9/12/2024 (rev 0)	Topic: Rack Thermocouple Calibration

Grease Thief Analyzer Heating Rack Thermocouple Calibration

REQUIRED TOOLS AND INSTRUMENTS

1. Grease Thief Analyzer

2. Calibrated digital thermocouple

3. Computer and cabling for connection

4. Extendable mirror from toolbox (optional)

PROCEDURE

1. *Calibration of the Rack Thermocouple in GTA*

    a. Obtain a calibrated digital thermometer with a thermocouple attachment.

    b. Lay the thermometer in the heating rack, next to the instrument sensor. The tips should be as close to each other as possible.

    c. From the main screen on the GTA control panel go to Temperature Control.

    d. Turn the preheating rack on and set to 21°C. The firmware keeps the rack at 5°C above the set point, so you will be starting at 26°C.

    e. Watch the instrument reading on the Temperature Control -> Temp Cal screen.

    f. Set the timer for 5 min and wait for the reading to stabilize. The tenths digit on the display may bounce slightly +/- 0.2°C, but it should be relatively consistent and it should be near the expected value.

    g. If the temperature isn't stable even after an extended wait period, check the PID settings found in the manual or the sensor may be damaged.

    h. After a 5 min wait, record the stable value seen on the instrument display and the value seen on the thermometer.

    i. Repeat step 3-5 for 2°C intervals up to 40°C.

    j. Recorded values are to be entered into the calibration template.

    k. The thermometer will be your x values and the sensor display will be your y values in a coordinate system.

    l. Plot the points using the template thermocouple calibration template

        i. Thermometer values go in Column A

        ii. Sensor values go in Column B

m. Review the best fit curve of the plotted data. Your results should follow a linear relationship with R^2 value >0.90. If they do not, consider rerunning the trial, or removing outliers until the plot is linear. If a linear response cannot be achieved, consult MRG Labs.

n. Put the m and b values from the y=mx+b fit into the labeled cells on the template.

o. Put the current gain and offset into the labeled cells in the template. The values can be obtained from the GTA instrument by going to the Temperature Control->Temp Cal screen.

p. **Cal Check:** If the best fit trend line for your trial falls within acceptable tolerances 0.85<m<1.15 and -5<b<5. The template will display 'Passed' and the calibration is complete. Resave the file in the calibration folder with the proper format and the date.

q. If the calibration does not pass, take the "new" calculated gain and offset values from row 4 and enter them into the instrument.

r. The new values can be input into the **Temp Cal** screen. Main-> Temperature Control->Temp Cal.

2. *Calculations*
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a. To calculate the new Gain and offset values take the equation from your best fit line: y=mx+b and the current values for the Gain and offset in the instrument Temp Cal screen: $Gain_{Current,}$ $Offset_{current}$ and put them into the equation below. This calculation is done automatically by tge calibration template.

b. New Gain= $(Gain_{Current}) / (m)$

c. New Offset= $-b/m + Offset_{Current}$