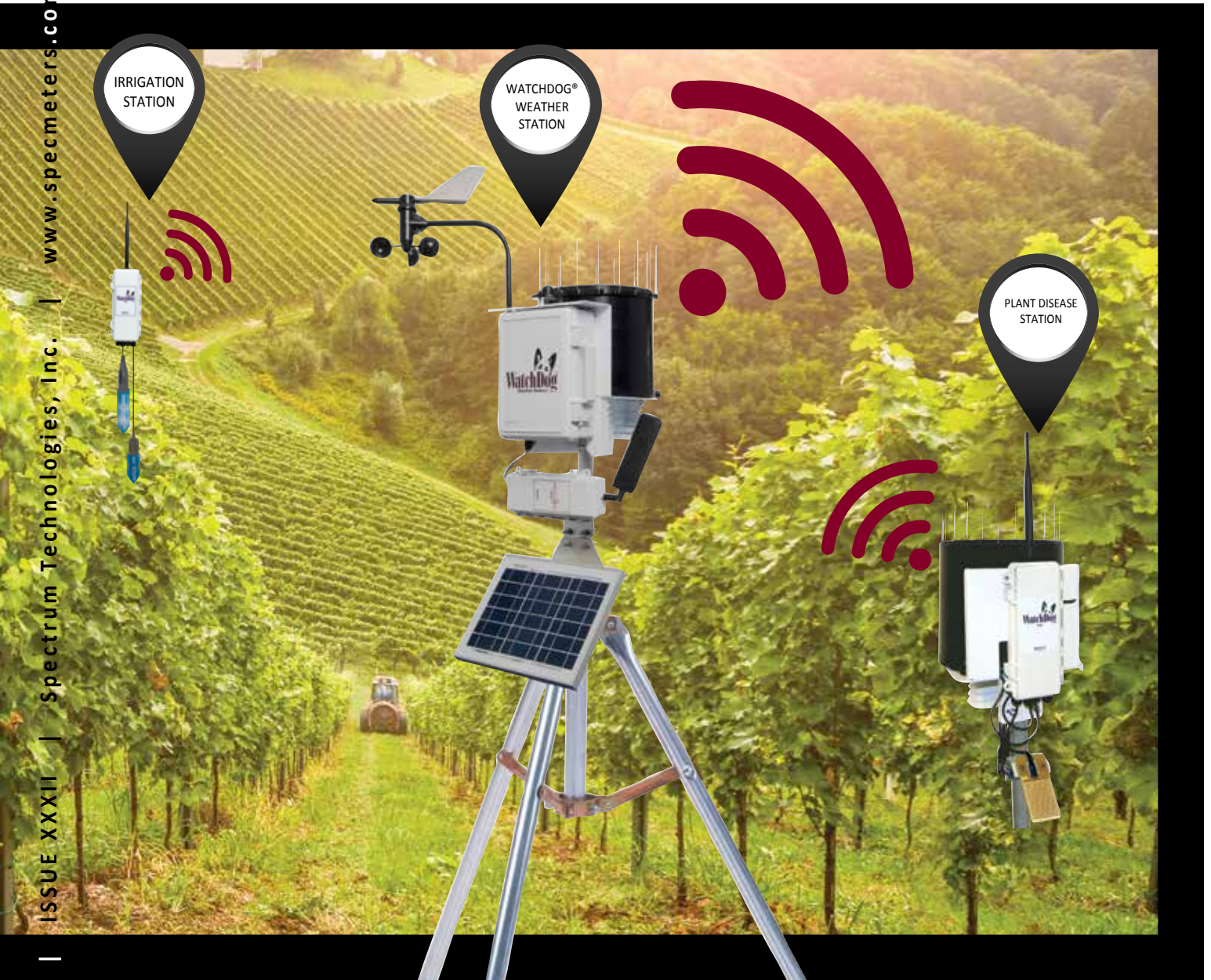


# SMARTGROWTH™

AGRONOMIC SOLUTIONS

VOL 2019 | ISSUE XXXII | Spectrum Technologies, Inc. | www.specmeters.com | +1 815-436-4440



**Spectrum**  
Technologies, Inc.  
"To Measure Is To Know"

# SMARTGROWTH™

Welcome!

Thank you to our valued customers and our talented team of employees for contributing to another successful year in business. Since 1987, we have been committed to meeting your needs. It's our mission to turn plant measurements into information for profitable decisions around the world.

Spectrum continues to be an industry leader in plant measurement technology, working closely with researchers, growers, golf course superintendents and industry suppliers to provide a broad line of professional, quality products in crop environmental monitoring, nutrient management, soil moisture measurement/irrigation scheduling and pest management.

We stand behind every product with our 100% Satisfaction Guarantee and are committed to providing a friendly and knowledgeable customer support team to answer your questions.

Thank you for your support and commitment to innovation.

Sincerely,



Mike Thurow  
CEO & Founder  
Spectrum Technologies, Inc.



**Spectrum®**  
**Technologies, Inc.**

## IT IS EASY TO CONTACT US!

-  **Online**      **[www.specmeters.com](http://www.specmeters.com)**
-  **E-mail**      **[info@specmeters.com](mailto:info@specmeters.com)**
-  **Phone**      **1 (800) 248-8873** (U.S. & Canada)  
**1 (815) 436-4440**
-  **Fax**      **1 (815) 436-4460**  
**3600 Thayer Court**  
**Aurora, IL 60504 USA**





## COMPANY OVERVIEW

Spectrum Technologies, Inc. manufactures affordable, leading-edge measurement information technology for the agricultural market throughout the world.



We develop peak plant performance tools for better field output. Using the most advanced plant measurement technology, we provide growers with actionable plant health data that translates into more profitable decisions.



## INDUSTRY FUTURE

With consumers demanding higher quality food and environmental conditions, the need for measurement and monitoring technology will continue to grow. The need to conserve resources such as soil and water will drive the need to CREATE more measurement information technology.

## PRODUCTS

### 1

#### WEATHER

Temperature, Light, Wind, Rain, Relative Humidity and Leaf Wetness Monitoring



### 2

#### INTEGRATED PEST MANAGEMENT (IPM) TOOLS

Insect and Disease Models, IPM Scopes



### 3

#### SOIL MOISTURE & QUALITY MEASUREMENT

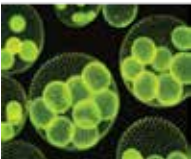
Soil Moisture, Soil Compaction and Water Quality Meters



### 4

#### NUTRIENT MANAGEMENT

Nutrient, Chlorophyll, pH, EC and Nitrogen Meters



### Award Winning Products

Since 1987, Spectrum Technologies has received 24 AE50 Awards from the American Society of Agricultural and Biological Engineers, which demonstrates our deep commitment to innovation and quality.

Our most recent AE50 award:

**2018** FieldScout® TDR 350 Soil Moisture Meter

See our website for a complete list of awards.



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## Wireless Communication

### WatchDog® Wireless Rain+Temp Station Features

- Measures temperature and rainfall
- Affordable station cost
- SigFox communication
- Highly accurate
- Remote/Wireless communication
- Radiation Shield
- Bird Guard
- Instantaneous rainfall notifications (with alerts active)



### Benefits

- Send data from every field directly to the cloud
- Deploy as many units as needed, with the option to move or add more
- Reduces communication cost
- Allows user to access data in near real time from anywhere
- Provides accurate temperature data hourly
- Bird Guard reduces debris in the rain collector
- Immediately updates with the first .01 inches of rain
- Continues to update every 10 minutes while raining

## Specifications

Operating Temperature:	-40° to 140°F (-40° to 60°C)
Event type:	Periodic hourly data logging with alarm based event checking every minute
Event intervals:	1 hour maximum, packet on .01 inches of rain then every 10 minutes until rain stops
Communication:	Sigfox LPWA network
<b>Temperature Sensor</b>	
Range:	-67° to 257°F (-55° to 125°C)
Accuracy:	± 1°F(0.5°C)
<b>Rain Sensor</b>	
Diameter:	8 inches (20.3cm)
Resolution:	.01 inch (0.25 mm)
Accuracy:	± 2% with rainfall at < 2 in (5 cm) per hour

## What is Sigfox Network?

Sigfox is the world's leading IoT services provider. The company's Low Power Wide Area (LPWA) network provides the lowest energy consumption for secure device-to-cloud connection. We are proud to partner with Sigfox to offer an affordable IoT connectivity solution to our customers.

**3200R2** WatchDog Wireless Rain+Temp Station

**3024** SpecConnect 1-year subscription







Manage your site data whenever, wherever.

Use this powerful tool as a central point for viewing and evaluating real-time data instantaneously for better decisions. SpecConnect can help improve yield and quality, conserve resources, increase profits and decrease risk by viewing current weather conditions and factors.

- Configure your network from your computer, smart phone, or tablet
- Easy and simple to navigate
- 100% customizable dashboard
- Supports multiple user logins
- Send customized alerts via text message or email
- Download your data for offline analysis
- Create custom reports and charts for full analyses of your data
- Map view allows you to see all station locations and current conditions
- Optional plant disease and insect models



### SpecConnect Reporting Features

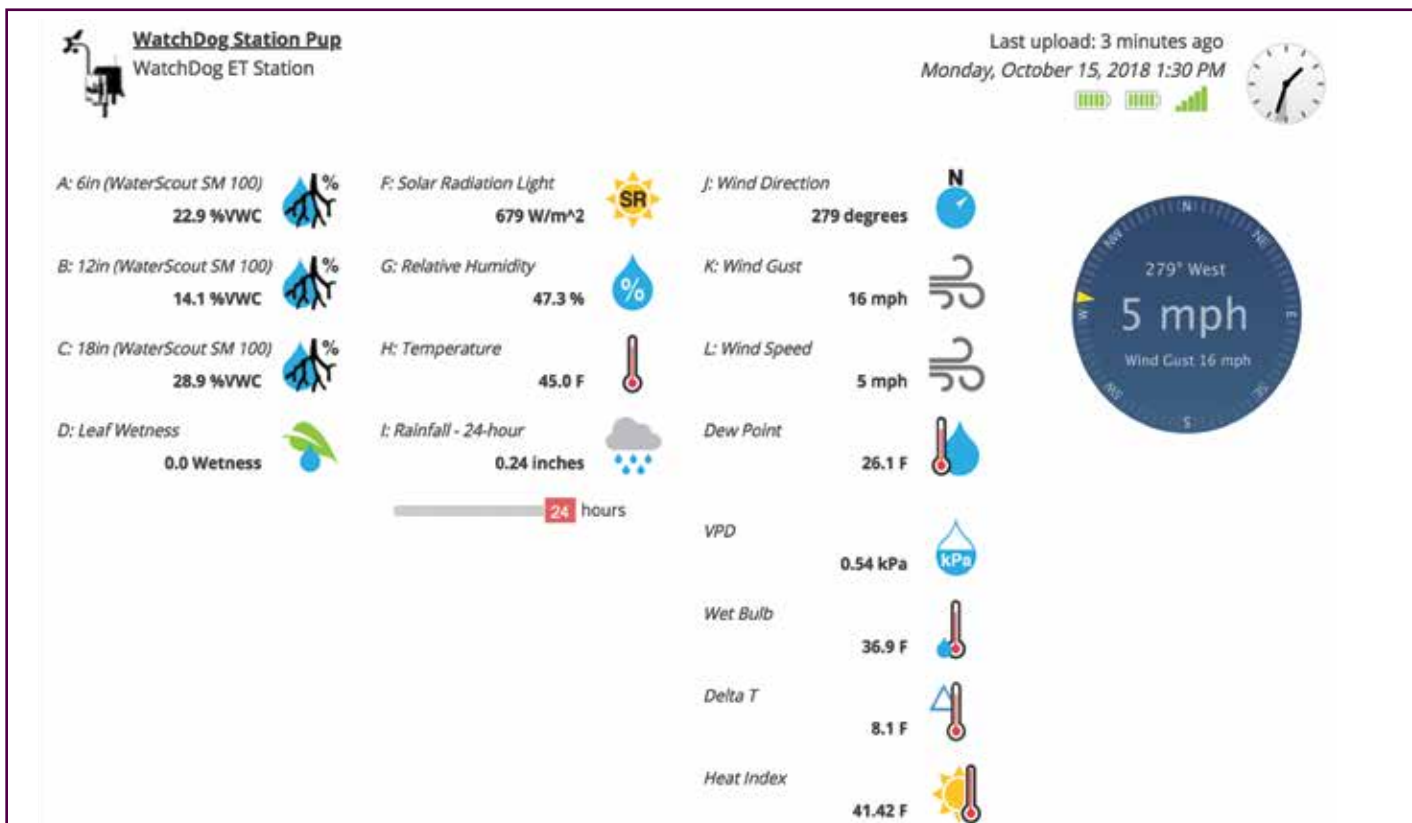
- Daily/Hourly
- Multi Station/Sensor
- Equipment Inventory & Activity
- Rainfall and Soil Moisture (product specific)
- And More!

### SpecConnect Compatible Items

- WatchDog® Retriever & Pups
- WatchDog® 2000 Series Weather Stations
- WatchDog® 2000 Series Mini Station
- FieldScout® TDR350/150
- FieldScout® TruFirm® Turf Firmness Meter

### Current Conditions At Your Fingertips

Example WatchDog Station Pup dashboard



## Daily Report

- Track the key growing factors of temperature, humidity, and rainfall
- Generate formal reports for permanent records
- Flexible date selection for reports you need: week, month or growing season

### Daily Report

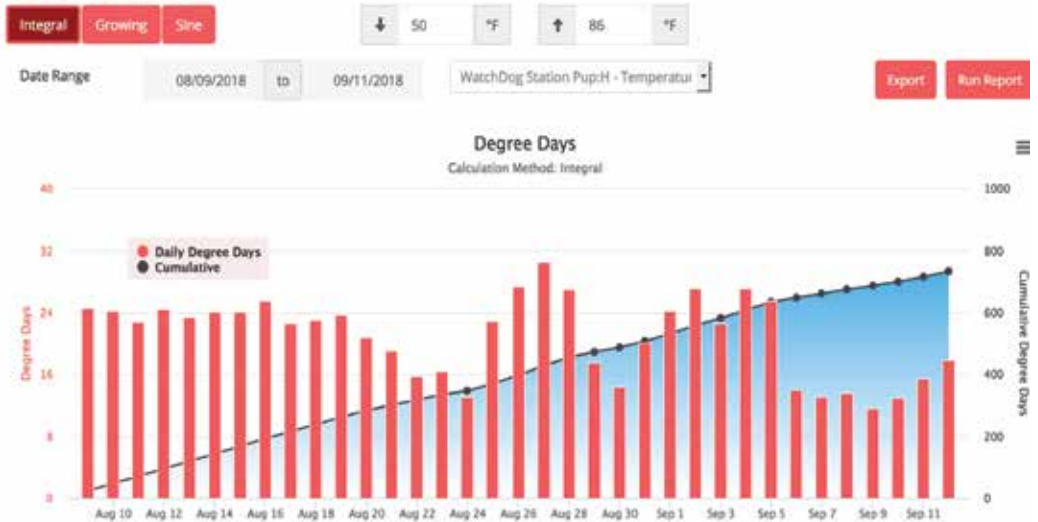
Date Range: 08/09/2018 to 09/11/2018 WatchDog Station Pup Export Run Report

Date	Temp High	Time @ Temp High	Temp Low	Time @ Temp Low	Temp Avg.	RH High	RH Low	RH Avg.	Daily Rainfall	Rainfall Cumulative
2018-09-11	80.80	4:30:00 pm	51.60	6:00:00 am	65.37	100.00	38.40	73.03	0.00	8.42
2018-09-10	77.50	3:30:00 pm	51.70	6:30:00 am	63.29	99.50	42.70	76.58	0.00	8.42
2018-09-09	70.70	2:00:00 pm	53.50	11:30:00 pm	61.90	93.40	44.10	68.47	0.00	8.42
2018-09-08	69.20	2:30:00 pm	58.90	12:30:00 am	63.75	89.50	59.00	70.17	0.00	8.42
2018-09-07	67.00	1:50:00 pm	59.40	11:30:00 pm	63.18	93.70	70.20	85.91	0.31	8.42
2018-09-06	68.70	12:00:00 am	59.90	11:00:00 pm	64.31	98.70	65.20	87.71	0.88	8.11
2018-09-05	87.90	1:30:00 pm	68.70	6:00:00 am	75.59	97.80	50.80	80.13	0.13	7.43
2018-09-04	90.50	2:30:00 pm	68.30	5:30:00 am	78.80	100.00	42.80	73.41	0.00	7.30
2018-09-03	83.40	1:30:00 pm	68.60	3:30:00 am	72.96	99.50	64.80	81.55	3.22	7.30
2018-09-02	88.70	3:00:00 pm	68.30	6:30:00 am	79.57	96.00	49.30	71.94	0.02	4.08
2018-09-01	88.00	4:30:00 pm	69.10	12:30:00 am	74.72	90.70	58.30	87.72	0.32	4.06
2018-08-31	84.70	4:30:00 pm	55.90	1:30:00 am	70.43	96.30	56.30	77.47	0.00	3.74

## Degree Days Report

- Track plant growth stage through the growing season
- Use degree-days for pest management decisions, not the calendar
- Time the application of pesticide spray more effectively with degree day information
- Aids growers and researchers in tracking the development of plants and pests
- Project the growth and development of plants and insects during the growing season

### Degree Days Report



## Disease Models

- Monitor disease pressure based on field-tested and validated algorithms along with data collected by sensors on your field
- Reduce the number of pesticide applications when disease risk is low
- Models available for Apple/Pear, Grape, Cherry, Potato, Tomato, Nut, and Turf diseases

### Disease Model Instance: Apple Scab

Model: Apple Scab Equipment: Watchdog Dates: 7/1/2018 to 7/19/2018 Export

Timestamp	Spore Mature Percent	Cornell Risk	Mills Risk	Calif Risk	Degree Day Sum	Mean Wet Temperature	Low Temperature	High Temperature	Degree Days	Leaf Wetness Hours
2018-07-01	1	None	None	None	46	83.80	64.90	94.90	45.85	.00
2018-07-02	2	Infected	None	None	89	70.27	66.40	94.60	43.48	6.92
2018-07-03	4	Infected	Medium	Infected	135	66.55	65.40	94.10	45.71	9.56
2018-07-04	7	Infected	Heavy	Infected	177	68.50	66.30	92.50	42.12	8.50
2018-07-05	10	Infected	Heavy	Infected	217	68.95	65.30	88.70	40.31	18.00
2018-07-06	17	Infected	Heavy	Infected	258	69.52	63.30	83.40	40.72	8.75
2018-07-07	22	None	None	None	292	65.00	79.90	79.90	33.72	.00
2018-07-08	27	None	None	None	324	48.60	81.60	81.60	31.83	.00
2018-07-09	34	None	None	None	361	51.00	90.20	90.20	37.40	.00
2018-07-10	42	None	None	None	403	57.50	88.70	88.70	42.04	.00

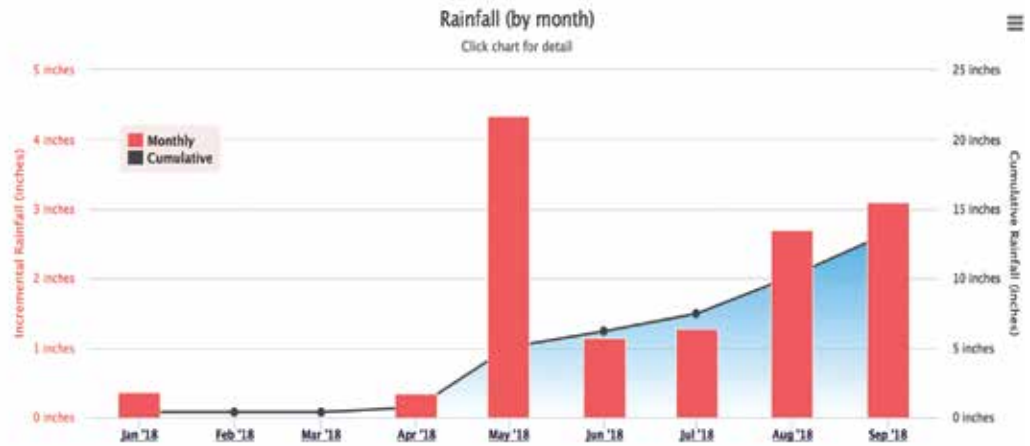
## Rainfall Report

- Monitor rainfall throughout the growing season
- See the monthly rainfalls superimposed on the cumulative total in one place
- Click on Monthly bars to see daily rain events

## Rainfall Report

Date Range 01/01/2018 to 09/21/2018

Export Run Report



## Soil Moisture Graph Report

- Maintain optimal levels of soilwater content in the root zone
- Avoid flushing nutrients beyond the bottom of the root zone
- Anticipate water stress by estimating water deficit
- Set the desired moisture thresholds based on your field needs and improve your irrigation efficiency

## Soil Moisture Graph Report

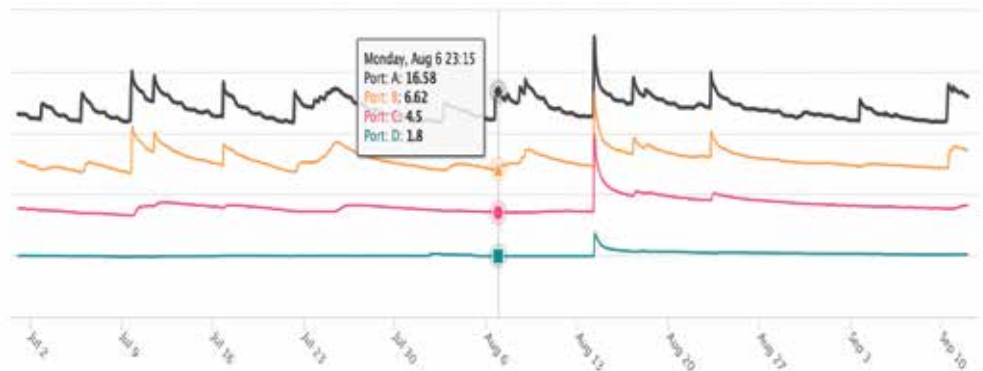
Date Range 07/01/2018 to 09/11/2018

Order Sensors

Stacked Summed

Export Run Report

### Soil Moisture Report for 7/1/2018 to 9/11/2018



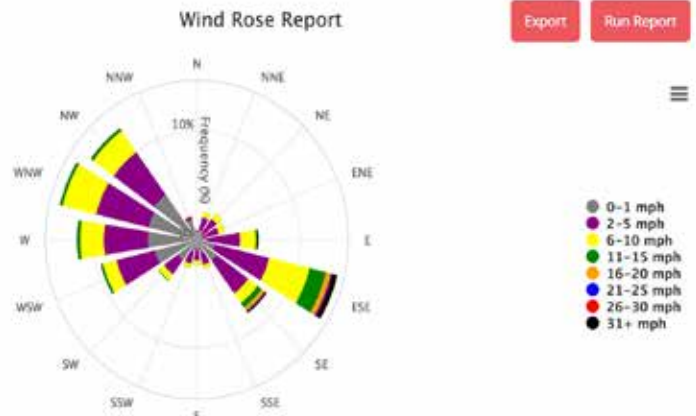
## Wind Rose Report

- Analyze and display distributions of wind speeds and directions at your locations
- Protect your plants from wind damage and adjust the direction of planting
- Anticipate soil erosion or deposition caused by intense and heavy wind
- Manage pesticide drift risk

## Wind Rose Report

Date Range 06/30/2018 to 09/20/2018

Export Run Report







- Web Portal connection requires a WatchDog Retriever & Pup network or any 2000 Series Weather Station to collect and log data, and DataScout Modem to send data to the internet
- FieldScout subscriptions require a TDR or TruFirm Meter and the free FieldScout Mobile App
- For more information about the FieldScout Mobile App (see page 33)

## Pro WatchDog Subscriptions

**3030** SpecConnect Pro 1-yr Subscription - WiFi  
[or user-supplied SIM card and data plan]

**3000** SpecConnect Initial Set Up Fee

## Additional Devices and Services

**3046** Additional WatchDog Device - Low-Cellular (1-yr)  
(15-60 minute, interval mean sensor values only)

**3055** Additional WatchDog Device - WiFi (1-yr)  
[or user-supplied SIM card and data plan]  
Needed per Pup or Station

**3040** Additional Login (1-yr)

Limit of three users per subscription

**3070** Alerts Function (1-yr) Up to 4 phone numbers and emails  
Needed per Pup or station

**3065** API Service - (one-time-charge)

## Pro FieldScout Subscriptions

**3035A** SpecConnect FieldScout Pro (1-yr) 1-3 devices

**3035B** SpecConnect FieldScout Pro (1-yr) 4-7 devices

**3035C** SpecConnect FieldScout Pro (1-yr) 8+ devices

# Disease & Insect Forecast Model Packages

## 1-YEAR SUBSCRIPTIONS

Be proactive in your management of diseases and insects by adding forecast models to your SpecConnect subscription

- Each package uses field-tested and validated algorithms along with your data to forecast the potential for the appearance of your crop's most notorious enemies
- Save money by spraying only when necessary
- Quickly produce the documentation needed to support your IPM decisions
- 1-year subscriptions

### 3095APP SpecConnect Apple/Pear Alert Package

**Required Sensors:** Leaf wetness and temperature  
**Models Included:** Apple Scab (Modified Mills, Cornell, UC Davis California)  
Fire Blight (Maryblyt, Cougarblight)  
Sooty Blotch/Flyspeck  
Insect Models

### 3095CHP SpecConnect Cherry Alert Package

**Required Sensors:** Leaf wetness and temperature  
**Models Included:** Leaf Spot  
Insect Models

### 3095GAP SpecConnect Grape Alert Package

**Required Sensors:** Leaf wetness, relative humidity, and temperature  
**Models Included:** Powdery Mildew (Thomas-Gubler)  
Black Rot (Spotts)  
Downey Mildew  
Botrytis  
Phomopsis Cane Leaf Spot  
Insect Models

### 3095POP SpecConnect Potato Alert Package

**Required Sensors:** Temperature, relative humidity, and rain  
**Models Included:** Early Blight  
Late Blight (BliteCast)  
Insect Models

### 3095TOP SpecConnect Tomato Alert Package

**Required Sensors:** Leaf wetness and temperature  
**Models Included:** Tomcast  
Insect Models

### 3095TUP SpecConnect Turf Alert Package

**Required Sensors:** Air and soil temperature, relative humidity, and rain  
**Models Included:** Brown Patch (Schumann)  
Pythium (Nutter, Schein)  
Dollar Spot (Hall, Mills/Rockwell)  
Insect Models

### 3095NUP SpecConnect Nut Alert Package

**Required Sensors:** Temperature, leaf wetness, relative humidity, rain  
**Models Included:** Almond Alternaria Leaf Spot  
Almond Anthracnose  
Pecan Scab  
Pistachio Panicle and Shoot Blight  
Walnut Blight  
Insect Models

## SpecConnect WATCHDOG SUBSCRIPTION FEATURES

Customizable Dashboard	✓
Current Conditions	✓
Basic Wind Speed/Direction & Temp Gauges	✓
Advanced Wind Rose	✓
Data Storage	✓
Mapping	✓
Calibration Adjustment	✓
Disease Models (additional fee)	✓
Reports	
Basic Reporting	✓
Custom Reporting	✓
Evapotranspiration (ET) Reports	✓
Degree Days Reports	✓
Daily Light Integral (DLI) Reports	✓
Chill Hours/Units/Portions Reports	✓
Other	
Alerts (additional fee)	✓
API Service (additional fee)	✓

## SpecWare 9 Basic

- Easily download, analyze and produce basic reports from the weather data collected on your WatchDog Micro Stations and data loggers
- Eliminate valuable time exporting the data and performing calculations in tedious spreadsheet programs
- SpecWare 9 Basic automatically assigns each WatchDog Data Logger Station to its own "logger location" directory, which is appended every time you download new data
- Includes USB cable and manual
- Download the software from [specmeters.com](http://specmeters.com) (activation required)
- Only one activation per purchase

SpecWare 9 Basic does not support disease models, 2000 Series Full Weather Stations, or Retriever & Pups

3654B9	Spec 9 Basic Software
3654B9X	Spec 9 Basic Extra User License
3654B9U	Spec 9 Basic Upgrade*
3661U	USB-to-3.5mm-Stereo-Plug Adapter

\* Does not include USB cable



## SpecWare 9 Pro

Powerful analysis tools that are easy to use.

- Graph on-the-fly with an interactive graphing window
- Build, customize and save your most important report formats or choose from 15 standard reports
- Add optional insect and disease models to forecast pest pressures and reduce pesticide costs; produce reports with graphs for each pest
- Set a frost alarm that will call your phone at frost temperatures or other sensor conditions
- Automate logger downloads with wireless or directly connected stations
- Generate scheduled log files for data-to-web applications or create an XML file that can be posted on the web
- Find and use data easily with an open file management system - all logger data is stored in one file per month, simplifying data sharing and exporting
- Import data files from other applications
- International features include handling date, time, and numbers with regional formats and Metric or US measurements
- Includes USB cable and manual
- Download the software from [specmeters.com](http://specmeters.com) (activation required)
- Only one activation per purchase

3654P9	SpecWare 9 Pro Software
3654P9X	SpecWare 9 Pro Extra User License
3654P9U	SpecWare 9 Pro Upgrade*
3661U	USB-to-3.5mm-Stereo-Plug Adapter

\* Does not include USB adapter cable



## Disease & Insect Forecast Model Packages

3656AP	SpecWare Apple/Pear Alert Package
3656CH	SpecWare Cherry Alert Package
3656GA	SpecWare Grape Alert Package
3656PO	SpecWare Potato Alert Package
3656TO	SpecWare Tomato Alert Package
3356TU	SpecWare Turf Alert Package

For more information, visit our website.

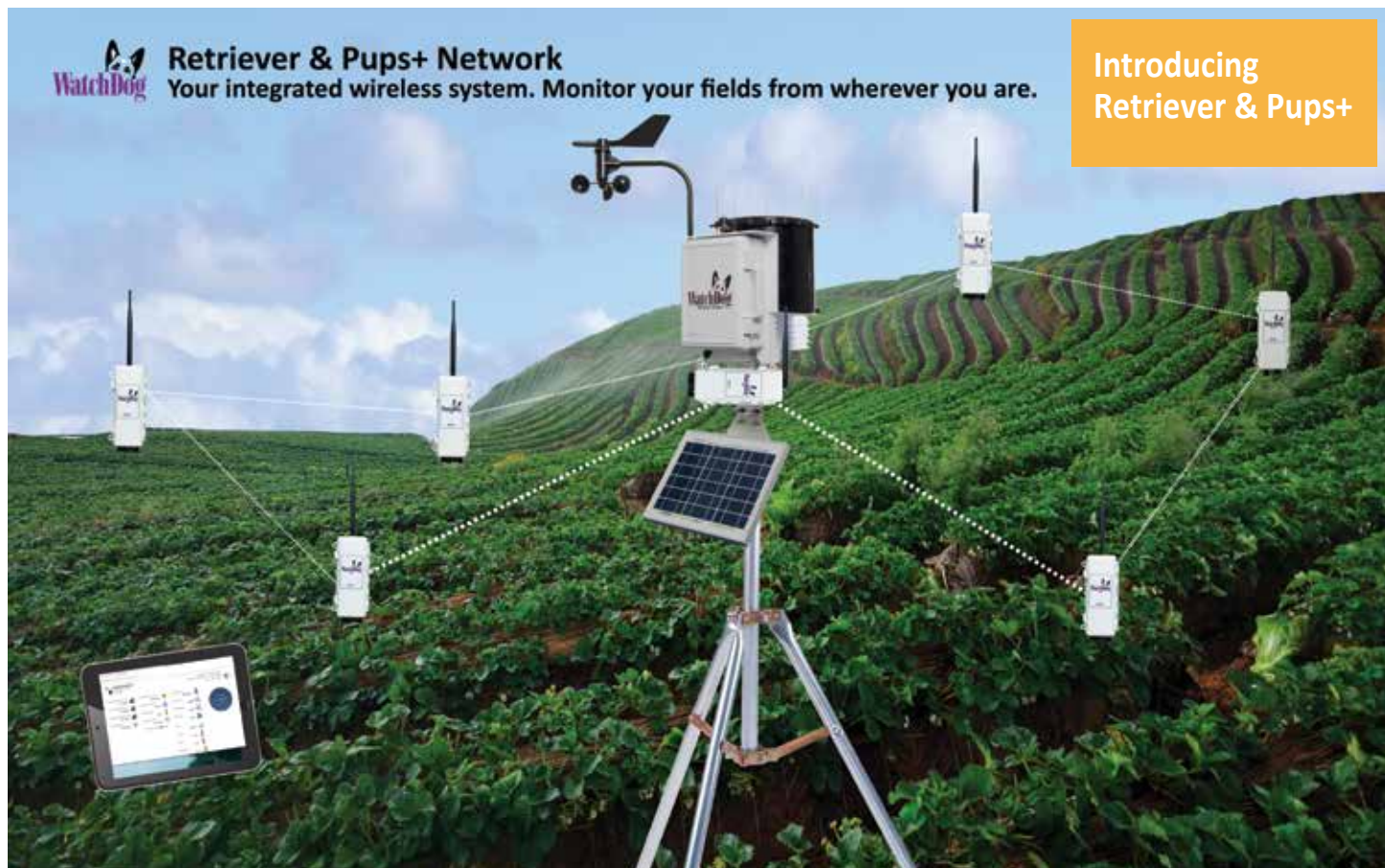
## BASIC VS. PRO

COMPARING SPEC 9 BASIC TO SPEC 9 PRO

	Basic	Pro
<b>View Data</b>		
On-demand graphing	✓	✓
<b>Manage Data</b>		
Calibration adjustment	✓	✓
Automatic data append	✓	✓
Single file per logger	✓	✓
International data format	✓	✓
<b>Reports</b>		
Standard reports	✓	✓
Custom reports		✓
Disease & Insect models		OPT
"Pest Alert" report models		OPT
<b>Communications</b>		
Direct connect or modem	✓	✓
Wireless capability		✓
Cellular or wi-fi modem		✓
Auto download		✓
<b>Supported Products</b>		
2000 Series Full Stations		✓
2000 Series Mini Stations		✓
Retriever & Pups		✓
1000 Series Micro Stations	✓	✓
A-Series & B-Series	✓	✓

SpecWare™ 9 software is compatible with Windows XP and later.

VISIT [SPECMETERS.COM/UPDATES](http://SPECMETERS.COM/UPDATES) TO ENSURE YOUR SOFTWARE VERSION IS COMPATIBLE WITH OUR NEWEST WATCHDOG MODELS.



Our Retriever & Pups+ Network sends real time data to your laptop, tablet or smartphone; anywhere you can access the internet. Trust the data and eliminate the guesswork! Each Retriever can support up to 12 Pups. Each Pup can support four different sensors and you can receive customized threshold alerts. Our sensors measure everything from soil moisture to light, wind, rain, humidity and more. Expand your network by adding weather stations to bring data from every nook and cranny of your property directly to you.

## Retriever & Pups+ Enhancements

- Added ability to remotely download firmware updates for Retrievers, Sensor & Station Pups
- Improved data transfer performance
- Pups save all data until the Retriever affirms that it has received and processed it
- Added acknowledgement feature, successful receipt sent to pup to ensure data is received
- Added flash memory feature on Pups to ensure over 10 months of unacknowledged data is saved pending the Retriever's response
- Added protection logic to prevent data spikes from occurring
- Increased number of Pup data records that can be stored on the Retriever
- Improved battery life
- If battery level gets too low to transmit data, the Pup shuts down the radio to dedicate all remaining battery power to collecting and saving data (for about 1 week)



**Frost & Irrigation Station**



Easily detect frost and be alerted of conditions in your crops, monitor and note site-specific conditions for insect and disease pressures and monitor soil moisture remotely.

**Irrigation Pup Station**



Flexibly monitor both soil moisture and EC in a variety of soil textures for better irrigation decisions.

**Plant Disease Station**

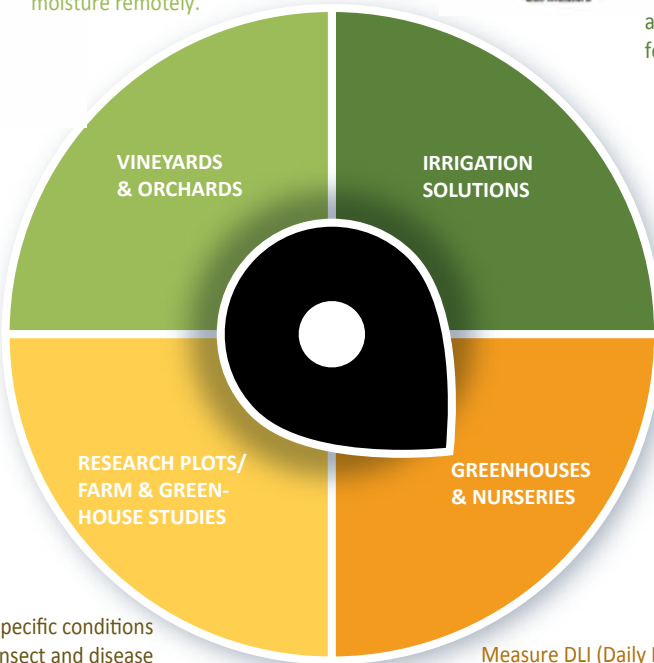


Capture site-specific conditions remotely for insect and disease pressures, soil moisture monitoring, weather conditions, light and more.

**2900ET Weather Station**



Measure DLI (Daily Light Interval), light duration and intensity for consistently better plant quality across greenhouse and high-tunnel structures. For outdoor growing monitor soil moisture, temperature and EC for efficient irrigation practices.



**Pup Weather Station with Soil Moisture**



**Plant Growth Pup Station**





# Pups



## STEP 1

CHOOSE YOUR PUPS

HOW MANY?

ARE YOU CONNECTING TO OTHER WEATHER STATIONS?

DO YOU HAVE OBSTACLES, LIKE TREES OR BUILDINGS, HIGH/LOW SPOTS THAT MIGHT INHIBIT TRANSMISSION?

### SETUP A NETWORK

Multiple Pups with a variety of sensors to choose from give you unlimited measurement options within a single network. Follow steps 1-5

## 3 models

### WatchDog Sensor Pup

- Connect up to 4 external sensor inputs per Pup
- Transmits data to Retriever (directly or via other Pups)
- Includes 6 lithium AA batteries (solar-power option below)
- Available as Pre-Packaged Pup Stations, including sensors

**3900 WatchDog Sensor Pup**

### WatchDog Station Pup

- Connects to WatchDog 2000 Series Full or Mini Weather Stations and transmits all station sensor data to the network
- No external sensors
- Includes 6 lithium AA batteries (solar-power option below)

**3901 WatchDog Station Pup**

### WatchDog Repeater Pup

- Serves as “signal booster” to help provide a path for the transmission signal around obstacles or to extend range; no sensor inputs of its own
- Includes 6 lithium AA batteries (solar-power option below)

**3902 WatchDog Repeater Pup**

### Additional Pup Information

- Single button operation: check battery status, signal strength, and join sensor network
- Tri-colored LEDs indicate battery level, signal strength, and data communication status
- Communication range of 2,500 ft (about 750 meters), line-of-sight installation between devices
- Pups act as repeaters to get data to the Retriever
- 900 MHz radios in this catalog; 868 MHz and 2.4 GHz also available for international use - Contact for details



## STEP 2

CHOOSE YOUR SENSORS

WHAT ARE YOU MEASURING?

WHAT INFLUENCES YOUR CROP MOST?

WHAT ELSE DO YOU WANT TO KNOW?

### Most Popular Sensors

Choose sensors for what you will measure. Choose up to 4 per Sensor Pup.

3613ARS	Temperature/RH Sensor with Aspirated Radiation Shield
3613THS	Temperature/RH Sensor with Passive Radiation Shield
3665RD	Digital Rain Collector with Bird Guard
3305ADD	Digital Anemometer
6470-20	WaterScout SMEC 300 Sensor with 20 ft (6.1 m) Cable
6460-20	WaterScout SM 100 Sensor with 20 ft (6.1 m) Cable
6450WD20	Watermark Sensor with 25 ft (7.6 m) Cable
3667	External (Soil) Temperature Sensor with 6 ft (1.8 m) Cable
3666	Leaf Wetness Sensor
3670I	LightScout Silicon Pyranometer
3668I	LightScout Quantum Light Sensor



### OPTIONAL ACCESSORIES

#### POWER UP Solar Power

**3999 Solar Power Package for Pups & Retrievers**  
Includes 5W solar panel and 6V 4.5Ah rechargeable battery



Pressure Transducer



CO2 Sensor



Digital Anemometer



Irrigation On/Off Sensor



LightScout UV / Solar Radiation / PAR Light Sensors



Digital Rain Collector



LightScout Quantum Sensor Bars



Barometric Pressure Sensor



WaterScout SM 100 Soil Moisture Sensor



External (Soil) Temperature Sensor



WaterScout SMEC 300 Soil Moisture, EC, and Temperature Sensor



Temperature (Micro) Sensor



Watermark Soil Moisture Sensor



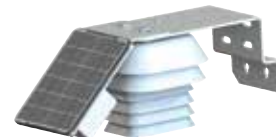
Leaf Wetness Sensor



Digital Temperature / Humidity Sensor with Passive Radiation Shield



Digital Temperature / Humidity Sensor with Aspirated Radiation Shield







# STEP 3

CHOOSE YOUR RETRIEVER

## Retriever

GATHER THE DATA  
WatchDog Retriever

- Receives all data from Pup network, each Retriever supports up to 12 Pups
- Includes USB Flash Drive and USB data cable
- Includes 6 lithium AA batteries. Can also be powered by DataScout modem, Direct-Connect cable or Solar Power Package
- Single button operation: switch modes, download data, upload configuration, and check battery status
- Tri-colored LEDs indicate mode, battery level, data communication status, and configuration status
- Non-volatile memory preserves your logged data, even when the batteries are removed
- 900 MHz radios; 868 MHz and 2.4 GHz also available for international use - Contact for details

3910 WatchDog Retriever



# STEP 4

CHOOSE ADDITIONAL ACCESSORIES

TRIPOD?  
BATTERY POWERED?  
SOLAR POWER PACKAGE?  
FLASH DRIVE?  
CABLE?  
ADAPTER?

### Optional Accessories

- 3999 **Solar Power Package**  
Includes 5W solar panel and 6V 4.5Ah rechargeable battery
- 3396TPS **Tripod Mount with Stakes**
- 3925 **Antenna Extension Cable - 10 ft (3 m)**  
Includes Mounting Bracket and Hardware
- 3388USB **Replacement/additional USB Flash Drive**
- 3927C75 **PC Direct Connection Cable - 75 ft (22.9m)**  
Connect your Retriever directly to your PC. Includes power and data cables, AC/DC power adapter, and DC plug adapter  
Has 9-pin serial connection on PC end, may require USB adapter (Item 366IU9)
- 3926 **AC/DC Power Adapter**

### SpecWare Software

- SpecWare Pro software version 9.6 or later may be used to view Pup data on PC
- If using the SpecConnect Web Portal all data can be viewed online (SpecWare software not required)

3654P9 Spec 9 Pro Software





# STEP 5

CHOOSE YOUR MODEM TO SEND DATA ONLINE

WI FI?

CELLULAR?

WHAT CELL NETWORK/CARRIER WILL YOU NEED?



3923 DataScout Cellular Modem mounted with a WatchDog Retriever

## DATA SCOUT Modems

- Communicate data to the web using either a Cellular or Wi-Fi signal
- Single button operation: test communications, pair with station, and check battery status
- Tri-colored LEDs indicate battery level, data communication, and wireless signal/connection status
- Power options: Choose between Solar power package which includes rechargeable battery and 5W solar panel, or the AC/DC power adapter (Max 17VDC)
- Required for connection to SpecConnect, sold separately
- Provides power to attached Watchdog Stations and Retrievers

### Compatibility Requirements

- WatchDog Retriever - Item 3910 with non-rechargeable batteries. The DataScout Modem and the Retriever can share the power from the solar power package
- 2000 Series Full Weather Stations - the station must be running firmware version 7.6 or above
- WatchDog 2000 Series Mini Stations - The station must be running firmware version 4.1 or above



3924M DataScout Cellular Modem

### Cellular Modems

#### 3923M 3G HSPA+ Cellular Modem

GSM 3G HSPA+ Cellular (Canadian, US and Mexico customers). Requires power selection from options below

#### 3924M 3G HSPA+ Cellular Modem

GSM 3G HSPA+ Cellular (for all other international markets). Requires power selection from options below

### Wi-Fi Modems

#### 3920 Wi-Fi Modem - AC/DC Powered

Includes AC/DC Power Cord

### Power Options

#### 3999 Solar Power Package

Includes 5W solar panel and 6V 4.5Ah rechargeable battery

#### 3926 AC/DC Power Cord

# WatchDog® 2000 Series Weather Stations



Monitor, record and analyze over a dozen environmental parameters directly from your field, orchard, vineyard or golf course

### What makes our WatchDog® Weather Stations different?

- Expand your measurement options with customizable external sensor ports
- Use the onboard LCD display to check your current and daily readings
- Choose measurement intervals from 1 to 60 minutes
- Log your data in fail-safe, non-volatile memory
- Powered by four AA batteries (included), also compatible with lithium batteries
- Compatible with WatchDog Retriever & Pups Network



### How do you access the data?

- 1. SpecConnect:** Wireless or Cellular Communication: Access real time data from your PC, tablet or smart phone
- 2. Direct Connect:** Download from the station to your PC. Requires SpecWare Basic or Pro
- 3. Data Shuttle:** Transport data from your station to your PC. Requires SpecWare Basic or Pro

### Model 2900ET

- The most powerful package for optimizing your irrigation and IPM decisions
- Measures wind direction, wind speed, air temperature, relative humidity, dew point, rainfall, solar radiation, evapotranspiration, with 5 available external sensor ports

**3350WD2 WatchDog® 2900ET Weather Station**

**Model 2900ET**  
Shown with optional Solar Power Package

Solar Power Option

**3999WD Solar Power Package \$200.00**

Includes 5W solar panel and 6V 4.5 AH rechargeable battery



### WATCHDOG 2000 SERIES WEATHER STATION FEATURES

Sensors	2900ET	2700	2550	2800	Specifications	Accuracy
Wind Direction	✓	✓	✓		1°	±3°
Wind Speed	✓	✓	✓		0, 1 to 200 mph (0, 1 to 322 km/h)	±2 mph (±3 km/h) , ±5%
Air Temperature	✓	✓	✓	OPT	-40° to 257°F (-40° to 125°C)	±0.54°F at -40 to 185°F(±0.3°C at -40+85°C)
Relative Humidity	✓	✓	✓		0% to 100%	±2% at 32° to 176°F(0° to 80°C)
Dew Point	✓	✓	✓		-99° to 140°F (-73° to 60°C)	±4°F (±2°C)
Rainfall	✓	✓		OPT	0.01 in (0.25 mm)	±2% at < 2 in (5 cm) per hour
Solar Radiation	✓	OPT	OPT	OPT	0 to 1500 W/m <sup>2</sup>	±5%
Evapotranspiration	✓					
External Sensor Ports	5	6	6	8		
Available ports for SMEC 300 Sensors	1	2	2	2		
Operating temperature range: -22 to 130°F (-30 to 55°C)						

### Additional Models



### Model 2700

- Affordable and versatile solution for growers, researchers, and consultants
  - Measures wind direction, wind speed, air temperature, relative humidity, dew point, rainfall, with 6 available external sensor ports
- 3340WD2 WatchDog® 2700 Weather Station**



### Model 2550

- Ideal for fast, on-demand deployment without measuring rainfall
  - Measures wind direction, wind speed, air temperature, relative humidity, dew point, with 6 available external sensor ports
- 3320WD2 WatchDog® 2550 Weather Station**



### Model 2800

- Ideal where multiple sensor measurements are required for temperature, soil moisture, crop canopy light, or leaf wetness data
  - Plug in up to 8 external sensors, plus 1 optional rainfall sensor
- 3345WD2 WatchDog® 2800 Weather Station**

# WatchDog® 2000 Series Mini Stations



## 2000 Series Mini Stations

Monitor microclimates with up to 4 external sensor ports. You can customize your WatchDog network, using different sensors based on the data you want to collect and analyze for optimal system performance.

- Same power, flexibility, and accuracy as the 2000 Series Weather Stations
- Measure temperature, humidity, quantum light, and more (varies by model)
- Customize your Mini Station with 1 to 4 plug-in sensors to meet your needs
- Custom measurement intervals
- Reliable NEMA-4 type IP 66 enclosure and weatherproof connectors
- 12-month battery power source (four AA alkaline batteries included)

## How do you access the data?

- 1. SpecConnect:** Wireless or Cellular Communication: Access real time data from your PC, tablet or smart phone
- 2. Direct Connect:** Download from the station to your PC. Requires SpecWare Basic or Pro
- 3. Data Shuttle:** Transport data from your station to your PC. Requires SpecWare Basic or Pro



### Model 2475 Plant Growth Station

- Ideal for greenhouses - includes sensors for quantum (PAR) light, air temperature, dew point, relative humidity, with 1 available external sensor port
- Computes and displays Daily Light Integral (DLI), dew point and degree days; live display of current light and cumulative light over the day
- Computes and displays DIF – Average day/night temperatures differences
- Computes and displays VPD – Vapor Pressure Deficit

**3686WD Model 2475**  
WatchDog® Weather Station

### Model 2450 Temperature/RH Station

- Measures air temperature, relative humidity, dew point, with 2 available external sensor ports
- Computes and displays dew point

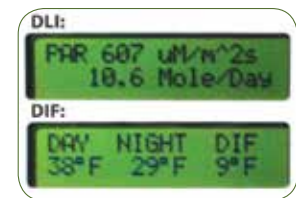
**3684WD Model 2450**  
WatchDog® Weather Station



### Model 2400 External Sensor Station

- Ideal where multiple sensor measurements are required for temperature, soil moisture, crop canopy light, or leaf wetness data
- Plug in up to 4 external sensors

**3685WD Model 2400**  
WatchDog® Weather Station



- Use the LCD display to check current and daily high/low readings without a PC

### Model 2425 Temperature Station

- Measures air temperature with 3 available external sensor ports
- Plug in up to 3 external sensors

**3683WD Model 2425**  
WatchDog® Weather Station

## WATCHDOG® 2000 SERIES MINI WEATHER STATION FEATURES

Sensors	2475	2450	2425	2400	Specifications	Accuracy
Air Temperature	✓	✓	✓	OPT	-40° to 257°F (-40° to 125°C)	±0.54°F at -40° to 185°F(±0.3°C at -40° to 85°C)
Relative Humidity	✓	✓			0% to 100%	±2% at 32° to 176°F(0° to 80°C)
Dew Point	✓	✓			-99° to 140°F (-73° to 60°C)	±4°F (±2°C)
Quantum Light (PAR)	✓	OPT	OPT	OPT	0 to 2500 μmol·m <sup>-2</sup> ·s <sup>-1</sup>	±5%
External Sensor Ports	1	2	3	4		
Available ports for SMEC 300 Sensors	1	2	3	4		
Operating temperature range:	-22 to 130°F (-30 to 55°C)					





## 1000 Series Micro Stations

Micro Stations offer a cost-effective way to record multiple environmental conditions.

- Internal sensors can include temperature and humidity (radiation shield required)
- Up to 4 external sensor ports
- Up to 8 sensor values with the Model 1650 using up to two WaterScout SMEC 300 Soil Moisture/EC/Temperature Sensors
- LCD displays sensor readings and battery level
- Select measurement intervals from 1 to 60 minutes
- Log 10,584 (8,064 with SMEC 300) intervals (220 days at 30 minute intervals)
- Water-resistant case (radiation shield or enclosure recommended for outdoor use)
- 12-month battery life (CR2450, included)

### How do you access the data?

1. **Direct Connect:** Download from the station to your PC. Requires SpecWare Basic or Pro
2. **Data Shuttle:** Transport data from your station to your PC. Requires SpecWare Basic or Pro



DESCRIPTION	INTERNAL SENSOR	EXTERNAL PORTS	MAX. NUMBER OF SMEC 300 SENSORS
<b>MODEL 1650</b> Item 3688WD1	TEMPERATURE RELATIVE HUMIDITY	4	2
<b>MODEL 1525</b> Item 3687WD1	TEMPERATURE	4	2
<b>MODEL 1450</b> Item 3684WD1	TEMPERATURE RELATIVE HUMIDITY	2	1
<b>MODEL 1425</b> Item 3683WD1	TEMPERATURE	3	1
<b>MODEL 1400</b> Item 3685WD1	NONE (EXTERNAL ONLY)	4	2
<b>MODEL 1250</b> Item 3682WD1	TEMPERATURE RELATIVE HUMIDITY	NONE	0
<b>MODEL 1225</b> Item 3681WD1	TEMPERATURE	1	0
<b>MODEL 1200</b> Item 3680WD1	NONE (EXTERNAL ONLY)	2	1
<b>MODEL 1120</b> Item 3554WD1	RAINFALL (SEE BELOW FOR DETAILS)	NONE	0
<b>MODEL 1115</b> Item 3635WD1	REQUIRES EXTERNAL RAINFALL (SEE WEBSITE FOR DETAILS)	1	0



### 1120 Data-Logging Rain Gauge

High accuracy, low-maintenance tipping bucket rain collector

- Meets NWS guidelines with an 8 in (20.5 cm) diameter collector
- The included data logger can log up to 10,584 intervals
- Select intervals from 1 to 60 minutes [maximum 10.23 in (26.0 cm) per interval]
- Rain collector mounting bracket and hardware included
- Record rainfall in either metric (mm) or US (in) units
- Accuracy: ±2% at < 2 in (5 cm) per hour
- Requires SpecWare 9 Basic or Pro
- Includes Bird Guard to reduce maintenance

3554WD1

Data-Logging Rain Gauge



# Pre-Packaged Stations

## WatchDog® 2000 Series Plant Disease Station

- Includes WatchDog Mini Station Model 2450, leaf wetness sensor and rainfall sensor
- View current conditions on LCD screen, as well as track severity indicators from onboard plant disease models
- University published disease models (sold separately) can be added to Specware 9 Pro or SpecConnect for more accurate disease and pest monitoring

Buy this station as a package and save

**3684WDPD WatchDog® 2000 Series Plant Disease Station**



## WatchDog® 1000 Series Plant Disease Micro Station

- Includes Watchdog Model 1450 Micro Station, leaf wetness sensor, tipping bucket rain gauge, and radiation shield
- Data log current conditions and historical plant disease severity indicators
- University published disease models (sold separately-requires SpecWare 9 Pro) can be added for more accurate disease and insect monitoring

Buy this station as a package and save

**3684PD1 WatchDog® Plant Disease Micro Station**



## Soil/Air Temperature Station

- Study soil and air temperature trends across multiple microclimates
- Includes Model A125 Data Logger, external temperature sensor and radiation shield

Buy this station as a package and save

**3617ARS Soil/Air Temperature Station**



## Plant Growth Micro Stations

- Includes a WatchDog Model 1450 Micro Station, Quantum/PAR light sensor and radiation shield
- Monitor conditions crucial to growing high quality plants

Buy this station as a package and save

**3684PAR1 WatchDog® Plant Growth Micro Station**



How do you access the data?	3684WDPD	3684PD1	3684PAR1	3617ARS
<b>Direct Connect:</b> Download from the station to your PC. Requires SpecWare Basic or Pro	✓	✓	✓	✓
<b>Data Shuttle:</b> Transport data from your station to your PC. Requires SpecWare Basic or Pro	✓	✓	✓	
<b>SpecConnect:</b> Wireless or Cellular Communication: Access real time data from your PC, tablet or smart phone	✓			

# WatchDog® A-Series & B-Series Data Loggers



## A-Series Data Loggers

The most affordable way to track environmental conditions for analysis.

- Log 4,000 to 8,000 intervals in fail-safe EEPROM data memory
- Water-resistant case (IP65 for A150 and A110, IP54 for A125 and A130); A160 is for indoor use only and must be protected from moisture
- Removable soft caps keep ports clear of debris
- Includes CR2 battery, 12-month life (except A160, which requires AC power; international adapter included)

### How do you access the data?

- LCD display confirms logger operation and displays last sensor readings
- Hook up A-Series Loggers to your computer with PC Connection cable (see below), requires SpecWare Basic or Pro
- Select measurement intervals from 1 to 120 minutes
- Direct connect requires SpecWare Basic or Pro plus A-Series PC Cable (see below)

Operating temperature range: -22 to 140°F (-30 to 60°C); A160: 32 to 122°F (0 to 50°C)  
 Temperature range: -40 to 185°F (-40 to 85°C); A160: 14 to 140°F (-10 to 60°C)  
 Accuracy: ±1.1°F (±0.6°C) at -4 to 122°F (-20 to 50°C), else ±2.2°F (±1.2°C); A160: ±1.0°F (±0.6°C)  
 RH range: 0 to 100%, Accuracy: ±3% from 10-90% at 77°F (25°C), else ±5%  
 CO<sub>2</sub> range: 0 to 9999 ppm, Accuracy: ±50 ppm ±5% of reading (0 to 2000 ppm), else unspecified



3611A



3612A



3617A

DESCRIPTION	INTERNAL SENSOR	INTERVALS	RADIATION SHIELD
<b>MODEL A160</b> 3611A	AIR TEMPERATURE RH, CO <sub>2</sub>	5,333	INDOOR USE ONLY (NO SHIELD AVAILABLE)
<b>MODEL A150</b> 3612A	AIR TEMPERATURE RELATIVE HUMIDITY	5,333	OPTIONAL
<b>MODEL A130</b> 3610A	AIR TEMPERATURE EXTERNAL LEAF WETNESS	4,000	INCLUDED
<b>MODEL A125</b> 3617A	AIR TEMPERATURE EXTERNAL TEMPERATURE	4,000	RECOMMENDED
<b>MODEL A110</b> 3618A	AIR TEMPERATURE	8,000	OPTIONAL

**3661A** WatchDog® A-Series PC Connection Cable - USB Port  
(required to download data)

**3663A** Radiation Shield (needed for outdoor use)

## B-Series Data Loggers

Space efficient and inexpensive logging technology.

- Ideal for shipping containers or situations where multiple areas need to be monitored
- Choose from temperature-only or temperature/humidity models
- Water resistant (IP56) stainless steel case
- Select measurement intervals from 1 to 120 minutes
- Log 2,000 to 8,000 intervals
- Integral non-replaceable battery

### How do you access the data?

• Snap the B-Series Data Loggers into the Docking Station and connect it to your PC to see data. Requires SpecWare Basic or Pro

DESCRIPTION	INTERNAL SENSOR	INTERVALS	LCD DISPLAY
<b>MODEL B102 T/RH</b> 3621WD Temp Range: -4 to 185°F (-20 to 85°C) Temp Accuracy: ±1.1°F from 5 to 149°F (±0.6°C from -15 to 65°C) Humidity: 0 to 100%, ±5%	TEMPERATURE RELATIVE HUMIDITY	4000	NO
<b>MODEL B101 8K</b> 3620WD Range: -40 to 185°F (-40 to 85°C) Accuracy: ±1.1°F from 5 to 149°F (±0.6°C from -15 to 65°C)	TEMPERATURE	8000	NO
<b>MODEL B100 2K</b> 3619WD Range: -40 to 185°F (-40 to 85°C) Accuracy: ±1.8°F from -22 to 158°F (±1.0°C from -30 to 70°C) <i>Use included plastic bag when measuring soil temperature</i>	TEMPERATURE	2000	NO

### Docking Station

**3655K1** WatchDog® B-Series Docking Station - USB Port  
(required to download data)



B102



B101



B100

Ideal for soil temperature



## AVOID DRIFT COMPLAINTS

Don't let misapplication of herbicides cost you. Let our sprayer station with ultrasonic anemometer help you put pesticides where they belong and nowhere else.

Pesticide drift is increasingly important to commercial applicators. Accurate data helps pesticide applicators make important decisions regarding weather conditions that affect safety, drift and proper application. With the WatchDog Sprayer Station you can provide evidence of suitable conditions for pesticide application by logging your data. Mount the station directly on your equipment to monitor and log weather conditions on-the-go.

## All-in-one Weather Station Measures

- Wind Speed/Direction & Chill
- Air Temperature
- Barometric Pressure
- Humidity
- Dew Point
- Computes True Wind Speed

## Additional Information

- Continuously log your weather parameters at a user-selectable rate or hit the snapshot button to capture current conditions at a specific moment
- Station uses an internal compass and GPS to adjust the wind sensor values by subtracting the vehicle speed and direction to compute the true values
- Handles adverse conditions with a UV-stabilized, compact housing that is fully waterproof and resistant to chemicals

## CHOOSE YOUR CONSOLE:



WatchDog® Sprayer Station Console



Raven Viper 4, ViperPro or Envizio Pro (not available through Spectrum)



AGCO Accu Terminal (not available through Spectrum)

2.75 in (7 cm)



WatchDog® Sprayer Station

12.75 in (33 cm)

## SPECIFICATIONS FOR SPRAYER STATION

Wind Resolution - Speed: 0.1 mph (0.2 km/h); Direction 1°

Wind Speed Range: 0 to 90 mph (0 to 145 km/h)

Wind Speed Accuracy: <12 mph (19 km/h): ±1.1 mph (1.7 km/h) ±10%;  
>12 mph (19 km/h): ±2.3 mph (3.7 km/h) or ±5%

Wind Direction Accuracy: 4 to 11 mph (6 to 18 km/h): ±5°; >12 mph (19 km/h): ±2°

Wind Accuracy Temperature Range: 32° to 131°F (0° to 55°C)

Operating Temperature: -13° to 131°F (-25° to 55°C)

Temperature Accuracy: ±2°F (±1.1°C) with wind above 4.6 mph (7.4 km/h)

Relative Humidity Range: 10 to 95%

Relative Humidity Accuracy: ±5% with wind above 4.6 mph (7.4 km/h)

Barometric Pressure Range: 24 to 33 in-Hg (800 to 1100 hPa)

Barometric Pressure Accuracy: ±0.029 in-Hg (±1 hPa)

Power Supply Voltage: 9 to 40 VDC; Current: <90 mA@12VDC

## Sprayer Station

3349SSCH

### WatchDog® Sprayer Station with Console

Buy as a Package & Save! See data on the display and/or download directly from console (requires SpecWare Mobile for WatchDog® Sprayer Station)

3349SSH

### WatchDog® Sprayer Station

Includes sensor unit with magnetic base, 21 ft (7 m) cable with vehicle power and 9-pin serial connectors, and display/logging program for Windows Mobile PDA or Windows Laptop  
Integrates Raven & AGCO

3349CN

### WatchDog® Sprayer Station Console

Includes console with built-in data logger, USB-to-3.5mm stereo cable, and software CD

3349H  
3661U9

### Replacement Humidity Sensor USB-to-9-Pin-Serial Adapter



# WatchDog® Weather Stations & Data Loggers Comparison Chart



SpecConnect Compatible	LCD Display	Wireless	Evapotranspiration	Alarm Output-Ready	Air Temperature Sensor	Relative Humidity Sensor	Dew Point	Wind Speed & Direction	Tipping Bucket Rain Collector	Solar Radiation Sensor	Available Sensor Ports	Quantum Light Sensor	Ext. (Soil) Temperature Sensor	Leaf Wetness Sensor	WaterScout Soil Moisture Sensor	WaterScout Soil Moisture/EC/ Temperature Sensor	Digital Sensor Compatible	Radiation Shield (P=Passive or A=Aspirated)
				3672						3670I		3668I	3667	3666	6460	64706		
STANDARD FEATURES											OPTIONAL SENSORS & ACCESSORIES							

Item # Model

## 2000 Series Weather Stations

<b>3350WD2</b>	2900ET	TEMP/RH/WIND/RAIN/ET	✓	✓	Opt	✓	✓	✓	✓	✓	5	Opt	Opt	Opt	Opt	Opt		P
<b>3345WD2</b>	2800	8 PORTS+OPT RAIN	✓	✓	Opt		✓			Opt	9	Opt	Opt	Opt	Opt	Opt		
<b>3340WD2</b>	2700	TEMP/RH/WIND/RAIN	✓	✓	Opt		✓	✓	✓	✓	6	Opt	Opt	Opt	Opt	Opt		P
<b>3320WD2</b>	2550	TEMP/RH/WIND	✓	✓	Opt		✓	✓	✓	✓	6	Opt	Opt	Opt	Opt	Opt		P

## 2000 Series Mini Station

<b>3684WDPD</b>	Plant Disease Station		✓	✓	Opt		✓	✓	✓	✓	0			✓				P
<b>3686WD</b>	2475	TEMP/RH/PAR + 1 PORT	✓	✓	Opt		✓	✓	✓		Opt	Opt	Opt	Opt	Opt	Opt		P
<b>3684WD</b>	2450	TEMP/RH/PAR + 2 PORTS	✓	✓	Opt		✓	✓	✓		Opt	Opt	Opt	Opt	Opt	Opt		P
<b>3683WD</b>	2425	TEMP +3 PORTS	✓	✓	Opt		✓	✓			Opt	Opt	Opt	Opt	Opt	Opt		P
<b>3685WD</b>	2400	4 PORTS	✓	✓	Opt		✓				Opt	Opt	Opt	Opt	Opt	Opt		

## Retriever & Pups Wireless Sensor Network

<b>3900ET</b>	ET Pup Station		✓	✓	✓		✓	✓	✓	✓	0							✓	P
<b>3900WS</b>	Pup Weather Station		✓	✓			✓	✓	✓	Opt	1	Opt	Opt	Opt	Opt	Opt		✓	P
<b>3900PD</b>	Plant Disease Pup Station		✓	✓			✓	✓	Opt	Opt	3	Opt	Opt	✓	Opt	Opt		✓	P
<b>3900PG</b>	Plant Growth Pup Station		✓	✓			✓	✓	Opt	Opt	2	✓	Opt	Opt	Opt	Opt		✓	A
<b>3900</b>	Sensor Pup		✓	✓			Opt	Opt	Opt	Opt	4	Opt	Opt	Opt	Opt	Opt		✓	P
<b>3901</b>	Station Pup		✓	✓							0								
<b>3902</b>	Repeater Pup		✓	✓							0								

## 1000 Series Micro Stations

<b>3685SM14</b>	Irrigation Station		✓								0				✓ (4)				
<b>3685SM13</b>	Irrigation Station		✓						Opt	Opt	1	Opt	Opt	Opt	✓ (3)	Opt			
<b>3684PD1</b>	Plant Disease Station		✓				✓	✓	✓		0			✓					P
<b>3684PAR1</b>	Plant Growth Station		✓				✓	✓			1	✓	Opt	Opt	Opt	Opt			P
<b>3688WD1</b>	1650	TEMP/RH+ 4 PORTS	✓				✓	✓		Opt	Opt	4	Opt	Opt	Opt	Opt	Opt		
<b>3687WD1</b>	1525	TEMP+ 4 PORTS	✓				✓			Opt	Opt	4	Opt	Opt	Opt	Opt			
<b>3684WD1</b>	1450	TEMP/RH+ 2 PORTS	✓				✓	✓		Opt	Opt	2	Opt	Opt	Opt	Opt			
<b>3683WD1</b>	1425	TEMP+ 3 PORTS	✓				✓			Opt	Opt	3	Opt	Opt	Opt	Opt			
<b>3685WD1</b>	1400	4 PORTS	✓							Opt	Opt	4	Opt	Opt	Opt	Opt			
<b>3682WD1</b>	1250	TEMP/RH	✓				✓	✓			0								
<b>3681WD1</b>	1225	TEMP+ 1 PORT	✓				✓			Opt	Opt	1	Opt	Opt	Opt	Opt			
<b>3680WD1</b>	1200	2 PORTS	✓							Opt	Opt	2	Opt	Opt	Opt	Opt			

## A-Series Loggers

<b>3611A</b>	A160 Temp/RH/CO <sub>2</sub>		✓				✓	✓			0								+CO <sub>2</sub>
<b>3612A</b>	A150 Temp/RH		✓				✓	✓			0								
<b>3610A</b>	A130 Leaf Wetness/Temp		✓				✓				0			✓					
<b>3617ARS</b>	A125 Soil/Air Temp Station		✓				✓				0		✓						P
<b>3617A</b>	A125 Soil/Air Temp		✓				✓				0		✓						
<b>3618A</b>	A110 Temperature		✓				✓				0								

## Sprayer Station

<b>3349SSCH</b>	Sprayer Station with Console		✓				✓	✓	✓	✓	0								
-----------------	------------------------------	--	---	--	--	--	---	---	---	---	---	--	--	--	--	--	--	--	--

### REFERENCE:

✓ STANDARD      Opt OPTIONAL      BLANK NOT AVAILABLE



## 1000 Series Micro & 2000 Series Weather Station Recertification Program

Our products are designed to provide the highest level of accuracy, reliability and ruggedness you deserve. We make every effort to produce the most durable and long-lasting products available today. Over time, certain components are subject to wear and tear. Lightning, rain, snow, salt spray and extreme temperatures all take their toll. Because of this, and because we know how important accurate data is to you, we offer a Recertification Program for weather stations. Our Recertification Program enables you to send your hardware to our Aurora, Illinois facility where it undergoes a complete diagnostic check-up.

### Diagnostic Check-Up

Each check-up includes an inspection of the complete module and wiring, updates to the latest firmware and accuracy checks on all stations. You will receive a Weather Station Functionality Report detailing our testing. If any components of the weather station are found not to be within the published specifications, you will be notified for recommended replacement\*. After authorization for replacement is received, each component will be calibrated and tested.

### One-Year Warranty & Turnaround Time

After the station has been recertified, a one-year warranty will apply to all parts replaced during the recertification process. The turnaround time for recertification of a weather station is estimated at 14 days from the time we receive it.

### Pricing

<b>3300C</b>	<b>Weather Station Recertification 2000 Series</b>
<b>3600C</b>	<b>Weather Station Recertification 2000 Series Mini</b>
<b>3680C</b>	<b>Weather Station Recertification 1000 Series</b>

\* The fee for recertification does not include the cost for any recommended replacement parts or sensors, or shipping to return.

## Soil Sensors



6470-6

### WaterScout® SMEC 300 Soil Moisture/EC/Temperature Sensor

Measures soil moisture (Volumetric Water Content), EC, and temperature. Range: VWC: 0 to saturation (typically 50%), Accuracy:  $\pm 3\%$ ; EC: 0 to 10 mS/cm, Accuracy:  $\pm 2\%$ . Requires WaterScout Calibration Device. Compatible with WatchDog 2000 Series Stations (Full and Mini), 1000 Series Micro Stations, and Pups

- 6470-6** WaterScout SMEC 300 Sensor with 6 ft (1.8 m) Cable
- 6470-20** WaterScout SMEC 300 Sensor with 20 ft (6.1 m) Cable
- 6470CAL3V** WaterScout Calibration Device
- 2251** Conductivity Standard, 1.41 mS/cm, 250 mL



6460

### WaterScout® SM 100 Soil Moisture Sensor

Measures soil moisture (Volumetric Water Content) with little or no disturbance to the root zone. Range: 0 to saturation (typically 50%), Accuracy:  $\pm 3\%$ . Compatible with WatchDog 2000 Series Stations (Full and Mini), 1000 Series Micro Stations, and Pups

- 6460** WaterScout SM 100 Sensor with 6 ft (1.8 m) Cable
- 6460-20** WaterScout SM 100 Sensor with 20 ft (6.1 m) Cable



6450WD

### Watermark Soil Moisture Sensor

Measures soil moisture tension from 0 to 200 centibars. Compatible with WatchDog 2000 Series Stations (Full and Mini), 1000 Series Micro Stations, and Pups

- 6450WD** Watermark Sensor with 11 ft (3.3 m) Cable
- 6450WD20** Watermark Sensor with 25 ft (7.6 m) Cable



3667

### External (Soil) Temperature Sensor

Measure soil, air, or water temperature with a resistance-based sensor. Range:  $-25$  to  $212^{\circ}\text{F}$  ( $-32$  to  $100^{\circ}\text{C}$ ). Accuracy:  $\pm 1^{\circ}\text{F}$  ( $\pm 0.5^{\circ}\text{C}$ ). Compatible with WatchDog 2000 Series Stations (Full and Mini), 1000 Series Micro Stations, and Pups

- 3667** External (Soil) Temperature Sensor with 6 ft (1.8 m) Cable
- 3667-20** External (Soil) Temperature Sensor with 20 ft (6.1 m) Cable



3669

### Pressure Transducer

Connects to Irrrometer tensiometers and utilizes the dial gauge for measurements. Accuracy:  $\pm 2\%$ . Compatible with WatchDog 2000 Series Stations (Full and Mini), 1000 Series Micro Stations, and Pups

- 3669** Pressure Transducer



6451

### Irrigation On/Off Sensor

Record and analyze relationships between irrigation periods and soil moisture. Does not control irrigation system, but monitors on/off periods. Range: On at 5psi. Compatible with WatchDog 2000 Series Stations (Full and Mini), 1000 Series Micro Stations, and Pups

- 6451** Irrigation On/Off Sensor

### LightScout® Silicon Pyranometer

Measure solar radiation between 300 and 1100 nanometers. 2000 Series & Pups Range: 2000 Series & Pups: 0 to 1500 W/m<sup>2</sup>, Accuracy:  $\pm 5\%$ ; Micro Stations: 0 to 1250 W/m<sup>2</sup>, Accuracy:  $\pm 5\%$ . Compatible with WatchDog 2000 Series Stations (Full and Mini), 1000 Series Micro Stations, and Pups

- 3670I** LightScout Silicon Pyranometer

### LightScout® UV Light Sensor

Measure UV radiation between 250 and 400 nanometers. Range: 0 to 200  $\mu\text{mol m}^{-2} \text{s}^{-1}$ , Accuracy:  $\pm 5\%$   
Compatible with WatchDog 2000 Series Stations (Full and Mini), 1000 Series Micro Stations, and Pups

- 3676I** LightScout UV Light Sensor

### LightScout® Quantum Light Sensors

Measure PAR light between 400 and 700 nanometers. Sensor bars average PAR light readings to minimize the effects of small shadows. Sensor bars are 19 in (48 cm) long and include mounting brackets. 2000 Series & Pups Range: 0 to 3000  $\mu\text{mol m}^{-2} \text{s}^{-1}$ , Accuracy:  $\pm 5\%$ ; Micro Stations: 0 to 2500  $\mu\text{mol m}^{-2} \text{s}^{-1}$ , Accuracy:  $\pm 5\%$ . Compatible with WatchDog 2000 Series Stations (Full and Mini), 1000 Series Micro Stations, and Pups

- 3668I** LightScout Quantum Light Sensor
- 3668I3** LightScout Quantum 3 Light Sensor Bar
- 3668I6** LightScout Quantum 6 Light Sensor Bar



3668I / 3676I



3668I6

## Light Sensors

## Environmental Sensors



3667S



3665R



3666



3671



2655

### Temperature (Micro) Sensor

Measure surface temperature of leaves, buds, and other tiny mediums.

Range: -25 to 212°F (-32 to 100°C). Accuracy: ± 1°F (±0.5 °C). Compatible with WatchDog 2000 Series Stations (Full and Mini), 1000 Series Micro Stations, and Pups

**3667S**                      **Temperature (Micro) Sensor**

### Tipping Bucket Rain Collector

Measure rainfall in 1/100 inch increments. Self-emptying and freeze resistant. Range: 0.01", 0.25 mm, Accuracy: ±2% at < 2 in (5 cm) per hour. Compatible with WatchDog 2800 Series Station and 1000 Series Micro Stations

**3665R**                      **Tipping Bucket Rain Collector**

### Leaf Wetness Sensor

Measure leaf wetness with a resistance-based sensor designed to replicate a leaf. Range: 0 (dry) to 15 (wet). Compatible with WatchDog 2000 Series Stations (Full and Mini), 1000 Series Micro Stations, and Pups

**3666**                      **Leaf Wetness Sensor**

### Barometric Pressure Sensor

Measure atmospheric pressure. Standard Sensor: Range: 26 to 32 inHg, 880-1080 hPa, Accuracy: ±0.05 inHg, ±1.7 hPa; High Altitude Sensor: 18.75 to 33.1 inHg, 635-1121 hPa, Accuracy: ±0.057 inHg, ±1.9 hPa

Compatible with WatchDog 2000 Series Stations (Full and Mini), 1000 Series Micro Stations, and Pups

**3671**                      **Barometric Pressure Sensor - Standard**  
**3671M**                      **Barometric Pressure Sensor - High Altitude**

### CO<sub>2</sub> Sensor

Measure CO<sub>2</sub> levels in ppm using NDIR technology. Requires AC power. Not waterproof. Range: 0 to 4000 ppm, Accuracy: ±5% or 50 ppm. Compatible with WatchDog 2000 Series Stations (Full and Mini), 1000 Series Micro Stations, and Pups

**2655**                      **CO2 Sensor**

## Miscellaneous Cables



3664



3673

### Sensor Extension Cable

20 ft (6 m) extension for all sensors (except digital sensors), connect up to 3 cables per sensor

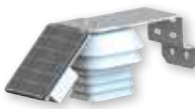
**3664**                      **Sensor Extension Cable**

### General Input Cables

Connect non-WatchDog sensors to your WatchDog Station. (Item 3673) Range: 0 to 3v, Accuracy: ±0.005V. (Item 3674) Range: 0 to 20.1 mA, Accuracy: ±1%. Compatible with WatchDog 2000 Series Stations (Full and Mini), 1000 Series Micro Stations, and Pups

**3673**                      **0-3V Input Cable**  
**3674**                      **4-20mA Input Cable**

## Digital Sensors (for Pups only)



3613ARS



3613THS



3665RD



3305ADD

### Digital Temperature/RH Sensor with Aspirated Radiation Shield

Digital temperature and RH sensor with 6 ft (2 m) cable, includes solar charging system to power internal fan. Range: -40 to 212°F (-40 to 100°C), 0 to 100% RH, Accuracy: ±0.54°F from 50 to 131°F (0.3°C from 10 to 55°C), ±2.5% RH Compatible with WatchDog Pups only. Operating temperature 14 to 140°F (-10 to 60°C)

**3613ARS**                      **Temperature/RH Sensor with Aspirated Radiation Shield**

### Digital Temperature/RH Sensor with Passive Radiation Shield

Digital temperature and RH sensor with 6 ft (2 m) cable. Range: -40 to 212°F (-40 to 100°C), 0 to 100% RH, Accuracy: ±0.54°F from 50 to 131°F (0.3°C from 10 to 55°C), ±2.5% RH Compatible with WatchDog Pups only

**3613THS**                      **Temperature/RH Sensor with Passive Radiation Shield**

### Digital Rain Collector

Measure rainfall in 1/100 inch increments. Self-emptying and freeze resistant. Range: 0.01", 0.25 mm, Accuracy: ±2% at < 2 in (5 cm) per hour. 6 ft cable. Compatible with WatchDog Pups only

**3665RD**                      **Digital Rain Collector**  
**3665DC**                      **Digital Cable - 6 ft**  
 Cable with tinned wire termination - for Pup connection to existing rain collectors only

### Digital Anemometer

Measure wind speed and direction. 40 ft cable. Range: 0 - 359°, Accuracy: ±3°, Range: 0, 1 to 200 mph (0, 1 to 322 km/h, Accuracy: ±2 mph (±3 km/h), ±5%. Compatible with WatchDog Pups only

**3305ADD**                      **Digital Anemometer**



# WatchDog® Accessories & Communication Options

## Accessories



### Tripod Mount

Rugged galvanized steel folding tripod and 3 ft (1 m) pole  
**3396TPS** Tripod Mount with Ground Stakes  
**3396TP** Tripod Mount without Ground Stakes

### Bird Guard

Reduce debris and maintenance. Improve accuracy. Adjustable to fit 8" diameter rain collectors  
**3665BG** Bird Guard

### Radiation Shield

Protect your Micro Station or logger from rain and measurement-distorting solar radiation. Compatible with 1000 Series Micro Stations and A-Series Data Loggers  
**3663A** Radiation Shield

### Sliding Enclosure

Water resistant - mounts to pole or post. Compatible with 1000 Series Micro Stations  
**3658A** Sliding Enclosure

### Waterproof Enclosure

Clamshell enclosure. Compatible with 1000 Series Micro Stations (Models 1400 or 1200, plus soil sensors)  
**3659WD1** Waterproof Enclosure

### Alarm Output Module

Triggers an external device based on a sensor reading. Compatible with WatchDog 2000 Series Stations (Full and Mini)  
**3672** Alarm Output Module

## Communication Options



3679WD1

### Mid Range Wireless Communications - up to 2 mi (3 km)

Experience the advantages of real-time weather information by connecting your 2000 Series Remote Weather Stations to a PC up to 2 mi (3 km) away (requires line of sight from Station to Base). Base station features a weatherproof case and 50 ft (15 m) cable (terminating in a 9-pin serial connection) to allow high mounting for the greatest range. Remotes include whip antenna, solar panel, and rechargeable batteries. 900 MHz  
**3393B** Mid Range Wireless Base Station  
**3393W** Mid Range Wireless for Remote Station  
 Optional Yagi antennas increase line of sight range to 7 mi (11 km); see website for details

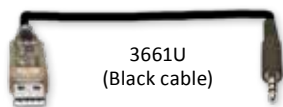
### WatchDog® 1000/2000 Series Data Shuttle

Transport weather data from your 2000 Series Stations or 1000 Series Micro Stations to your host PC. Holds data for multiple stations (up to 5 Full, 10 Mini, or 12 Micro Stations). Includes soft-sided case (also available separately as Item 7500, see page 39). Requires SpecWare 9 Basic or Pro.  
**3679WD1** WatchDog 1000/2000 Data Shuttle

## Cables & Adapters



3660-75SP



3661U  
(Black cable)



3661U9  
(White cable)

### Short Range Modem Pair

Use short-range modems to maintain signal on wired connections up to 4,000 ft (1.2 km). Has 9-pin serial connection on PC end.  
**3365WD2** Short Range Modem Pair

### Direct Connect Cables for Weather Stations

Connect your WatchDog Weather Station directly to your PC with a 75 ft (22.8 m) cable. Has 9-pin serial connection on PC end, may require USB adapter (Item 3661U9)  
**3660-75SP** 75 ft (22.8 m) Direct Connect Cable  
 Includes surge protectors for both ends of the cable connection  
**3660DP** 75 ft (22.8 m) Powered Direct Connect Cable  
 Includes AC adapter; no surge protectors

### USB-to-3.5mm-Stereo-Plug Adapter

Connect WatchDog and FieldScout® devices directly to your computer's USB port  
**3661U** USB-to-3.5mm-Stereo-Plug Adapter

### USB-to-9-Pin-Serial Adapter

Connect 9-pin Serial cables (such as Item 3660-75SP) directly to your computer's USB port  
**3661U9** USB-to-9-Pin-Serial Adapter

## Multi-Parameter U-50 Series Meters

Simultaneously monitor, collect, and store up to 11 water quality parameters with these high-performance meters. Measured parameters include pH, ORP, dissolved oxygen, salinity, TDS, seawater specific gravity, temperature, turbidity, and water depth. The waterproof control unit is designed to be both rugged and easy to operate, making it a perfect match for fieldwork – ideal for sampling rivers, groundwater, wells, lakes, runoff / drainage, and a myriad of other ecological and agricultural applications. Refer to the chart below to help decide which model best fits your needs.

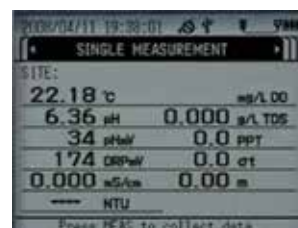
### Control Unit Features:

- Easy to read, backlit display
- Display up to 11 parameters simultaneously
- Auto-calibration feature for pH, dissolved oxygen, turbidity, and depth provides hassle-free calibration
- One-hand operation
- Quick-connect connector (cable to control unit)
- Shock resistant cover

### Sensor Probe Unit Features:

- Ultra-sensitive turbidity sensor
- Minimum dissolved oxygen sensor maintenance with screw-on type membrane cap
- Chemical resistant construction materials
- Field replaceable sensors

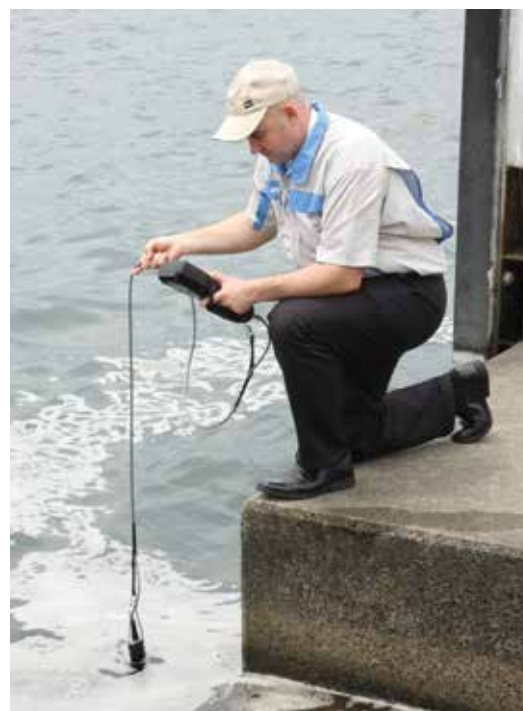
Item 2195-2	U51-2 Meter with 2m Cable
Item 2195-10	U51-10 Meter with 10m Cable
Item 2196-2	U52-2 Meter with 2m Cable
Item 2196-10	U52-10 Meter with 10m Cable
Item 2196-30	U52-30 Meter with 30m Cable
Item 2197-2	U52G-2 Meter with 2m Cable
Item 2197-10	U52G-10 Meter with 10m Cable
Item 2197-30	U52G-30 Meter with 30m Cable
Item 2198-2	U53-2 Meter with 2m Cable
Item 2198-10	U53-10 Meter with 10m Cable
Item 2198-30	U53-30 Meter with 30m Cable
Item 2199-2	U53G-2 Meter with 2m Cable
Item 2199-10	U53G-10 Meter with 10m Cable
Item 2199-30	U53G-30 Meter with 30m Cable



Water quality monitor displays 11 parameters simultaneously

### U-50 SERIES COMPARISON

	U-51	U-52	U52G	U-53	U-53G
pH	✓	✓	✓	✓	✓
ORP (Oxidation Reduction Potential)	✓	✓	✓	✓	✓
Dissolved Oxygen	✓	✓	✓	✓	✓
Conductivity	✓	✓	✓	✓	✓
Salinity	✓	✓	✓	✓	✓
TDS (Total Dissolved Solids)	✓	✓	✓	✓	✓
Seawater Specific Gravity	✓	✓	✓	✓	✓
Temperature	✓	✓	✓	✓	✓
Turbidity (LED)		✓	✓		
Turbidity (Tungsten lamp)				✓	✓
Water Depth			✓	✓	✓
GPS			✓		✓





## Frost Cellular Alert

Ideal for temperature-sensitive fruits and vegetables - be alerted when frost conditions are near.

- LCD display (current settings, signal strength, etc.)
- Key pad for user set up: user-defined thresholds, system test operation
- Relay terminal connections to control an external device
- NEMA 4 (IP66) enclosure
- GSM 3G/HSPA+ cellular module included (user provides SIM card and service plan Pay-As-You-Go recommended)
- Set a second limit to periodically send texts with current conditions
- Makes voice call or sends text message (or both) to up to 4 phone numbers
- Makes voice call again, if calls go unanswered (if answered, will not call again)
- Requires 6-volt lantern battery (not included)
- Includes 6 ft (1.8 m) external temperature sensor

Temperature range: -22 to 130°F (-30 to 55°C)  
Accuracy: ±1.1°F (±0.6°C) at -4 to 122°F (-20 to 50°C), else ±2.2°F (±1.2°C)

**3453**                    **WatchDog® Frost Cellular Alert Pro - GSM 3G HSPA+**



## Color Frost Alert

Protect your high-value crops.

- Easy visual signal for drones, helicopter pilots or distance viewing
- When temperatures approach freezing, the high-powered LED light (visible from about two miles) changes color and flash frequency to indicate temperature conditions at-a-glance
- Shuts off above 37°F (2.8°C) to conserve power
- Requires 6V lantern battery (not included)

**3430**                    **WatchDog® Color Frost Alert**



## Color Frost Alert Warning Colors

Lights will warn you of falling temperatures and risk of frost.

- Green – Above 34°F (1°C)
- White – 32° to 34°F (0-1°C)
- Red – Below 32°F (0°C)
- Flashing Red – Below 30°F (-1°C)



## IPM Scope

Portable digital microscope at an affordable price.

The IPM Scope combines a digital camera, precision optics, and LED lighting into a powerful handheld microscope that connects to your computer via USB

- 40x and 140x magnification
- View magnified image right on your computer screen
- Included software allows you to customize your images with labels, markers, time stamps, and measurement scales
- Archive still images or send files via e-mail
- Requires computer connection to operate
- Video software upgrade provides the ability to capture live videos and time lapse sequences of insect movement

<b>2860</b>	<b>IPM Scope</b>
<b>2860V</b>	<b>Video Software Upgrade</b>
<b>2860UV</b>	<b>IPM Scope-Ultra Violet</b>
<b>2860MP</b>	<b>IPM Scope-Mega Pixel</b>
<b>2860HS</b>	<b>Plastic Horseshoe-3D images</b>
<b>2860MAC</b>	<b>Software for Mac Computers</b>

Go to [www.specmeters.com](http://www.specmeters.com) for more models and accessories



IPM Scope shown with optional Plastic Horseshoe to view 3D images

### SPECIFICATIONS FOR IPM SCOPE

<b>Image Sensor:</b> 1/3 in CMOS	<b>Pixels:</b> 640 x 480
<b>Power:</b> USB Port	<b>Light Source:</b> Super-bright LEDs
<b>Field of View:</b> @40x: 7.5 x 10 mm	<b>Resolution:</b> 4 microns
@140x: 1.8 x 2.5 mm	



Image taken by IPM Scope - Mega Pixel



Image taken by IPM Scope

## Macroscopes

Identify pests and diseases up close.

- Macroscope 25 provides 25X magnification over a wide 5 mm (3/16 in) field of view
- Macroscope 45 provides 45X magnification over a wide 3 mm (2/16 in) field of view
- Positionally correct image includes an interchangeable scale
- Incorporates a measuring scale providing measurements in inches or millimeters
- Can be used for distance viewing when close-up lens is removed

<b>2851</b>	<b>Macroscope 25 with hard carrying case</b>
<b>2852</b>	<b>Macroscope 45 with hard carrying case</b>



photo courtesy of Derek Settle





# Sunlight Consistent plant quality starts with light

Why measure light? Improve growth and quality of your plants. Shade cloths and hanging baskets reduce plant light more than you know!

Position the meters throughout your greenhouse to compare light levels and the effect those changes have on plant quality. You can also use multiple meters simultaneously to compare light levels and the impact on turf health, quality and aesthetics.

## LIGHTSCOUT® DLI 100 Light Meter

Light is one of the most important factors in plant and turf quality. The best way to quantify light for growing plants is to measure photosynthetically active radiation (PAR) light between 400 and 700 - the range that promotes photosynthesis. The daily light integral (DLI) measures the total amount of PAR within a 24-hour period.

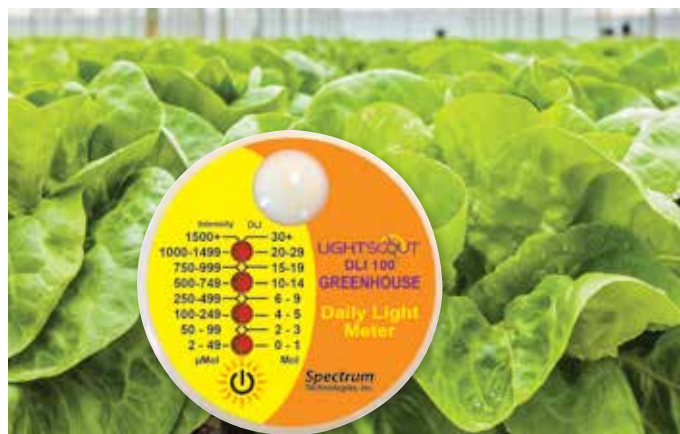
- Affordable & simple, one button operation
- Meter runs for 24 hours to calculate DLI
- Real-time intensity levels are shown in  $\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$  every 4 seconds over the course of a day
- Battery included
- Greenhouse & Turf models available

3405G3 LightScout® DLI 100 Meter - Greenhouse (set of 3)

3405G LightScout DLI 100 Meter - Greenhouse (1 unit)

3405T3 LightScout® DLI 100 Meter - Turf (set of 3)

3405T LightScout DLI 100 Meter - Turf (1 unit)



For the best results place one meter in the sun, one in partial shade and one in full shade.



“Measuring DLI inside the greenhouse can be very revealing, since growers usually rely on their eyes to determine the light levels and the human eye is a terrible light sensor because it is so effective at adjusting to different light environments.”

James E. Faust  
Associate Professor of Horticulture  
Clemson University

### GENERALIZED PLANT RESPONSES TO DIFFERENT LIGHT LEVELS

Relative Light Level	DLI* - Daily Light Integral	Light Intensity** at Noon	Generalized Plant Growth Response
Very Low	2 to 5	100 to 200	Poor quality
Low	5 to 10	200 to 400	Minimum acceptable
Medium	10 to 20	400 to 800	Good quality
High	20 to 30	800 to 1,200	Excellent quality
Very High	30 to 60	1,200 to 2,000	Excellent quality

\* Moles  
\*\* Micromoles ( $\mu\text{mol}/\text{m}^2\cdot\text{s}$ )

Note: It is not possible to make a direct conversion between an instantaneous light measurement and the Daily Light Integral. Also, temperature is a key factor in plant quality and growth. Source: Hamrick, Debbie, ed. *Ball Red Book*. Batavia, IL: Ball Publishing, 2003.



3412

## LIGHTSCOUT<sup>®</sup> Red/Far-Red Meter

Red/Far-Red light ratio helps plants determine their proximity to each other, which affects how tall or full they grow.

- Cost-effective Red/Far-Red measurement
- Displays the Red/Far-Red ratio on the LCD screen
- Press a button to display 660 nm and 730 nm readings
- Includes soft-sided case (also available separately as Item 7500)

**3412** LightScout<sup>®</sup> Red/Far-Red Meter



3414F

## LIGHTSCOUT<sup>®</sup> UV Meter

Handheld meter monitors critical UV radiation (250-400 nm).

- Determine UV filtering capacity of greenhouse shades and glass barriers
- Range is 0 to 200.0  $\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$  (full sunlight)

**3414F** LightScout<sup>®</sup> UV Meter  
**7500** Soft-Sided Carrying Case



3415FXSE

## LIGHTSCOUT<sup>®</sup> Quantum/PAR Meters

Measure the light used for plant growth - PAR is a more valuable measurement than foot-candles, as it measures only the light used by plants for photosynthesis.

- Measures photosynthetically active radiation (PAR) from 400 to 700 nm
- Range of 0 to 2,000  $\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$
- Available in a variety of configurations for your convenience

**3415F** LightScout<sup>®</sup> Quantum Meter  
**3415FSE** LightScout<sup>®</sup> Dual Solar/Electric Quantum Meter  
**3415FXSE** LightScout<sup>®</sup> Dual Solar/Electric Quantum Meter - External Sensor  
**3415FQF** LightScout<sup>®</sup> Quantum and Foot-Candle Meter  
**7500** Soft-Sided Carrying Case

## LIGHTSCOUT<sup>®</sup> Foot-Candle Meter

Displays immediate light level in units of foot-candles.

- An affordable light measurement solution
- Precision photodiode with cosine correction

**3413F** LightScout<sup>®</sup> Foot-Candle Meter  
**7500** Soft-Sided Carrying Case

# LIGHTSCOUT<sup>®</sup> External Light Sensor Reader

Reads any of Spectrum's external light sensors.

- Plug in a sensor, choose it on the LCD, and start measuring UV, Quantum Light, or Solar Radiation
- Sensors can also be used with WatchDog<sup>®</sup> Weather, Mini, and Micro Stations
- LightScout<sup>®</sup> External Light Sensor Reader includes soft-sided case (also available separately as Item 7500)

- 3415FX** LightScout<sup>®</sup> External Light Sensor Reader  
Compatible light sensors sold separately:
- 3668I** LightScout<sup>®</sup> Quantum Light Sensor (PAR Light)
- 3668I3** LightScout<sup>®</sup> Quantum Light 3 Sensor Bar
- 3668I6** LightScout<sup>®</sup> Quantum Light 6 Sensor Bar
- 3670I** LightScout<sup>®</sup> Silicon Pyranometer Sensor (Solar Radiation)
- 3676I** LightScout<sup>®</sup> UV Sensor



# WatchDog<sup>®</sup> Model 2475 Plant Growth Station

Ideal for Greenhouses - monitor microclimates with four sensor channels.

- Computes and displays Daily Light Integral (DLI), current light levels, dew point, degree day models, and chill hours
- Computes and displays DIF – Average day/night temperature difference
- Computes and displays VPD – Vapor Pressure Deficit
- Measure temperature, humidity and light conditions, plus 1 additional sensor port
- Check current conditions or 12 months of historical data on the LCD display
- Requires SpecWare Pro software or SpecConnect subscription

### How do you access the data?

- Cellular/WiFi to SpecConnect, Direct Connect or Data Shuttle

**3686WD** WatchDog<sup>®</sup> Model 2475 Plant Growth Station



## Plant Growth Report

Template: Plant Growth (DIF/DLI) w/VPD Equipment: North - Aspirated

Timestamp	VPD	PAR Hrs	DLI	Temp DIF	Day Mean Temp	Night Mean Temp	High	Low
6/1/2017	1.11	12.25	31.88	11.68	80.56	68.88	91.00	64.40
6/2/2017	.81	12.75	34.32	10.76	78.62	67.86	89.70	60.40
6/3/2017	.75	13.00	38.82	9.39	77.96	68.56	90.90	61.30
6/4/2017	.85	12.75	17.02	7.10	77.48	70.38	84.20	68.60
6/5/2017	.55	12.00	18.80	5.54	76.94	71.40	86.60	69.60
6/6/2017	.77	12.25	29.72	7.86	77.82	69.97	88.80	68.20

SpecConnect Plant Growth Report



## FIELDSCOUT® MOBILE APP

Data at your fingertips! We've made it easier for you to send data from the field to your smartphone.

### Basic Features

Free Mobile App download from Apple App Store or Android Google Play.

Basic capabilities include:

- Handsfree data collection
- Visualize in-field, real time readings on a smartphone or tablet
- Color coded to represent a scale of moisture, EC, surface temperature or turf firmness
- E-mail relevant information to communicate results to others

### Pro Features

Collect data, evaluate trends, log and analyze multiple data points. Data can be sent via Bluetooth to an IOS or Android device and saved to the Cloud. Pull together soil moisture and EC data from your TDR meter and firmness data from your TruFirm to fine-tune agro-nomic and cultural practices for specific greens or other surfaces.

FieldScout Pro Mode requires the purchase of a SpecConnect FieldScout 1-yr subscription

Pro Mobile App capabilities include:

- Handsfree data collection
- Google Maps dynamic satellite image shows readings data overlaid on your property on mobile device and web portal
- Freeform Mode plots a point for each reading, and stores its data independently
- Automatic wireless upload to SpecConnect for further analysis from your personal web portal
- SpecConnect provides complete data overview at once, overlaid on a satellite map
- Color Gradient Mapping of data points within custom selected areas or groupings
- Map locations of sprinkler heads, pin locations and more

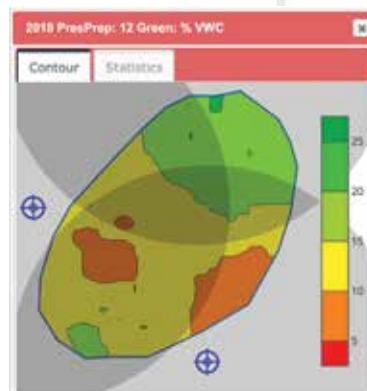
### FieldScout® Mobile Compatible Items

- TDR350 Soil Moisture Meter
- TruFirm Turf Firmness Meter
- TDR150 Soil Moisture Meter (with optional GPS/Bluetooth upgrade)
- TDR300 Soil Moisture Meter (with optional Bluetooth device)

### FieldScout Mobile App

**FREE**

- 3035A SpecConnect FieldScout Pro Subscription (1-yr) 1-3 Devices
- 3035B SpecConnect FieldScout Pro Subscription (1-yr) 4-7 Devices
- 3035C SpecConnect FieldScout Pro Subscription (1-yr) 8+ Devices



### FIELDSCOUT MOBILE APP BASIC vs. PRO

	Basic	Pro
Basic Grid Map	✓	✓
Change Number of Grid Zones	✓	✓
Customizable Google Map Image		✓
Saves the Average Measurement by Zone	✓	✓
Email the Map/Results View	✓	✓
Freeform Notes		✓
Freeform Mode		✓
Guided Mode (Auto-Advancing through Zones)		✓
SpecConnect Data Sharing		✓
Auto-Upload to SpecConnect		✓
Add User Note or Comment to Individual Reading or Zone		✓
Irrigation/Soil Moisture Audit		✓





Backed with proven time-domain measurement technology, the TDR350 accurately measures soil moisture across a full range of soil conditions. An ergonomic design and built-in display provide quick and easy measurements to validate your cultural practices.

### What does it measure?

Soil moisture (Volumetric Water Content %), Salts (Electrical Conductivity) and surface temperature, plus optional Infrared Temperature sensor available on next page

### Common Applications

- Reliable portable meter for instant, accurate and actionable rootzone moisture and soil EC readings average of rod length
- Irrigation scheduling, syringing practices, soil flushes and many other agronomic and cultural practices
- Track and trend data from day to day, month to month and season to season to optimize turf Health and Conditioning

### Features & Benefits

- Backlit Display - Easy to see on early mornings and bright sunny days
- Improved Layout & Larger Digits - Clearly view readings, settings and icons
- Integrated Bluetooth & GPS - Greater accuracy with onboard components
- Internal Data Logger - Records approximately 50,000 measurements with GPS coordinates
- Improved Durability – Sturdy telescoping tubular frame encloses/protects cabling



### How do you access the data?

- Manual – download the data with a USB flash drive, no special software or cable required
- Hands free – instantly view data on your smartphone or tablet via FieldScout Mobile App
- Cloud – SpecConnect FieldScout Pro subscription automatically uploads data to your personal web portal to view enhanced mapping and reporting features

SpecConnect Web Portal showing TDR350 data



**6435 TDR350**  
Includes carrying case. Rods required for TDRs to function and sold separately.

**6435TS Infrared Temperature Sensor for TDR350**  
**6435SP Rod Spacer for 0.5" and 1" depths**

## SPECIFICATIONS FOR TDR SOIL MOISTURE METERS

VWC Range: 0% to saturation, Resolution: 0.1%, Accuracy: ±3.0% VWC

EC Range: 0 to 5 mS/cm, Resolution: 0.01 mS/cm, Accuracy: ±0.1 mS/cm

Temperature Range: -22° to 140°F (-30° to 60°C), Resolution: 0.1°, Accuracy: ±1.8°F (1°C)

IR Temperature Range: 32° to 140°F (0° to 60°C), Resolution: 0.2°F (0.1°C), Accuracy: ±0.2°F (0.1°C)

## SMARTIRRIGATION:

Maximize Irrigation Audits with TDR





## TDR150 Soil Moisture Meters

An affordable alternative to the TDR350, the TDR150 is a compact meter that allows you to obtain readings on-the-go. Ideal for measuring containers on benches, variable rod length options provide soil moisture measurements for your ideal root depth.

### What does it measure?

Soil moisture, (Volumetric Water Content %), Salts (Electrical Conductivity) and Temperature (Surface thermistor)

### Features & Benefits

- Backlit Display – Easy to see on early mornings and bright sunny days
- Easy-to-read Layout & Large Digits – Clearly view readings, settings and icons
- Integrated Bluetooth & GPS – Greater accuracy with onboard components
- Internal Data Logger – Records approximately 50,000 measurements with GPS coordinates

### How do you access the data?

- Manual – download the data with a USB flash drive, no special software or cable required
- With optional GPS and Bluetooth upgrade (see details below)
- Hands free – instantly view data on your smartphone or tablet via FieldScout Mobile App
- Cloud – SpecConnect FieldScout Pro subscription automatically uploads data to your personal web portal to view enhanced mapping and reporting features



<b>6445</b>	<b>TDR150</b> Includes carrying case. Rods sold separately (below).
<b>6445TS</b>	<b>Infrared Temperature Sensor-TDR 150</b>
<b>6435SP</b>	<b>TDR Rod Spacer for 0.5" and 1" depths</b>
<b>6445GBU</b>	<b>Bluetooth and GPS Upgrade</b>

## TDR Rods

Multiple depth options for varying root zones.

- Sturdy stainless-steel construction
- Field replaceable

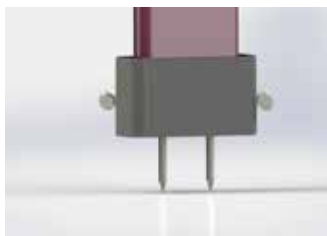
NOTE: Required for TDRs to function. Must be fully inserted for valid measurements.

<b>6428FS4</b>	<b>Two 1.5 inch (3.8 cm) Rods</b>
<b>6429FS4</b>	<b>Two 3 inch (7.6 cm) Rods</b>
<b>6431FS4</b>	<b>Two 4.8 inch (12 cm) Rods</b>
<b>6432FS4</b>	<b>Two 8 inch (20 cm) Rods</b>
<b>6430PH</b>	<b>Pilot Hole Maker for TDR Meters</b> Includes two 3 inch (7.6 cm) rods



## TDR Spacers

- Measure Soil Moisture at 0.5 " to 1"
- Expand the measurement range of our FieldScout TDR Soil moisture probes
- Using 1.5" (3.9 cm) rods, the TDR Rod Spacer enables easy measurement of 0.5" and 1" depths
- Flip to switch between the two depths
- Easily attach and detach from any FieldScout TDR meters



FOR TDR350/TDR150

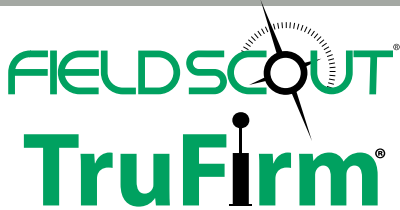
### 6435SP Rod Spacer

Also available for TDR 300/100. See website for details.

## Infrared Temperature Sensor

<b>6435TS</b>	<b>Infrared Temperature Sensor for TDR350</b>
<b>6445TS</b>	<b>Infrared Temperature Sensor for TDR150</b>

- Predict turf wilt with higher accuracy
- Easily correct a moisture deficit earlier and reduce heat stress to the green
- Quickly and accurately monitor canopy and soil temperatures
- Use IR temperature real-time - instantaneous readings
- Easy installation to our FieldScout TDR350 and TDR150



Based on USGA technology, the FieldScout® TruFirm® offers a quick, easy and affordable method to measure the firmness of turf, bunker sands and other playing surfaces. Data acquired from the device allows turf management professionals to measure the relationship between the compaction of the soil and the moisture level to quantify safety and performance of playing conditions.

## What does it measure?

Surface Firmness/Hardness (depth of impact in inches)

## Common Applications

- All-in-one portable meter for evaluating impacts of cultural practices, play and environmental conditions on putting greens and other athletic surfaces
- Golf course greens, approaches, bunker sands and fairway landing areas for achievement of optimal surface performance and consistency
- Natural and artificial turf playing surfaces, infield dirt, turf and clay tennis courts, cricket pitches, bowling greens, racing tracks, etc.
- Track and trend data over time to better understand effects of turf inputs and optimize conditioning, playability and safety

## Features & Benefits

- Built-in Display – immediate digital results on a conveniently located screen
- Easy to Use – simply raise and drop the hammer in one motion
- Objective Values – analyze & compare impact of environment and maintenance inputs on play
- Versatile Tool – perfect for golf courses and sports fields at schools, parks, etc.
- Self-Contained – one complete unit, no small pieces to keep track of or lose
- Very Affordable – designed to make measurement possible for every facility
- Bluetooth – wireless data collection with the FieldScout Mobile App and add satellite mapping with automatic cloud upload with SpecConnect FieldScout Pro

## How do you access the data?

- Hands free – instantly view data on your smartphone or tablet via FieldScout Mobile App
- Cloud – SpecConnect FieldScout Pro subscription automatically uploads data to your personal web portal to view enhanced mapping and reporting features



## SPECIFICATIONS FOR TRUFIRM

Range: 0.1 in - 1.5 in (2.54 mm - 38.1 mm)

Resolution: 0.01 in at 1.00 in - 1.50 in (0.25 mm at 25.4 mm - 38.1 mm)

0.003 in at 0.00 in - 0.999 in (0.076 mm at 0 mm - 25.4 mm)

Diameter of Hammer: 1.68 in (4.45 cm)

Height: 27 in (69 cm)

Weight: 4.3 lb (1.95 kg)

Measurement Units: Depth of travel (inches)

Power: 2 AA batteries (included)

64905 FieldScout® TruFirm® Turf Firmness Meter  
with Bluetooth Low Energy





## FIELDSCOUT® SC 900 Soil Compaction Meter

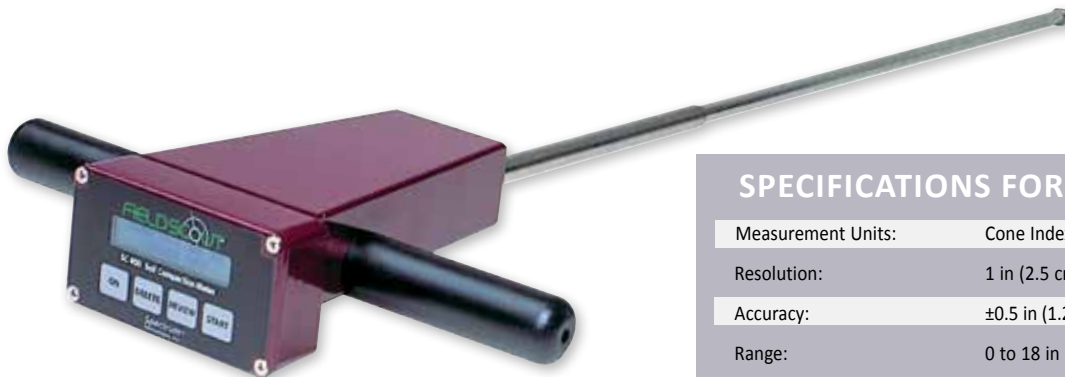


Help make decisions regarding areas of the field that require tillage, changes to crop rotation, and planting of cover crops.

- Includes 1/2 in and 3/4 in cone tip
- Takes compaction readings every inch from 0 to 18 in (45 cm)
- Exclusive ultrasonic depth sensor captures readings in 1 in (2.5 cm) increments
- Penetration resistance measured by internal load cell
- Compaction data is displayed in PSI or kPa (1 PSI = 6.9 kPa)
- Connects to any GPS receiver that has a serial output option\*
- Equipped with internal data logger and RS-232 port
- Configure and download meter with FieldScout® software (included)\*\*
- Upload your data to SpecConnect for maps of compaction by depth, or depth to hard pan layer
- Includes USB cable, carrying case, and depth target

\* GPS interface requires two cables. The GPS/DGPS cable (item 2950CV5) is available from Spectrum. A PC serial interface cable supplied by the manufacturer of the GPS receiver is also required.  
 \*\* PC cable connects to a computer USB port. See our website for other cable connection options.

- |         |  |
|---------|--|
| 6110FS  | FieldScout® SC 900 Soil Compaction Meter |
| 2950CV5 | GPS/DGPS Cable                           |
| 7250    | GPS Unit Mounting Bracket                |
| 6110FST | Replacement Depth Target                 |
| 6106    | 1/2 in Replacement Tip (Fine soils)      |
| 6107    | 3/4 in Replacement Tip (Coarse soils)    |



FieldScout SC 900

### SPECIFICATIONS FOR FIELDSCOUT SC 900

Measurement Units:	Cone Index (PSI or kPa)
Resolution:	1 in (2.5 cm), 5 PSI (35 kPa)
Accuracy:	±0.5 in (1.25 cm) Depth, ±15 PSI (103 kPa) Pressure
Range:	0 to 18 in (0 to 45 cm), 0 to 1,000 PSI (0 to 7,000 kPa)
Battery/Life:	4 AAA alkaline batteries; approximately 12-month life
Data Logger Capacity:	772 profiles without GPS; 579 profiles with GPS

## Soil Compaction Tester

Economical way to measure soil compaction with analog read out.

- Large and small tip included with convenient storage in tester housing
- 24 in stainless steel rod with adjustable shock collar to prevent damage to the gauge during transport or storage
- Easy to read, color-coded, stainless steel dial that is liquid filled to reduce shock
- Durable molded housing with rubber grip handles
- Penetration Depth: Up to 24 in (60 cm) in 3 in (7.6 cm) increments

- |      |                                       |
|------|---------------------------------------|
| 6120 | Soil Compaction Tester                |
| 6121 | 1/2 in Replacement Tip (Fine Soils)   |
| 6122 | 3/4 in Replacement Tip (Coarse Soils) |







## SM 100 Soil Moisture Sensor



Place at multiple depths to help determine both when and how much to water.

- Measures Volumetric Water Content (VWC) of soil
- Capacitance-type sensor responds immediately to changes in soil moisture content for better irrigation decisions
- Calibrated for mineral soils or soilless media
- Installs easily into 3/4 in (1.9 cm) hole
- Install permanently or use to take spot measurements
- Can be read with the FieldScout® Soil Sensor Reader (Item 6466) or WatchDog 2000, 1000 Series Stations, and WatchDog Pups
- Connect up to 8 sensors to one station

**6460** WaterScout® SM 100 Sensor - 6 ft (1.8 m)  
**6460-20** WaterScout SM 100 Sensor - 20 ft (6 m)

### SPECIFICATIONS FOR WATERSCOUT SM 100 SENSOR

Standard Interface: WatchDog weather station, Pups, and FieldScout soil moisture reader

Range: 0% VWC to saturation

Power Requirements: 3 to 5V @ 6 to 10 mA

Output: Analog voltage 0.5 - 1.5V for a 3V excitation (ratiometric for other excitation voltages)

Resolution: 0.1% VWC

Cable Length: 6 ft (1.8 m) and 20 ft (6 m) standard, extendable up to 50 ft (15 m)

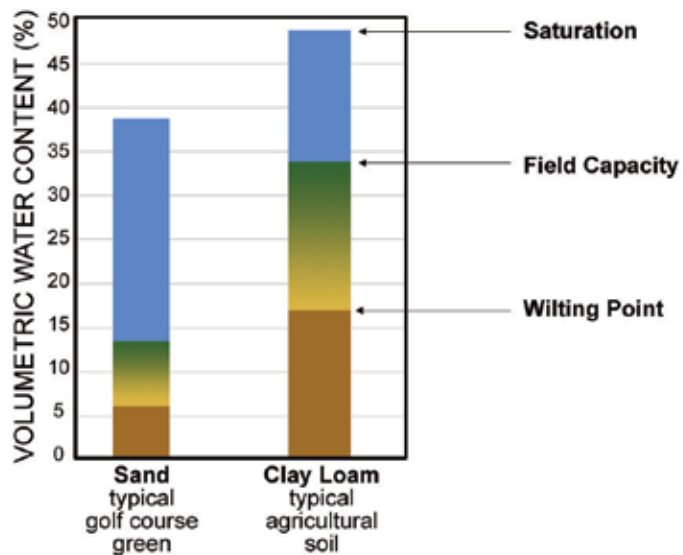
Accuracy: 3% VWC @ EC < 8 mS/cm

Sensing Area: 2.4 in (6 cm) x 0.8 in (2 cm)



Shown measuring in soilless media mode to gather immediate data

### Water Holding Capacity By Soil Type





## SMEC 300 Soil Moisture/EC/Temperature Sensor

Identify situations where soil salinity is an issue or where certain moisture and temperature conditions facilitate soil-borne diseases.

- Capacitance-type soil moisture sensor
- Carbon ink electrodes provide large measuring surface for electrical conductivity (EC)
- Easy, 1-step EC calibration process
- Can be read with the FieldScout® Soil Sensor Reader (Item 6466) or WatchDog 2000, 1000 Series Stations, and WatchDog Pups
- Connect up to 4 sensors per station
- Recommended placement of sensors is 10 feet separation to prevent EC interference when in the same medium
- WaterScout Calibration Device required unless using Soil Sensor Reader (Item 6466)

WatchDog Stations sold prior to 2012 must be upgraded (Contact for support)

6470-6	WaterScout SMEC 300 Sensor - 6 ft (1.8 m)
6470-20	WaterScout SMEC 300 Sensor - 20 ft (6 m)
6470CAL3V	WaterScout Calibration Device
2251	Conductivity Standard, 1.41 mS/cm, 250 mL



### SPECIFICATIONS FOR WATERSCOUT SMEC 300

Standard Interface: WatchDog weather station, Pups, and FieldScout soil moisture reader

Range: VWC: 0% VWC to saturation, EC: 0 to 10 mS/cm, Temp: 33 - 175°F (0.5 - 80°C)

Resolution: VWC: 0.1%, EC: 0.01 mS/cm, Temp: 0.1°F (0.1°C)

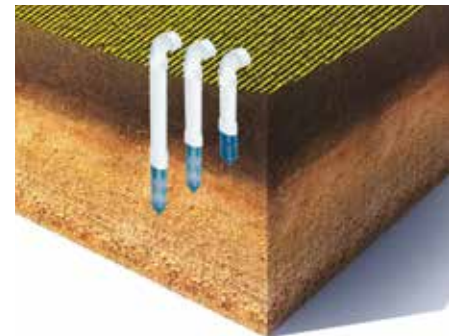
Accuracy: VWC: 3%, EC: ±2%, Temp: ±1°F (0.6°C)

Cable Length: 6 ft (1.8 m) and 20 ft (6 m) standard, extendable up to 50 ft (15 m)

Power Requirements: 3V @ 6 to 10 mA

Output: Analog voltage, time division multiplexed

Sensing Area: 2.25 in. x 0.75 in. (5.7 x 2 cm)



## FIELDSCOUT® Soil Sensor Reader

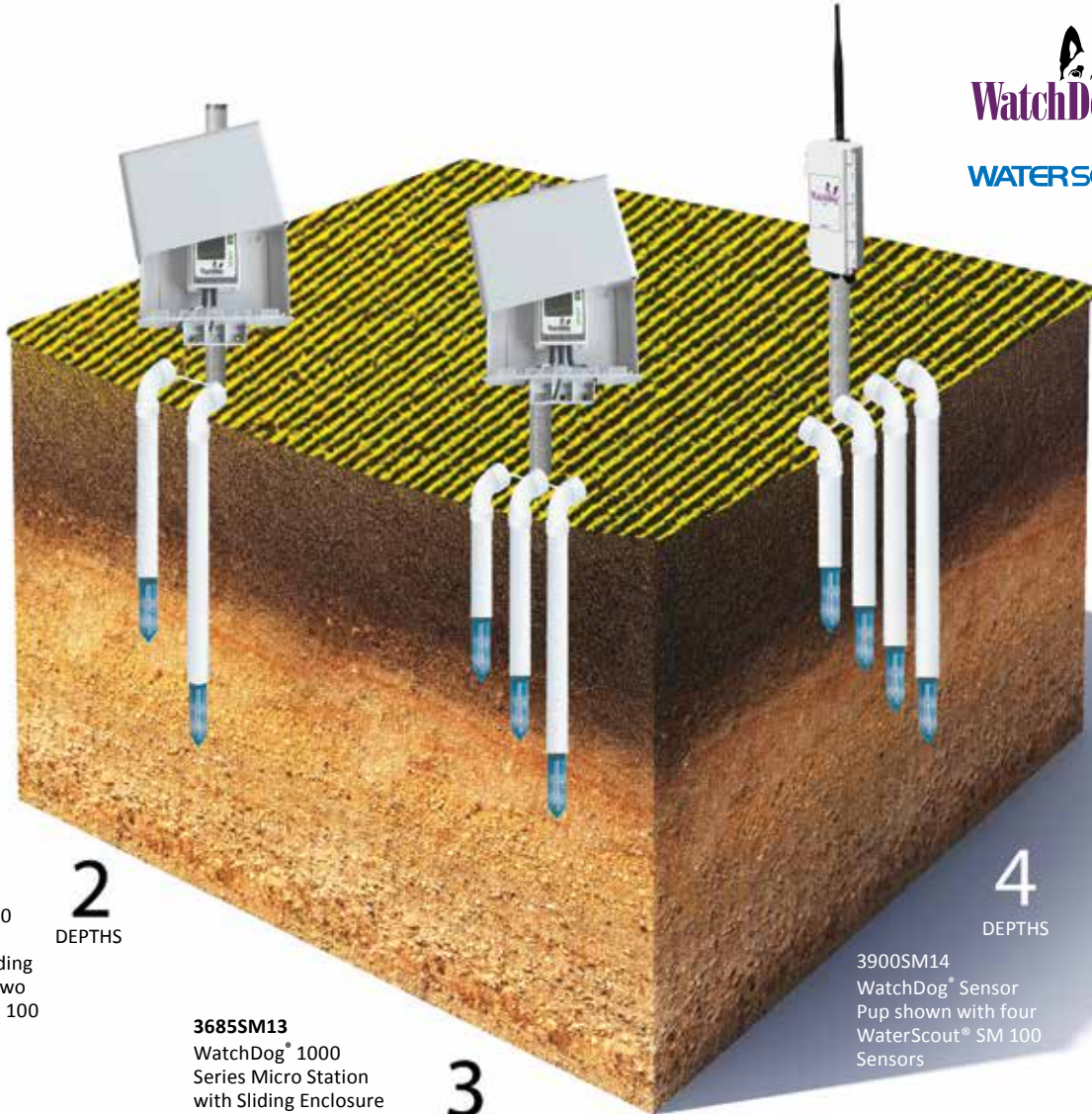
Spot-check WaterScout SM 100 and SMEC 300 sensors in the field.

- Also reads Watermark sensors (requires separate adapter)
- Includes soft-sided case (also available separately)

6466	FieldScout® Soil Sensor Reader
6450FSADPT	Watermark Adapter for Soil Sensor Reader
7500	Soft-Sided Carrying Case*

\* Item 7500 will also fit the WatchDog 1000/2000 Series Data Shuttle (Item 3679WD), LightScout Red/Far-Red Meter (Item 3412), LightScout Quantum Light Meters (four models) and the LightScout External Light Sensor Reader (Item 3415FX)





**3680SM12**  
WatchDog® 1000  
Series Micro  
Station with Sliding  
Enclosure and two  
WaterScout SM 100  
Sensors

**2**  
DEPTHS

**3685SM13**  
WatchDog® 1000  
Series Micro Station  
with Sliding Enclosure  
and three WaterScout  
SM 100 Sensors

**3**  
DEPTHS

**3900SM14**  
WatchDog® Sensor  
Pup shown with four  
WaterScout® SM 100  
Sensors

**4**  
DEPTHS

## WatchDog® Irrigation Stations with WaterScout® Sensors and Watermark Sensors

Affordably monitor, compare and evaluate soil moisture levels from two, three, or four user-defined soil depths.

- Includes WatchDog Station and WaterScout Sensors with 20 ft (6 m) cables - save money when purchased as a system

- Micro Stations also include the Protective Sliding Enclosure
- Watermark Stations include Watermark Soil Moisture Sensors with 11 ft (3.3 m) cables
- Add soil moisture sensors to your WatchDog Pup network and see your data on SpecConnect.net
- Add a WaterScout SMEC 300 Soil Moisture/EC/Temp Sensor (Item 6470-20) and monitor soil temperature and EC levels
- Requires SpecConnect, SpecWare 9 Basic or Pro software
- [Buy these stations as packages and save](#)

	MODEL 1200 MICRO STATION	MODEL 1400 MICRO STATION	SENSOR PUP IRRIGATION STATION
2 WaterScout SM 100 Soil Moisture Sensors	3680SM12	3685SM12	3900SM12
3 WaterScout SM 100 Soil Moisture Sensors		3685SM13	3900SM13
4 WaterScout SM 100 Soil Moisture Sensors		3685SM14	3900SM14

	MODEL 1200 MICRO STATION	MODEL 1400 MICRO STATION
2 Watermark Soil Moisture Sensors	3680WM12	3685WM12
3 Watermark Soil Moisture Sensors		3685WM13
4 Watermark Soil Moisture Sensors		3685WM14





6450

## Watermark Soil Moisture Sensor

Economical way to measure soil moisture tension.

- Works with FieldScout Soil Sensor Reader and WatchDog Weather Stations
- Reads moisture tension from 0 (saturated) to 200 (dry) centibars

6450	Watermark Sensor with 5 ft (1.5 m) cable
6450FSADPT	Watermark Adapter for Soil Sensor Reader
6450WD	Watermark Sensor for WatchDog® Stations & Pups with 11 ft (3.3 m) cable
6450WD20	Watermark Sensor for WatchDog® Stations & Pups with 25 ft (7.6 m) cable
6450AH	Watermark Adapter for WatchDog® Stations & Pups



6421

## Irrrometer Tensiometers

Schedule irrigation based on how hard plant roots are working to draw water from the soil.

- “SR” models (items 6419 thru 6423) are for general use with field or tree crops
- Low Tension (LT) models (see [www.specmeters.com](http://www.specmeters.com)) are for coarse soils or soilless media
- Portable models for specialized applications (see [www.specmeters.com](http://www.specmeters.com))
- Can be connected to WatchDog Data Loggers and Stations with Pressure Transducer (Item 3669)
- Pressure gauge has a quarter inch pipe thread
- Service kit required (Item 6425)

6425	Service Kit - Required
6419	SR Model 6 in (15 cm) Depth
6420	SR Model 12 in (30 cm) Depth
6421	SR Model 18 in (45 cm) Depth
6422	SR Model 24 in (60 cm) Depth
6423	SR Model 36 in (90 cm) Depth
9917	Replacement tip for SR models

- Connect your “SR” model (Items 6419 thru 6423) tensiometer to your weather station. The Pressure Transducer adapts to Irrrometer tensiometers and allows use of the dial gauge for in-field measurements

3669	Pressure Transducer
------	---------------------



6400

## Economy Soil Moisture Tester

Analog soil moisture meter measures any type of soil with just one calibration.

- Resistance-type sensor located at the tip of the shaft
- Provides instant results ranging from 0 (dry) to 10 (saturated)
- 3-month warranty

6400	9 in (22 cm) Soil Moisture Tester
6405	24 in (60 cm) Soil Moisture Tester

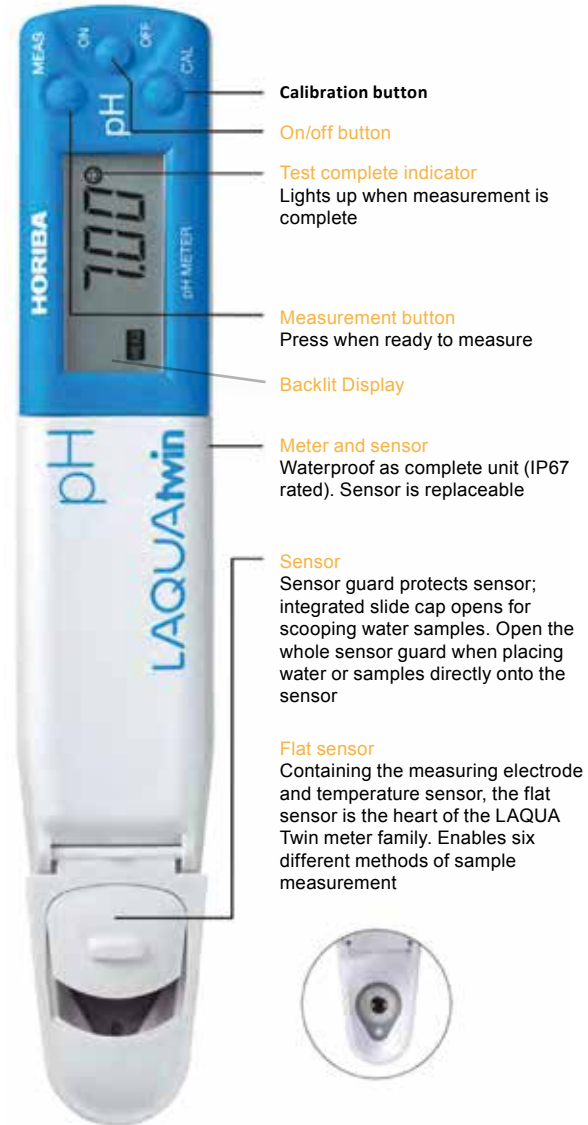


# LAQUA twin



Put the power of a laboratory right in your hands.

- Professional grade meters
- Measure samples in nutrient solutions, water, soils, and tissue sap (Two plant sap press options available on page 44)
- Waterproof pocket-sized meter with digital calibration
- Sensors store dry and are field replaceable
- Accuracy correlates well with laboratory analysis
- Unique flat sensor allows you to conveniently and accurately measure samples as small as 0.3 ml
- Automatic temperature compensation, waterproof, auto power-off
- Includes two CR2032 batteries, case and calibration standards



**Calibration button**

**On/off button**

**Test complete indicator**

Lights up when measurement is complete

**Measurement button**

Press when ready to measure

**Backlit Display**

**Meter and sensor**

Waterproof as complete unit (IP67 rated). Sensor is replaceable

**Sensor**

Sensor guard protects sensor; integrated slide cap opens for scooping water samples. Open the whole sensor guard when placing water or samples directly onto the sensor

**Flat sensor**

Containing the measuring electrode and temperature sensor, the flat sensor is the heart of the LAQUA Twin meter family. Enables six different methods of sample measurement



## LAQUA Twin pH Meter

Ideal for testing irrigation water, leachate, pesticides, or dairy rumen pH.

**2103ALP**

**LAQUA Twin pH meter**

Includes case, batteries, and pH 4 & 7 standards

**2110**

**Refill Solutions - pH 4 and 7, 60 mL ea.**

**2143L**

**LAQUA Twin pH Replacement Sensor**

**2135L**

**Sampling Sheets - 100 pieces**

## LAQUA Twin EC Meter

Ideal for water quality and greenhouse applications.

**2205LP**

**LAQUA Twin EC Meter**

Includes case, batteries, and calibration standards

**2210L**

**Conductivity Standard, 1.41 mS/cm (6 - 14 mL bottles)**

**2242L**

**Replacement Sensor**



**pH**      **Conductivity (EC)**      **Sodium**      **Potassium**      **Nitrate**      **Calcium**

<b>Measurement Principle:</b>	Glass electrode method	2 AC bipolar	Ion electrode method	Ion electrode method	Ion electrode method	Ion electrode method
<b>Sample Volume Required:</b>	0.1 mL to 2.0 mL	0.12 mL to 2.0 mL	0.3 mL to 2.0 mL	0.3 mL to 2.0 mL	0.3 mL to 2.0 mL	0.3 mL to 2.0 mL
<b>Measurement Range:</b>	0 to 14 pH	0 to 199.9 mS/cm	2 to 9900 ppm	4 to 9900 ppm	6 to 9900 ppm	4 to 9900 ppm
<b>Calibration:</b>	pH 4 and pH 7	1.41 mS/cm	150 ppm and 2000 ppm*	150 ppm and 2000 ppm*	34 ppm and 450 ppm*	150 ppm and 2000 ppm*
<b>Reproducibility:</b>	± 0.1 pH	± 2%	± 10% or ± 10 ppm	± 10% or ± 10 ppm	± 10% or ± 10 ppm	± 20% or ± 20 ppm
<b>Display:</b>	4-digit digital LCD display with Backlight (New)					
<b>Power:</b>	CR2032 coin batteries (x2)					
<b>Battery Life:</b>	400 hours continuous operation with Backlight Off (New)					
<b>Operating Range:</b>	40°F (5°C) to 105°F (40°C), 85% relative humidity					
<b>Dimensions:</b>	164mm x 29mm x 20mm					

\* High and low calibration points can be changed (customer must provide custom solutions)

### LAQUA Twin Sodium Na<sup>+</sup>

- 2500GL**      **LAQUA Twin Sodium (Na<sup>+</sup>) Meter**  
Includes case, batteries, and calibration standards
- 2540L**      **Replacement Sodium Sensor**
- 2514L**      **150 ppm Na<sup>+</sup> Standard, 6 - 14 mL bottles**
- 2518L**      **2000 ppm Na<sup>+</sup> Standard, 6 - 14 mL bottles**
- 2535**      **Na<sup>+</sup> Soil Test Kit w/30 Samples**  
Includes filter paper, cups, and soil scoop
- 2135L**      **Sampling Sheets - 100 pieces**

### LAQUA Twin Potassium K<sup>+</sup>

- 2400GL**      **LAQUA Twin Potassium (K<sup>+</sup>) Meter**  
Includes case, batteries, and calibration standards
- 2440L**      **Replacement Potassium Sensor**
- 2414L**      **150 ppm K<sup>+</sup> DI Standard, 6 - 14 mL bottles**
- 2418L**      **2,000 ppm K<sup>+</sup> DI Standard, 6 - 14 mL bottles**
- 2434**      **K<sup>+</sup> Soil Test Kit w/30 Samples**  
Includes solutions, filter paper, cups, and soil scoop
- 2135L**      **Sampling Sheets - 100 pieces**



### LAQUA Twin Nitrate NO<sub>3</sub><sup>-</sup>

- 2305GL**      **LAQUA Twin Nitrate (NO<sub>3</sub><sup>-</sup>) Meter**  
Includes case, batteries, and calibration standards
- 2345L**      **Replacement Nitrate Sensor**
- 2311**      **450 ppm NO<sub>3</sub><sup>-</sup>-N Standard, 6 - 14 mL bottles**
- 2312**      **34 ppm NO<sub>3</sub><sup>-</sup>-N Standard, 6 - 14 mL bottles**
- 2330**      **NO<sub>3</sub><sup>-</sup> Soil Test Kit w/30 Samples**  
Includes solutions, filter paper, cups, and soil scoop
- 2135L**      **Sampling Sheets - 100 pieces**



### LAQUA Twin Calcium Ca<sup>2+</sup>

- 2450L**      **LAQUA Twin Calcium (Ca<sup>2+</sup>) Meter**  
Includes case, batteries, and calibration standards
- 2455L**      **Replacement Calcium Sensor**
- 2460L**      **150 ppm Ca<sup>2+</sup> Standard, 6 - 14 mL bottles**
- 2461L**      **2000 ppm Ca<sup>2+</sup> Standard, 6 - 14 mL bottles**
- 2135L**      **Sampling Sheets - 100 pieces**



2726

## Handheld Plant Sap Press

- Use with LAQUA Twin meters or Brix meters (see below) for on-site testing
- Made of high quality, non-corrosive metal
- Includes cleaning device

**2726 Hand Held Plant Sap Press**



2720

## Hydraulic Plant Sap Press

- Speed up collection of large or less succulent samples
- Hydraulic press extracts sap into a collection vial
- Includes plunger, grate, cylinder, expeller rod and six collection vials

**2720 Hydraulic Plant Sap Press**



2812

## Digital Refractometer

Easy and convenient way to measure Brix.

- Small sensor area allows measurement of minute samples
- Measures Brix from 0 to 53.0% (Accuracy  $\pm 0.2\%$ )
- Automatic temperature compensation
- Large digital display of Brix and temperature
- Operates on two AAA batteries (included)

**2812 Digital Refractometer**

## Handheld Refractometer

Compact meter ideal for field or lab use.

- Measures Brix from 0 to 32.0% (Accuracy  $\pm 0.2\%$ )
- Place a couple drops of sample on the scale and read the results in Brix through the shaded area on the eyepiece
- Available with or without automatic temperature compensation
- Includes case and instructions



**2806 Refractometer 0–32% with Automatic Temperature Compensation**

# FIELDSCOUT<sup>®</sup> SoilStik<sup>™</sup> pH Meter

Easy to use and cost-efficient meter.

- Flat surface electrode measures pH in soils, semi-solids, solids, and liquids
- RENEW indicator tells you when it's time to replace your electrode - eliminates guesswork
- CAL alert tells you it's time to recalibrate to ensure accuracy
- Memory records and recalls 15 sequentially tagged readings, allowing detection of changes over time
- 1- or 2-point calibration: automatically recognizes buffer solutions
- Automatic temperature compensation
- Simultaneous display of pH and temperature
- Display indicates when the reading has stabilized
- Data Hold, auto power off, and low battery indication
- Water resistant design (IP57) floats in water and protects the meter in wet environments
- Includes protective sensor cap, rinse bottle, two CR2032 batteries, pH 4 & 7 standard solutions, and soft case

- 2105 FieldScout<sup>®</sup> SoilStik pH Meter
- 2106 Flat Sensor, Replacement
- 2110 Refill Solutions - pH 4 and 7, 60 mL ea.



Measuring the pH of the pesticide spray solutions is important to ensure performance.



SoilStik shown in use with Item 6510 Model HC Soil Sampler (available online)



Flat end electrode works in liquids, semi-solids, and soils

## SPECIFICATIONS FOR SOILSTIK pH METER

**pH: 0.00 to 14.00 pH**

**Temperature: 23°F to 194°F (-5°C to 90°C)**

**Resolution: 0.01 pH, 0.1°**

**Accuracy: ±0.01 pH, ±1.8°F/±1°C**

**Dimensions: 1.4 x 6.8 x 1.6 in (35.6 x 172.7 x 40.6mm)**

**Weight: 3.8 oz (110 g)**





## pH 400 and 600 Meters

Fast, easy and accurate “direct” soil pH measurement.

### Modern User Interface

- The FieldScout pH 400 & 600 Meters have a modern, intuitive, and user friendly interface that allows users to quickly access the meter’s advanced features and settings
- Temperature and pH data remain visible, so monitoring does not stop when settings are changed or options are selected
- Large backlit 3.2” LCD color display ensures measurement values and menu options are easy to read

### Rugged and Ergonomic Design

- Both the FieldScout pH 400 & 600 Meters are lightweight, and their compact design makes them highly suitable for field use and handheld applications
- Dust and splash resistant – IP65 rating
- Meters are fitted with a rubber boot to help absorb shock
- The USB port is protected by a tightly sealed cover and the casing and battery door are fitted with rubber seals
- 1 year warranty on meter

### ISFET (Ion Sensitive Field Effect Transistor) Probes

Glass Free and Durable Probe - 2 Options to Fit Your Needs

- Unlike glass electrodes, the FieldScout 400 and 600 pH Meters feature ISFET pH electrodes that will not shatter. Neither model requires wet storage
- Both come with a 6-month warranty
- Spectrum ISFET probes are made of high quality materials such as PEEK, ABS, and PVC
- Sample directly in plug trays, pots, containers, solutions, and soilless media

- 2107 **FieldScout pH 400 Meter**  
Meter includes case, batteries, AC adapter, brush, and pH 4 & 7 standards  
(Does not include pH Probe - order separately below)
- 2108 **FieldScout pH 600 Meter**  
Meter includes case, batteries, AC adapter, brush, and pH 4 & 7 standards  
(Does not include pH Probe - order separately below)
- 2127 **FieldScout pH Meter Blunt Tip ISFET Probe**
- 2128 **FieldScout pH Meter Pin Point Tip ISFET Probe**
- 2110 **Refill Solutions - pH 4 and 7, 60 mL each**



Robust probe design makes it easy to go from sample to sample



### pH 400

- Professional grade quality
- Intelligent calibration wizard simplifies the calibration process
- Supports 1-and 2-point calibration
- Powered by 3 rechargeable AA-batteries (AC adapter included)



### pH 600

Includes all features of the FieldScout pH 400 Meter, plus...

- Internal storage of measured data points, up to 65,000 measurements
- Ability to query both momentary pH value and temperature
- Supports up to 5-point calibration

### Pin Point Tip ISFET Probe



- Uses patented non-glass ISFET technology for the smallest pH measurement
- Sharp and to the point for pH measurement of materials that need to be penetrated
- Eliminates clogging from dirty samples or semi-solids



### Blunt Tip ISFET Probe

- Uses patented non-glass ISFET technology for general purpose pH measurement
- Ideal for liquids, hydroponics, and soilless media



## Direct Soil EC Meter

Instant and accurate direct EC and temperature measurements.

- Professional-grade meter - Patented
- No need to prepare samples - simply sample through the profile
- Patented paired sensor tip provides maximum soil-sensor contact and higher accuracy
- Sample directly in plug trays, pots, containers, solutions, or ground soils
- 0 to 19.9 mS/cm (Accuracy  $\pm 1\%$ , resolution 0.01 mS/cm)
- Automatic temperature compensation, long lasting, and waterproof
- Includes battery and EC calibration standard

### 8 in (20 cm) Probe Option

<b>2265FS</b>	<b>FieldScout® Direct Soil EC Meter w/ 8 in Probe</b> Includes Carrying Case and 2.76 Standard
<b>2265PROBE</b>	<b>FieldScout EC 8 in Probe (Replacement)</b>
<b>2254</b>	<b>Conductivity Standard, 2.76 mS/cm, 250 mL</b>
<b>2251</b>	<b>Conductivity Standard, 1.41 mS/cm, 250 mL</b>

### 24 in (60 cm) Probe Option

<b>2265FSTP</b>	<b>FieldScout Direct Soil EC Meter w/ 24 in T-Handle Probe and Replaceable Tip</b> Includes Carrying Case and 2.76 Standard
<b>2265FST24P</b>	<b>FieldScout T-Handle EC 24 in Probe w/ Replaceable Tip</b>
<b>2266</b>	<b>Replaceable Tip For T-Handle EC Probe</b>
<b>2254</b>	<b>Conductivity Standard, 2.76 mS/cm, 250 mL</b>
<b>2251</b>	<b>Conductivity Standard, 1.41 mS/cm, 250 mL</b>



FieldScout Direct Soil EC Meter with 24 in (60 cm) T-Handle



Exclusive Paired Sensor

## Waterproof



## Waterproof EC Meter

Economic meter for measuring salinity.

- Measures four parameters; conductivity, TDS, salinity, and temperature
- 6 units of measurement:  $\mu\text{S}/\text{cm}$ ,  $\text{mS}/\text{cm}$ , ppm, ppt,  $\text{mg}/\text{L}$ , and  $\text{g}/\text{L}$
- Internal memory stores up to 15 labeled readings for easy recall
- Adjustable conductivity-to-TDS ratio factor (0.4 to 1.0)
- Accuracy:  $\pm 2\%$
- Automatic temperature compensation
- Measurement ranges:
  - Conductivity: 0.00 to 199  $\mu\text{S}/\text{cm}$ , 200 to 1,999  $\mu\text{S}/\text{cm}$ , or 2.00 to 19.99  $\text{mS}/\text{cm}$
  - TDS: 0 to 99.9  $\text{mg}/\text{L}$ , 100 to 999  $\text{mg}/\text{L}$ , or 1.00 to 9.99  $\text{g}/\text{L}$
  - Salinity (fixed ratio of 0.5): 0 to 99.9 ppm, 100 to 999 ppm, or 1.00 to 9.99 ppt
  - Temperature: 32 to 194 $^{\circ}\text{F}$  (0.0 to 90.0 $^{\circ}\text{C}$ )
- Includes conductivity cell, protective sensor cap, sample cup with cap, four SR44W button batteries, and 48 in (1.2 m) neckstrap
- Calibration standard sold separately

**2246**

**Waterproof EC Meter**

**2246SENSOR**

**Replacement Sensor**

**2251**

**Conductivity Standard, 1.41  $\text{mS}/\text{cm}$ , 250 mL**

## Economical



## Economy pH/EC Meter

Affordable way to monitor pH and EC levels in any liquid.

- Combination pH and electrical conductivity (EC) probe
- 150-hour battery life
- Automatic temperature compensation
- 0.68 TDS ratio calculation
- Accuracy:  $\pm 0.2$  pH and 2% EC scale
- Range: 0 - 6  $\text{mS}/\text{cm}$
- Includes handheld meter, probe, calibration solutions, and carrying case

**2182A**

**Economy pH/EC Meter**

**2183A**

**Replacement pH/EC Probe**

**2110**

**Refill Solutions - pH 4 and 7, 60 mL ea.**

**2251**

**Conductivity Standard, 1.41  $\text{mS}/\text{cm}$ , 250 mL**



# Green = Nitrogen

## Chlorophyll Meters

Research supports the correlation between SPAD measurements and the nitrogen in your leaf. Support and defend the health of your plants.

### SPAD 502 Plus Chlorophyll Meter (2900P)

Quantifies the health of your crops.

- Instantly measures chlorophyll content or “greenness” of your plants on a scale of -9.9 to 199
- Non-invasive, non-destructive measurement
- Trend graph stores and displays up to 30 measurements
- Water resistant design (IPX4)
- Compare in-field SPAD readings to university guidelines
- Research shows a strong correlation between SPAD measurements and leaf Nitrogen content
- Available with or without a built-in data logger
- Includes hard carrying case and batteries



### SPAD Data-Logging Model (2900PDL)

All the features of the 2900P, plus:

- Connects to any GPS receiver that has a serial output option\*
- Equipped with internal data logger and RS-232 port
- Records 4,096 measurements (1,488 with added GPS/DGPS option)
- Configure and download meter with FieldScout® software (included)\*\*

\* GPS interface requires two cables. The GPS/DGPS cable (item 2950CV5) is available from Spectrum. A PC serial interface cable supplied by the manufacturer of the GPS receiver is also required.  
 \*\* PC cable connects to a computer USB port. See our website for other cable connection options.



Non-invasive measurement with readings in less than 2 seconds

**2900PDL**      **Minolta SPAD 502DL Plus Chlorophyll Meter with RS-232 Data Port and Built-In Data Logger (includes software and USB PC cable)**

**2900P**      **Minolta SPAD 502 Plus Chlorophyll Meter Basic version, no Data Logger**

**2950CV5**      **GPS/DGPS Cable**  
**2900CASE**      **Replacement Hard Carrying Case**

#### SPECIFICATIONS FOR SPAD 502 PLUS

Optical Density Difference at two wavelengths: 650 nm and 940 nm

Measurement Area: 2 mm x 3 mm (Approximately 3/32 in x 1/8 in)

Light Source: 2 LEDs

Receptor: Silicon Photodiode

Power Source: 2 AA alkaline batteries (1.5V)

Repeatability: Within ±0.3 SPAD unit

SPAD Value: Index of relative chlorophyll content; -9.9 to 199



## FIELDSCOUT<sup>®</sup> CM 1000 Chlorophyll Meter

“Point-and-shoot” technology to instantly measure relative chlorophyll content.

- Detects stress earlier than visual monitoring
- Technology based on an exclusive patent license from NASA
- Laser guides outline the edges of the measured sample area
- Calculates and displays a running average for multiple readings
- Connects to any GPS receiver that has a serial output option\*
- Equipped with internal data logger and RS-232 port (Requires software to activate data logger)
- Records 3,250 measurements (1,350 with added GPS/DGPS option)
- Configure and download meter with FieldScout<sup>®</sup> software (not included)\*\*
- Includes hard carrying case and batteries

\* GPS interface requires two cables. The GPS/DGPS cable (item 2950CV5) is available from Spectrum. A PC serial interface cable supplied by the manufacturer of the GPS receiver is also required.

\*\* PC cable connects to a computer USB port. See our website for other cable connection options.

**2950** FieldScout CM 1000 Chlorophyll Meter  
**2950S** Software To Activate Data Logger  
 (includes PC cable)  
**2950CV5** GPS/DGPS Cable



2950



## FIELDSCOUT<sup>®</sup> CM 1000 NDVI Meter

“Point-and-shoot” technology to instantly measure red (660 nm) and near infrared (840 nm) spectral bands.

- Detects stress earlier than visual monitoring
- Computes Normalized Difference Vegetative Index (NDVI)
- Laser guides outline the edges of the measured sample area
- Calculates and displays a running average for multiple readings
- Connects to any GPS receiver that has a serial output option\*
- Equipped with internal data logger and RS-232 port
- Records 3,250 measurements (1,350 with added GPS/DGPS option)
- Configure and download meter with FieldScout<sup>®</sup> software (included)\*\*
- Includes hard carrying case and batteries

\* GPS interface requires two cables. The GPS/DGPS cable (item 2950CV5) is available from Spectrum. A PC serial interface cable supplied by the manufacturer of the GPS receiver is also required.

\*\* PC cable connects to a computer USB port. See our website for other cable connection options.

**2953** FieldScout CM 1000 NDVI Meter  
**2950CV5** GPS/DGPS Cable



2953



# FIELDSCOUT<sup>®</sup> TCM 500 NDVI Turf Color Meter

Helps diagnose plant health based on color.

- Measures reflected light from approximately a 3 inch (7.6 cm) diameter section of turfgrass
- Uses an internal light source to negate the effect of sunny versus cloudy conditions
- Measures reflectance in the red (660 nm) and near infrared (850 nm) spectral bands
- Displays result as NDVI, percent reflectance, or as a user-adjustable grass index from 1 to 9
- Connects to any GPS receiver that has a serial output option\*
- Equipped with internal data logger and RS-232 port
- Records 3,250 measurements (1,350 with added GPS/DGPS option)
- Configure and download meter with FieldScout<sup>®</sup> software (included)\*\*
- Includes hard carrying case, batteries, and TCM 500 T-Handle (item 2975H)



\* GPS interface requires two cables. The GPS/DGPS cable (item 2950CV5) is available from Spectrum. A PC serial interface cable supplied by the manufacturer of the GPS receiver is also required.

\*\* PC cable connects to a computer USB port. See our website for other cable connection options.

- 2975NDVI FieldScout TCM 500 NDVI Turf Color Meter  
Includes TCM 500 T-Handle
- 2975H FieldScout TCM 500 Replacement T-Handle
- 2950CV5 GPS/DGPS Cable



Displays Turf Color Index and NDVI on the LCD



## SPECIFICATIONS FOR TCM 500

Measurement Sample: Turf grass canopy

Measurement System: Reflectance of red (660 nm) and NIR (850 nm) light

Measurement Area: Approx. 3.0 in (7.6 cm)

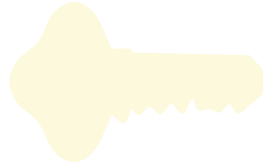
Measurement Units: Percent reflectance (0.0 to 99.9) of Red and NIR

NDVI (0.000 to 1.000)

Grass Index (1.00 to 9.00)

Power Source: 19 V alkaline battery (included); approx. 3,000 measurements

Repeatability: ± 5% of measurement



Headquarters located at:  
3600 Thayer Court  
Aurora, Illinois 60504 USA  
Phone: 1 (815) 436-4440

Distributed by:

info@specmeters.com  
www.specmeters.com  
Distributed worldwide.

