Temperature Control Board TC & Setpoint Inputs Calibration Procedure

1. **SCOPE**
   a. The scope of this procedure is to calibrate the Temperature Control board analog inputs for the Thermocouples & Setpoints. The TC inputs are connected to Input 1 (IN1) on the Center, Front, Side and Rear boards. The Center zone receives its setpoint from the System Controller via the RS485 serial communication port and sends the setpoints to the other zones via its Output 2 (OUT2) as 4-20mA signals. The setpoints for the Front, Side and Rear boards are connected to Input 4 (IN4) for each board.
   b. The inputs should be calibrated whenever any of the following conditions are applicable:
      i. A new Temperature Control board is installed.
      ii. A new version of Temperature Control board software has been installed.
      iii. A Thermocouple Transmitter has been replaced.
      iv. Any time the temperature for any zone seems to be relatively different from the other zones without any offsets being sent to any of the outer zones.

2. **TOOLS REQUIRED**
   a. Option 1
      i. Thermocouple Simulator – Fluke 714B, or equivalent.
   b. Option 2
      i. 4-20mA Simulator – Fluke 789, or equivalent.
      ii. Phillips screwdriver

3. **SYSTEM STATE**
   a. The system should be in the following state:
      i. Cold Idle, Safety 1 or Safety 3 state.
      ii. Lamp Contactor OFF.
      iii. Process gases OFF.

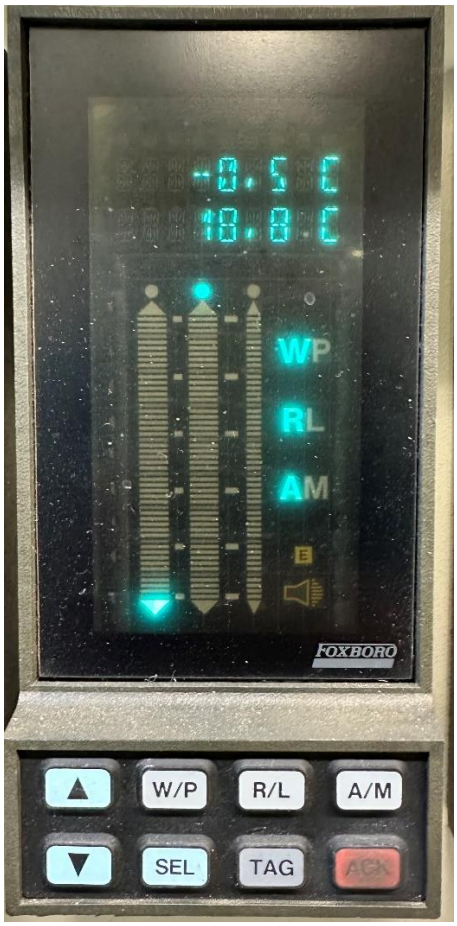

FIGURE 1

4. PROCEDURE

a. Connect the Thermocouple Simulator or 4-20mA Simulator to the applicable zone being calibrated.
   i. Option 1 – Using the TC Simulator (Fluke 714B, or equivalent).
      1. Disconnect the applicable TC and plug in the TC Simulator
      2. Turn on the Simulator and set the temperature output to 0° C.
   ii. Option 2 – Using the 4-20mA Simulator (Fluke 789, or equivalent).
      1. Turn OFF the Power to the Temperature Controller.
      2. Disconnect the Power Input wires to the applicable TC Transmitter and connect the 4-20mA Simulator to the wires you just disconnected, noting the correct polarity.

3. Turn ON the Power to the Temperature Controller.
4. Turn on the Simulator and set the mA output to 4mA.

b. Refer to Figure 1 for the button locations on the Foxboro keyboard/display called out in the following steps.
c. Push the **W/P** button on the keyboard so that the **P** is lighted on the display.
d. Push the **TAG** button -> **CALIB ?** is displayed.
e. Push the **ACK** button -> **CALIB INPUTS ?** is displayed.
f. Push the **ACK** button -> **CALIB IN 1 ZR ?** is displayed.
g. Push the **ACK** button -> **CALIB IN 1 ZR 7** [1] is displayed, then counts down to **0**.
h. **CALIB IN 1 FS ?** is displayed.
i. Set the Thermocouple Simulator or 4-20mA Simulator to the full-scale value:
    i. Option 1 – Using the TC Simulator (Fluke 714B, or equivalent).
        1. Set the temperature output to 1600° C.
    ii. Option 2 – Using the 4-20mA Simulator (Fluke 789, or equivalent).
        1. Set the Simulator mA output to 20mA.
j. Push the **ACK** button -> **CALIB IN 1 FS 7** [2] is displayed, then counts down to 0.
k. **CALIB IN 2 ZR ?** is displayed.
l. Push the **TAG** button -> the setpoints and actual temperatures should be displayed [3] [4].
m. Adjust the Simulator to various temperature/mA settings and verify that the correct actual temperature is displayed.
n. Remove the TC Simulator or 4-20mA Simulator and plug in the applicable TC or connect the wires back onto the applicable TC Transmitter.
o. If additional zones are being calibrated, repeat steps **a.** through **n.** above.
p. If the setpoint inputs are going to be calibrated, perform the following steps.
q. On the Center Zone keypad push the **SEL** button until the dot is lit up above the leftmost Bar Graph.
r. Push the **W/P** button on the keyboard so that the **P** is lighted on the display.
s. Push the **R/L** button on the keyboard so that the **L** is lighted on the display.
t. Verify that the Setpoint, which is the upper of the two values, in the upper display reads 0.0°C. If it's not, push the ▲ or ▼ buttons until it is.
u. On each of the Front, Side and Rear zone keyboards perform the following steps.

---

[1] **NOTE 1 –** During the countdown do not disconnect or adjust the Simulator. If, at the end of the countdown an error message is displayed that the reading was too low or too high, check the Simulator and repeat the **Zero** calibration.
[2] **NOTE 2 –** During the countdown do not disconnect or adjust the Simulator. If, at the end of the countdown an error message is displayed that the reading was too low or too high, check the Simulator and repeat the **Full-Scale** calibration.
[3] **Note 3 –** The dot must be above the center bar graph to read the actual temperature. If it is not, push the **SEL** button until the dot is above the center bar graph.
[4] **Note 4 –** If the actual temperature is above 1250° C, push the **ACK** button to clear the alarm.

v. Push the **W/P** button on the keyboard so that the **P** is lighted on the display.
w. Push the **TAG** button -> **CALIB ?** is displayed.
x. Push the **ACK** button -> **CALIB INPUTS ?** is displayed.
y. Push the **ACK** button -> **CALIB IN 1 ZR ?** is displayed.
z. Push the ▲ button until **CALIB IN 4 ZR ?** is displayed. If you go too far, you can use the ▼ button to go the opposite direction.
aa. Push the **ACK** button -> **CALIB IN 1 ZR 7** [5] is displayed, then counts down to **0**.
bb. **CALIB IN 4 FS ?** is displayed.
cc. On the Center Zone push and hold the ▲ button until the setpoint reads 1600° C.
dd. On the outer zones, push the **ACK** button -> **CALIB IN 4 FS 7** [6] is displayed, then counts down to 0.
ee. **CALIB IN 1 ZR ?** is displayed.
ff. Push the **TAG** button on each of the outer zones -> the setpoints and actual temperatures should be displayed [7].
gg. Adjust the Center Zone setpoint by pushing the ▲ or ▼ buttons and verify the setpoints on each of the outer zones matches the Center Zone (Top numbers on the upper display). If the setpoint on any of the zones is not reasonably close to the Center Zone repeat the setpoint calibration.
hh. If all the zone's temperatures setpoints and actual temperature readings are satisfactory, set the Temperature Controllers to the following:
    i. If necessary, push the **R/L** button on the keyboard so that the **R** is lighted on the display.
    ii. If necessary, push the **A/M** button on the keyboard so that the **A** is lighted on the display.
    iii. If necessary, push the **W/P** button on the keyboard so that the **W** is lighted on the display.
    iv. Verify that the temperature boxes on the System Controller "Status" display do not have any red background color and the setpoints and temperatures match the Foxboro displays.
ii. This completes the Foxboro calibration.

[5] **NOTE 5 –** During the countdown do not adjust the Setpoint. If, at the end of the countdown an error message is displayed that the reading was too low or too high, check the Setpoint and repeat the **Zero** calibration.
[6] **NOTE 6 –** During the countdown do not adjust the Setpoint. If, at the end of the countdown an error message is displayed that the reading was too low or too high, check the Setpoint and repeat the **Full-Scale** calibration.
[7] **Note 7 –** The dot must be above the center bar graph to read the actual temperature. If it is not, push the **SEL** button until the dot is above the center bar graph.