8280 Willow Oaks Corporate Drive
Suite 400
Fairfax, VA 22301
Tel: 703-536-7080
www.swatirrigation.org

Smart Water Application Technologies/SWAT Calibration Report

Testing Agency: Center for Irrigation Technology http://cati.csufresno.edu/cit/

Testing Period: January 2009 to January 2010

Product Type: Soil Moisture Sensor

Product Make and Model: Baseline BL-5315B biSensor

Product Description: Sensor measures moisture content in Time Domain Transmissometry

SWAT Protocol*: Turf and Landscape Irrigation Equipment - SOIL MOISTURE SENSORS
Phase 1: Indoor Lab Screening Tests - 7th Draft Testing Protocol

The concept of soil moisture sensors has an extensive history of scientific study and documentation. The objective of Phase 1 lab tests is to determine sensor calibration curves over a range of conditions that affect soil moisture, including soil type, temperature and salinity. Phase 1 testing determines sensor response over manufacturer specified test ranges to continue into Phase 2. At that time the soil sensor will be integrated with an irrigation controller to measure irrigation adequacy and efficiency in a virtual landscape using the current performance criteria of 0.40 inches of rainfall and 2.50 inches of ETo.

Phase 1 Soil Moisture Sensor testing does not test the efficacy of a sensor over the entire range of soil moisture conditions possible and do not measure the integration of a soil sensor with a controller to manage irrigation.

Sensor performance curves were developed to determine the relationship between sensor readings and soil moisture content for a soil filled container. Relationships are determined for a range of soil textures, ambient temperatures and water conductivity values.
***All SWAT protocols may be viewed at www.irrigation.org**

Phase 1 SWAT Calibration Summary: Baseline BL-5315B biSensor

Measures are between field capacity (i.e. practical soil water holding capacity) and a selected drying range specified by the manufacturer over which the sensor was tested.	**Equation (Linear)**
Test of Soil Moisture Sensor	**Response Function Developed[1]**
Response in Fine-Textured Soil	Linear (y =0.1687x + 0.2518)
Response in Medium-Textured Soil	Linear (y =0.5042x + 0.1198)
Response in Coarse-Textured Soil	Linear (y =0.6613x + 0.0902)
Response in Soil at 15 °C (59 °F)	Linear (y =0.5066x + 0.1334)
Response in Soil at 35 °C (95 °F)	Linear (y =0.4897x + 0.1229)
Response in Soil Susceptible to Freezing	Linear (y =0.4370x + 0.1404)
Response in Fine-Textured Soil to Irrigation with 2.5 dS/m salinity water	Linear (y =0.1263x + 0.2727)
Response in Fine-Textured Soil to Irrigation with 5.0 dS/m salinity water	Linear (y =0.1105x + 0.2849)
Response in Medium-Textured Soil to Irrigation with 2.5 dS/m salinity water	Linear (y =0.5541x + 0.1221)
Response in Coarse-Textured Soil to Irrigation with 2.5 dS/m salinity water	Linear (y =0.8550x + 0.0940)
Response in Medium-Textured Soil for six wet/dry cycles	Linear (y =0.5014x + 0.1418)

[1]Regression equations of the data gathered vs. moisture content as measured by gravimetric sampling, or the measured weight of water in the soil samples. The dynamics of variable manufacture selected calibration endpoints preclude the applicability of correlation coefficients for inter-test or inter-sensor comparisons. A Nonlinear designation means a regression equation other than a straight line was used to best describe the relationship.

Product Detail Supplied by Manufacturer

Baseline BL 5315B biSensor **www.baselinesystems.com**

Operation	Features	Additional Hardware
Digital Absolute-reading Time Domain Transmissometry	• Provides stable readings across a wide range of soil temperature and EC conditions • Ability to act as a moisture transducer in a closed loop irrigation system. • No post-install adjustments needed. • Can measure soil and irrigation system properties for automatic setup • No electrically conductive components having earth contact.	• Natively communicates via highly reliable digital protocol to Baseline controllers and monitors over two-wire or over conventional field valve and common wires in parallel with standard 24vac solenoids. • BL6000 Controller Family: Combination two-wire and/or conventionally wired Internet ready smart irrigation control system capable of expanding to 4000 zones. • BL3200 Controller Family: Combination two-wire and/or conventionally wired Internet ready smart irrigation controller capable of expanding to 200 zones.