



**09 February 2007
07-002A**

INSTALLING M108A/E CONVERTER, TYPE-S THERMOCOUPLE

I. PURPOSE:

To provide instructions for installing a new thermocouple into the Converter Heater Block. This is a Type S Thermocouple. The following instructions provide the necessary information to remove the existing thermocouple and replace it with the new one supplied.

II. TOOLS:

Nutdriver, ⁵/₁₆
Nutdriver, ¹¹/₃₂
Diagonal Cutter
Philips Head Screw Driver #2

III. PARTS:

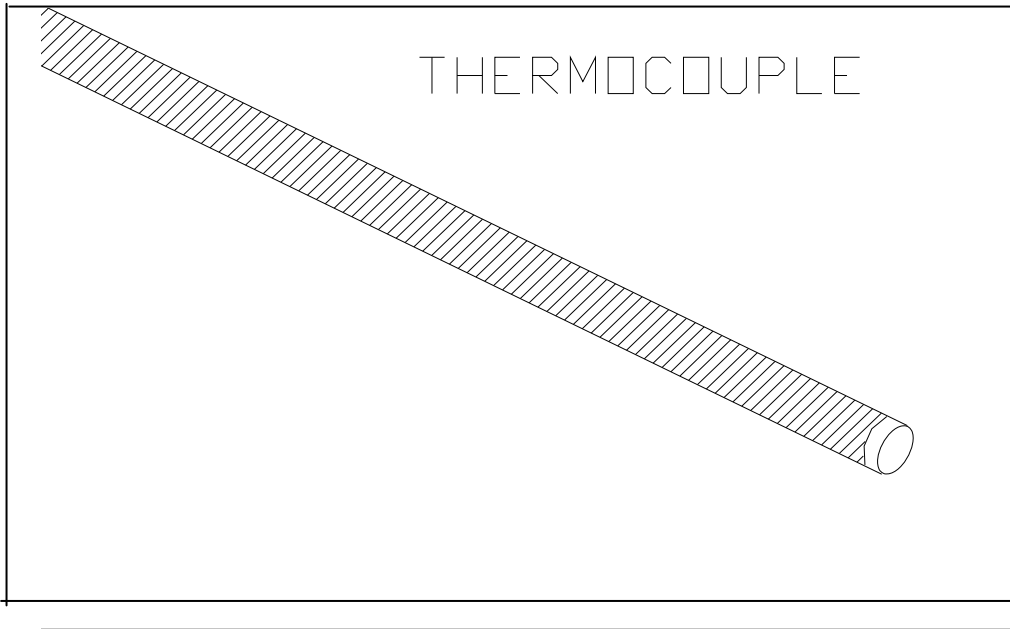
KIT000255 KIT, RETROFIT, M501TS, TC TYPE S RPLCMNT

NOTE: There are currently two different styles of Thermocouple in field units. Type N Thermocouples have 'Red' & 'Orange' wires, while type K Thermocouples have 'Red' & 'Yellow' wires. The replacement S-Type Thermocouple has 'Red' and 'Black' wires. The 'Red' wire connects to the same terminal in all cases. The 'Black' wire replaces the 'Orange' or 'Yellow' wire depending on which Thermocouple is being replaced.

IV. PROCEDURE:

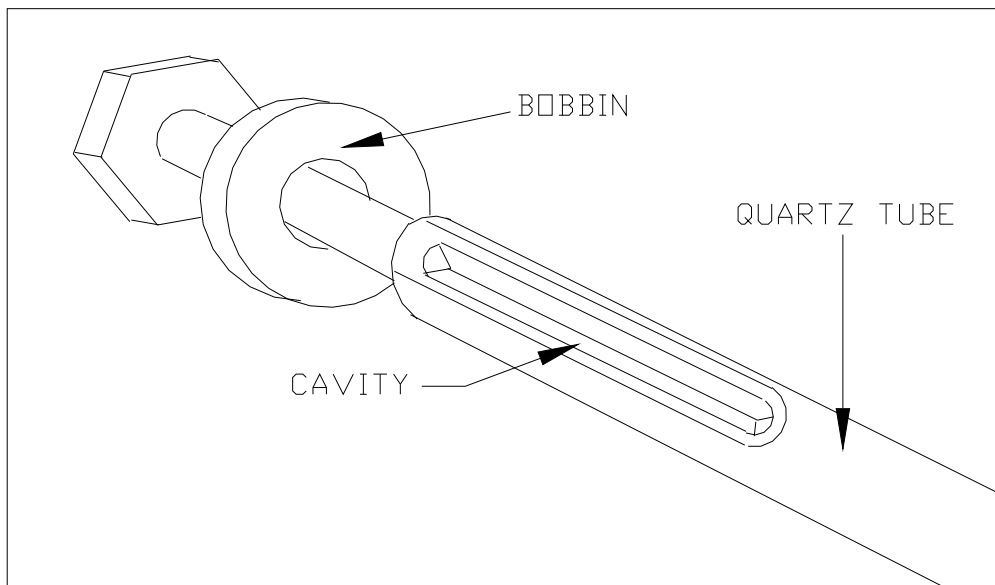
1. Ensure power is removed from the M501TS Converter. If the Converter has been operational you will need to wait for 2 hours for the Converter oven to cool before continuing with the replacement of the thermocouple.
2. Remove the cover from the Converter chassis.
3. Unscrew the (4) nuts that secure the front panel to the chassis. They are located just behind the Front Panel along the top.
4. Lower the Front Panel to gain easier access to the end of the quartz tube.
5. Unscrew the (3) nuts that secure the Heater cover that protects the Heater Block and quartz tube. Remove this cover.
6. Cut the tie-wrap that secures the thermocouple to the fitting at the end of the quartz tube.
7. Loosen the teflon fitting at the end of the quartz tube taking care not to put any stress on the tube and slide the fitting off the tube.
8. Remove the thermocouple.
9. Disconnect the thermocouple wires from the Temperature Controller noting that the 'Black' wire goes to pin 1 and the 'red' wire goes to pin 2.

FIGURE 1



10. In preparation for installing the new thermocouple, look into the end of the Heater Block. You will see that there is an indentation (cavity) in the fat part of the quartz tube. This is where the thermocouple you are installing will reside. Refer to FIGURE 2.

FIGURE 2



11. The thermocouple should slide into the Heater Block and into the indentation of the quartz.
12. a) Align the thermocouple with this cavity and carefully push the thermocouple all the way into the cavity until it comes to a stop, which is the end of the cavity of the quartz tube.
b) Assure the thermocouple is seated flat. If it is not, the quartz tube will have to be replaced (Part #03710000). A few quartz tubes may need to be replaced.

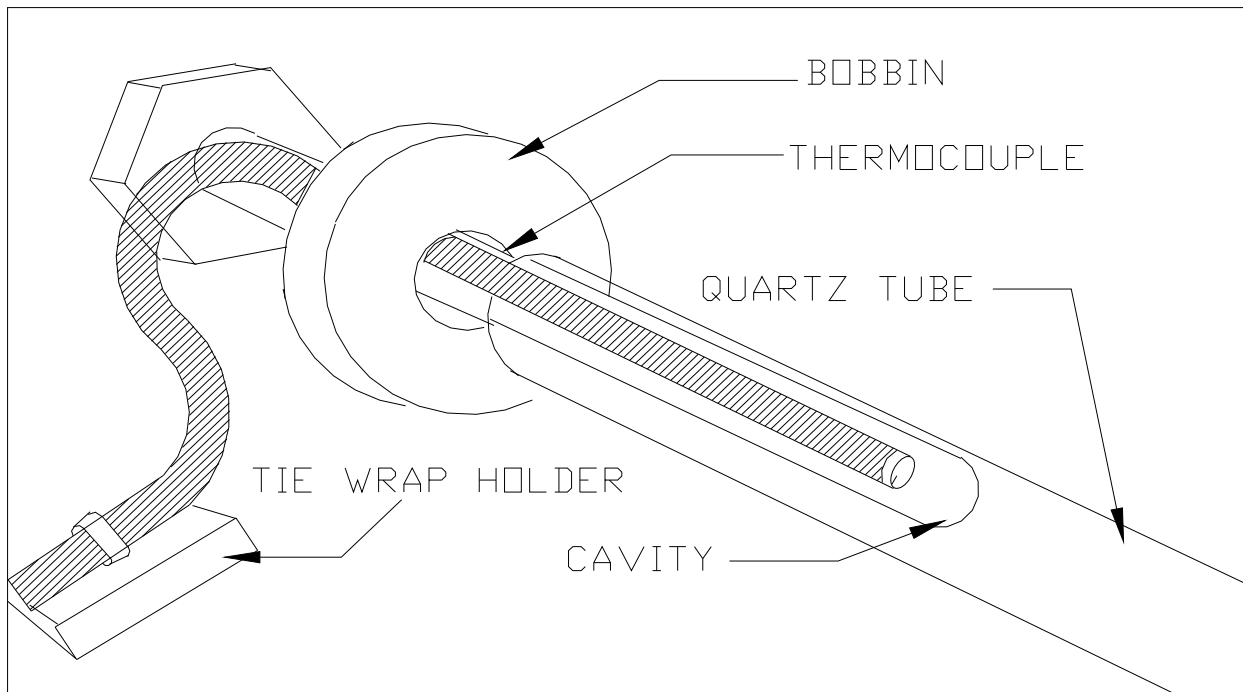
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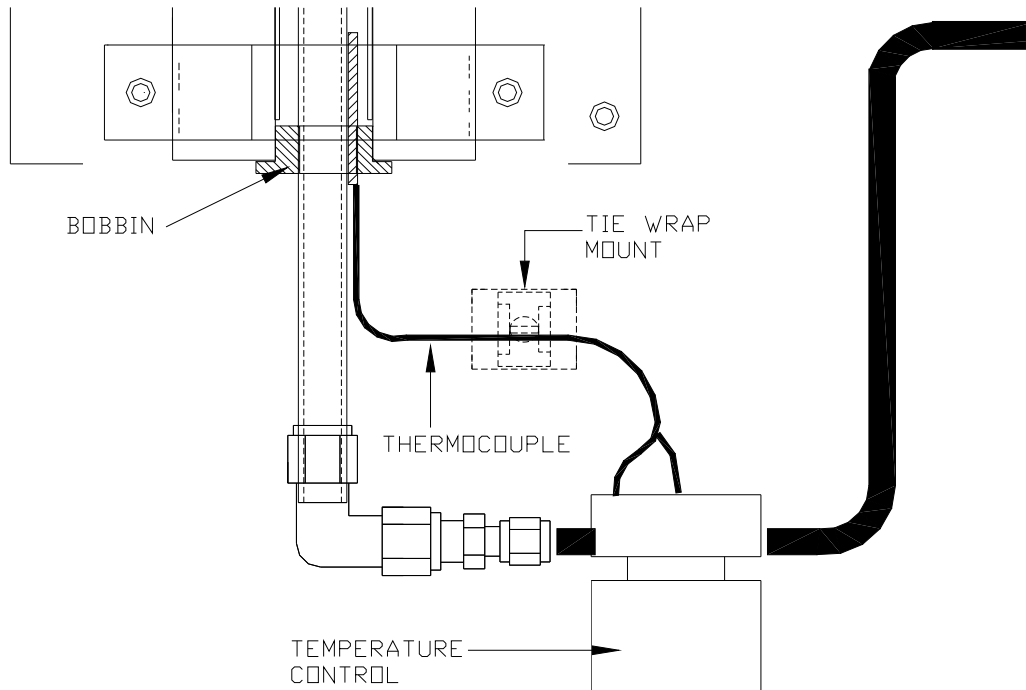
The thermocouple should now be properly residing in the cavity of the quartz tube. Refer to Figure 3

FIGURE 3



13. Reconnect the Teflon fitting that was removed earlier from the end of the quartz tube. Take care not to put any stress on the quartz tube as the Teflon fitting is tightened
14. Place the Tie Wrap Hold down in the location shown in the Figure 4. Be sure to clean the chassis where the Tie Wrap Hold down is to be replaced (Alcohol).

FIGURE 4



15. Form the Thermocouple wire so that it rests in the cavity with little movement.
16. Connect the (2) wires of the thermocouple to the Temperature Controller. The “Black” wire should be connected to pin 1 and the “Red” wire should be connected to pin 2.
17. At this point, all connections have been made, both electrically and pneumatically. A leak check should be performed on the Converter to verify that all connections are leak free. If a leak is detected, the leak should be resolved before continuing.
18. Install the Heater cover of the Heater Block and secure with the (3) nuts. Close the front panel and secure with the (4) nuts. Install the top cover on the Converter chassis.
19. The Converter is now ready for the application of power. You will be looking for an indication from the temperature controller that it is functioning correctly and driving the heater to the desired “set” temperature. Apply power now.
20. You will need to change the thermocouple type from a N type(12) to a S Type (6). To perform this, press Sel and hold until P-N2 is displayed and change set from 12 (should be 12 which is a Type N thermocouple) to 6 (Type S thermocouple).
21. You will need to perform a function in the Temperature Controller called “autotune”. This will tune the Temperature Controller to the new thermocouple. This procedure should be performed after the Converter comes to the regulated temperature. To perform Auto Tune function, first set the SV to the desired temperature (1000 Cel), allow the temperature to stabilize then press the Sel key until the parameter A7 appears. Set A7 to 1, and then press ENTER.

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The controller will begin the autotune process, which takes several minutes. The decimal point at the lower right of the display will blink, indicating the controller is autotuning. During the process, the temperature may oscillate $\pm 100^{\circ}\text{C}$ or more. When the process is completed, the decimal point will stop blinking.

22. After the “autotune” process is completed, verify that the “process” temperature is indicating that the desired temperature is stable and being regulated.
23. The converter is now ready for operation.