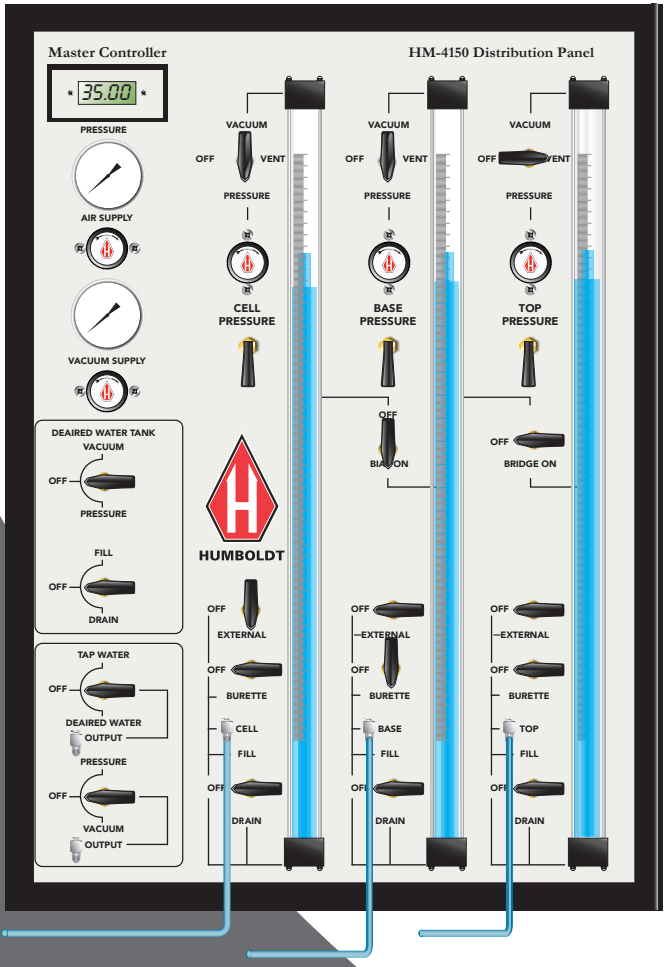
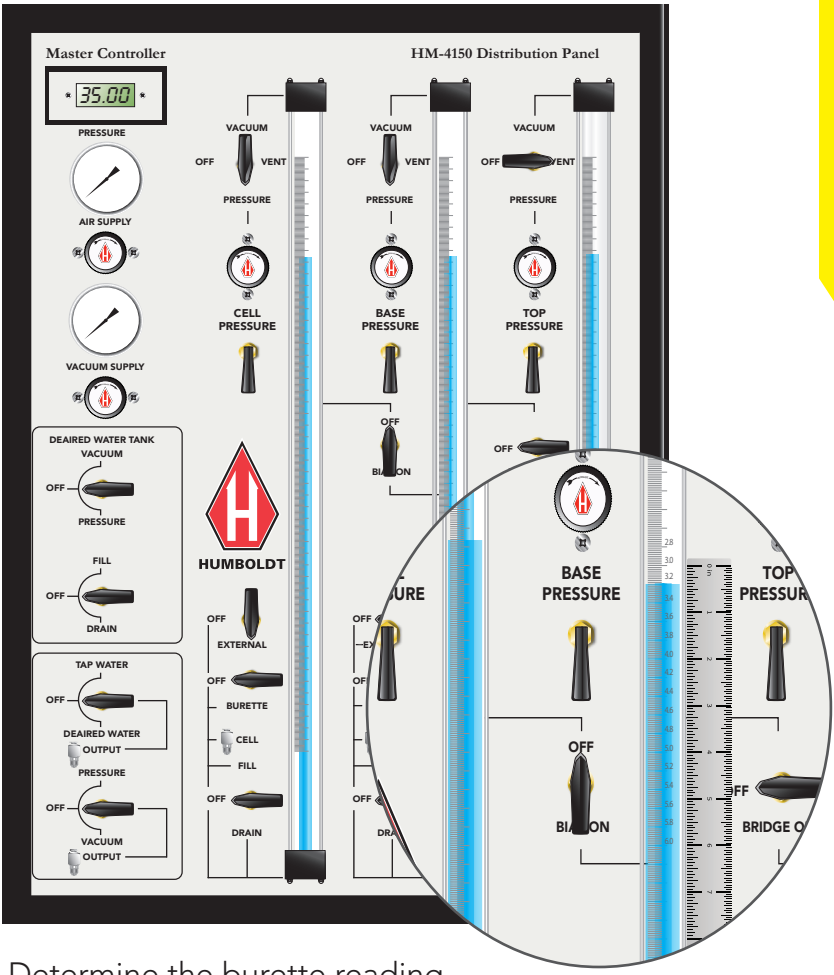
Falling Head, Rising Tail Permeability



Testing Equipment For Construction Materials

HUMBOLDT

1. Base and Top Burette cross-sectional Area (inflow and outflow) check /Verification



A. Determine the burette reading.

B. Measure the length of the known volume of the burette using a steel ruler.

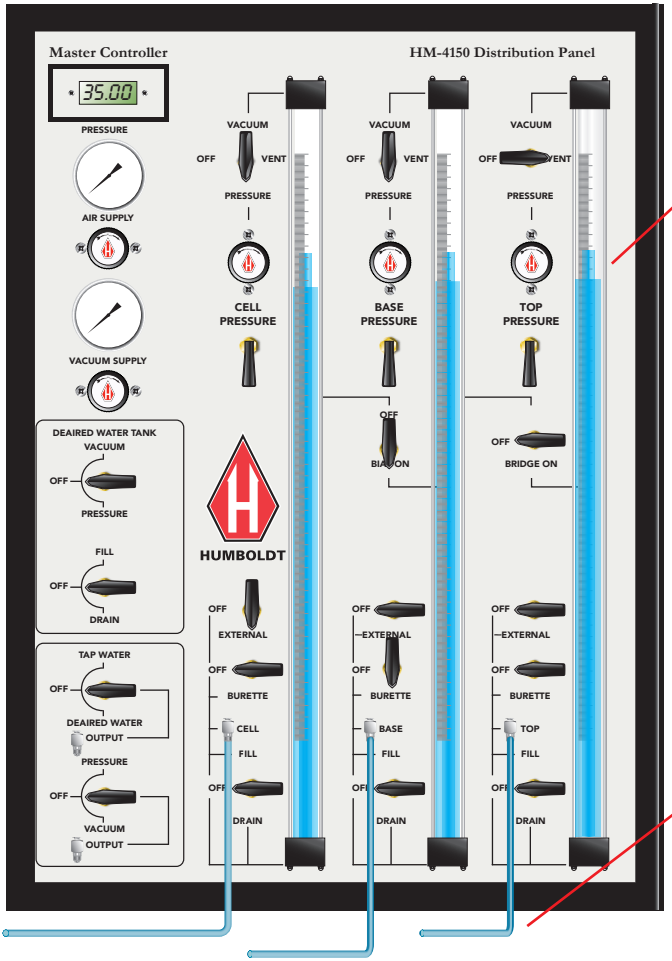
   Example: In this example 2.00 CC is equal to 4.00 inches in length.

C. Convert the length into cm.

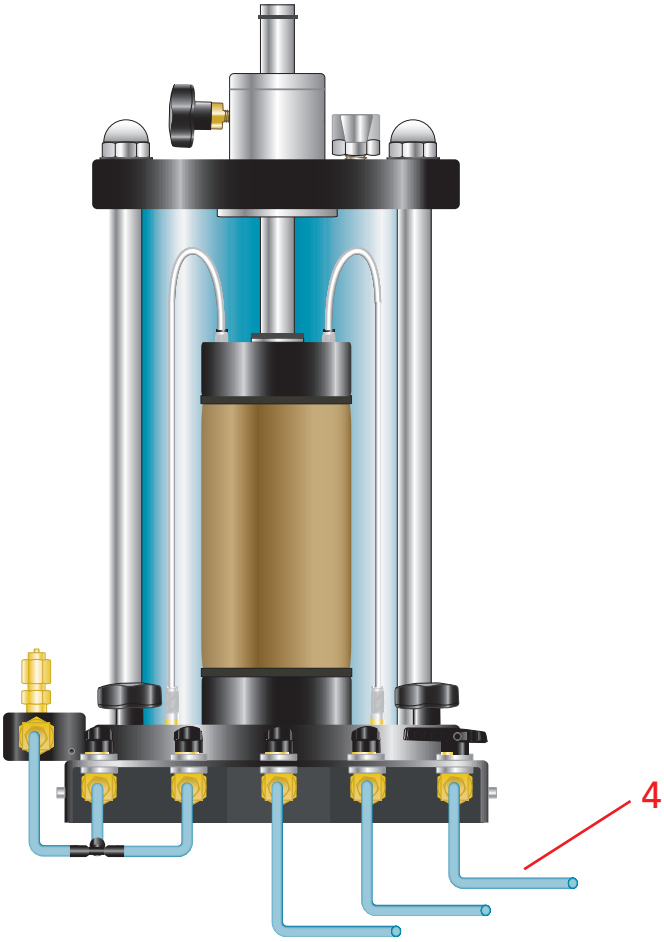
   Example: (4.00 x 2.54) = 10.18 cm

D. The area of the burette equals the known volume, divided by the measured length.

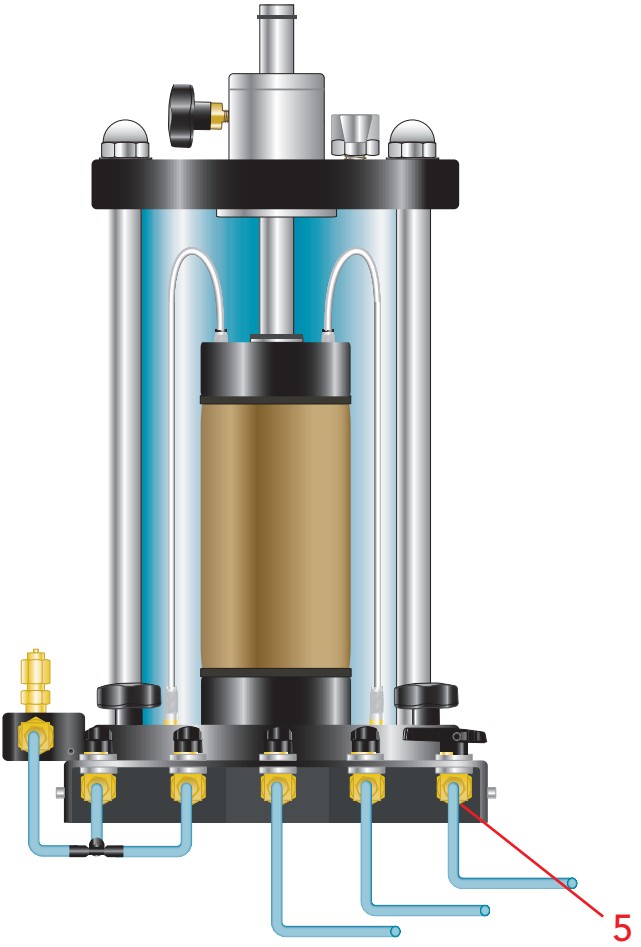
   Example: Area = 2.00 divided by 10.18 cm = 0.196 cm^2



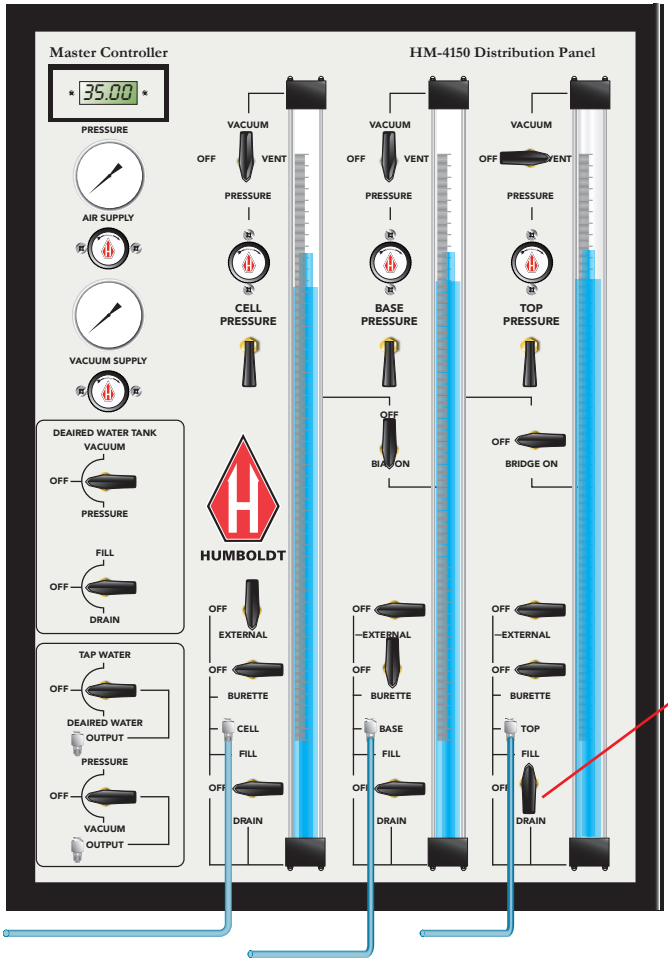
2. Fill the top burette, if it is not filled.
3. Connect the tubing to Top Burette Assembly (far right) on the pressure panel.



4. Connect the tubing from the Top Burette Assembly on the pressure panel to the Top Input on the right-hand side of the Triaxial cell.

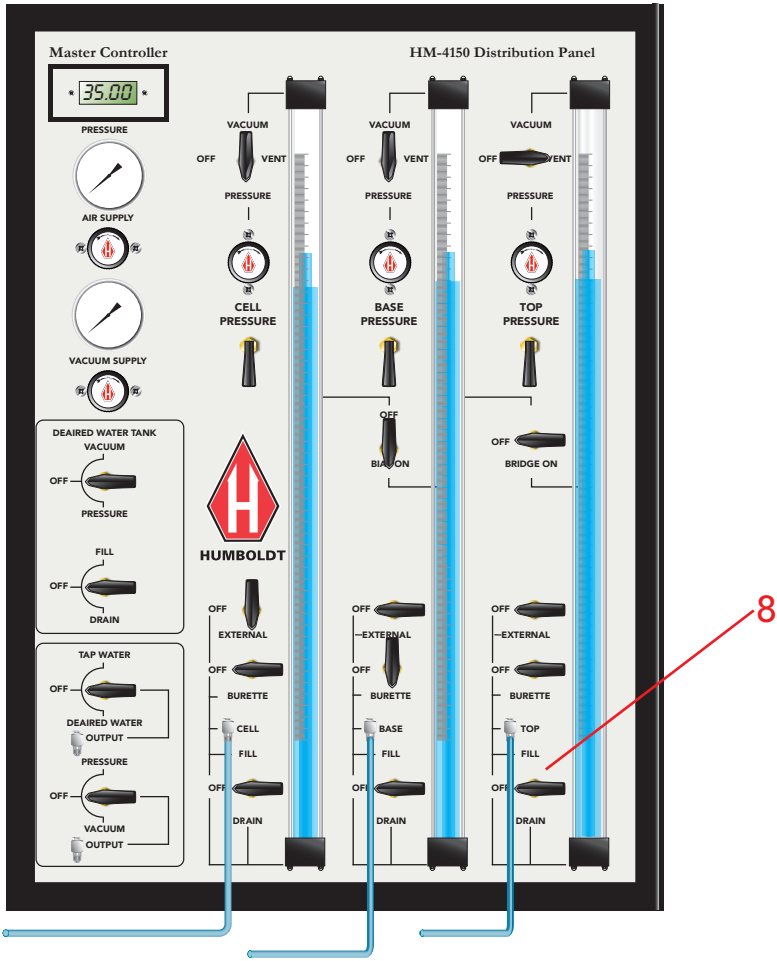


5. Loosen the nut holding the tubing on the Top Input valve of the triaxial cell.

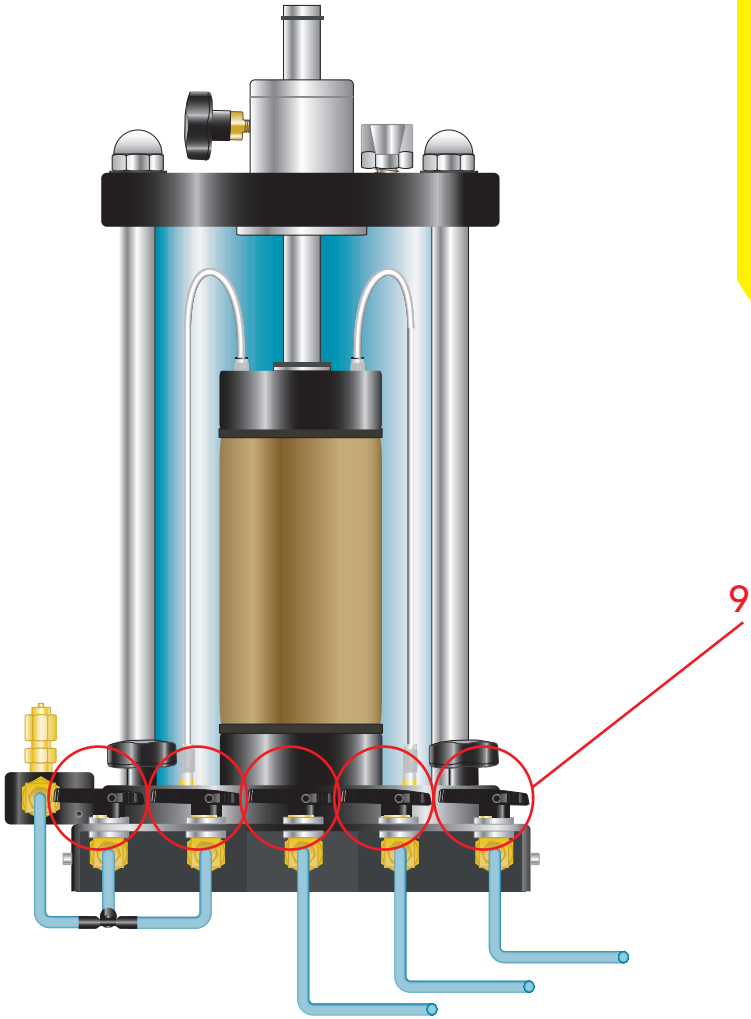


6. Turn the Top Pressure burette assembly's Fill/Drain valve to the Fill position, and allow the water to drain, which flushes the Top Input valve and tubing (Step 5).

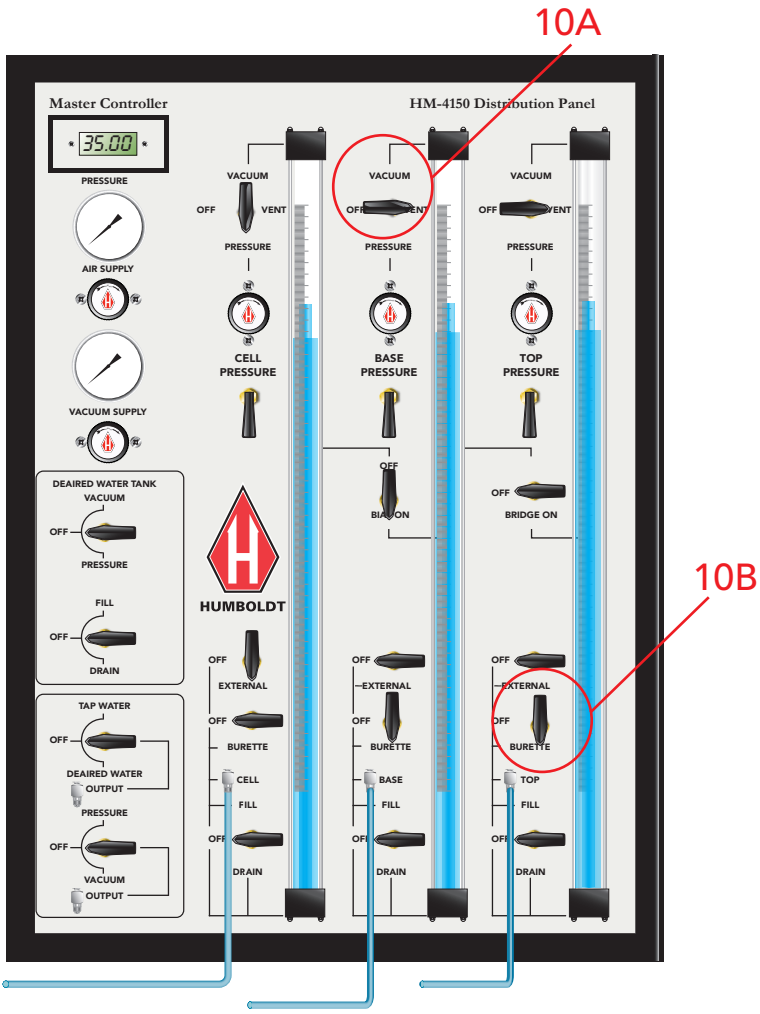
7. Then, Tighten the nut we loosened in Step 5.



8. Turn the Top Pressure Burette assembly's Fill/Drain valve to the off position.

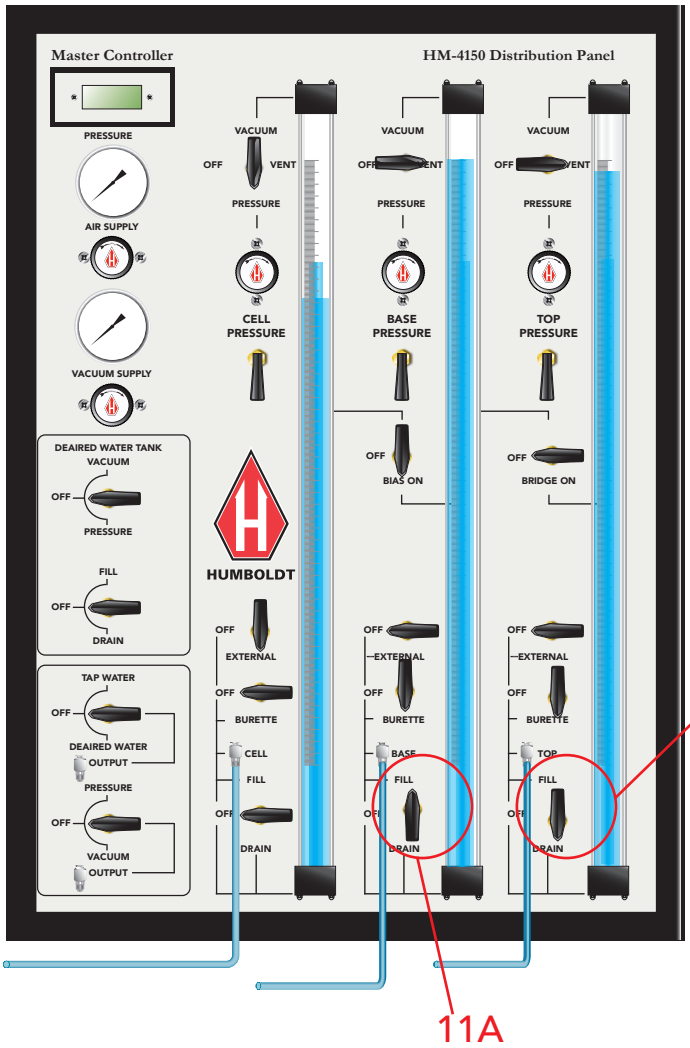


9. Close all of the valves on the Triaxial cell.



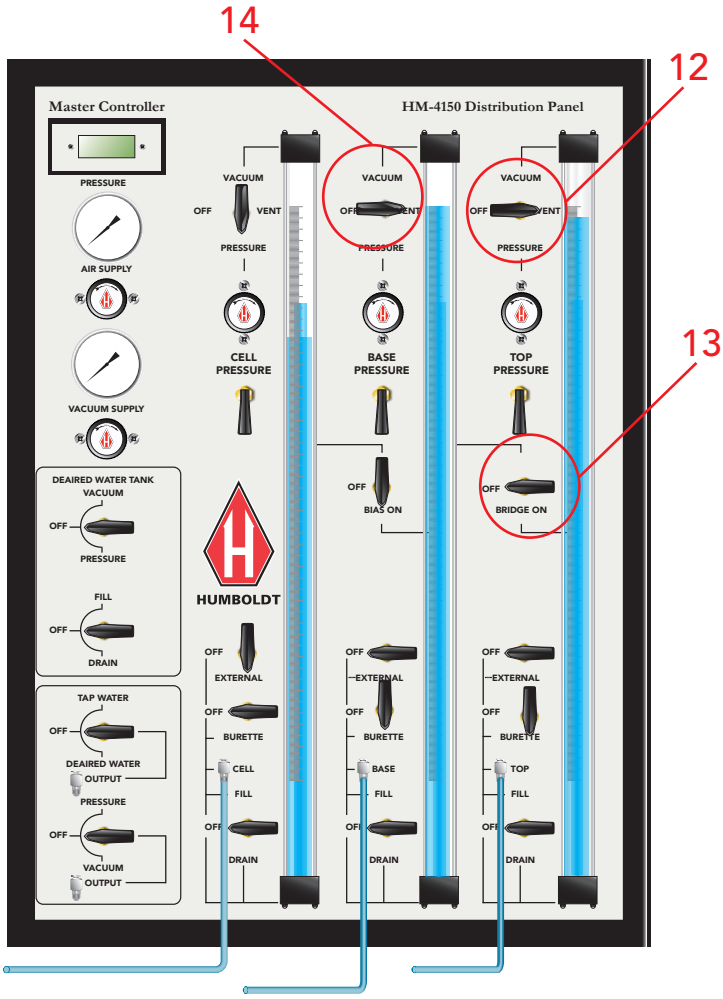
10A. Turn the Base Pressure Valve to the Vent position.

10B. Turn the External/Burette Valve for the Top Pressure Burette to the Burette position.



11A. Slowly Turn Base Fill/Drain to the Fill position, setting the Burette level close to 0.00 mark.

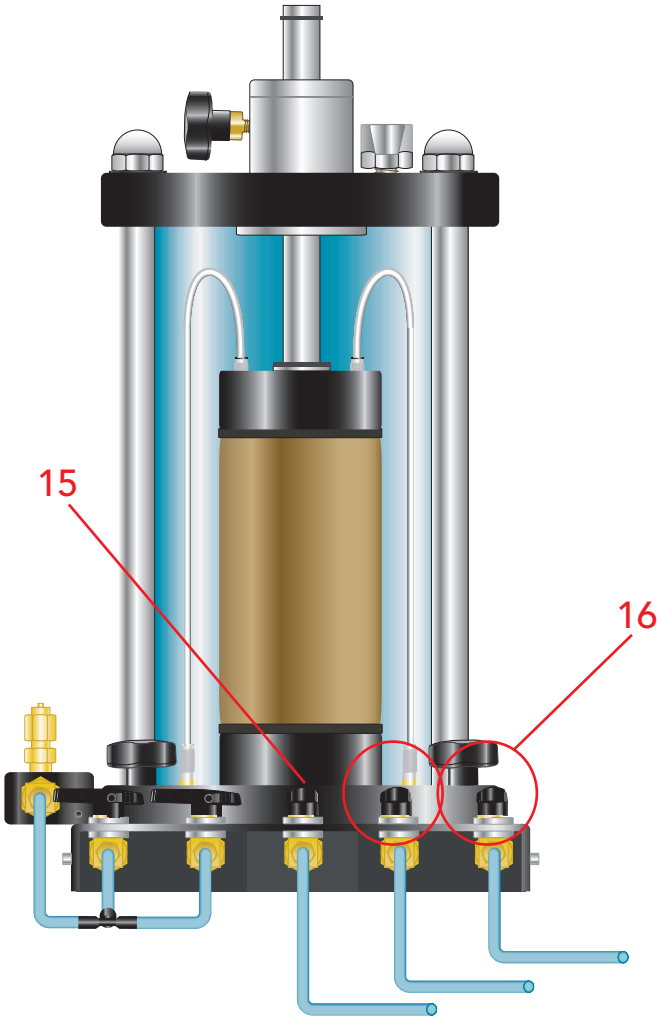
11B. Slowly Turn Top Fill/Drain to Drain position, setting the Burette level close to 10.00 mark.



12. Turn Top pressure valve to OFF.

13. Turn Bridge Valve to ON.

14. Turn Base pressure valve to Pressure.



15. Open The Cell valve located in the middle of the Triaxial cell.

16. Open Top and Base valves, located on the right-hand side of the Triaxial cell.

17. Allow top and base burette to stabilize for 5 -10 minutes, then start a timer and take a burette reading for both base and top.

18. The base burette should go down and top burette should go up.

19. When base burette drops to about 0.3 CC, record the time expired, and the level readings of the base and top burettes.

20. Continue recording the levels in the burettes.

21. Compute the inflow to the outflow ratio.

22. After computing four consecutive ratios of inflow to outflow between 0.75 and 1.25, you can now compute the Permeability.

23. **Permeability K(cm/sec.) = ((a_{in} (cm^2)* a_{out} (cm^2)* L (cm)) / ((a_{in} + a_{out})* ΔA* Δt(sec.))) ln (Δh1 /Δh2)**

K = hydraulic conductivity, cm/s,

ΔQ = quantity of flow for given time interval Δt, taken as theaverage of inflow and outflow, cm^3,

L = length of specimen, cm,

A = cross-sectional area of specimen, cm^2,

$t\Delta$ = interval of time, s, over which the flow ΔQ occurs (t2 – t1),

t1 = time at start of permeation trial, date: hr:min:sec,

t2 = time at end of permeation trial, date:hr:min:sec,

Δh = average head loss across the permeameter/specimen ($(\Delta h1 + \Delta h2)/2$), cm of water,

$\Delta h1$ = head loss across the permeameter/specimen at t1, cm of water,

$\Delta h2$ = head loss across the permeameter/specimen at t2, cm of water,

a_{in} = cross-sectional area of the reservoir containing the influent/inflow liquid, cm^2, and

a_{out} = cross-sectional area of the reservoir containing the effluent/outflow liquid, cm^2.

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