



METER
ENVIRONMENT

SOIL/LAB/HYDROLOGY INSTRUMENTS



HYPROP

The HYPROP 2 uses two precision mini-tensiometers to measure water potential at different levels within a saturated soil sample while the sample rests on a laboratory balance. Over time, the sample dries, and the instrument measures the changing water potential and the changing sample weight simultaneously. It calculates the moisture content from the weight measurements and plots changes in water potential correlated to changes in moisture content.

After setup, the HYPROP 2 is capable of generating a moisture characteristic curve and determining the unsaturated hydraulic conductivity of soil samples in only days versus months. To save you even more time, it can operate while being left unattended.

KEY FEATURES

- High-resolution data (over 100 data points in the 0 to -100 kPa range)
- Fast: complete SWCC in a few days
- Completely automated
- Can be combined with WP4C data for complete SWCC across all water potential ranges

SPECIFICATIONS

- Accuracy: ± 1.5 hPa (0 hPa to 820 hPa)
- Resolution: 0.01 hPa
- Measurement range for tensiometers: +20 hPa to -1200 hPa / -2400 hPa



WP4C Water Potential Meter

The WP4C determines the relative humidity of the air above a sample in a sealed chamber (conforms to ASTM D6836). Once the sample comes into equilibrium with the vapor, relative humidity is determined using the chilled mirror method. This involves chilling a tiny mirror until dew starts to form. At the dew point, the WP4C measures both mirror and sample temperature within 0.001 °C. This allows for unparalleled accuracy in the -0.1 MPa to -300 MPa range so you can have full confidence in sample readings.

KEY FEATURES

- Fast: readings in less than 10 minutes
- Accurate: $\pm 1\%$ from
- Primary measure of water potential
- Measures the combined matric and osmotic potentials
- Durable and easy to clean
- Simple to operate
- Conforms to ASTM D6836
- Can be combined with HYPROP for complete SWCC across all water potential ranges

SPECIFICATIONS

- Range: 0 to -300 MPa
- Accuracy: ± 0.05 MPa from 0 to -5 MPa; 1% from -5 to -300 MPa
- Temperature range: 15-40 °C
- Read time:
 - Soil sample: ~10-15 min (precise mode), <5 min (fast mode)
 - Plant sample: ~20 min



KSAT

The KSAT is the only easy-to-use automated setup for taking saturated hydraulic conductivity measurements in the lab. In its simplest form, it's an instrument that uses both the falling head (automated) and constant head (non-automated) methods on a soil core. Best of all, it's completely integrated and automated, so you're also assured of software-controlled engineering that's fully tested.

KEY FEATURES

- Accurate
- Completely automated -- removes human error
- Directly calculates Ksat
- Temperature corrections
- Completely integrated package
- Uses both constant and falling head methods
- Easy-to-use software
- Wide range of conductivities
- Complies with DIN 19683-9 and DIN 18130-1

SPECIFICATIONS

- Measurable KSAT values (min.): 0.01 cm/d (0.004 in/d)
- Measurable KSAT values (max.): 5000 cm/d (196 in/d)
- Hydraulic conductivity (K_s) of the porous plate: $K_s = 14000$ cm/d (5512 in/d)
- Typical statistical inaccuracy at constant environmental parameter and constant flow resistance of the soils: approx. 2% (in practice 10%)
- Pressure sensor accuracy: 1 Pa (0.01 cm WC or 0.0001 psi)
- Temperature sensor accuracy: 0.2 °C C (0.4 °F)
- Sampling ring (also fits with HYPROP)
Volume: 250 ml (0.066 gal)
Height: 50 mm (2 in)
Inside diameter: 80 mm (3.15 in)
100 ml sampling rings possible w/separate adapter



SATURO

The SATURO dual head infiltrometer is a fully automated system for measuring saturated hydraulic conductivity. The SATURO will take measurements unattended, so you don't have to wait. As it measures, the SATURO automatically measures infiltration rates, and the control unit calculates field saturated hydraulic conductivity (Kfs).

KEY FEATURES

- Fully automated infiltrometer
- Capable of unattended measurement
- Kfs values calculated and graphed in real time, no data post-processing is necessary
- Portable
- Includes self-contained water reservoir

SPECIFICATIONS

- Infiltration rate range: 0.0038 cm/hr to 115 cm/hr
- Infiltration rate resolution: 0.0038 cm/hr
- Infiltration rate accuracy: $\pm 5\%$ of reading
- Water level: Maintained at 5 cm
- Pressure head ranges: 0 to 40 cm
- Operating temperature: 0 to 50 °C



PARIO

PARIO calculates the particle size distribution by Stokes' law, with a range spanning from 63 μm to 2 μm , finally making it easy to obtain a complete particle size distribution curve, instead of just a few measurements at discrete time points.

It allows for unattended, automated operation (with the exception of opening the valve after completion). Just set it up and come back later to a finished measurement with all the data you need.

FEATURES:

- Complete particle size distribution curves
- Autonomous operation
- Fast measurement time: 2.5h
+/- 0.5% error
- Quasi-continuous resolution of particle size distribution
- No physical disturbance of suspension during measurement
- No manual reading or calculation errors
- Direct measurement of clay content

SPECIFICATIONS

- Particle size range: 2-63 μm
- Approximate error in mass fraction detection: $\pm 0.5\%$
- Pressure measurement
Accuracy: ± 1.0 Pa
Resolution: ± 0.1 Pa
- Typical particle mass: 25–50 g per 1-L suspension
- Typical duration of measurement: 2.5 h
- Measurement interval: 10 s
- Estimation of clay content: Derived from integrated particle mass in effluent
- Estimation of sand fraction: Estimated by sieve data



DRAIN GAUGE G3 LYSIMETER

The Drain Gauge G3 is a passive-capillary lysimeter that determines the volume of water and chemicals draining from the root zone into groundwater. Once installed below the root zone, water samples are easily collected through the surface port for analysis of chemicals, fertilizers, and other contaminants. Drainage and solute levels can be continually measured in real time using the optional EC/depth sensor. Not only is the Drain Gauge constructed from inert materials so it won't react with compounds collected in the sample reservoir, it also features a sealed design, which allows it to work in both saturated and unsaturated conditions.

KEY FEATURES

- Completely sealed system protects from high water tables
- 6.1 cm drainage capacity allows for large sampling volumes
- Monitor solute fluxes with optional EC sensor
- Can be used with the optional AutoPump to automatically draw samples on remote or high drainage deployments

SPECIFICATIONS

- Drainage
 - Range: 0–61 mm bottom of wick, 61–100 mm top of reservoir chambers
 - Resolution: 0.2 mm
 - Accuracy: ± 1.4 mm
- Water depth
 - Range: 0–10,000 mm
 - Resolution: 1 mm
 - Accuracy: $\pm 0.05\%$ of full scale at 20 °C
- Temperature
 - Range: -40 to $+60$ °C
 - Resolution: 0.1 °C
 - Accuracy: ± 1 °C
- Bulk electrical conductivity (EC)
 - Range: 0–120 dS/m
 - Resolution: 0.001 dS/m
 - Accuracy: ± 0.01 dS/m or $\pm 10\%$, whichever is greater



HYDROS 21

The HYDROS 21 is a low-cost, durable, and easy-to-use tool for monitoring EC, temperature, and depth in both groundwater and surface water. More importantly, it's an all-in-one instrument. When used with the ZL6 data logger or any other logging system, you won't require an additional sensor for measuring—and referencing—barometric pressure. With a range of 0 to 120 dS/m and a measuring depth of 10 m, the sensor makes accurate depth and EC measurements for a broad range of applications.

KEY FEATURES

- Continuously monitor groundwater and surface water level changes
- Vented sensor means no need for an additional sensor to measure and reference barometric pressure
- Integrated electrical conductivity and temperature measurement
- 3.4 cm diameter sensor that fits into tight spaces
- Low cost
- Durable
- Easy to use

SPECIFICATIONS

- Bulk electrical conductivity (EC)
Range: 0–120 dS/m
Resolution: 0.001 dS/m
Accuracy: ± 0.01 dS/m or $\pm 10\%$, whichever is greater
- NOTE: The EC measurement is corrected to a standard temperature of 25 °C.
- Temperature
Range: -11 to $+49$ °C
Resolution: 0.1 °C
Accuracy: ± 1 °C
- Water depth
Range: 0–10,000 mm
Resolution: 1 mm
Accuracy: $\pm 0.5\%$ of full scale at 20 °C



ES-2

The ES-2 Electrical Conductivity and Temperature Sensor is designed to measure the electrical conductivity of water in a pipe or tank. When you pair the new ES-2 with a TEROS 12 soil moisture sensor in the soil, you'll begin to develop a complete picture of the salts that are going into your system, as well as the salts remaining in your soil or substrate.

KEY FEATURES

- Integrated electrical conductivity and temperature measurement
- Low cost
- Durable
- Easy to use

SPECIFICATIONS

- Temperature
Range: -40 to 60 °C
Resolution: 0.1 °C
Accuracy: ± 1 °C
- Bulk EC
Range: 0 to 120 dS/m
Resolution: 0.001 dS/m
Accuracy: ± 0.01 dS/m or $\pm 10\%$ (whichever is greater)