

Procedure for Leak Detector Station

Qichun Xu

Department of Physics
The University of Michigan, Ann Arbor, MI 48109
March 15, 1999

The Leak Detector Station is the place where leak rates of muon tubes and end-plugs are measured. This paper describe the general procedure to operate this station.

Prior to work, do the following:

1. Turn on the leak detector machine (Veeco MS40) and wait for a few minutes, until the light 'READY' is on.
2. Open all gas bottle valves, including helium, high-pressure nitrogen and low-pressure nitrogen. Also, check all gas gauges to see if they are in right range and if there is enough gas. The output pressures are about 29 psi for helium, about 100 psi for high-pressure nitrogen and about 29 psi for low-pressure nitrogen.
3. Close both electric vacuum valves ('off' position). Begin the test cycle by pressing 'START' button on leak detector. In this case, the reading normally should be less than 10^{-9} std cc/sec.

If the reading is larger than the normal, please refer to 'Procedure for abnormal condition (1)'.

4. Check the ventilation port for the dump of helium. This is very important to keep helium background normal and to make all measurement repeatable.
5. At this moment, all valves in the control panel should be closed.

Normal Test Procedure:

1. Close valves of helium input, nitrogen input and exhaust.
2. Insert tube to be tested through all three aluminum blocks with sniff block in middle and vacuum blocks on both sides. Make sure that both ends of tube line up with the ends of blocks.
3. Turn on the high-pressure nitrogen switch to squeeze o-rings at both ends of tube. Connect gas jumpers and end caps.

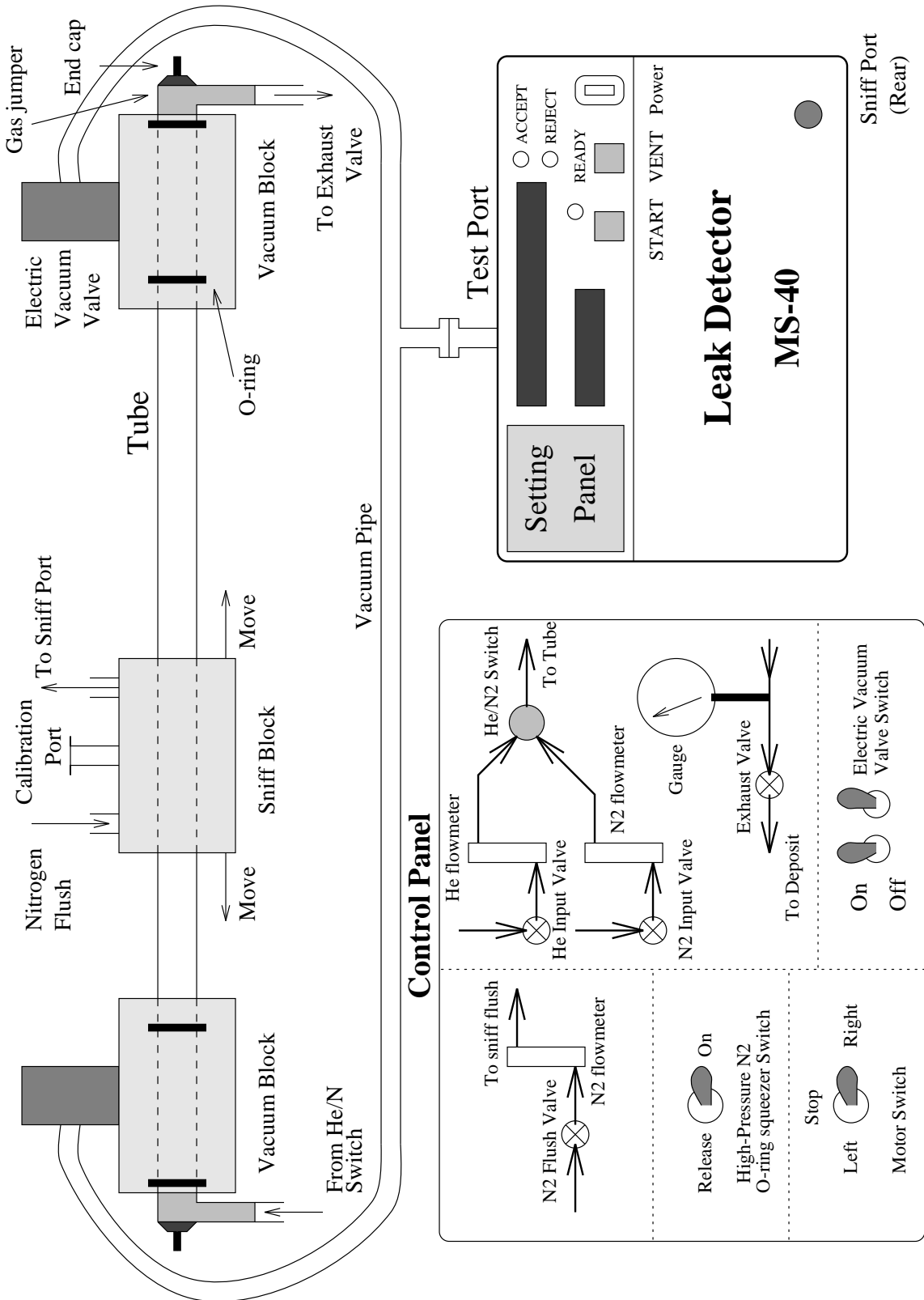


Figure 1: Diagram for leak detector station

4. Turn the helium/nitrogen switch to helium. Flow the helium by opening the helium input valve. Wait until the pressure gauge reading reaches about 29 psi (2 atm).
5. Open both electric vacuum valves by turning switches to 'ON' position. Start leak rate measurement by pressing the 'START' button (make sure that machine is now in normal mode, not in 'SNIFF' mode). Wait until the reading is stable, or well below the reject point, which is 10^{-5} std cc/sec. This step usually takes up to 1 minute. Record the reading. If the leak rate is below the reject point, stop the measurement by pressing the 'START' button again. Close both electric vacuum valves.

If the leak rate is larger than the reject point, 'REJECT' will be lit. In this case, follow the 'Procedure for abnormal condition (2)'.

6. Open nitrogen flush valve. Change leak detector to 'SNIFF' mode by pressing the 'SNIFF' button on setting panel. Start leak rate measurement and turn on the motor to pull the sniff block at about 3cm/sec. A nitrogen flush hose and sniff probe are attached to the top of it.

Watch the leak rate indicator. If the sniff block comes to the other end of tube and leak rate is always below the reject point, the tube is passed. Stop the leak detector and record the results.

If the 'REJECT' light is on at any point in the process, stop motor and follow the 'Procedure for abnormal condition (3)'.

7. Close helium input valve. Open the exhaust valve. Change helium/nitrogen switch to nitrogen and open the valve of nitrogen input. Flow nitrogen for about 1 minutes. Close all valves.
8. Release the o-ring squeezer and take off gas jumpers. Remove the tube.

Procedure for abnormal condition:

1. If the combined leak rate of two ends is larger than reject point, stop leak measurement. Close one vacuum electric valve and leave the other open. Measure the leak rate. Record reading and change to measure the leak rate of the other end.
2. Stop the motor at once. Move the sniff block manually around the point where leak rate is large than reject point. Make a mark where the leak occurs.

After work:

1. Make sure the leak detector is in 'READY' state. Ventilate the test port and then turn off the machine.
2. Close all gas bottle valves.