CaTeC
MEETINSTRUMENTATIE
Turfschipper 114 | 2292 JB Wateringen | Tel. 0174 272330 | Fax. 0174 272340 | info@catec.nl | www.catec.nl

The MPS-6 features:

- **Dramatically Improved Accuracy** - Accuracy (±10% of the reading) comes from the MPS-6's six point factory calibration. Compare with confidence to other MPS-6 sensors or to other measures of water potential.
- **Tough, Long-Lasting Body** - Epoxy overmolding will withstand even difficult field conditions. Sensors are rated for long-term research studies.
- **No Recalibration** - Other matrix potential sensors have a tendency to degrade over time. The MPS-6 uses a silica based ceramic material that doesn't degrade and doesn't need replacement or recalibration.
- **Insensitivity to Salts** -The sensor is accurate in salty environments, a variety of soils, and even in locations where the salinity conditions change over time.
- **Affordability** - Breakthrough calibration technique gives the MPS-6 the accuracy of an individually calibrated sensor at a price comparable to most uncalibrated sensors.
- **Excellent Range** - The MPS-6 has sensitivity from -9 kPa all the way to air dry (-100,000 kPa), with accurate measruements to at least permanent wilting point.
- **Onboard Temperature Measurement** - Temperature measurements let you evaluate another important growing condition without adding a sensor.
- **Plug and Play Capability** - Just install the sensor, plug it into the Em50 series logger, set the clock and measurement intervals, and start logging data. No programming required.
- **Remote access to data** - Use the MPS-6 with an Em50G data logger and access your data from your office, lab, classroom, or anywhere with an internet connection.
- **SDI-12 Compatible** - The MPS-6 is compatible with nearly all major commercial data loggers through SDI-12, a universal communications protocol.

How it Works

MPS-6 sensors are composed of a moisture content sensor and a porous substrate with a known moisture release curve. After the porous material has equilibrated with the surrounding soil, the moisture sensor measures the water content of the porous material, and the sensor uses the moisture release curve to translate moisture content into water potential.

Range vs. Accuracy

A sensor's range depends on the variation in pore sizes in the porous substrate; the wider the range of pore sizes, the bigger the measurement range. Commercially available ceramics are designed to have a uniform pore size, which limits their range. The MPS-6 uses a ceramic specifically designed with a wide pore size distribution for wider measurement range. However, a sensor's accuracy depends on how well the moisture release curve characterizes the porous substrate in that particular sensor. The more consistent the substrate is from sensor to sensor, the more accurate each sensor will be. Widely varied pore sizes lead to inconsistency from sensor to sensor, putting these two critical sensor goals in conflict.

Calibration Solution

This conflict can be resolved by individually calibrating each sensor. This has always been a time-consuming and expensive process, however.
The MPS-6's accuracy comes from breakthrough calibration methods that allow sensors to be individually calibrated using an automated calibration apparatus. These new techniques make the MPS-6 the first low cost matrix potential sensor with research-grade accuracy

Case Study: Water potential measurements in a Swiss forest.

The data below were taken with MPS-2 sensors in a Beech and Dry Oak forest, respectively. Both the MPS-2 and the MPS-6 share the same ceramic plate and technology; only the calibration methodology is different. The data sets show excellent sensor agreement down to permanent wilting point (-1,500 kPa) with a range that extends well beyond permanent wilting point.

ACCURACY	Soil Water Potential: ±(10% + 2 kPa) from -9 to -100 kPa (see manual for additional accuracy specifications past -100 kPa) Soil Temperature: ± 1°C
RESOLUTION	Soil Water Potential: 0.1 kPa Soil Temperature: 0.1°C
RANGE	Soil Water Potential: -9 to -100,000 kPa Soil Temperature: -40° to 60°C* *Sensors can be used at higher temperatures under some conditions. Contact Decagon for more details.
MEASUREMENT SPEED	150 ms (milliseconds)
EQUILIBRATION TIME	10 min to 1 hr depending on soil water potential
SENSOR TYPE	Frequency domain with calibrated ceramic discs, thermistor
OUTPUT	RS232 (TTL) with 3.6 volt levels or SDI-12 communication protocol
OPERATING ENVIRONMENT	-40° to 60°C* *Sensors can be used at higher temperatures under some conditions. Contact Decagon for more details. Water potential measurements will not be accurate below 0° C.
POWER	3.6 - 15 VDC, 0.03 mA quiescent, 10 mA max during 150 ms measurement
CABLE LENGTH	5 m, custom cable lengths available
CABLE CONNECTOR TYPES	3.5 mm "stereo" plug or stripped and tinned lead wires (3)
SENSOR DIMENSIONS	9.6 cm (l) x 3.5 cm (w) x 1.5 cm (d)
DATA LOGGER COMPATIBILITY (NOT EXCLUSIVE)	Decagon Em50 Series (rev 2.13+), ProCheck (rev 1.53+), Campbell Scientific, any SDI-12-capable data logger
WARRANTY	One year, parts and labor

	MPS-6	MPS-2	T5/T5x* Laboratory Tensiometer	T4 External Refilling Field Tensiometer	T8 External Refilling Field Tensiometers	TS1 Sell Refilling Smart Tensiometer
ACCURACY	± 10% of reading + 2 kPa from -9 to -100 kPa	± 25% of reading + 2 kPa from -9 to -100 kPa	±0.5 kPa	±0.5 kPa	±0.5 kPa	±0.5 kPa
RANGE	-9 to -100,000 kPa	-9 to -100,000 kPa	+100 kPa to -85 kPa (-200 kPa*)	+100 kPa to -85 kPa	+100 kPa to -85 kPa	+100 kPa to -85 kPa
POWER REQUIREMENTS	3.6-15 V, 10 mA	3.6-15 V, 10 mA	5-15 VDC	5-15 VDC	3.6 V-15 VDC	5-15 VDC
MEASUREMENT OUTPUT	Digital SDI-12	Digital SDI-12	Analog	Analog	Digital SDI-12, RS-485	Digital SDI-12, RS-485
METHOD USED FOR DETERMINING WATER POTENTIAL	Capacitance of a ceramic matrix, 6 point calibration	Capacitance of a ceramic matrix, 2 point calibration	Piezoelectric pressure sensor, Wheatstone full bridge	Piezoelectric pressure sensor, Wheatstone full bridge	Piezoelectric pressure sensor, Wheatstone full bridge	Piezoelectric pressure sensor, Wheatstone full bridge
BEST FOR	- Long-term research studies - Natural environment monitoring	- Low-cost irrigation monitoring	- Column & Spot Measurements in the Laboratory - Small point measurements	- Long term field studies - Vadose zone hydrology	- Long term field studies - Vadose zone hydrology	- Long term field studies - Vadose zone hydrology - Monitoring in remote sites