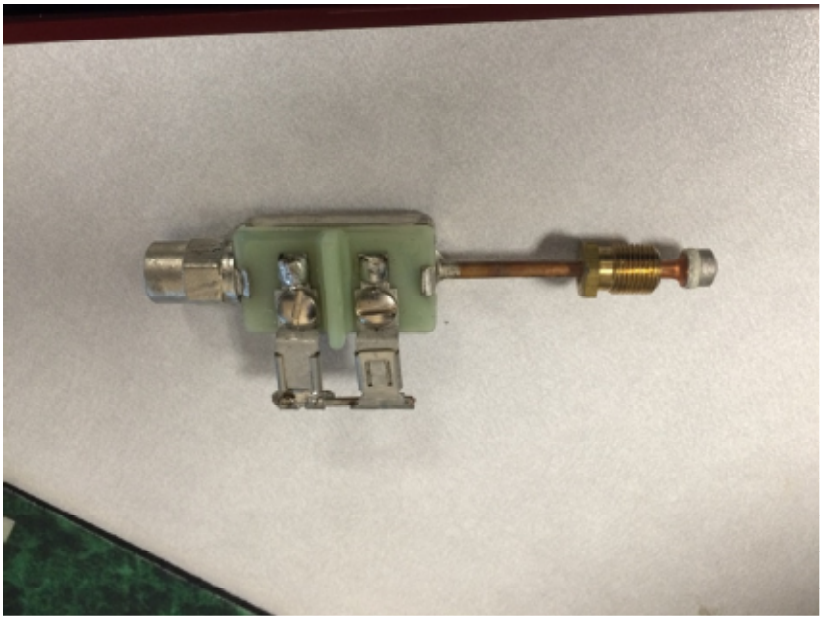
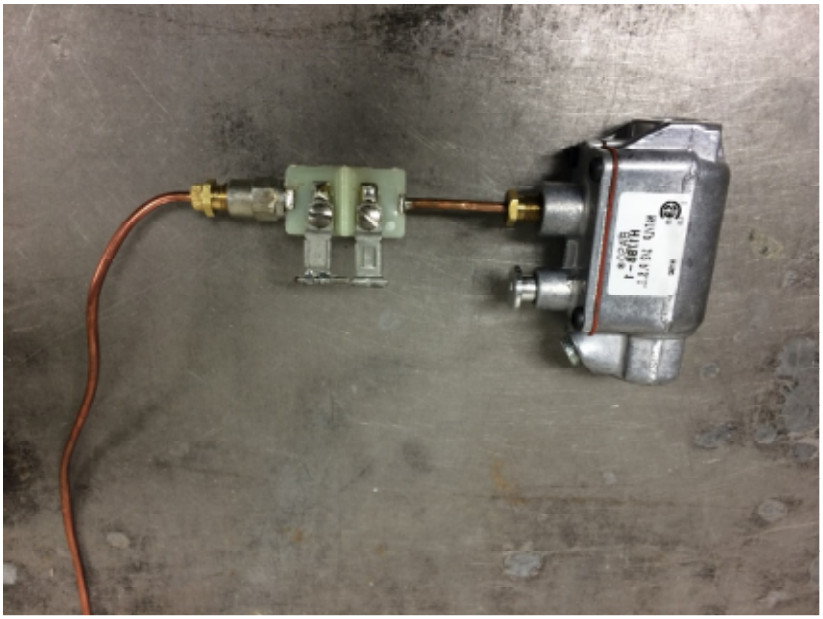
Thermocouple Test-Block

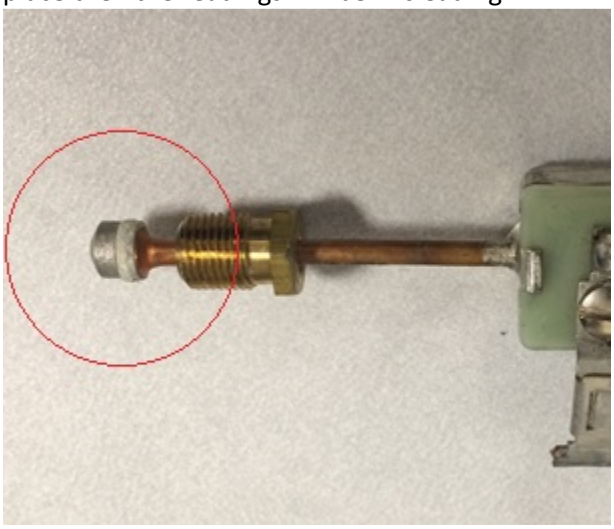
Used for measuring current through a K-type thermocouple used with manaual control systems (Baso valves and Maxitrol Mertiks). Allows for measurements without disengaging the thermocouple from the safety valve.



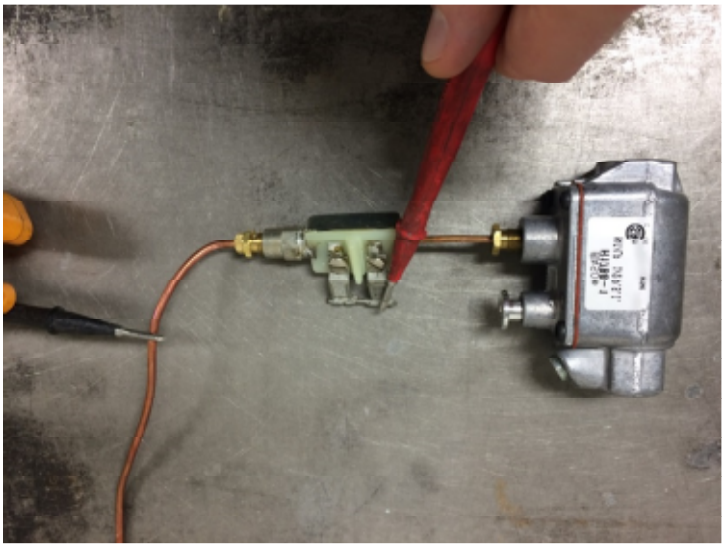


Installation:
The test-block should be installed directly into the safety valve on the end with the threaded nut, and on the female threaded end insert the K-type thermocouple connected to the heater.

Be sure that the connections are snug. If the contacts at the ends of the thermocouples are not firmly in place then the readings will be misleading.



Above: this point of contact needs to be firmly seated. Same goes for the contact on the thermocouple.



Taking a reading:

We're looking for the voltage at the end of the thermocouple where it contacts the safety valve. The voltage measured will actually be in millivolts, so be sure your meter has the capability to display readings in millivolts.

Important to get your mV readings in DC, rather than AC. The digital multimeter we use defaults to AC output and has to be manually set to DC every time, so be careful that the reading indicated is DC. The multimeter screen should indicate whether it's set to AC or DC

See last page for a visual of a multimeter & more explicit instructions.

With a voltmeter, make contact with one probe on the test block and the other probe contacting the thermocouple sheath (Where the black probe is in the photo). You might see a positive or negative mV reading, and you can switch places with the probes to reverse it. Ultimately doesn't matter, we only care about the absolute value of the mV reading.

The Baso & Mertik safety valves require ~2 mV or more at the end of the thermocouple to open and remain open. During preheat this reading will exceed 2 mV (can reach 8+ mV w/electric element power on), then when gas enters the heater it will drop slightly because the gas is cold at first.
Once the heater is stable, the mV reading will be lower than it was with only the element energized. This is normal. Turning off the electrical element will drop the mV a bit more, but it should always be above 2mV. Normally we see the safety valves drop out at 1.6-1.8 mV, but they vary slightly.

Interpreting results:

Assuming the thermocouple is working properly, the mV output is directly proportional to the heater's internal temperature. By measuring the mV output we can verify whether the safety valve is failing or if the heater is simply lacking heat.

You may find older, worn-out safety valves that drop out before the 2mV mark, and with this test-block you can verify whether a safety valve is dropping out prematurely.

Alternatively, if the mV drops to 2 or less and the safety valve snaps shut (as it should) then we know the heater or thermocouple is the source.

After a certain amount of time (may take an hour or so) you should see the mV reading stabilize. It needs to remain above 2mV at a minimum. The safety valve will shut and will not re-open if the required mV is lost even for a moment, so if a heater is close to the 2mV threshold it could be at risk of shutting off unexpectedly.

Keep in mind that when using the test block to measure mV we're measuring a "closed circuit" voltage, which includes the resistance through the safety valve. You will see different values when measuring mV by disengaging the thermocouple (without using the test block), which is an "open circuit" reading that doesn't include the safety valve's resistance.

Meter Example

The AC/DC indicator is circled on the display screen. The yellow button switches between AC & DC on a Fluke meter like this. We need to take these readings in DC, so make sure that's displayed on screen.

The red & black probes need to be connected as shown, in the COM & Voltage ports (red vs black doesn't really matter, one way you'll see a positive number and the other way you'll see a negative number of the same absolute value.)

Also make sure the round dial is set to read mV, circled in red.