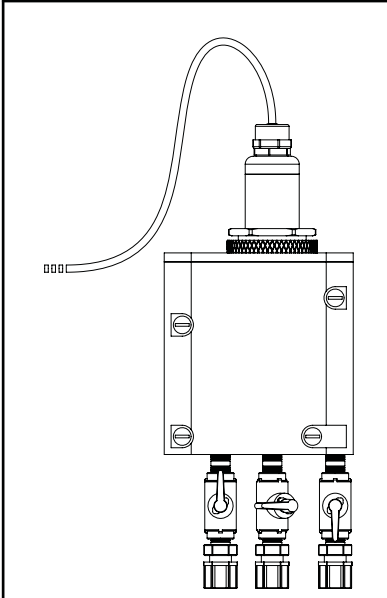
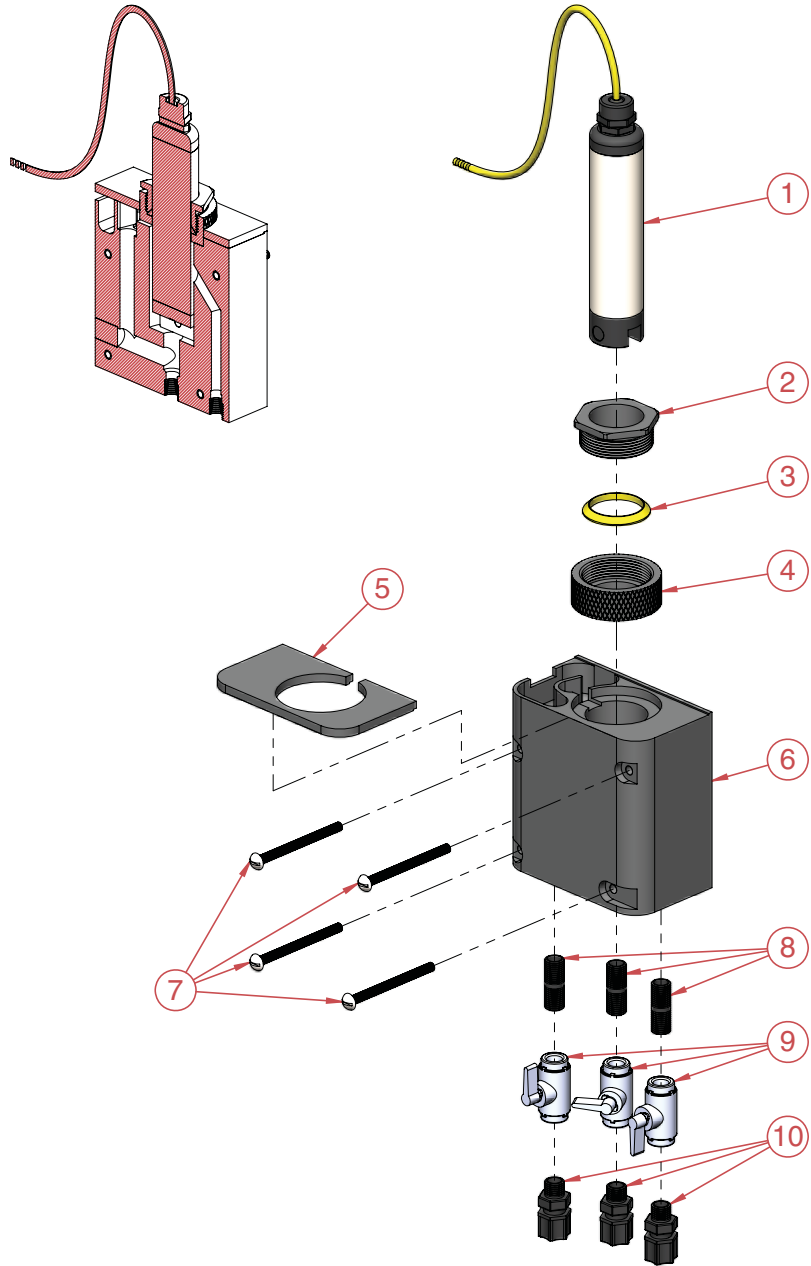
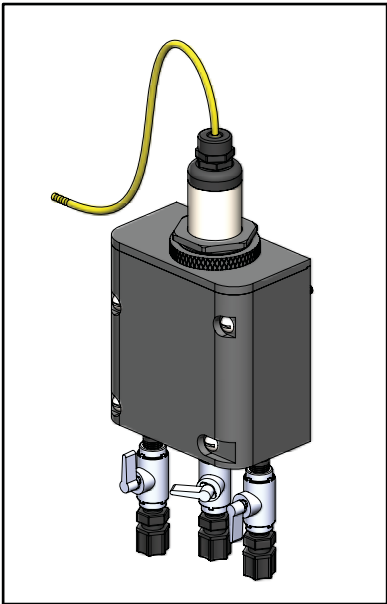
Normally Closed 2  
Common 2  
Normally Open 2  
Normally Closed 1  
Common 1  
Normally Open 1  
Analog Output 2  
Analog Output 1  
V -  
V +  
Analog Input 2  
Analog Input 1  
V +  
V -

For 0 - 50 NTU Turbidity Probe	For 0 - 1,000 NTU Turbidity Probe
<p><b>Use Relay 1</b> NC1 / CO1 / NO1</p> <p><b>Use Analog Output 1</b> ( use AO1 and V- )</p> <p><b>Use Analog Input 1</b> (green) AI1 (red) V+ (black) V -</p>	<p><b>Use Relay 2</b> NC2 / CO2 / NO2</p> <p><b>Use Analog Output 2</b> ( use AO2 and V- )</p> <p><b>Use Analog Input 2</b> (white) AI2 (red) V+ (black) V -</p>



Date: 2019-07-25-V1  
Dwg. No.: TH-4000-PCB  
TH-4000 CIRCUIT BOARD MB124





Item No.	Description	Quantity	Part No.
1	Turbidity Probe	1	TSH-1000
2	Probe Nut	1	TFC-PN
3	Teflon Ring	1	TFC-TR
4	Threaded Holder	1	TFC-TH
5	Flow Cell Lid	1	TFC-LID
6	Flow Cell Body	1	TFC-BODY
7	1/4-20 x 3 1/4" Stainless Steel Bolt (RHMS)	4	1/4-20 x 3 1/4"
8	1/4" x 1 1/2" PVC Nipple	3	880-015
9	1/4" Ball Valve	3	22321
10	1/4" NPT 3/8" Tube Tubing Connector	3	BKF-64

**hydro**  
INSTRUMENTS™  
HIGH RANGE TURBIDITY ANALYZER  
FLOW CELL AND PROBE

Date: June 2016  
EXPLODED VIEW & BOM  
Dwg. No. TH-4000-1