



MPMS Application Note 1014-211

Procedures for Achieving Low Temperature, No Overshoot Temperature Control

Under normal operating conditions, MPMS temperature control is limited by natural fluctuations around the target conditions. This procedure describes how to override the automated temperature control on MPMS systems not equipped with the Continuous Low Temperature Control (CLTC) option so that the user may produce a temperature transition with no, or nearly no, overshoot.

Note: This procedure only applies to transitions from lower to higher temperatures. Use this procedure only when monitoring the temperature transition and when the transition will be relatively small. The procedure uses a transition from 10.0-10.2 K for example purposes.

Set the Temperature

1. Press **F4 (Set Parameters)**. Set the temperature to below the minimum temperature value. For our example, we use 9.90 K.
2. Wait for the temperature status to stabilize.

Set the Temperature Tolerance

1. Press **F7 (Diagnostic Menus)**.
2. Select **Calibration Factors** and press **Enter** to open the **MPMS Factors** menu.
3. Press **Enter** to open the **Calibration Factors** menu. Select **Temperature Calibrations** and press **Enter**.
4. Set the **Temp Tolerance** to 1.00.
5. Press **Enter** to activate the change in temperature tolerance.

Note: Setting the temperature tolerance will ensure that the system will always have a stable temperature status so that measurements can be performed during the temperature transition.

Set the Drivers

1. Press **Esc** until you come to the **Diagnostic Menus**.
2. Select **RG Bridge Driver Controls** and press **Enter**.
3. Select **Driver 1** from the **Output Driver** menu.
4. Set the **Driver #2 Assign** menu item to **Proportional Valve**.
5. Set the **Driver Updates** menu item to **On** to display the driver output values. **Note:** For 10.0 K, the value of the **Output Value** menu should be approximately 18 mW/ Ω .
6. Set the **Minimum Output** menu item to a value of .01 greater than the **Output Value**. For example, if the output value is 0.18, set the minimum output to 0.19. This will cause the system to increase the driver power by 0.01 mW/ Ω , causing the temperature to rise gradually.

At this point, you should be able to perform measurement as needed. If the temperature levels off, you may increase the minimum output value again to increase the temperature further.

Restore the System to Its Original State

1. When you are finished setting the temperature, return the **Temp Tolerance** value to its original value (probably .001).
2. Use the **Set Parameters** screen to set a system temperature.