7000 Series Pressure Controller or Monitor Internal Vacuum Sensor Verification/Adjustment

1. PURPOSE

The purpose of this procedure is to establish and document the method to calibrate Hastings Vacuum Gauge Tubes that are installed in Fluke Calibration and/or Ruska Instruments 7000 Series Pressure Products.

2. SCOPE

A wide variety of pneumatic controllers/monitors with vacuum sensor option. Models include: 7050, 7050i, 7052, 7052i, 7250, 7250i, 7250SYS, 7252, 7252i, 7710, 7750i.

3. EQUIPMENT

3.1 REFERENCE EQUIPMENT

Item	Minimum Use Specifications	Calibration Equipment
1.1 Vacuum reference with display and isolation valve	Range: 0 to 1 Torr	MKS Baratron 626A01TDE w/ PDR2000 Display

3.2 VACUUM GENERATION AND CONTROL EQUIPMENT

Item	Minimum Use Specifications	Notes
2.1 Vacuum pump with tubing and isolation valve	See user's manual or other instructions, diagrams, etc.	Leybold D16B rotary vane vacuum pump, or scroll and turbo pump
2.2 Metering valve	See user's manual or other instructions, diagrams, etc.	Swagelok® part number: SS-SS4-A-VH Description: SS Low-Flow Angle-Pattern Metering Valve, 1/4 in. Swagelok Tube Fitting, Vernier Handle
2.3 Vacuum volume (optional), interconnect hardware and tubing	Validated with calibration system.	Nor-Cal products part number: 93-02096. Stainless steel vacuum chamber, 225 in3 (3700 cm3), quantity 3 KF25 vacuum fittings. Ensure that all tubing is at least ¼ inch (6 mm) inside diameter. Up to ¾ inch (20 mm) diameter is preferred.

4. PROCEDURE

4.1 SETUP

4.1.1 Ensure that the Device Under Test (DUT), 7000 Series controller or monitor, is powered on for 24 hours (warm up time) and that Reference vacuum gauge is warmed up per its specifications.

4.1.2 Ensure that the test equipment is assembled per Figure 1, and that pressure to the SUPPLY port is disconnected. Minimize the distance from the vacuum reference gauge to the DUT.

4.1.3 Connect the DUT's REFERENCE port to the tubing that goes to the tee at the Reference vacuum gauge on top of the vacuum volume. The vacuum volume is optional but makes it easier to achieve setpoints and maintain stability at them.

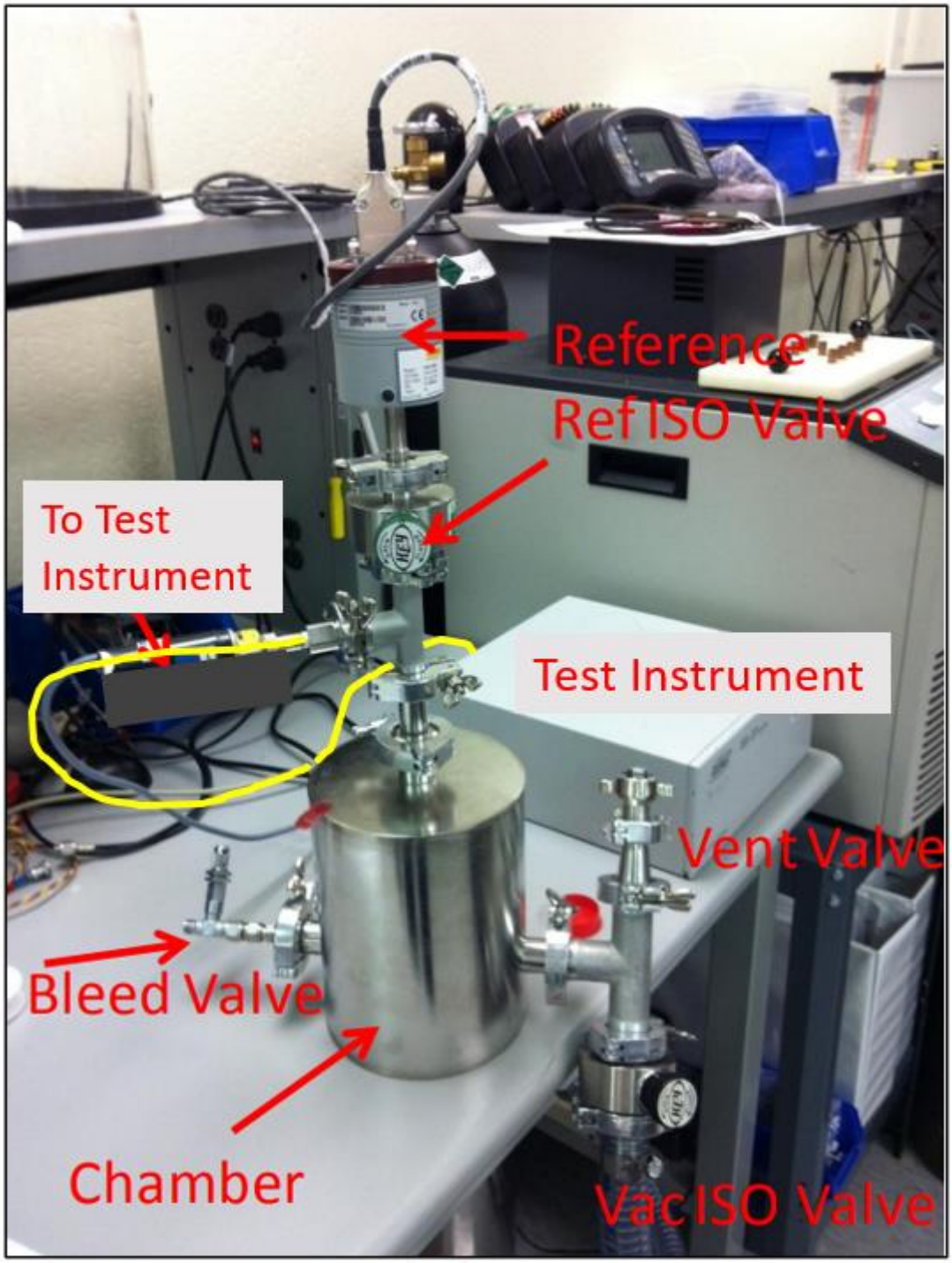


Figure 1.

4.2 POWER ON VACUUM PUMPS, STABILIZATION TIME

4.2.1 Close the metering valve.

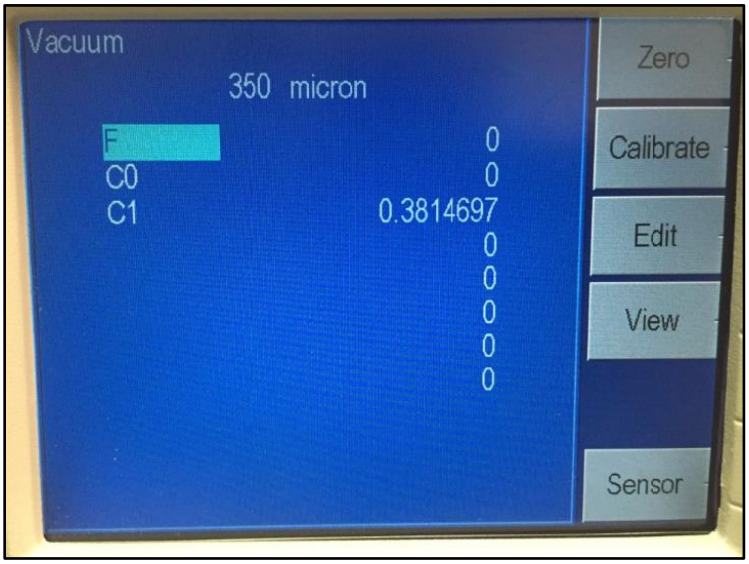
4.2.2 Open the isolation valve to the vacuum pump.

4.2.3 Power on the vacuum pump. Do not turn on the turbo pump (if applicable).

4.2.4 At least 5 minutes after turning on the vacuum pump, turn on the turbo pump (if applicable).

4.2.5 At least 5 minutes after turning on the vacuum pump, open the isolation valve to the Reference vacuum gauge.

4.2.6 Follow this menu path to the vacuum sensor calibration screen on the DUT: Menu > Calibrate > Sensor (press repeatedly until the Vacuum screen is active).



4.2.7 Wait 12 hours for vacuum to pull down and stabilize.

4.3 LEAK TEST

4.3.1 Ensure that Reference vacuum gauge is down to at least 20 mTorr.

4.3.2 Close the isolation valve to the vacuum pump(s).

4.3.3 Wait 5 minutes and verify that the Reference Vacuum and DUT are within ±25 mT of each other, and that the rate of change (leak rate) is less than ±12 mT/min (±0.2 mT/sec).

4.4 AS-FOUND OR AS-LEFT VERIFICATION PROCEDURE

4.4.1 Carefully adjust the metering valve to achieve the first test point of 50 mT ±1 mT, and stable to ±0.2 mT per second. Wait for 30 seconds dwell time and record the reference vacuum gauge and DUT readings. If you are using a vacuum volume you may be able to leave the needle valve open and not induce a difference between the reference and DUT. Without the vacuum volume, the needle valve likely needs to be closed to ensure there is not a difference between the reference and DUT.

4.4.2 Repeat the above step at 100, 150, 200 and 250 mT.

4.4.3 Close the metering valve.

4.4.4 Evaluate the data.

4.4.4.1 If adjustment is necessary, proceed to ADJUSTMENT PROCEDURE.

4.4.4.2 If adjustment is not necessary, proceed to SHUTDOWN PROCEDURE.

4.5 ADJUSTMENT PROCEDURE

4.5.1 Open isolation valve to vacuum pump(s).

4.5.2 Wait for vacuum to pull down and Reference vacuum gauge to read 20 mTorr or less.

4.5.3 Close the isolation valve to the vacuum pump(s).

4.5.4 Wait 5 minutes and verify that the Reference Vacuum and DUT are within ±25 mT of each other, and that the rate of change (leak rate) is less than ±0.2 mT per second.

4.5.5 Adjust the vacuum sensor with the onboard calibration routine at 100 and 200 mT.

4.5.6 Close the metering valve.

4.5.7 Repeat the AS FOUND OR AS-LEFT VERIFICATION PROCEDURE, recording the As-Left data.

4.5.8 Verify that the As-Left data is in tolerance.

4.6 SHUTDOWN PROCEDURE

4.6.1 **IMPORTANT** - Close the isolation valve to the Reference vacuum gauge. Do this before turning off the vacuum pump(s).

4.6.2 Power off the turbo pump (if applicable).

4.6.3 Power off the vacuum pump.

4.6.4 Open the metering valve to vent the vacuum in the test system.

4.6.5 Disconnect the hardware from the DUT and leave in idle and/or storage condition.

4.7 TROUBLESHOOTING

4.7.1 For a permanent absolute model - If the leak rate is too high, you might connect the vacuum system to the REFERENCE **and** the TEST port of the DUT. If the leak rate improves, this might indicate that the test port isolation valve is leaking.

END OF DOCUMENT