

Quick Start Guide

Ceramic Tension-Table system for close-to-saturation soil moisture retention measurements

PURPOSE Use this guide to assemble the MCT75 system, saturate the ceramic plates, load saturated soil samples, apply the target vacuum, and monitor the system until equilibrium. The MCT75 has a nominal operating range of 0 to 75 cbar (0 to 75 kPa) and is listed by SoilMoisture as ASTM D6836 compliant.

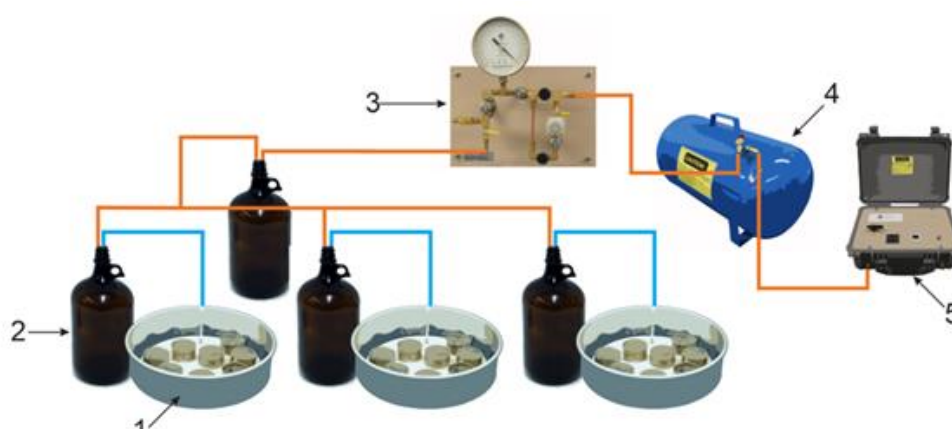


Figure 1. MCT75 system schematic. Orange = vacuum lines; blue = water drainage lines.

System Components

Item	Component	Function
1	Ceramic Tension Tables (3 each)	Hold the saturated ceramic plates and soil samples. Transparent lids minimize evaporation.
2	4-Liter Water Traps (4 each)	Each table drains into its own water trap jar. An additional 4-liter jar protects the common vacuum line.
3	Precision Vacuum Stabilizer Manifold (1 each)	Sets and distributes one controlled vacuum level to all three tables.
4	Vacuum Tank (1 each)	Stabilizes the vacuum supply and supports consistent pump operation.
5	PM10 Automated Vacuum Pump (1 each)	Creates the vacuum used by the MCT75 system.

1. Assemble the System

Vacuum path

PM10 Pump → Vacuum Tank → Manifold → Safety Water Trap → Primary Water Traps → Tension Tables

1. **Place the components.** Set the three tension tables and all water traps upright on a stable, level laboratory bench.
2. **Connect the blue drainage lines.** Connect each tension table drain outlet to its own 4-liter water trap.
3. **Connect the orange vacuum lines.** Connect the vacuum ports of the three primary traps to the common vacuum network. Install the extra 4-liter safety water trap in the common line as shown in Figure 1.
4. **Connect the vacuum source.** Connect the safety-trap line to the precision manifold, the manifold to the vacuum tank, and the tank to the Vacuum Port of the PM10 pump.
5. **Check every connection.** Confirm that caps, tubing, fittings, and valves are secure and that the blue and orange lines have not been crossed.

BEFORE APPLYING VACUUM Keep all water traps upright and empty. Water must remain in the blue drainage lines and traps; it must not enter the orange vacuum lines.

2. Saturate the Ceramic Plates

1. **Place each ceramic plate in its Tension-Table Pan.** Make sure the ceramic plate is seated properly and the drainage connection is secure.
2. **Add 2 to 3 cm of water above the plate.** Use the same preparation procedure for all three tables.
3. **Set the manifold to approximately 0.4 bar vacuum.** Turn on the PM10. Adjust it to vacuum levels between 0.5 to 0.6 bar (refer to the PM10 (2008F2) Operating Instructions). Adjust the Vacuum Manifold to approximately 40 kPa of suction. Allow water to pass through the plate into the water trap.
4. **Complete one saturation run.** Continue until water has been driven through the plate and collected in the corresponding water trap.
5. **Empty the water traps.** Empty all traps after every saturation run.
6. **Repeat the saturation cycle 2 to 3 times.** Repeated wetting and evacuation removes trapped air and fully saturates the ceramic plate.

VOLUME LIMIT: Each 1 cm depth of water in a tension-table pan is approximately 0.75 liter. Do NOT add more than 4 cm of water to any pan. This limit helps prevent a 4-liter trap from overfilling.

3. Load Samples and Begin the Test

1. **Leave a shallow water layer on the plate.** After plate saturation, add or retain approximately 2 to 3 mm of water above the ceramic surface.
2. **Place a large filter paper over the plate.** Wet the paper filter so it adheres uniformly to the ceramic plate and provides continuous hydraulic contact.
3. **Load the saturated soil samples.** Place the saturated sample rings on the wet filter paper over the ceramic plate. Confirm that each sample has full contact with the paper filter and the ceramic plate.
4. **Install the transparent lid.** Cover each pan to minimize evaporation during the equilibration period.

4. Apply Vacuum and Reach Equilibrium

1. **Set the target vacuum on the manifold.** The same regulated vacuum level is applied to all three tension tables.
2. **Monitor drainage and the water traps.** Check the traps regularly. If needed, empty them before they approach capacity, and stop the system if water enters an orange vacuum line.
3. **Wait for equilibrium.** Depending on soil texture, sample dimensions, and the selected vacuum, equilibrium may require several days to several weeks. Equilibrium is reached when water movement from the samples becomes negligible.
4. **Record the equilibrium water content.** Once the soil samples reach equilibrium, remove and weigh samples according to the laboratory method. Saturate and return them to the table and repeat at the next target vacuum when developing a stepwise moisture-retention curve.

Key operating limit	Guidance
MCT75 nominal range	0 to 75 cbar (0 to 75 kPa) vacuum.
Typical pump maximum	Approximately 0.75 to 0.80 bar vacuum at sea level.
Plate saturation setting	Approximately 0.4 bar vacuum; repeat 2 to 3 times.
Maximum water depth in the Pan	4 cm
Water Trap capacity	4 liters per. Empty traps before they fill.

Quick Troubleshooting

Observation	Check first
Vacuum will not stabilize	Check trap caps, tubing connections, manifold valves, and all fittings for leaks.
Water appears in an orange line	Stop the pump, release vacuum, empty the water traps and other system components, verify the 4 cm pan limit, and correct the water trap/tubing arrangement.
One table drains slowly	Check for a kinked or blocked blue drain line, incomplete plate saturation, or poor hydraulic contact between the plate, filter paper, and samples.

Product references

- MCT75 product page: <https://soilmoisture.com/product/mct75/>
- Moisture Retention Curve Systems: <https://soilmoisture.com/product-line/moisture-retention-curve-systems/>
- PM10-1 automated pressure/vacuum pump: <https://soilmoisture.com/product/pm10-1/>
- SBT100 precision vacuum stabilizer manifold: <https://soilmoisture.com/product/sbt100/>