

TS1

The first self-refilling Tensiometer

- Automatic self-refilling and deaerating
- Continuous fill level controlling
- Incorporated pore water sampling
- Independent emptying before frost
- Integrated soil temperature probe
- Extendible with multilevel modules
- Auto logging function
- Low power consumption
- Bus linking and RS485 interface

If your task is soil water monitoring you know the problem: If soil gets dryer than 850 hPa, no Tensiometer is able to take measurements. If the soil dries out beyond 900 hPa, the Tensiometer cup might even run empty completely. As only little water movements occur in extreme dry soil, losing readings might be tolerable. Then, when the soil gets wet again, the Tensiometer could actually restart measurements - but first it needs to be refilled again.

X Automatic refilling

Now, the TS1 solves this problem: In case the cup needs to be refilled and soil water is available the internal pump will draw up some water out of the soil, refill the cup and remove all air through an exhaust outlet - fully automatically.

Even if only a bubble is detected by the integrated Infrared filling status indicator, the cup is deaerated automatically.

Contrariwise, if the temperature probe indicates emerging frost, the TS1 empties itself to prevent damages caused by freezing.

X Intelligent pore water sampler

For refilling, soil water is drawn up through the cup and air and excessive water are pressed out of the exhaust outlet back into the soil. Now, this process can be used for pore water sampling as well. The water is saved inside the shaft for later collecting and analysis, or is pumped to the top right away. The intervals for automatic sampling as well as the sample amount can be preset in the controller.

The water is extracted with a pressure that is slightly higher than the current soil water tension measured by the TS1. Thus, soil disturbance, filtration effects, lime accumulation or pH-value shifts are prevented.

X Microprocessor controlling

The internal microprocessor controls and coordinates all the features of the TS1, as taking readings, checking filling status, soil water tension and temperature and managing the pore water sampling. Also, an autologging mode is incorporated for independent operation. Via the internal bus and a RS485 interface, all functions are programmed and data is collected.



*Do you know
what your tensiometer
is measuring today?*

X Multilevel modules

The TS1 can be assembled as a multiple level sensor, which means several "Tensiometer"-modules can be connected in a row. Each Tensiometer module has a length of 30 cm. Each module consists of the water filled cylindrical cup and a tube attachment incorporating all electronics, microprocessor and pump. The temperature probe and IR-filling status indicator dip into the cup. All modules are linked with the bus interface.

X Internal microcontroller

The controller supervises the filling status and the soil water tension, checks readings for reliability and processes preset algorithms. Thus, water will be drawn only if it is available and the soil water tension is in a measurable range. The integrity of the readings is assured and error messages reveal false readings.

X Logging function

The TS1 incorporates a memory for up to 1000 readings. The logging intervals are programmable. Readings are readout via the RS485 interface.

X Output signals and bus interface

The standard assignment for datalogger applications are two analogue outputs, one each for pressure and temperature.

Tensiometers on an extended site are linked to the bus as well as the different modules of a multilevel TS1.

Configuration parameters, pump cycles, pore water sampling etc. are adjusted from a PC (USB port, requires adapter cable) or via the INFIELD7b handheld measuring device.

X Internal pump

The internal high precision pump has been specially designed by UMS. The pump is controlled by the microprocessor. While pumping the power consumption is 10 mA, but far below 1 mA during measurements.

X Installation

Recommendable installation angles are from 90° (vertical) to 10° (nearly horizontal). To exclude disturbances of the water flow, it is preferable to have a nearly horizontal installation. The offset shift caused by a vertical water column inside the cup is compensated automatically.

X Maintenance

After two years, the tube of the pump and the desiccant should be renewed. As with other sensors, it is recommendable to re-calibrated Tensiometers after two years.

Accessories

- X INFIELD 7b handheld measuring device (see fig.).
- X PC-adapter cable (8-pin plug to USB).
- X Tensiometer connecting cables (8-pin plug to free wire ends) and extension cables.



Multilevel Tensiometer with three modules: soil water tension is measured in depths of 90 cm, 60 cm and 30 cm.

Technical specifications

Tensiometer

Measuring range	-1000 hPa ... +1000 hPa
Resolution	± 0.1 hPa
Accuracy	± 1.5 hPa

Temperature

Measuring range	-30°C ... +70°C
Resolution	± 0,1 K
Accuracy	± 0,2 K

Analogue outputs

2 per module, single ended, selectable ranges 0 ... 1 V, 0 ... 2 V, 0 ... 5 V

Digital outputs

Bus, RS485

Autologging

Memory for 1000 readings, logging interval programmeable

Power supply

7...20 VDC

Current consumption

3 mA typically, min. 0,5 mA; max. 20 mA

Housing

GFK/PMMA resist, Ø 40 mm

Connector

8-pin plug M12/IP67

