

How to make vacuum in the Ferrarix tank.

State of the tank before pumping:

- the pumps are stopped
- all the valves are closed (pre-emptying, discharge, valve of the turbo and tube connection)
- the tank is at air pressure (or almost) but hermetically closed (decompression tap)
- constraints are closed (water + gas)
- the different elements are switched on (turbo pump controller, valves control box, gauge reader)

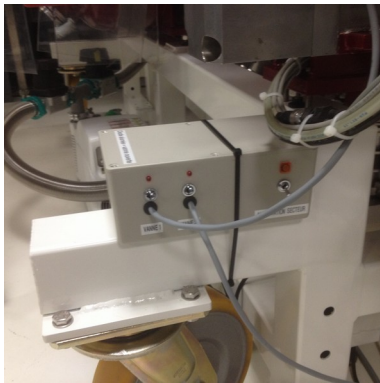


Illustration 1: Valve control box of the turbo-molecular pump



Illustration 2: Gauge pressure reader



Illustration 3: Turbo-molecular pump controller

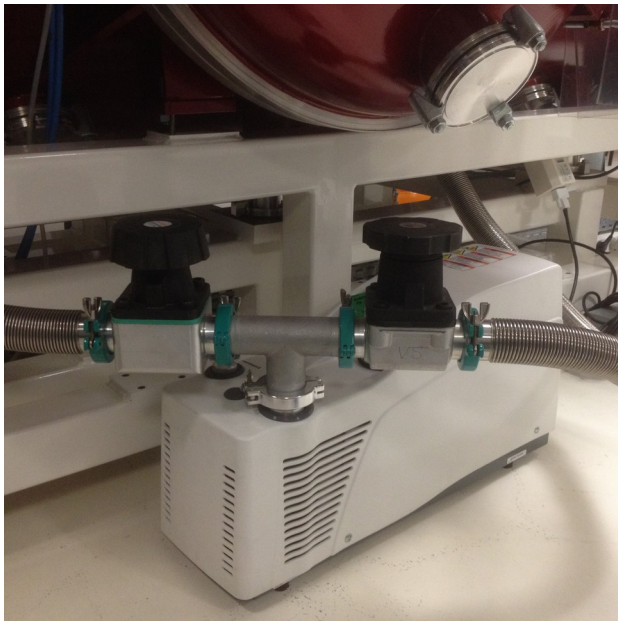


Illustration 4: Primary pump + discharge valve on the left and pre-emptying valve on the right



Illustration 5: Turbo-molecular pump and its valve

Procedure:

- Start the primary pump and wait for 20 minutes until it warms up pumping on itself.
- Open the pre-emptying valve and the discharge valve of the secondary pump and wait for a pressure of 10^{-2} mBar inside the tank (it can make noise).
- Start the turbo-molecular pump via its controller.
- Open the gas bottle (7 Bar) and the water inlet (small jet of water in return).
- When the turbo-molecular pump reach its nominal speed (39 000 tr/min), close the pre-emptying valve and open the valve of the turbo pump using its control box.
- Wait until caramel flow slowly along the Flanby before eating it.

To survey:

- No water leakage on the cooling system of the turbo pump.
- Time to go to 10^{-2} mBar in pre-emptying
- Amperage and temperature of the turbo pump in fuction :
 - 1-1,5 A
 - ACT $\approx 25^{\circ}\text{C}$
 - ATH $\approx 30^{\circ}\text{C}$

Stop pumping:

- Close the valve between Ferrarix and the tube.
- Close the valve of the turbo pump using its control box.
- Stop the turbo-molecular pump via its controller.
- Close the water inlet.
- Wait until the speed of the turbo-molecular pump goes down 5 000 tr/min.
- Close the discharge valve of the secondary pump.
- Stop the primary pump.

Primary pump maintenance:

- The turbo pump is off
- The primary pump is on
- Open the maintenance stopper of the primary pump by one quarter turn (cf. Illustration 6) during about 30 minutes to empty humidity in the primary pump (it should make a lot of noise)
- To do regularly: before a start or after a pumping cycle for instance.

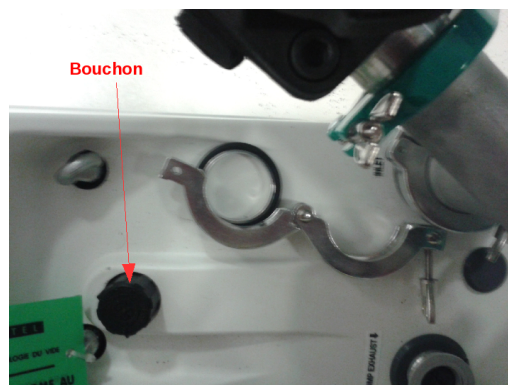


Illustration 6: Maintenance stopper (« bouchon ») of the primary pump