

**No Matter
What Crops
You Grow...**

**Frost &
Irrigation
Pup**

Soil Moisture, EC,
and Temperature
Soil Moisture
Temperature
and Humidity

**Or Where
You Grow Them...**

**Plant
Disease
Pup Station**

Rainfall
Temperature
and Humidity
Leaf Wetness

**We Can Help
You Measure!**

 **SpecConnect**
Your Crops... Your Data... Better Decisions

*SpecConnect, an advanced cloud-based
agronomic solution for remote crop environmental
monitoring using wireless sensor networks*

Spectrum[®] **Technologies, Inc.**

SERVING YOU SINCE 1987



Welcome!

It's our mission to enhance the work you do by bringing you products that solve your problems and simplify managing the crops you grow.

Since 1987, we have been committed to meeting your needs. That commitment encompasses many things. We listen to you and your needs by constantly developing innovative solutions. Add to that our comprehensive range of customer support services, and you'll find a unique partner willing to develop actionable and cost effective plant measurement solutions used around the world.

As an innovator, Spectrum has developed a broad line of professional, quality products in the area of crop environmental monitoring, nutrient management, soil moisture measurement/irrigation scheduling and pest management.

This could not have occurred without the input from our valued customers and the talents of a passionate team of employees. Thank you for your support and commitment to innovation!

Best Regards,


A handwritten signature in black ink that reads "Mike Thurow". The signature is fluid and cursive.


Mike Thurow
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Innovation You Can Count On

Spectrum Technologies aims to consistently deliver the latest in Agronomic technology. Our global sales & marketing, and product development teams are dedicated to building lasting relationships and helping customers be more satisfied, profitable and efficient in the field. Thank you for your business!



Award Winning Products

Since 1987, Spectrum Technologies has won over 21 AE50 Awards from the American Society of Agricultural and Biological Engineers, which demonstrates the deep commitment to innovation and quality.

2015	SpecConnect Web Portal WatchDog® Retriever & Pups Wireless Network
2013	FieldScout® GreenIndex+® SmartPhone App WatchDog Cellular Alert Stations
2012	WaterScout® SMEC 300 Soil Moisture/EC/ Temp Sensor
2011	WatchDog 1000 Series Micro Station LightScout® DLI 100 Light Meter
2008	WatchDog Sprayer Station SpecMaps™ Web Mapping Utility Software
2007	WatchDog 2000 Series Mini Weather Station
2005	SpecWare™ Software
2004	FieldScout Direct Soil EC Probe FieldScout TCM 500 Turf Color Meter WeatherTracker Greenhouse Growth Tracker
2003	WatchDog WeatherTracker FieldScout SC 900 Soil Compaction Meter
2002	WatchDog Weather Station FieldScout TDR 300 Soil Moisture Meter
2001	FieldScout CM 1000 Chlorophyll Meter
2000	WatchDog Data Logger
1999	StarLogger Data Logger Investigator Soil Compaction Meter WatchDog Leaf Wetness/Temperature Logger

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SpecConnect Integrated Wireless Solution

Your Crops. Your Data. Better Decision\$.

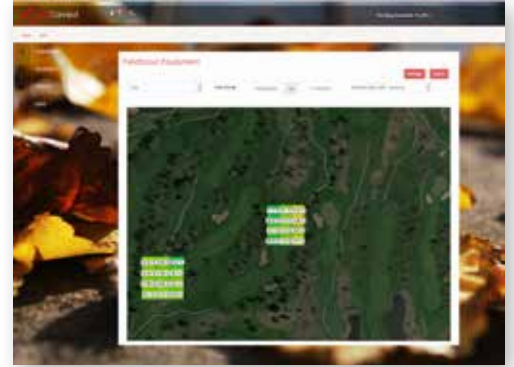
Monitor your fields from wherever you are with Spectrum's new WatchDog Retriever & Pups Wireless Network & SpecConnect Web Portal

How It Works:

- 1 WatchDog Pup (see pages 8-10)**
 - Capture real-time, site-specific data with custom stations
 - Each Sensor Pup can be configured with up to 4 different sensors
 - All data is sent wirelessly to the Retriever
 - Maintain data integrity through "self-healing" mesh network
- 2 WatchDog Retriever (see page 8)**
 - Receives all data from Pup network
 - One Retriever can support up to 16 Pups per network
- 3 DataScout™ Modem (see page 12)**
 - Connects to the Retriever and communicates data to the web
 - Choose from a variety of cellular and Wi-Fi models
 - Solar powered option, never worry about battery drain
- 4 SpecConnect Web Portal Cloud Solution (see pages 13-15)**
 - Real-time data on your computer, smart phone, or tablet
 - Simple to use and 100% customizable dashboard
 - Send custom threshold alerts via text message and/or email
 - Configure your network from your computer or mobile device



**SpecConnect
Web Portal**
(WatchDog weather data)



**SpecConnect
Web Portal**
(FieldScout soil
moisture data)



**DataScout Modem -
Cellular or Wi-Fi**



**FieldScout
Mobile App**



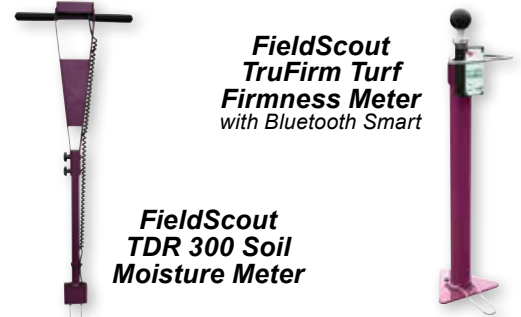
**WatchDog
Retriever**



**FieldScout
Bluetooth
Device**



**FieldScout
TruFirm Turf
Firmness Meter
with Bluetooth Smart**



**WatchDog
Weather
Stations**

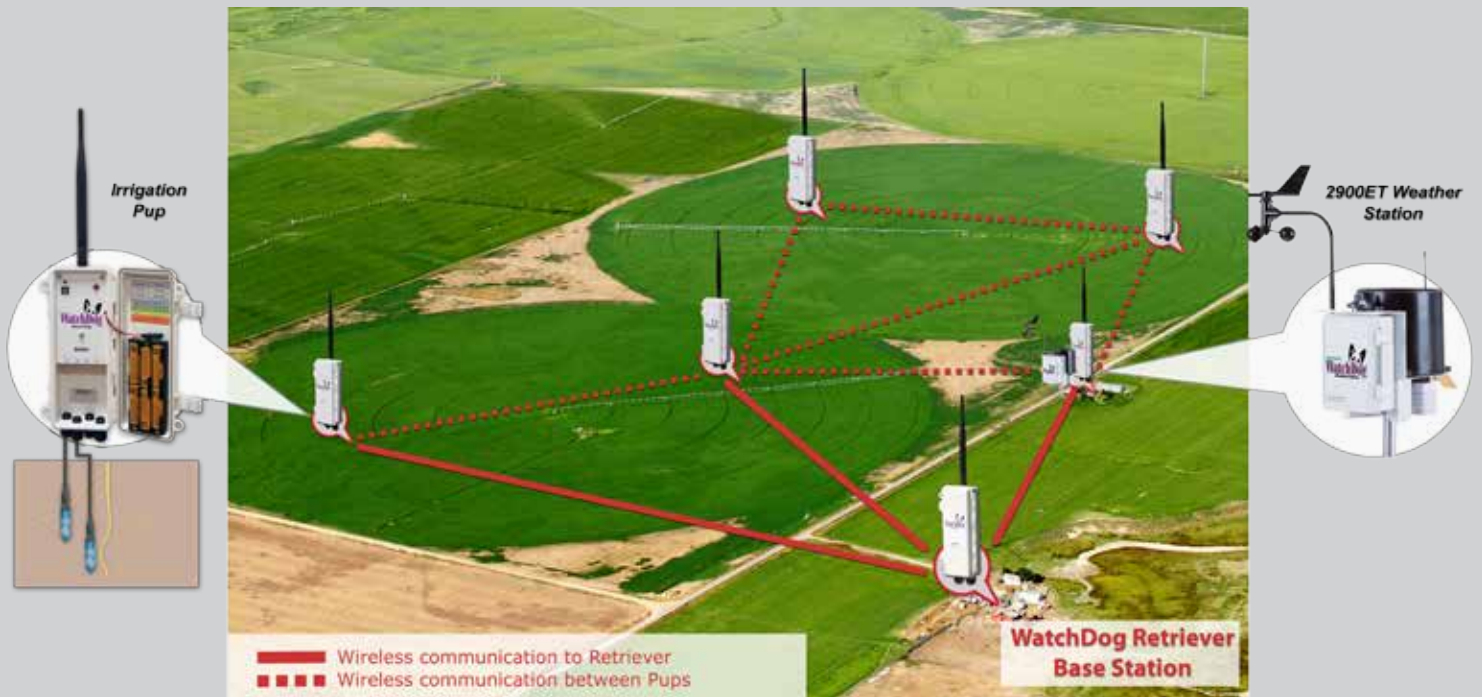


**WatchDog
Pup Network**



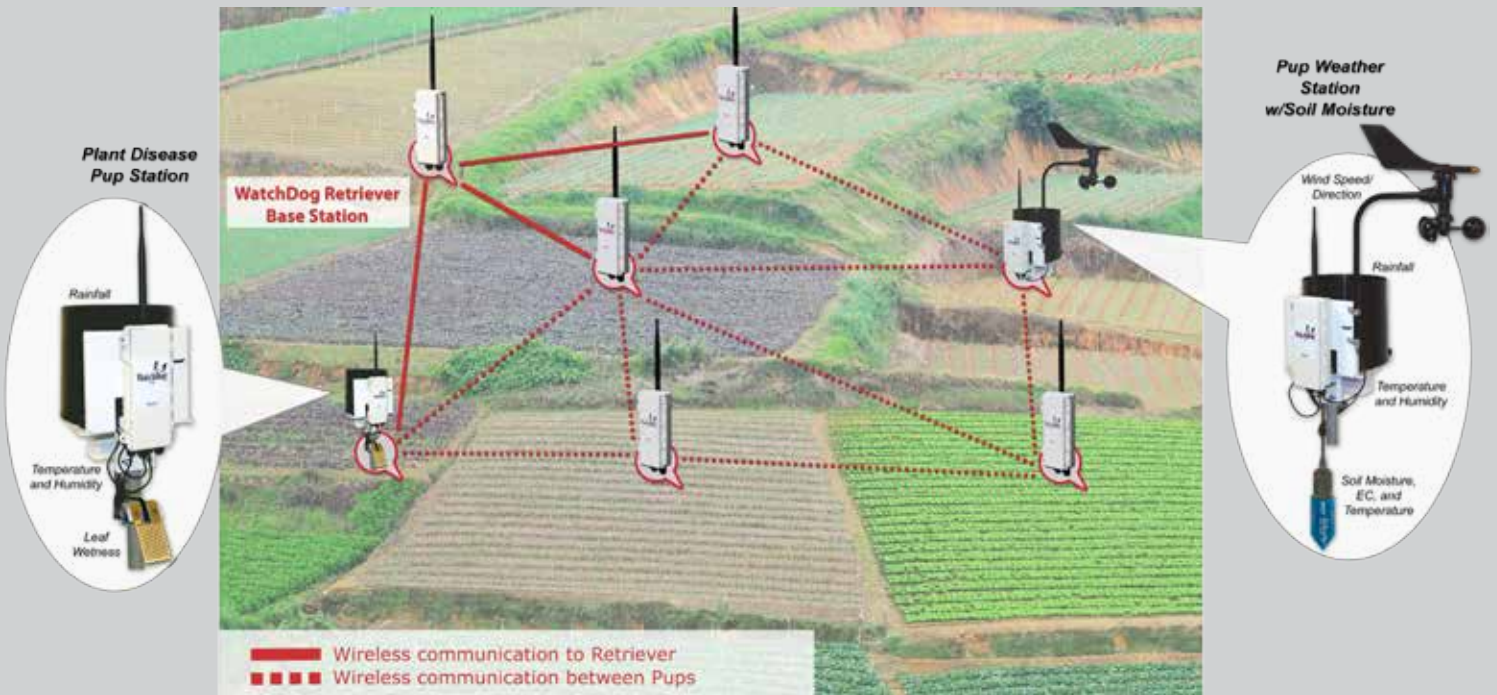
**FieldScout
TDR 300 Soil
Moisture Meter**

Examples of In-Field Applications



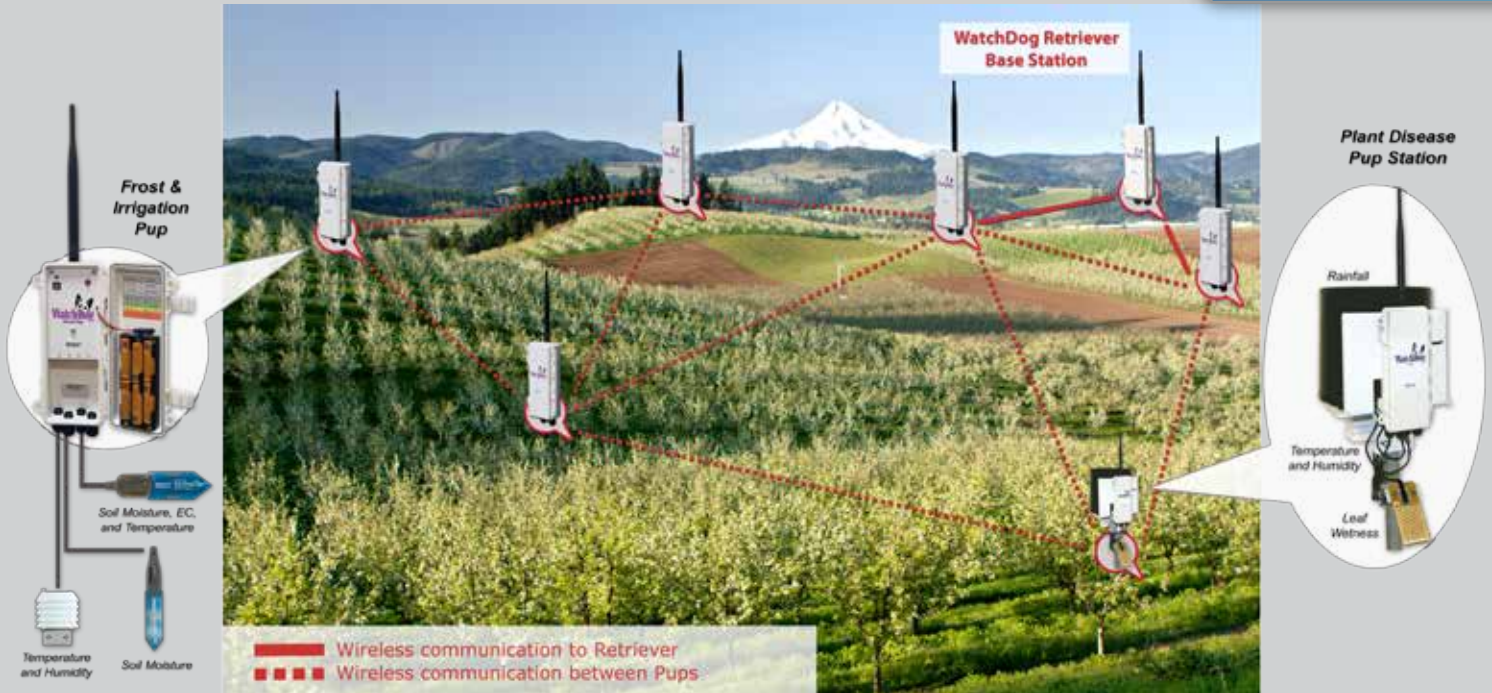
Irrigation Solutions

Flexibly monitor both soil moisture and EC in a variety of soil textures for better irrigation decisions. Connect WatchDog Weather Stations to the network using a Station Pup.



Research Plots/Farm and Greenhouse Studies

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



Vineyards & Orchards

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



Greenhouses & Nurseries

Measure DLI (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 more efficient irrigation practices.



WatchDog Pups

Multiple Pups with a variety of sensors to choose from give you unlimited measurement options within a single network.

- 3 varieties: Sensor Pup, Station Pup, and Repeater Pup
- Single button operation: check battery status, signal strength, and join sensor network
- Tri-colored LEDs indicate battery level, signal strength, and data communication status
- Includes six non-rechargeable AA batteries (up to 6 months typical life)
- Pups are available in 900 MHz and 2.4 GHz
- Communication range: (900 MHz) 2,500 ft (760 m), (2.4 GHz) 650 ft (200 m), line-of-sight installation recommended between Pups or Retriever
- Pups act as repeaters to get data to the Retriever

Sensor Pups

- Connect up to 4 external sensors via 2.5mm stereo-plug (see page 24-25 for sensor options)
- Can monitor high, low, current, and average values for each sensor during each logging period - up to 16 parameters

Station Pups

- Connect to a WatchDog 2000 Series (Full or Mini) Weather Station
- Adds your Weather Station sensor data to your Retriever network
- No external sensors

Repeater Pups

- Provide added range to WatchDog Retriever networks
- Serves as a “signal booster” around buildings or obstacles, or over high sections of your fields
- No external sensors can be connected



WatchDog Retriever & Pups

See page 11
for ordering information



WatchDog Retriever

Retriever logs sensor data from its network of Pups (up to 16 Pups per network).

- 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
- Transfer data or configure the system via flash drive, direct PC connection, or Datascout Modem (see page 12)
- Internal flash memory on the Retriever will hold approximately 6 months of data (for a 10-Pup network using 15 minute logging intervals)
- Spectrum-supplied USB flash drive will hold several years of data at the Retriever (for a 10-Pup network using 15 minute logging intervals)
- 3.5mm stereo port for computer connection USB cable (included)
- AUX port for wireless (DataScout Cellular or WiFi modem, see page 12) communication and power connection
- Includes six non-rechargeable AA batteries (up to 6 months typical life)
- DC port for optional AC/DC power adapter (Max 17VDC)
- Optional solar package includes rechargeable battery pack (2200 mAh, 7.2V NiMH), and 5W solar panel
- Retrievers are available in 900 MHz and 2.4 GHz
- Retriever & Pups Launch Utility software included on USB flash drive



100% Customizable



WatchDog Pre-Packaged Sensor Pups



- The most common Sensor Pups and sensors have been bundled together to simplify ordering
- Pup Stations are built on a unique mounting bracket to allow for simple installation
- Pup Stations (except ET Pup) have available sensor ports, allowing for additional/future expansion

WatchDog ET Pup Station

- Includes Pup and these sensors:
 - Rainfall
 - Temperature/RH
 - Solar Light
 - Wind Speed/Direction

• No available sensor ports

- Item 3900ET WatchDog ET Pup Station - 900 MHz
 Item 3905ET WatchDog ET Pup Station - 2.4 GHz
 Item 3396TPS Tripod Mount with Stakes



3900ET

WatchDog Pup Weather Station

- Includes Pup and these sensors:
 - Rainfall
 - Temperature/RH
 - Wind Speed/Direction

• One available sensor port

- Item 3900WS WatchDog Pup Weather Station - 900 MHz
 Item 3905WS WatchDog Pup Weather Station - 2.4 GHz
 Item 3396TPS Tripod Mount with Stakes



3900WS

WatchDog Plant Growth Pup Station

- Includes Pup and these sensors:
 - PAR Light
 - Temperature/RH with Aspirated Radiation Shield and solar charging system
- Two available sensor ports

- Item 3900PG WatchDog Plant Growth Pup Station - 900 MHz
 Item 3905PG WatchDog Plant Growth Pup Station - 2.4 GHz
 Item 3396TPS Tripod Mount with Stakes



3900PD

WatchDog Plant Disease Pup Station

- Includes Pup and these sensors:
 - Rainfall
 - Temperature/RH
 - Leaf Wetness

• One available sensor port

- Item 3900PD WatchDog Plant Disease Pup Station - 900 MHz
 Item 3905PD WatchDog Plant Disease Pup Station - 2.4 GHz
 Item 3396TPS Tripod Mount with Stakes



3900PG

WatchDog Irrigation Pups

See page 42 for our selection of Irrigation Stations

Step 1

Choose your Pups

Things to Consider...

How many Pups do you need?

Are you connecting to other WatchDog Weather Stations?

Do you have obstacles (buildings, trees, high or low spots, etc.) that might inhibit data transmission?

WatchDog Sensor Pup

- Up to 4 sensor inputs per Pup (see sensors below or on pages 24-25)
- Available as Pre-Packaged Sensor Pups, includes sensors (see left page)
- Transmits data to Retriever (directly or via other Pups)
- Includes standard non-rechargeable batteries

Item 3900 [WatchDog Sensor Pup - 900 MHz](#)
Item 3905 [WatchDog Sensor Pup - 2.4 GHz](#)

WatchDog Station Pup

- Connects to WatchDog 2000 Series Weather Stations and transmits all sensor data to the network, no sensor inputs (see pages 16-17 for station details)
- Includes standard non-rechargeable batteries

Item 3901 [WatchDog Station Pup - 900 MHz](#)
Item 3906 [WatchDog Station Pup - 2.4 GHz](#)

WatchDog Repeater Pup

- Serve as "signal booster" to help provide a path for the transmission signal around obstacles, no sensor inputs of its own
- Includes standard non-rechargeable batteries

Item 3902 [WatchDog Repeater Pup - 900 MHz](#)
Item 3907 [WatchDog Repeater Pup - 2.4 GHz](#)

Step 2

Choose sensors for your Pups

Things to Consider...

What parameters do you need to measure?

What influences your crop most?

Most Popular Sensors

- The following list is our most popular sensors, see pages 24-25 for complete list
- Up to 4 sensors per Sensor Pup
- For sensor specifications, see pages 24-25

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

Step 3

Choose your Retriever

Things to Consider...

Do you want battery powered or solar powered?

WatchDog Retriever

- Receives all data from Pup network, supports up to 16 Pups
- Includes USB Flash Drive and USB data cable

Item 3910 [WatchDog Retriever - 900 MHz](#)
Includes Standard Non-Rechargeable Batteries
Item 3910S [WatchDog Retriever - 900 MHz - Solar Powered](#)
Includes Solar Panel and Rechargeable Battery Pack
Item 3911 [WatchDog Retriever - 2.4 GHz](#)
Includes Standard Non-Rechargeable Batteries
Item 3911S [WatchDog Retriever - 2.4 GHz - Solar Powered](#)
Includes Solar Panel and Rechargeable Battery Pack

Step 4

Choose additional accessories

Optional Accessories

Item 3396TPS [Tripod Mount with Stakes](#)
Item 3664 [Sensor Extension Cable - 20 ft \(6.1 m\)](#)
Item 3925 [Antenna Extension Cable - 10 ft \(3 m\)](#)
Includes Mounting Bracket and Hardware
Item 3388USB [Replacement USB Flash Drive \(for Retriever\)](#)
Item 3927C75 [PC Direct Connection Cable - 75 ft \(for Retriever\)](#)
Connect your Retriever directly to your PC. Includes power and data cables, AC/DC power adapter, and DC plug adapter
Item 3926 [AC/DC Power Cord \(for Retriever\)](#)

Step 5

Choose your modem to send your data online
[See page 12 for details](#)

Step 6

View your data on our SpecConnect Web Portal
[See pages 13 - 15 for details](#)

SpecWare Software

- SpecWare Pro Software version 9.6 or later (see page 22) may be used to view Pup data on PC
- If using the SpecConnect Web Portal (see pages 13-15), then all data will be viewed online (SpecWare software not required)

Item 3654P9 [Spec 9 Pro Software](#)

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Step 5
Choose your modem to send your data online

Things to Consider...
 Do you need Wi-Fi or cellular?

Which cellular network do you need?

DATASCOUT® Modems

- Communicates 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
- DC port for optional AC/DC power adapter (Max 17VDC)
- Solar powered - includes rechargeable battery pack (2200 mAh, 7.2V NiMH), and 5W solar panel
- Includes SIM card, Cellular Data Plan required (see page 14)
- Four different network options
- Required for connection to SpecConnect (see pages 13-15), sold separately
- Provides power to attached Watchdog Stations and Retrievers

Compatibility Requirements:

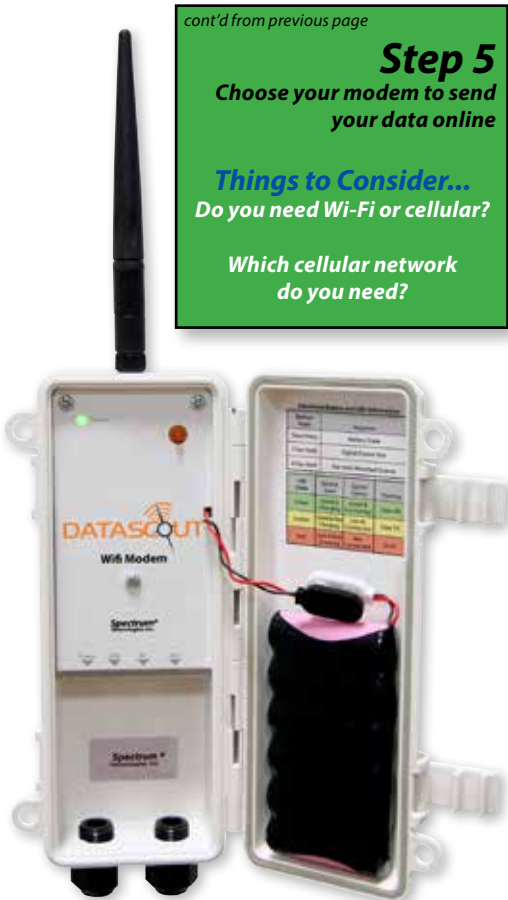
- WatchDog Retriever - Order Item 3910 WatchDog Retriever (with non rechargeable batteries). The DataScout Modem and the Retriever will share the power from the solar panel
- For use with WatchDog 2000 Series Weather Stations - The station must be running firmware version 7.6 or above. Call for details
- For use with WatchDog 2000 Series Mini Stations - The station must be running firmware version 4.1 or above. Call for details

Cellular Modems

- Item 3922** **Model 110 CDMA Cellular Modem - Solar Powered**
 CDMA Cellular (US customers)
 Includes Solar Panel and Rechargeable Battery Pack
- Item 3921** **Model 120 GSM/GPRS Cellular Modem - Solar Powered**
 GSM/GPRS Cellular (International customers)
 Includes Solar Panel and Rechargeable Battery Pack
- Item 3923** **Model 130 HSPA+ Cellular Modem - Solar Powered**
 HSPA+ Cellular (Canadian, US, and International customers)
 Includes Solar Panel and Rechargeable Battery Pack

Wi-Fi Modems

- Item 3920S** **Model 140 Wi-Fi Modem - Solar Powered**
 Includes Solar Panel and Rechargeable Battery Pack
- Item 3920** **Model 140 Wi-Fi Modem - AC/DC Powered**
 Includes AC/DC Power Cord



DataScout Model 140 Wi-Fi Modem with Solar Powered Battery Pack



DataScout Model 110 CDMA Modem



DataScout Model 110 Modem mounted with a WatchDog Retriever



DataScout Model 130 Modem mounted with a WatchDog 2000 Series Full Weather Station



www.SpecConnect.net

- Central point for viewing and evaluating real-time data instantaneously on the internet for better decisions to improve yield and quality, conserve resources, and increase profits
- Cloud-based data analysis tool to deliver useful information to end users
- View map-centric data on web/mobile devices
- View current conditions and monitor weather factors that increase risk
- Allows easy creation of reports and charts
- Customizable dashboard to provide end-users the data they need upon login
- Can support multiple users at the same time
- Alert capable - notify users via text and/or email when customized sensor thresholds have been reached
- Collects in-field data from FieldScout mobile devices via Bluetooth and the FieldScout mobile app (see page 38) for remote monitoring

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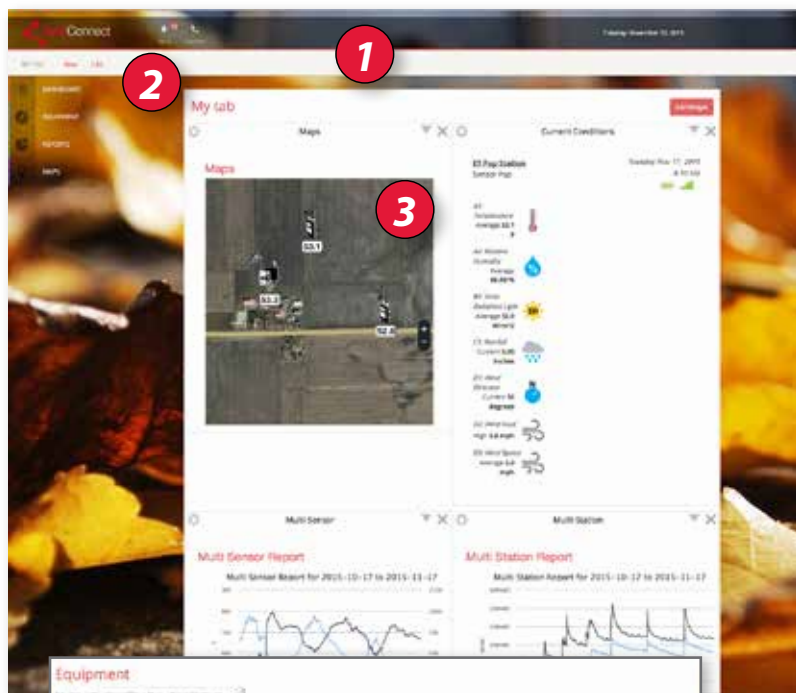
Step 6

View your data on our SpecConnect Web Portal

Things to Consider...

Pro or Basic subscription?

How many devices make up your network?



- 1 Dashboard**
 - Customizable layout tabs for multiple views
- 2 Alerts** (additional subscription required)
 - Create custom alerts, configure up to 4 phone numbers for text messages and 4 email addresses
 - View alert summary right on the Dashboard
- 3 Map View**
 - See all of your station locations, along with current conditions
 - Hover over a station to view expanded details
 - See if any stations are in "alert" state
- 4 Equipment View**
 - See real-time weather information, including current readings for all external sensors
 - View data columns or as a line graph
- 5 Data On The Go With Your Mobile Device**
 - View all your data and reports on your iOS and Android device
 - Configure stations, sensors, and alerts



SpecConnect Web Portal
See pages 14-15
for ordering information

cont'd from previous pages

Step 6

View your data on our SpecConnect Web Portal



- Web Portal connection requires a WatchDog Retriever & Pup network or a 2000 Series Full or Mini Weather Station to collect and log data, and DataScout Modem to send data to the internet
- For more information about SpecConnect and FieldScout Mobile App, see page 38

Pro WatchDog Subscriptions (includes one device)

- Item 3010** **SpecConnect Pro 1-yr Subscription - Cellular**
For WatchDog devices, includes cellular plan
- Item 3030** **SpecConnect Pro 1-yr Subscription - WiFi**

Basic WatchDog Subscriptions (includes one device)

- Item 3005** **SpecConnect Basic 1-yr Subscription - Cellular**
For WatchDog devices, includes cellular plan
- Item 3025** **SpecConnect Basic 1-yr Subscription - WiFi**

Initial Setup Fee

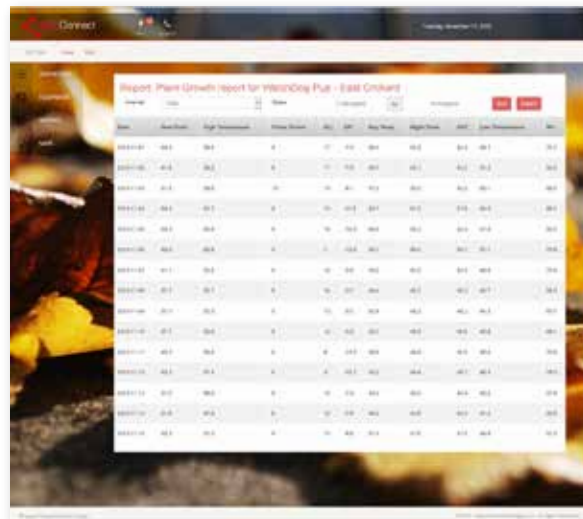
- Item 3000** **SpecConnect Set-up Fee**
Per device with modem - one time charge

Additional Devices and Services

- Item 3045** **Additional WatchDog Device - Cellular (1-yr)**
Needed per Pup or Station, includes cellular plan
- Item 3055** **Additional WatchDog Device - WiFi (1-yr)**
Needed per Pup or Station
- Item 3040** **Additional Login (1-yr)**
Up to three users per subscription
- Item 3070** **Alerts Function (1-yr)**
Needed per device
- Item 3065** **API Service**

Pro FieldScout Subscriptions (includes one device)

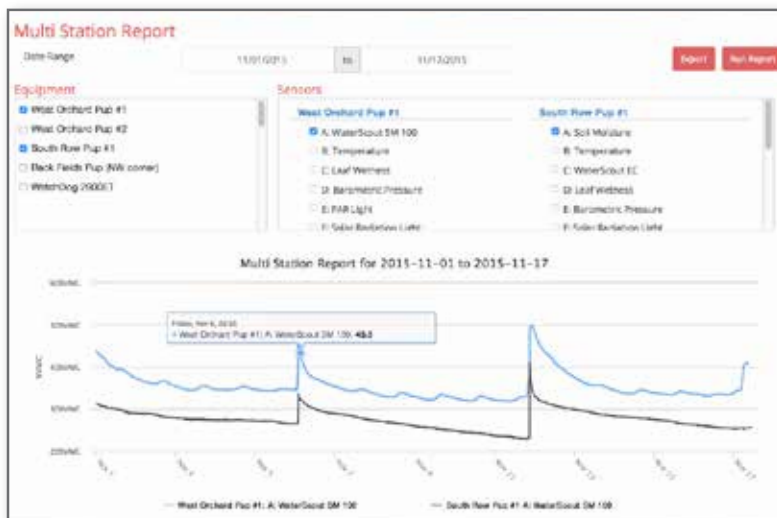
- Item 3035** **SpecConnect FieldScout Pro 1-yr Subscription**
- Item 3060** **Additional FieldScout Device (1-yr)**
Needed per device



Plant growth report



Easily configure each device on your network



Multiple Station (shown) and Multiple Sensor reporting

SpecConnect BASIC VS. PRO SUBSCRIPTIONS

	Basic	Pro
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		✓
Wind Chill Reports		✓
Dew Point Reports		✓
Other		
Alerts (additional fee)	✓	✓
API Service (additional fee)	✓	✓



SpecConnect *Disease and Insect Models*

Become more proactive in your management of diseases and insects by adding forecast modules 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

Evapotranspiration (ET) report - Pro feature



Wind Rose - Pro feature

Configuring the Apple Scab model

Apple Scab report

Forecast Model Packages

Item 3095APP SpecConnect Apple/Pear Alert Package

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

Item 3095CHP SpecConnect Cherry Alert Package

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

Item 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

Item 3095POP SpecConnect Potato Alert Package

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

Item 3095TOP SpecConnect Tomato Alert Package

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

Item 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



Weather Station Recertification
Now Available - see website

WatchDog® 2000 Series Weather Stations

- Base your crop management decisions on your weather, not the airport's
- Full-featured weather stations measure temperature, humidity, rainfall, wind, and solar radiation (varies by model). Also monitors degree day models and chill hour data.
 - Customize your station with plug-in sensors to meet your needs
 - Accurate, real-time weather information directly from your field, orchard or vineyard
 - Monitor, record, and analyze over a dozen important environmental inputs
 - Log your data in fail-safe, non-volatile memory
 - Choose measurement intervals from 1 to 60 minutes (holds 183 days of data with a 30 minute interval)
 - Multiple PCs can access the station without impacting data collection
 - Use the LCD display to check all current and daily high/low readings without a PC
 - Communicate via wireless, cellular, shuttle, or direct connect (see page 26), also compatible with the new WatchDog Station Pups, DataScout™ Modems (see pages 4-15)
 - Powered by four AA batteries - 10 months with alkaline (included), 12 months with lithium
 - **Requires SpecWare™ Pro software (see page 22) or DataScout Modem and SpecConnect (see pages 12-15)**

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

Item 3350WD2 WatchDog® 2900ET Weather Station

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

Item 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

Item 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

Item 3345WD2 WatchDog 2800 Weather Station

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	-25° to 212°F (-32° to 100°C)	±1°F (±0.5°C)
Relative Humidity	✓	✓	✓		10% to 100% @ 5° to 50°C	±3% at 20% to 100% and 25°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 ²	±5%
Evapotranspiration	✓					
External Sensor Ports	5	6	6	9		
Available ports for SMEC 300 Sensors	1	2	2	2		
Operating temperature range: -22 to 130°F (-30 to 55°C)						

Model 2900ET
Shown with optional Tripod Mount

Customize Your Station
See pages 24-25 for our WatchDog Sensors and Accessories

Tripod not included

Model 2550

Model 2800



WatchDog® 2000 Series Mini Stations

- Monitor microclimates with up to 4 external sensor channels
- Same power, flexibility, and accuracy as the 2000 Series Weather Stations
 - Measure temperature, humidity, quantum light, and more (varies by model). Also monitors degree day models and chill hour data.
 - Customize your Mini Station with 1 to 4 plug-in sensors to meet your needs
 - Accurate, real-time weather information directly from where you grow
 - Log your data in fail-safe, non-volatile memory
 - Choose measurement intervals from 1 to 60 minutes (holds 198 days of data with a 30 minute interval). Capacity is 89 days when using WaterScout SMEC 300 sensors
 - Reliable NEMA-4 type IP 66 enclosure and weatherproof connectors
 - Use the LCD display to check current and daily high/low readings without a PC
 - Run disease models on the station, providing field viewing of disease severity indicators
 - Use the optional alarms (page 26) to warn if a sensor exceeds high and low limits
 - Communicate via wireless, cellular, shuttle, or direct connect (see page 26), also compatible with the new WatchDog Station Pups, DataScout™ Modems (see pages 4-15)
 - 12-month battery power source (four AA alkaline batteries included)
 - **Requires SpecWare™ Pro software (see page 22) or DataScout Modem and SpecConnect (see pages 12-15)**



LCD display on all 2000 Series Mini Stations



Model 2475

Model 2475 Plant Growth Station

- Ideal for greenhouses - includes sensors for quantum (PAR) light, air temperature, 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 (upgrade required for pre-2013 stations)

Item 3686WD WatchDog® 2475 Weather Station

Model 2450 Temperature/RH Station

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

Item 3684WD WatchDog 2450 Weather Station

Model 2425 Temperature Station

- Measures air temperature with 3 available external sensor ports

Item 3683WD WatchDog 2425 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

Item 3685WD WatchDog 2400 Weather Station

Customize Your Station
See pages 24-25 for our WatchDog Sensors and Accessories



Model 2400

WATCHDOG 2000 SERIES MINI WEATHER STATION FEATURES

Sensors	2475	2450	2425	2400	Specifications	Accuracy
Air Temperature	✓	✓	✓	OPT	-25° to 212°F (-32° to 100°C)	±1°F (±0.5°C)
Relative Humidity	✓	✓			10% to 100% @ 5° to 50°C	±3% at 20% to 100% and 25°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 ⁻² ·s ⁻¹	±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)					



WatchDog 1000 Series Micro Stations



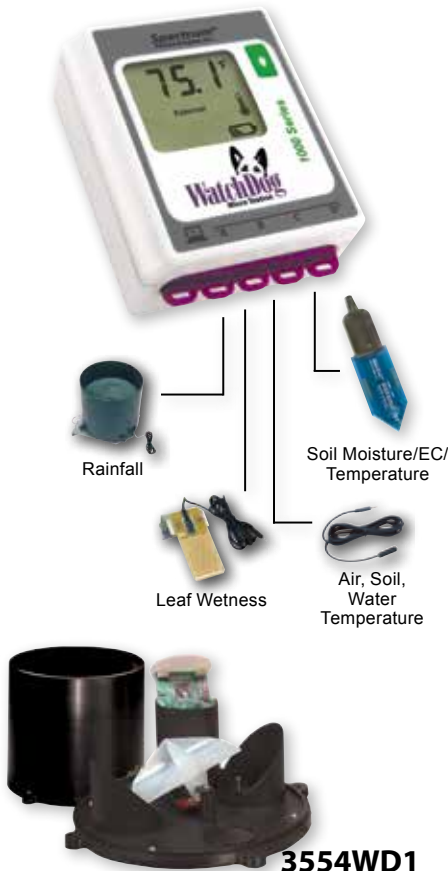
Micro Stations offer a cost-effective way to record multiple environmental conditions

- Internal sensors can include temperature and humidity (radiation shield recommended (see page 26))
- With up to 4 external sensor ports, you choose the sensors you need
- Up to 8 sensor values with the Model 1650 using the WaterScout® SMEC 300 Soil Moisture/EC/Temperature Sensor (page 41)
- LCD displays current 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)
- Data is stored in fail-safe non-volatile memory
- Water-resistant case (radiation shield or enclosure recommended for outdoor use)
- 12-month battery life (CR2450, included)
- Transfer data with a direct-connect cable or Data Shuttle (page 26)
- **Requires SpecWare™ 9 Basic or Pro software (page 22)**

Operating temperature range: -4 to 130°F (-20 to 55°C)
 Temperature range: -40 to 185°F (-40 to 85°C)
 Accuracy: ±1°F (±0.5°C) at -4 to 122°F (-20 to 50°C), else ±2.2°F (±1.2°C)
 RH range: 0 - 100%, Accuracy: ±3% at 77°F (25°C, 10 - 90%), else ±5%

Customize Your Station
 See pages 24-25 for our
 WatchDog Sensors and Accessories

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



WatchDog 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 (page 22)**

Item 3554WD1 Data-Logging Rain Gauge

WatchDog A-Series Data Loggers

- The most affordable way to track environmental conditions for analysis
- Measure temperature, humidity, leaf wetness and CO₂
 - LCD display confirms logger operation and displays last sensor readings
 - Select measurement intervals from 1 to 120 minutes
 - 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 A/C; international adapter included)
 - **SpecWare™ 9 Basic or Pro (page 22) and the A-Series PC Connection Cable are required (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%
 CO₂ range: 0 to 9999 ppm, Accuracy: ±50 ppm ±5% of reading (0 to 2000 ppm), else unspecified

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

Item 3661A WatchDog A-Series PC Connection Cable - USB
 Item 3663A Radiation Shield (needed for outdoor use)



3612A



3611A



3617A



WatchDog B-Series Button 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
 - **SpecWare Basic or Pro software (page 22) and the B-Series Docking Station are required (see below)**

DESCRIPTION	INTERNAL SENSOR	INTERVALS	LCD DISPLAY
MODEL B102 T/RH Item 3621WD	TEMPERATURE RELATIVE HUMIDITY	4000	NO
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%			
MODEL B101 8K Item 3620WD	TEMPERATURE	8000	NO
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)			
MODEL B100 2K Item 3619WD	TEMPERATURE	2000	NO
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) Use included plastic bag when measuring soil temperature			

Docking Stations

Item 3655K1 WatchDog B-Series Docking Station - USB*
 Item 3655K WatchDog B-Series Docking Station - Serial

*Requires SpecWare 9 (v9.1 or later)



B102



B101



B100

Ideal for soil temperature





WatchDog Plant Disease Stations

Choose from two types of plant disease stations to monitor current and historical plant disease severity indicators

WatchDog 2000 Series Plant Disease Station

- Wireless communication allows you to receive real-time conditions and send condition alarms to your PC (page 26)
- Includes WatchDog Mini Station Model 2450, leaf wetness sensor and rainfall sensor
- See page 17 for full description of Mini Station
- View current conditions on LCD screen, as well as track severity indicators from onboard plant disease models
- **Requires SpecWare™ Pro software (see page 22) or DataScout Modem and SpecConnect (see pages 12-15)**
- University published disease models (sold separately) can be added for more accurate disease and pest monitoring (page 23)

Item 3684WDPD WatchDog 2000 Series Plant Disease Station

WatchDog Plant Disease Micro Station

- Data log current conditions and historical plant disease severity indicators
- Includes Watchdog Model 1450 Micro Station, leaf wetness sensor, tipping bucket rain gauge, and radiation shield
 - **Requires SpecWare Pro software (page 22)**
 - University published disease models (sold separately, SpecWare 9 Pro required) can be added for more accurate disease and insect monitoring (page 23)

Item 3684PD1 WatchDog Plant Disease Micro Station



WatchDog Plant Growth Micro Station

Monitor conditions crucial to growing high quality plants

- Includes a WatchDog Model 1450 Micro Station, Quantum/PAR light sensor and radiation shield
- **Requires SpecWare 9 Basic or Pro software (page 22)**

Item 3684PAR1 WatchDog Plant Growth Micro Station



WatchDog Soil/Air Temperature Station

Study soil and air temperature trends across multiple microclimates

- Includes Model A125 Data Logger, external temperature sensor and radiation shield
- **SpecWare 9 Basic or Pro (page 22) and the A-Series PC Connection Cable (page 19) are required**

Item 3617ARS Soil/Air Temperature Station



WatchDog Irrigation Stations
See page 42 for our selection of Irrigation Stations →





WatchDog® Sprayer Station

Reduce pesticide drift complaints and monitor your current conditions

Pesticide drift is increasingly important to commercial applicators. Now you can monitor wind speed and direction and data log weather conditions with the ultrasonic WatchDog® Sprayer Station. Accurate data helps pesticide applicators make important decisions regarding weather conditions that affect safety, drift, and proper pesticide application. User controlled data logging of weather conditions provides evidence of suitable conditions for pesticide application.

- This all-in-one weather station measures air temperature, humidity, dew point, wind chill, barometric pressure and apparent wind speed and direction
- 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
- Field replaceable humidity sensor
- Handles adverse conditions with a UV-stabilized, compact housing that is fully waterproof and resistant to chemicals
- Reliability is enhanced by eliminating moving parts: the traditional wind vane and cups have been replaced with ultrasonic transducers
- Continuously log your weather parameters at a user-selectable rate or hit the snapshot button to capture current conditions

Item 3349SSCH WatchDog® Sprayer Station with Console

Save by purchasing the Station and Console together

Item 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

Item 3349CN WatchDog Sprayer Station Console

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

Item 3349H Replacement Humidity Sensor

Item 3661USB USB-to-9-Pin-Serial Adapter

2.75 in (7 cm)

12.75 in (33 cm)



WatchDog Sprayer Station



Also integrates with Raven Envizio Pro, Viper Pro, and Viper 4

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: -40° to 131°F (-40° to 55°C)
Temperature Accuracy: ±1.8°F (±1°C) with wind above 4.6 mph (7.4 km/h)
Relative Humidity Range: 10 to 95%
Relative Humidity Accuracy: ±4% 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: <70 mA



WatchDog Sprayer Station Console

Spec 9 Pro Software



- 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 13 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 CD, USB cable, and manual (see page 26 for more cable options)

- Item 3654P9 Spec 9 Pro Software
- Item 3654P9X Spec 9 Pro Extra User License
- Item 3654P9U Spec 9 Pro Upgrade*
- Item 3654P9U8 Spec 9 Pro Upgrade from Spec 8 Pro*
- Item 3661U USB-to-3.5mm-Stereo-Plug Adapter

* Does not include USB cable

Software Updates
Stay up to date to ensure compatibility with the latest WatchDog models - download free updates at specmeters.com/updates

COMPARING SPEC 9 BASIC TO SPEC 9 PRO

	Basic	Pro
View Data		
On-demand graphing	✓	✓
Manage Data		
Calibration adjustment	✓	✓
Automatic data append	✓	✓
Single file per logger	✓	✓
International data format	✓	✓
Reports		
Standard reports	✓	✓
Custom reports		✓
Disease & Insect models		OPT
"Pest Alert" report models		OPT
Communications		
Direct connect or modem	✓	✓
Wireless capability		✓
Dial up modem		✓
Auto download		✓
Supported Products		
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.

Spec 9 Basic Software

- 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
- Spec 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 CD, USB cable, and manual (see page 26 for more cable options)

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

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

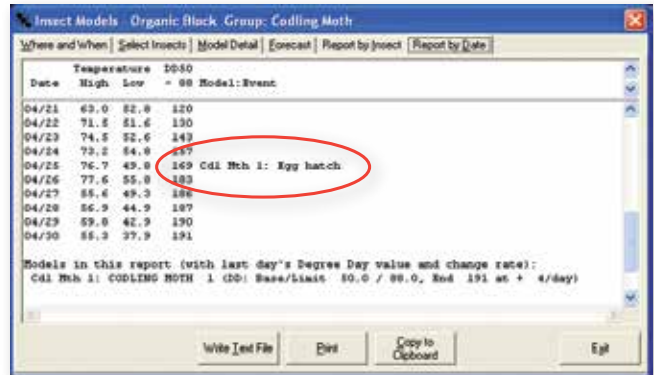
* Does not include USB cable

Spec 9 Pro Models

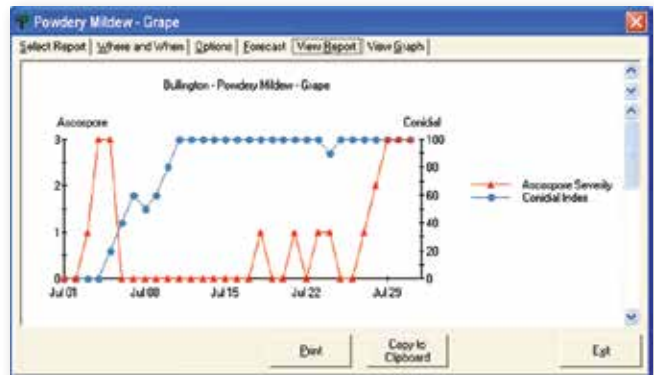
Disease and Insect Models

Become more proactive in your management of disease and insects by adding forecast modules to your Spec 9 Pro software

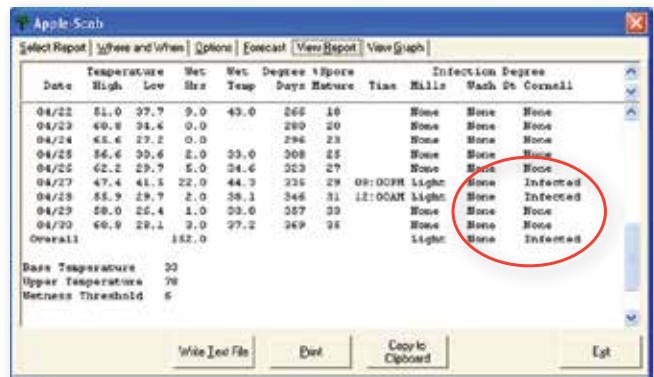
- Each package uses field-tested and validated algorithms along with your data to forecast the potential for the appearance of your crop's most notorious enemies
- Save money by spraying only when necessary
- Quickly produce the documentation needed to support your IPM decisions



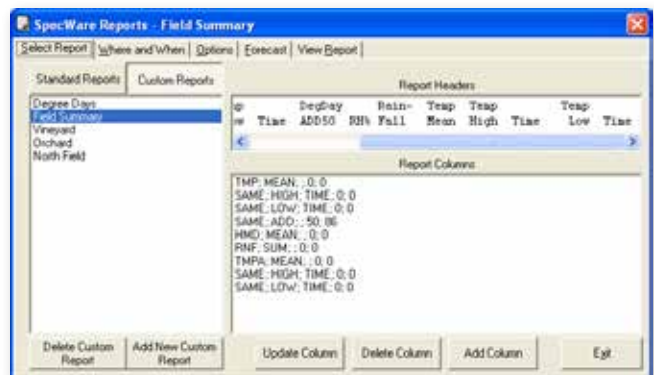
Codling Moth Insect Model



Powdery Mildew Report for Grapes



Apple Scab Report



Custom Reports

Forecast Model Packages

Item 3656AP Apple/Pear Alert Package

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

Item 3656CH Cherry Alert Package

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

Item 3656GA 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

Item 3656PO Potato Alert Package

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

Item 3656TO Tomato Alert Package

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

Item 3656TU 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

*Can be displayed on WatchDog® 2000 Series Mini Stations

Soil Sensors



6470-6



6460



6450WD



3667



3669



6451

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: $\pm 2\%$. May require WaterScout Calibration Device. See page 41 for more information. *Compatible with WatchDog 2000 Series Stations (Full and Mini), 1000 Series Micro Stations, and Pups*

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

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: $\pm 3\%$. Optional WaterScout Calibration Device. See page 40 for more information. *Compatible with WatchDog 2000 Series Stations (Full and Mini), 1000 Series Micro Stations, and Pups*

- Item 6460 WaterScout SM 100 Sensor with 6 ft (1.8 m) Cable
- Item 6460-20 WaterScout SM 100 Sensor with 20 ft (6.1 m) Cable
- Item 6470CAL3V WaterScout Calibration Device

Watermark Soil Moisture Sensor

Measures soil moisture tension from 0 to 200 centibars. May require Watermark Adapter to connect original Watermarks to stations. See page 43 for more information. *Compatible with WatchDog 2000 Series Stations (Full and Mini), 1000 Series Micro Stations, and Pups*

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

External (Soil) Temperature Sensor

Measure soil, air, or water temperature with a resistance-based sensor. Range: -25 to 212°F (-32 to 100°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*

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

Pressure Transducer

Adapts to Irrrometer tensiometers and utilizes the dial gauge for measurements. See page 43 for more information. Accuracy: $\pm 2\%$. *Compatible with WatchDog 2000 Series Stations (Full and Mini), 1000 Series Micro Stations, and Pups*

- Item 3669 Pressure Transducer

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*

- Item 6451 Irrigation On/Off Sensor

Light Sensors



3676I



3668I6

LightScout® Silicon Pyranometer

Measure solar radiation between 300 and 1100 nanometers. Range: 2000 Series & Pups: 0 to 1500 W/m², Accuracy: $\pm 5\%$; Micro Stations: 0 to 1250 W/m², Accuracy: $\pm 5\%$. *Compatible with WatchDog 2000 Series Stations (Full and Mini), 1000 Series Micro Stations, and Pups*

- Item 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*

- Item 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 long and include mounting brackets. Range: 2000 Series & Pups: 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*

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

Environmental Sensors

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*

Item 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 2000 Series Stations (Full and Mini) and 1000 Series Micro Stations*

Item 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*

Item 3666 Leaf Wetness Sensor

Barometric Pressure Sensor

Measure atmospheric pressure. Range: Standard Sensor: 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

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

CO₂ Sensor

Measure CO₂ 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*

Item 2655 CO₂ Sensor
Item 2655X CO₂ Sensor - International Use



Miscellaneous Cables

Sensor Extension Cable

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

Item 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*

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



Digital Sensors - for Pups only

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*

Item 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*

Item 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*

Item 3665RD Digital Rain Collector
Item 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*

Item 3305ADD Digital Anemometer



Accessories

3396TPS



3658A



3663A



3672



3659WD1



Tripod Mount

Rugged galvanized steel folding tripod and 3 ft (1 m) pole.

Item 3396TPS [Tripod Mount with Ground Stakes](#)

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*

Item 3663A [Radiation Shield](#)

Sliding Enclosure

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

Item 3658A [Sliding Enclosure](#)

Waterproof Enclosure

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

Item 3659WD1 [Waterproof Enclosure](#)

Alarm Output Module

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

Item 3672 [Alarm Output Module](#)

Communication Options



3388SI

Satellite Communications

Sends your weather data to the web – anywhere there's sky. Ideal for extremely remote locations with limited or no cellular signal. Includes satellite modem and solar panel with mounting brackets. Fully-charged power supply can operate 28 days without recharge. Option to power weather station with modem solar panel power supply. Iridium or Orbcomm data subscription required

Item 3388SI [WatchDog Comm Satellite](#)

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; 2.4 GHz also available - call for details

Item 3393B [Mid Range Wireless Base Station](#)
Item 3393W [Mid Range Wireless for Remote Station](#)

Optional Yagi antennas increase line of sight range to 7 mi (11 km); see website for details



3679WD1

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 41). Requires SpecWare 8 Basic or Pro or greater (page 22).

Item 3679WD1 [WatchDog 1000/2000 Data Shuttle](#)

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.

Item 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 3661USB).

Item 3660-75SP [75 ft \(22.8 m\) Direct Connect Cable](#)

Includes surge protectors for both ends of the cable connection

Item 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

Item 3661U [USB-to-3.5mm-Stereo-Plug Adapter](#)

9-Pin-Serial-to-3.5mm-Stereo-Plug Adapter

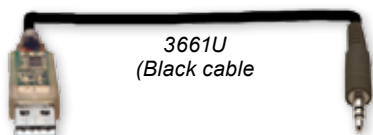
Connect WatchDog and FieldScout devices directly to your computer's 9-pin Serial Port

Item 3661 [9-Pin-Serial-to-3.5mm-Stereo-Plug Adapter](#)

USB-to-9-Pin-Serial Adapter

Connect 9-pin Serial cables (such as Item 3661) directly to your computer's USB port

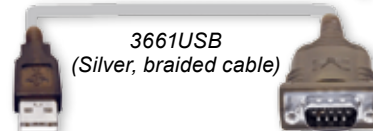
Item 3661USB [USB-to-9-Pin-Serial Adapter](#)



3661U
(Black cable)



3661
(Grey cable)



3661USB
(Silver, braided cable)



REFERENCE:

✓ STANDARD
 Opt OPTIONAL
 BLANK NOT AVAILABLE

Item #	Model	SpecConnect Compatible	LCD Display	Wireless	Evapotranspiration	Alarm Output-Ready 3672	Air Temperature Sensor	Relative Humidity Sensor	Dew Point	Wind Speed & Direction	Tipping Bucket Rain Collector	Solar Radiation Sensor 36701	OPTIONAL SENSORS & ACCESSORIES						Digital Sensor Compatible	Radiation Shield (P=Passive or A=Aspirated)	
													Available Sensor Ports	Quantum Light Sensor 36681	Ext. (Soil) Temperature Sensor 3667	Leaf Wetness Sensor 3666	WaterScout Soil Moisture Sensor 6460	WaterScout Soil Moisture/EC/ Temperature Sensor 6470-6			
2000 Series Weather Stations																					
3350WD2	2900ET	✓	✓	Opt	✓	✓	✓	✓	✓	✓	✓	✓	5	Opt	Opt	Opt	Opt	Opt	Opt	P	
3345WD2	2800	✓	✓	Opt	✓	✓	✓	✓	✓	✓	Opt	Opt	9	Opt	Opt	Opt	Opt	Opt	Opt		
3340WD2	2700	✓	✓	Opt	✓	✓	✓	✓	✓	✓	✓	Opt	6	Opt	Opt	Opt	Opt	Opt	Opt	P	
3320WD2	2550	✓	✓	Opt	✓	✓	✓	✓	✓	✓	✓	Opt	6	Opt	Opt	Opt	Opt	Opt	Opt	P	
2000 Series Mini Station																					
3684WDPD	Plant Disease Station	✓	✓	Opt	✓	✓	✓	✓	✓	✓	✓	0				✓				P	
3686WD	2475	✓	✓	Opt	✓	✓	✓	✓	✓	✓	Opt	Opt	1	✓	Opt	Opt	Opt	Opt	Opt	P	
3684WD	2450	✓	✓	Opt	✓	✓	✓	✓	✓	✓	Opt	Opt	2	Opt	Opt	Opt	Opt	Opt	Opt	P	
3683WD	2425	✓	✓	Opt	✓	✓	✓	✓	✓	✓	Opt	Opt	3	Opt	Opt	Opt	Opt	Opt	Opt	P	
3685WD	2400	✓	✓	Opt	✓	✓	✓	✓	✓	✓	Opt	Opt	4	Opt	Opt	Opt	Opt	Opt	Opt		
Retriever & Pups Wireless Sensor Network																					
3900	Sensor Pup	✓		✓			Opt	Opt		Opt	Opt	Opt	4	Opt	Opt	Opt	Opt	Opt	Opt	✓	P
3901	Station Pup	✓		✓									0								
3902	Repeater Pup	✓		✓									0								
3900PG	Pup Plant Growth Station	✓		✓			✓	✓		Opt	Opt	Opt	2	✓	Opt	Opt	Opt	Opt	Opt	✓	A
3900PD	Pup Plant Disease Station	✓		✓			✓	✓		Opt	✓	Opt	3	Opt	Opt	✓	Opt	Opt	Opt	✓	P
3900ET	Pup ET Station	✓		✓			✓	✓		✓	✓	✓	0							✓	P
3900WS	Pup Weather Station	✓		✓			✓	✓		✓	✓	Opt	1	Opt	Opt	Opt	Opt	Opt	Opt	✓	P
1000 Series Micro Stations																					
3685SM14	Irrigation Station		✓										0					✓ (4)			
3685SM13	Irrigation Station		✓								Opt	Opt	1	Opt	Opt	Opt	✓ (3)	Opt			
3684PD1	Plant Disease Station		✓				✓	✓			✓		0			✓					P
3684PAR1	Plant Growth Station		✓				✓	✓					1	✓	Opt	Opt	Opt	Opt	Opt		P
3688WD1	1650		✓				✓	✓			Opt	Opt	4	Opt	Opt	Opt	Opt	Opt	Opt		
3687WD1	1525		✓				✓	✓			Opt	Opt	4	Opt	Opt	Opt	Opt	Opt	Opt		
3684WD1	1450		✓				✓	✓			Opt	Opt	2	Opt	Opt	Opt	Opt	Opt	Opt		
3683WD1	1425		✓				✓	✓			Opt	Opt	3	Opt	Opt	Opt	Opt	Opt	Opt		
3685WD1	1400		✓				✓	✓			Opt	Opt	4	Opt	Opt	Opt	Opt	Opt	Opt		
3682WD1	1250		✓				✓	✓					0								
3681WD1	1225		✓				✓	✓			Opt	Opt	1	Opt	Opt	Opt	Opt	Opt			
3680WD1	1200		✓				✓	✓			Opt	Opt	2	Opt	Opt	Opt	Opt	Opt	Opt		
A-Series Loggers																					
3611A	A160 Temp/RH/CO ₂		✓				✓	✓					0								+CO ₂
3612A	A150 Temp/RH		✓				✓	✓					0								
3610A	A130 Leaf Wetness/Temp		✓				✓	✓					0			✓					
3617ARS	A125 Soil/Air Temp Station		✓				✓	✓					0		✓						P
3617A	A125 Soil/Air Temp		✓				✓	✓					0		✓						P
3618A	A110 Temperature		✓				✓	✓					0								
Sprayer Station																					
3349SSCH			✓				✓	✓	✓	✓			0								



Monitor weather without the need of a computer

- Record and display conditions in your orchard, vineyard or greenhouse that can alert you to insect and plant disease pressure
- Values are calculated based on sensor readings taken every 15 minutes

Degree days:

- Program up to three degree-day memories and one chill-hour memory
- Solar radiation shield and 15-minute degree-day data point intervals result in exceptionally accurate degree-day calculations

Built-in Data Logger:

- Store your events in fail-safe, non-volatile memory
- Replace the batteries without losing valuable weather data
- More than enough memory for a complete growing season

LCD display:

- Displays the current conditions in addition to the daily high/low temperature readings, degree days, leaf wetness hours*, disease pressure*, DLI/DIF (Daily Light Integral and day/night temperature difference)
- Recall the last 30 days of detail data, as well as 12 months of summaries
- Current readings are updated every 15 seconds

* on applicable models

Battery powered:

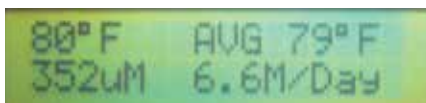
- 8-month battery power source (9V battery included) means no solar panels to purchase or maintain



3501PAR

SPECIFICATIONS FOR WEATHERTRACKERS

Item #	Model #	Air Temp	Quantum Light	Leaf Wetness	Disease Forecast
Greenhouse Growth Tracker 3501PAR	305	Yes	Yes	No	No
Degree Day Tracker 3500	300	Yes	No	No	No
Apple/Pear Pest Alert 3504	320	Yes	No	Yes	Apple Scab Sooty Blotch
Grape Pest Alert 3512	330	Yes	No	Yes	Powdery Mildew Black Rot

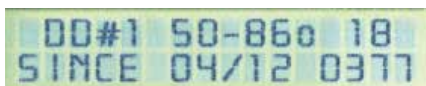


Greenhouse Growth Tracker

Monitor both current and cumulative light levels



Apple/Pear Pest Alert



All Models

Shows current degree days



Grape Pest Alert

Built-in disease models, allow you to make adjustments as soon as it's needed



3512

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, includes software
- Video software upgrade provides the ability to capture live videos and time lapse sequences of insect movement

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

Go to www.specmeters.com for more models and accessories

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



Image taken by IPM Scope



Image taken by IPM Scope - Mega Pixel

SPECIFICATIONS FOR IPM SCOPE

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

IPM Scope CAM2

View images in the field with a portable camera/scope. The 2 megapixel IPM Scope CAM2 allows you to capture high resolution pictures and videos in the field.

- View pictures instantly on the built-in LCD display and then transfer them via USB cable to a PC, includes software
- LED lighted unit features 10x and 40x optical zoom and up to 200x digital zoom
- Battery life of up to 5 hours
- Includes an adjustable-height stand
- 2.8 inch LCD display
- 2GB internal flash memory
- Easy to use touch screen controls
- 4 built in white-light LEDs with brightness control
- Rechargeable lithium ion battery included

- Item 2862 IPM Scope CAM2

SPECIFICATIONS FOR IPM SCOPE CAM2

Image Sensor: 2M Pixel
Power: Rechargeable lithium
Magnification: Optical zoom: 10x or 40x , Digital zoom: up to 200x
Light Source: 4 white LED



photo courtesy of Derek Settle

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

- Item 2851 Macroscope 25 with hard carrying case
- Item 2852 Macroscope 45 with hard carrying case



3412

LIGHTSCOUT® 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, see details on page 41)

Item 3412 LightScout® Red/Far-Red Meter



3414F

LIGHTSCOUT® 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)

Item 3414F LightScout UV Meter
 Item 7500 Soft-Sided Carrying Case
 Sold separately (page 41)



3415FXSE

LIGHTSCOUT® 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

Item 3415F LightScout Quantum Meter
 Item 3415FSE LightScout Dual Solar/Electric Quantum Meter
 Item 3415FXSE LightScout Dual Solar/Electric Quantum Meter - External Sensor
 Item 3415FQF LightScout Quantum and Foot-Candle Meter
 Item 7500 Soft-Sided Carrying Case
 Sold separately (page 41)

LIGHTSCOUT® Foot-Candle Meter

Displays immediate light level in units of foot-candles

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

Item 3413F LightScout Foot-Candle Meter
 Item 7500 Soft-Sided Carrying Case
 Sold separately (page 41)

Visit
www.specmeters.com
 and view our
 "Measuring Light"
 Brochure



LIGHTSCOUT® 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® Weather, Mini, and Micro Stations
- LightScout® External Light Sensor Reader includes soft-sided case (also available separately as Item 7500, see details on page 41)

Item 3415FX **LightScout External Light Sensor Reader**

Compatible light sensors sold separately:

Item 3668I **LightScout Quantum Light Sensor (PAR Light)**

Item 3668I3 **LightScout Quantum Light 3 Sensor Bar**

Item 3668I6 **LightScout Quantum Light 6 Sensor Bar**

Item 3670I **LightScout Silicon Pyranometer Sensor (Solar Radiation)**

Item 3676I **LightScout UV Sensor**



3415FX



3670I



3668I6

WatchDog® 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
- Monitor and record temperature, humidity and light conditions, plus 1 additional sensor port
- Easily check current conditions and up to 12 months of historical data on the LCD display
- Calculate DLI and compare to research guidelines (from your extension office or at www.specmeters.com/articles)
- **Requires SpecWare™ software (page 22)**

Item 3686WD **WatchDog Model 2475 Plant Growth Station**



SpecWare plant growth report



Displays Daily Light Integral (DLI) and Day/Night Temperature Difference on the LCD



WatchDog® WeatherTracker Model 305 Greenhouse Growth Tracker

Keep tabs on the conditions affecting your plants on the LCD display

- Temperature sensor tracks degree-days without a computer
- Quantum light sensor measures your plants' light exposure over time (in moles/day) - displays current and cumulative (DLI)
- Computes and displays DIF – average day/night temperature difference
- Comprehensive tool to assess physiological maturity of your plants
- Stand-alone device – all information is shown on the LCD display
- One-button review of 30 days of values and 12 months of summaries
- LCD (updates every 20 seconds) with easy-to-use keypad
- 9V battery with 8-month life; memory protection in case of power loss

Item 3501PAR **WeatherTracker Model 305 Greenhouse Growth**





Greenhouse growers can position the meters throughout the greenhouse, as well as outside, to compare differences in light levels and the effect on plant growth and quality.

Simple way to measure how much sunlight a shaded green actually gets

LIGHTSCOUT® DLI 100 Light Meter

NEW - Greenhouse and Turf Models

Measure the light “falling” on your plants

- Measures PAR light (Photosynthetically Active Radiation)
- Meter runs for 24 hours to calculate the Daily Light Integral (DLI)
- Real-time intensity levels are shown in $\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$ every 4 seconds
- Greenhouse and Turf models available - each model provides greater resolution where it's needed most
- Helps you make decisions to increase plant growth and quality
- Simultaneously compare light between multiple locations
- Simple, one button operation
- Affordable, first step in measuring light
- Battery included

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

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

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

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



“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.

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.

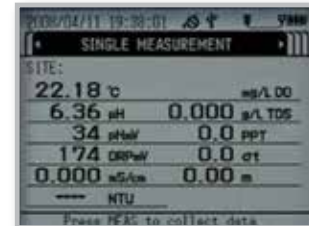
Control Unit Features:

- 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

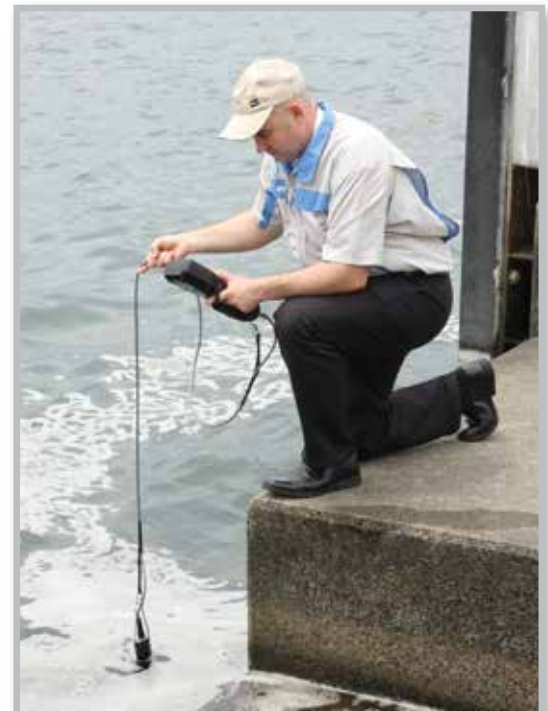
Sensor Probe Unit Features:

- 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			✓		✓



WatchDog 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 cellular module included (user provides SIM card and service plan — Pay-As-You-Go recommended)
- CDMA model for Verizon Wireless (service plan required)
- 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
- Requires 6-volt lantern battery (not included)
- Includes 6 ft (1.8 m) external temperature sensor

Go to www.specmeters.com for more options and models for humidity, flood irrigation, and power monitoring

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)

Item 3453
Item 3452

WatchDog Frost Cellular Alert Pro - GSM 3G HSPA+
WatchDog Frost Cellular Alert Pro - CDMA



WatchDog Visual Frost Alert

Spot frost conditions easily in your vineyard or orchard

- When temperatures approach freezing, the high-powered LED light (visible from about two miles) changes flash frequency and pattern to indicate temperature conditions at a glance
- Sensor cable is 6 ft (1.8 m) long for ease of placement
- Requires 3 AAA lithium batteries (not included)

Item 3435

WatchDog® Visual Frost Alert

Temperature	Interval	Flashes per Interval
Above 37°F (3°C)	30 Seconds	1
34 to 37°F (1 to 3°C)	30 Seconds	2
32 to 34°F (0 to 1°C)	15 Seconds	3
30 to 32°F (-1 to 0°C)	5 Seconds	4
Below 30°F (-1°C)	1 Second	1

WatchDog Color Frost Alert

Protect your high-value crops

- Easy visual signal for 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)

Item 3430

WatchDog Color Frost Alert

Color Frost Alert warning colors



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)





FIELDSCOUT® TDR 100

Obtain soil moisture readings at the press of a button

- Instantaneous readings of root zone soil moisture
- Ideal for measuring containers on benches
- Probe block comes with a 5 ft (1.5 m) cable
- Configure meter with FieldScout® software (included)*
- Variable length rods sold separately (see below)
- See specifications on page 36

* PC cable connects to a 9-pin serial port. USB-Serial adapter (item 3661USB) required for connection to computers with only USB ports.

- Item 6440FS** **FieldScout® TDR 100 Soil Moisture Meter**
Includes hard-sided carrying case
- Item 6440FSS** **Replacement TDR 100 Probe Block**
(with cable)
- Item 6440CASE** **TDR 100 Carrying Case**
- Item 3661USB** **USB-to-9-Pin-Serial Adapter**



TDR Rods

Multiple depth options for varying root zones

- Sturdy stainless-steel construction
- Field replaceable
- Rods must be fully inserted for valid measurements

- Item 6428FS3** **Two 1.5 inch (3.8 cm) Rods**
- Item 6429FS3** **Two 3 inch (7.5 cm) Rods**
- Item 6431FS3** **Two 4.8 inch (12 cm) Rods**
- Item 6432FS** **Two 8 inch (20 cm) Rods**

- Item 6430PH** **Pilot Hole Maker for TDR Meters**
Includes two 3 inch (7.5 cm) rods



Pilot Hole Maker for TDR Meters



Field replaceable rods





FIELDSCOUT® TDR 300

Portable soil moisture meter to help manage water evenly and responsibly and reduce operating expenses

- Instantaneous readings of root zone soil moisture
- FieldScout Bluetooth Device connects to the FieldScout Mobile App, instantly see your data on your smart phone or tablet (see page 38)
- Compatible with SpecMaps™ online web-mapping application, create 2-dimensional maps of your data (see website for details)
- Connects to a GPS receiver that has a serial output option (GPS required with SpecMaps*), we recommend the Garmin 72H GPS unit (see below)
- Equipped with internal data logger and RS-232 port
- Configure and download meter with FieldScout® software (included)**
- Rods sold separately (page 35)

* GPS interface requires two cables. The GPS/DGPS cable (item 2950CV5) and the PC serial interface cable (Item 7072CABLE).

** PC cable connects to a 9-pin serial port. USB-Serial adapter (item 3661USB) required for connection to computers with only USB ports.

- | | |
|-----------------------|-------------------------------------------------------------------------------------|
| Item 6430FS | FieldScout® TDR 300 Soil Moisture Meter
Includes soft-sided carrying case |
| Item 6453BT | FieldScout Bluetooth Device |
| Item 7072 | Garmin 72H GPS Unit |
| Item 7072CABLE | Garmin 72H PC Serial Interface Cable |
| Item 2950CV5 | GPS/DGPS Cable |
| Item 7250 | GPS Unit Mounting Bracket |
| Item 3661USB | USB-to-9-Pin-Serial Adapter |
| Item 3661U | USB-to-3.5mm-Stereo-Plug Adapter |
| Item 6430CASE | Replacement TDR 300 Carrying Case |

SPECIFICATIONS FOR TDR SOIL MOISTURE METERS

Measurement Principle: Time-domain measurement methods
Measurement Units: Percent volumetric water content
Resolution: 0.1% volumetric water content
Accuracy: ±3.0% volumetric water content with electrical conductivity < 2 mS/cm
Range: 0% to saturation (Saturation typically around 50% volumetric water)
Battery/Life: 4 AAA alkaline batteries; approximately 12-month battery life
Data Logger: (TDR 300) 3,250 measurements without GPS; 1,350 with GPS/DGPS

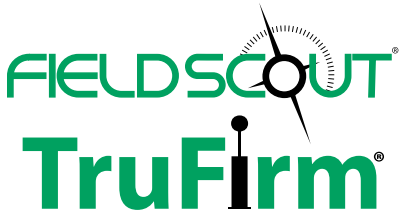


LCD display shows current measurement, rod length, number of readings, and running average

FIELDSCOUT® Mobile

Download the FieldScout Mobile App (more information on page 38) to capture and analyze measurements on your turf using Bluetooth wireless technology on a FieldScout TDR 300 Soil Moisture Meter and the FieldScout TruFirm Turf Firmness Meter. Available in two versions, Basic and Pro. Works on iOS and Android devices. TDR 300 requires the FieldScout Bluetooth Device for connection.





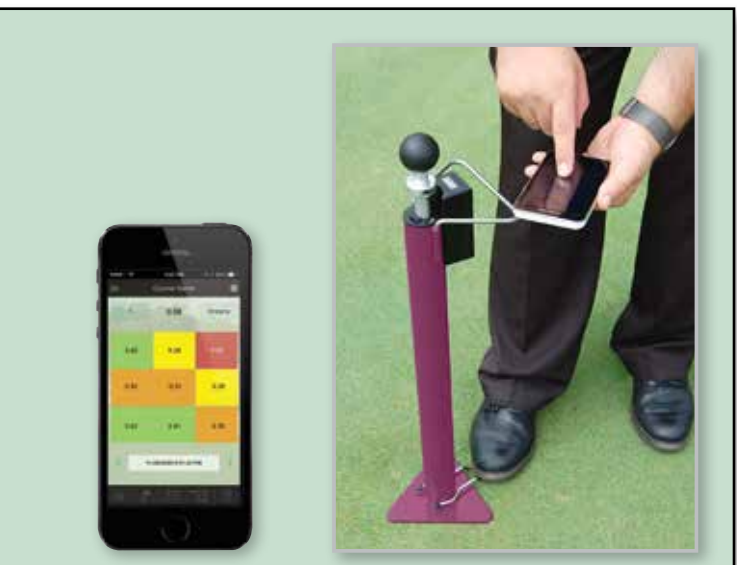
Based on technology developed by the United States Golf Association (USGA), the FieldScout® TruFirm® offers a quick, easy, and affordable method to measure the firmness of turf and bunker sands. Data acquired from the device allows researchers and turf management professionals to measure the relationship between the compaction of the soil and the moisture level.

- Evaluate trends and monitor sections of turf relative to one another
- FieldScout Mobile App, instantly see your data on your smart phone or tablet (see page 38)
- The lower the value, the firmer the turf
- Easy-to-use design provides instantaneous measurements
- Logged data can be sent via Bluetooth to a iOS and Android device for plotting specific greens or other surfaces
- Lightweight design results in an easily portable device without the need for extra parts
- Includes soft-sided carrying case

- Item 6490S** **FieldScout TruFirm Turf Firmness Meter with Bluetooth Smart**
- Item 6490** **FieldScout TruFirm Turf Firmness Meter Base model without Bluetooth**
- Item 6491S** **Bluetooth Smart Upgrade for TruFirm**



SPECIFICATIONS FOR TRUFIRM	
Power:	2 AA batteries (included)
Weight:	4.3 lb (1.95 kg)
Height:	27 in (69 cm)
Diameter of Hammer:	1.68 in (4.45 cm)
Measurement Units:	Depth of travel (inches)
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)
Display:	LCD with backlight





Pro Version
Showing Soil Moisture



Basic Version
Showing Soil Moisture



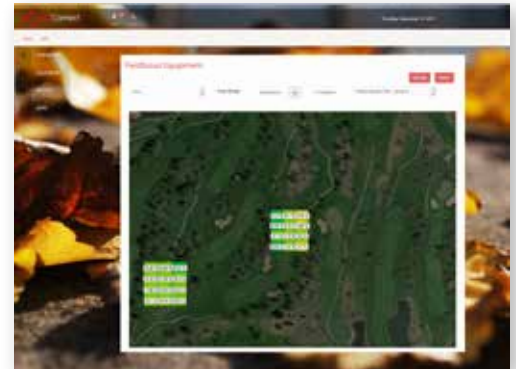
Basic Version
Showing Turf Firmness



FieldScout TDR 300 with FieldScout Bluetooth Device



- On-the-go means of collecting data
- Collects data from FieldScout TDR 300 Soil Moisture Meter (Bluetooth device required) and FieldScout TruFirm Turf Firmness Meter using Bluetooth Smart connection
- Uses your smart phone for time-stamping and geo-referencing the data
- Upload to SpecConnect Web Portal and view your entire course's data at once and export for further analysis by (see pages 13-15)
- Color coded to represent a scale of turf firmness or moisture
- Eliminates the need for hooking up to a GPS or computer
- Visualize readings in real time
- E-mail relevant information
- FieldScout TDR 300 requires new FieldScout Bluetooth Device
- Compatible with iOS and Android smart phones and tablets, device requires Bluetooth Smart Ready
- Free download from App Store or Google Play, Pro version requires a SpecConnect subscription (see below)



SpecConnect Web Portal showing TDR 300 data



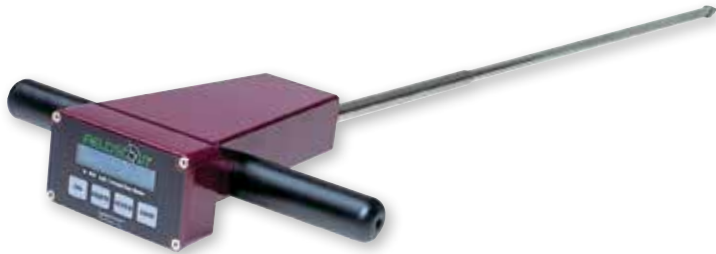
FieldScout Mobile App

Item 6453BT
Item 3035
Item 3060

FieldScout Bluetooth Device for TDR 300
SpecConnect FieldScout Pro Subscription (1-yr)
SpecConnect Additional FieldScout Device (1-yr)

FIELDSCOUT MOBILE APP BASIC vs. PRO

	Basic	Pro
Basic Grid of Zones	✓	✓
Change Number of Zones	✓	✓
Customizable Google Map Image		✓
Saves the Average Measurement by Zone	✓	✓
Email the Map/Results View	✓	✓
Note Different Surface Types	✓	✓
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		✓



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)**
- Compatible with SpecMaps™ online web-mapping application, create 2-dimensional maps of your data (see website for details)
- 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.

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

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





Actual size

WATERSCOUT® 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
- WaterScout Calibration Device can be used to reset the baseline reading

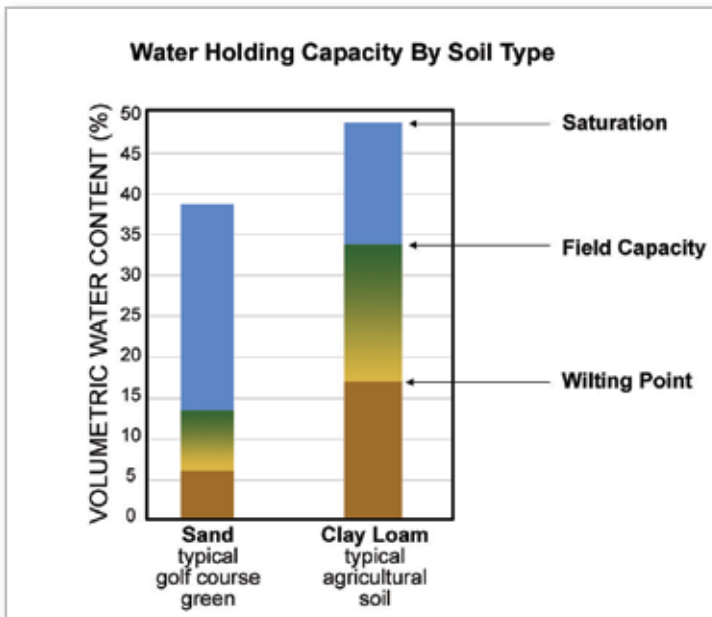
- Item 6460 WaterScout® SM 100 Sensor - 6 ft (1.8 m)
- Item 6460-20 WaterScout SM 100 Sensor - 20 ft (6 m)
- Item 6470CAL3V WaterScout Calibration Device

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



WATERSCOUT® 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 (see WatchDog Station pages 16-18 for details). Recommended placement of sensors is 10 feet separation to prevent 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. (Call for support)

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



Actual size

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.

FIELDSCOUT® Soil Sensor Reader

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

- Also reads Watermark sensors (page 43) (requires separate adapter)
- Includes soft-sided case (also available separately)

- Item 6466** FieldScout® Soil Sensor Reader
- Item 6450FSADPT** Watermark Adapter for Soil Sensor Reader

- Item 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)



7500

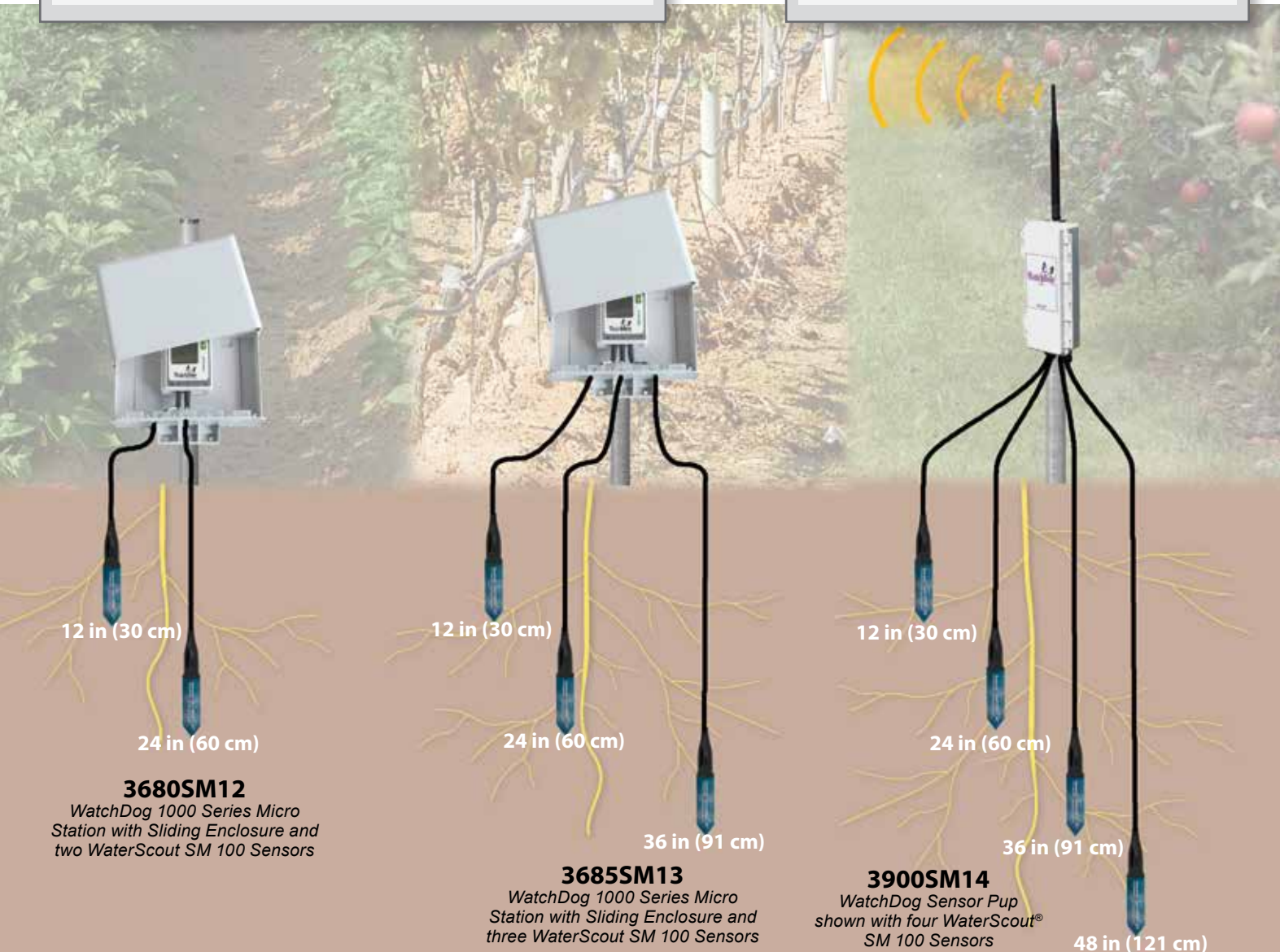


WatchDog Irrigation Stations with **WATERSCOUT** Sensors and **Watermark** Sensors

- 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 (see pages 4-15)
 - Add a WaterScout SMEC 300 Soil Moisture/EC/Temp Sensor (Item 6470-20) and monitor soil temperature and EC levels
 - More information on WaterScout SM 100 and SMEC 300 sensors can be found on pages 40-41, Watermark sensors on page 43
 - **Requires SpecWare 9 Basic or Pro software (page 22)**

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

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





Watermark Soil Moisture Sensor

Economical way to measure soil moisture tension

- Works with FieldScout® Soil Sensor Reader (Item 6466, pg. 41)*
- Reads moisture tension from 0 (saturated) to 200 (dry) centibars

- Item 6450** **Watermark Sensor with 5 ft (1.5 m) cable**
- Item 6450FSADPT** **Watermark Adapter for Soil Sensor Reader***

Watermark Sensors for WatchDog® Weather Stations

- Item 6450WD** **Watermark Sensor for WatchDog Stations with 11 ft (3.3 m) cable**
- Item 6450WD20** **Watermark Sensor for WatchDog Stations with 25 ft (7.6 m) cable**
- Item 6450AH** **Watermark Adapter**

*Adapter required to connect WatchDogs to existing Watermark Sensors

Irrrometer Tensiometers

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

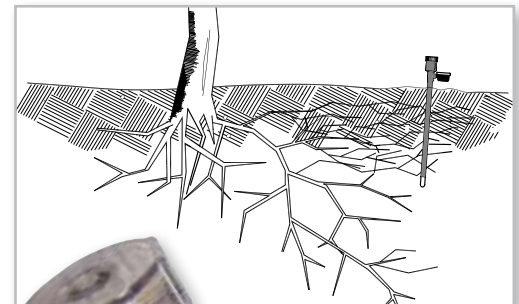
- “R” models (Items 6419 thru 6423) are for general use with field or tree crops
- Low Tension (LT) models (see www.specmeters.com) are for coarse soils or greenhouse media
- Portable models for specialized applications (see www.specmeters.com)
- Can be connected to WatchDog Data Loggers and Stations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

- Item 6425** **Service Kit - Required**

- Item 6419** **R Model 6 in (15 cm) Depth**
- Item 6420** **R Model 12 in (30 cm) Depth**
- Item 6421** **R Model 18 in (45 cm) Depth**
- Item 6422** **R Model 24 in (60 cm) Depth**
- Item 6423** **R Model 36 in (90 cm) Depth**

- Connect your “R” 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

- Item 3669** **Pressure Transducer**



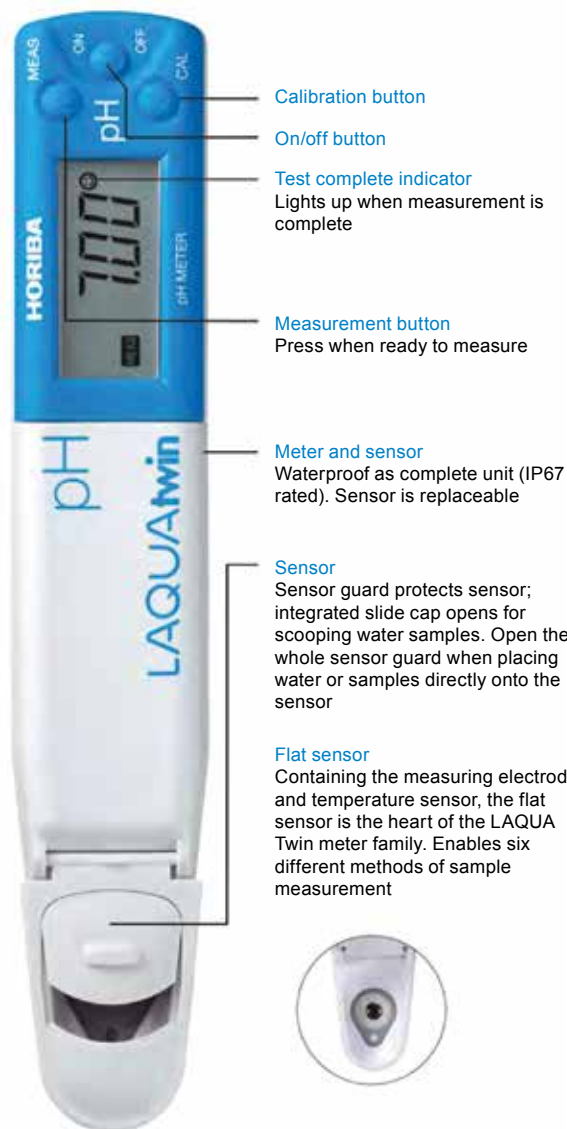
Economy Soil Moisture Tester

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

- Item 6400** **9 in (22 cm) Soil Moisture Tester**
- Item 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 46)
- 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



LAQUA Twin pH Meter

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

- Item 2103AL** LAQUA Twin pH meter
Includes case, batteries, and pH 4 & 7 standards
- Item 2110** Refill Solutions - pH 4 and 7, 60 mL ea.
- Item 2143L** LAQUA Twin pH Replacement Sensor
- Item 2135L** Sampling Sheets - 100 pieces

LAQUA Twin EC Meter

Ideal for water quality and greenhouse applications

- Item 2205L** LAQUA Twin EC Meter
Includes case, batteries, and calibration standards
- Item 2210L** Conductivity Standard, 1.41 mS/cm (6 - 14 mL bottles)
- Item 2242L** Replacement Sensor



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

Measurement Principle:	Glass electrode method	2 AC bipolar	Ion electrode method	Ion electrode method	Ion electrode method	Ion electrode method
Sample Volume Required:	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
Measurement Range:	2 to 12 pH	0 to 19.9 mS/cm	23 to 1300 ppm	39 to 3900 ppm	62 to 6200 ppm	40 to 4,000 ppm
Calibration:	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
Reproducibility:	± 0.1 pH	± 2%	± 10% or ± 10 ppm	± 10% or ± 10 ppm	± 10% or ± 10 ppm	± 20% or ± 20 ppm
Display:	4-digit digital LCD display					
Power:	CR2032 coin batteries (x2)					
Battery Life:	400 hours continuous operation					
Operating Range:	40°F (5°C) to 105°F (40°C), 85% relative humidity					
Dimensions:	164mm x 29mm x 20mm					

LAQUA Twin Sodium Na⁺

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

LAQUA Twin Potassium K⁺

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

LAQUA Twin Nitrate NO₃⁻

- Item 2305GL** **LAQUA Twin Nitrate (NO₃⁻) Meter**
Includes case, batteries, and calibration standards
- Item 2345L** **Replacement Nitrate Sensor**
- Item 2311** **450 ppm NO₃⁻-N Standard, 6 - 14 mL bottles**
- Item 2312** **34 ppm NO₃⁻-N Standard, 6 - 14 mL bottles**
- Item 2330** **NO₃⁻ Soil Test Kit w/30 Samples**
Includes solutions, filter paper, cups, and soil scoop
- Item 2135L** **Sampling Sheets - 100 pieces**

LAQUA Twin Calcium Ca²⁺

- Item 2450L** **LAQUA Twin Calcium (Ca²⁺) Meter**
Includes case, batteries, and calibration standards
- Item 2455L** **Replacement Calcium Sensor**
- Item 2460L** **150 ppm Ca²⁺ Standard, 6 - 14 mL bottles**
- Item 2461L** **2000 ppm Ca²⁺ Standard, 6 - 14 mL bottles**
- Item 2135L** **Sampling Sheets - 100 pieces**





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

Item 2726 Hand Held Plant Sap Press

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

Item 2720 Hydraulic Plant Sap Press

Brix Meters



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)

Item 2812 Digital Refractometer

Suggested Brix Values
 See our website for suggested Brix values
www.specmeters.com/articles
 under the Miscellaneous section

Handheld Refractometers

- 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

Item 2801 Refractometer 0–32% Brix
 Item 2806 Refractometer 0–32% with Automatic
 Temperature Compensation





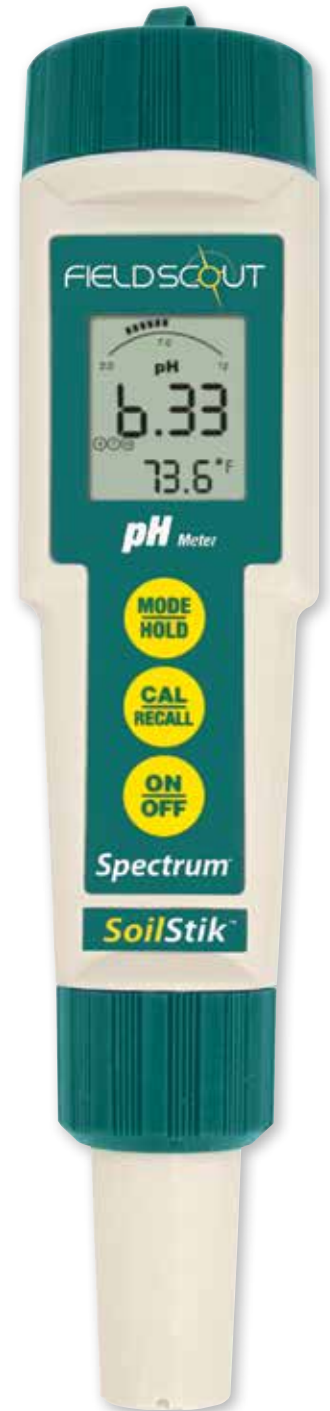
SoilStik shown in use with Item 6510, Model HC Soil Sampler (available online)

FIELDSCOUT® SoilStik pH Meter

Easy to use and cost-efficient meter

- Flat surface electrode measures pH in soils, semi-solids, solids, and liquids - no more electrode breakage or clogged junctions
- 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
- Waterproof 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

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



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)



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

FIELDSCOUT[®] pH 400 and 600 Meters **NEW**

Fast, easy and accurate "direct" soil pH measurement

Modern User Interface

- The new 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 light weight, 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. Additionally, 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, soil, and soilless media

Item 2107

FieldScout pH 400 Meter

Meter includes case, batteries, AC adapter, brush, and pH 4 & 7 standards
Excludes pH Probe - order separately

Item 2108

FieldScout pH 600 Meter

Meter includes case, batteries, AC adapter, brush, and pH 4 & 7 standards
Excludes pH Probe - order separately

Item 2127

FieldScout pH Meter Blunt Tip ISFET Probe

Item 2128

FieldScout pH Meter Pin Point Tip ISFET Probe

Item 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



FIELDSCOUT Direct Soil EC Meter

- Instant and accurate direct EC and temperature measurements
- Professional-grade meter
 - 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

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

24 in (60 cm) Probe Option

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



2265FS



2265FSTP

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



Exclusive Paired Sensor



Waterproof EC Meter

Economic meter for measuring salinity

- Measures four parameters; conductivity, TDS, salinity, and temperature
- 6 units of measurement: $\mu\text{S}/\text{cm}$, mS/cm , ppm, ppt, mg/L , and g/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 mS/cm
 - TDS: 0 to 99.9 mg/L , 100 to 999 mg/L , or 1.00 to 9.99 g/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°F (0.0 to 90.0°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

Item 2246

Waterproof EC Meter

Item 2246SENSOR

Replacement Sensor

Item 2251

Conductivity Standard, 1.41 mS/cm , 250 mL

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: ± 0.2 pH and 2% EC scale
- Range: 0 - 6 mS/cm
- Includes handheld meter, probe, calibration solutions, and carrying case

Item 2182A

Economy pH/EC Meter

Item 2183A

Replacement pH/EC Probe

Item 2110

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

Item 2251

Conductivity Standard, 1.41 mS/cm , 250 mL



SPAD 502 Plus Chlorophyll Meter

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 N content
- Available with or without a built-in data logger
- Includes hard carrying case and batteries

Data-logging model (2900PDL)

- 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)**
- Compatible with SpecMaps™ online web-mapping application, create 2-dimensional maps of your data (see website for details)

* 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.

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

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

Item 2950CV5 **GPS/DGPS Cable**

Item 2900CASE **Hard Carrying Case**



2900P

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)

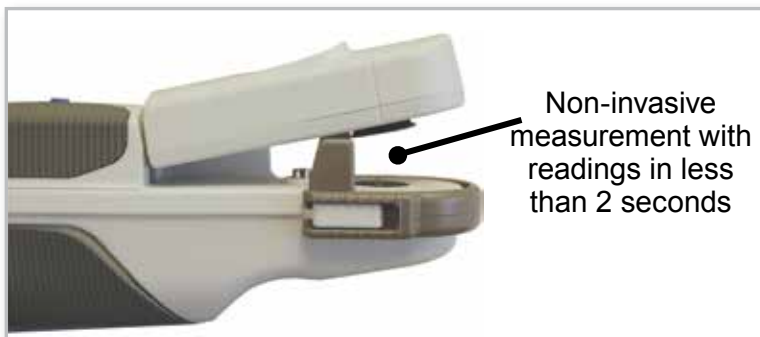
Light Source: 2 LEDs

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



Non-invasive measurement with readings in less than 2 seconds

FIELDSCOUT[®] 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
- Records 3,250 measurements (1,350 with added GPS/DGPS option)
- Configure and download meter with FieldScout[®] software (not included)**
- Compatible with SpecMaps[™] online web-mapping application, create 2-dimensional maps of your data (see website for details)
- 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.

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



2950



2953

FIELDSCOUT[®] 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[®] software (included)**
- Compatible with SpecMaps[™] online web-mapping application, create 2-dimensional maps of your data (see website for details)
- 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.

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

FIELDSCOUT[®] 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[®] software (included)**
- Compatible with SpecMaps[™] online web-mapping application, create 2-dimensional maps of your data (see website for details)
- 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.

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



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)

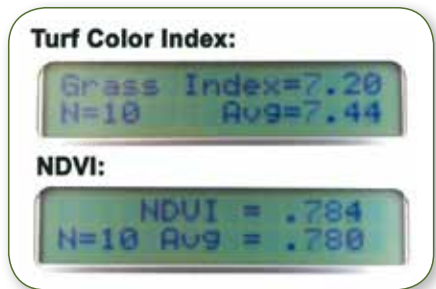
Measurement Units: Percent reflectance (0.0 to 99.9) of Red and NIR

NDVI (0.000 to 1.000)

Grass Index (1.00 to 9.00)

Power Source: 1 9 V alkaline battery (included); approx. 3,000 measurements

Repeatability: ± 5% of measurement



Displays Turf Color Index and NDVI on the LCD



FIELDSCOUT® GreenIndex+® Turf

The FieldScout® GreenIndex+® Turf app utilizes the latest advancements in smartphone camera technology to measure plant health via the chlorophyll content (relative greenness) of turf. The app captures turfgrass images with an iPhone, iPod Touch, or iPad, calculates the Dark Green Color Index (DGCI), and displays a visual rating. Measurements can be compared to identify variability or trends in turf health across golf course greens, fairways, and research plots, providing valuable data for decisions regarding fertilization and irrigation.

- Quantify turf color and quality
- Identify turf stress before it's too late
- Make critical decisions in real time without high up-front costs
- Customize the visual rating calculation for different species of grass and specific plots of land
- Data is logged and geo-referenced, and can be emailed to a personal computer for further analysis

iOS Device not included.



FieldScout GreenIndex+ Turf App

Item 2910T

FieldScout GreenIndex+ Turf Board

Order from Spectrum, online or by phone

SPECIFICATIONS FOR GREENINDEX+ TURF	
Compatible Devices:	Apple iPhone 3GS and newer
	Apple iPad, 2nd generation and newer
	Apple iPod Touch, 4th generation and newer
Operating System Required:	iOS 6.0 and above
GPS:	Devices with built-in GPS will embed location metadata
Board:	9 x 11.5 in (23 x 29 cm) aluminum



Unique color reference board eliminates subjective measurements



Capture



Process



Instant Results



Adjust the visual rating scale for specific grass varieties to match your rating protocol



Now there is a better, more affordable way to monitor the health of your crops. Taking advantage of the latest advancements in technology, the FieldScout® GreenIndex+® app conveniently captures and processes images from an iPhone, iPod Touch, or iPad and instantly computes the Dark Green Color Index (DGCI) of plant leaves, which is a measurement of the plant's greenness. Because nitrogen is a part of the chlorophyll pigment, measuring the greenness of plants allows growers to indirectly measure the amount of nitrogen in the plant and make decisions for more efficient scheduling of fertilizer applications.

- Make corrective measurements based on early diagnosis of severe nitrogen deficiencies to prevent significant yield reduction
- Lower nitrogen costs and increase profits through more efficient application of fertilizers
- Compute SPAD equivalent based on research correlating DGCI to SPAD readings in corn at the V6 growth stage
- Compare crop health via relative greenness for any crop under different fertility, fungicide, or foliar treatments
- All data is logged and geo-referenced, and can be emailed to a personal computer for further analysis

iOS Device not included.



FieldScout GreenIndex+ Plant Health App

Item 2910B

FieldScout GreenIndex+ Board

Order from Spectrum, online or by phone

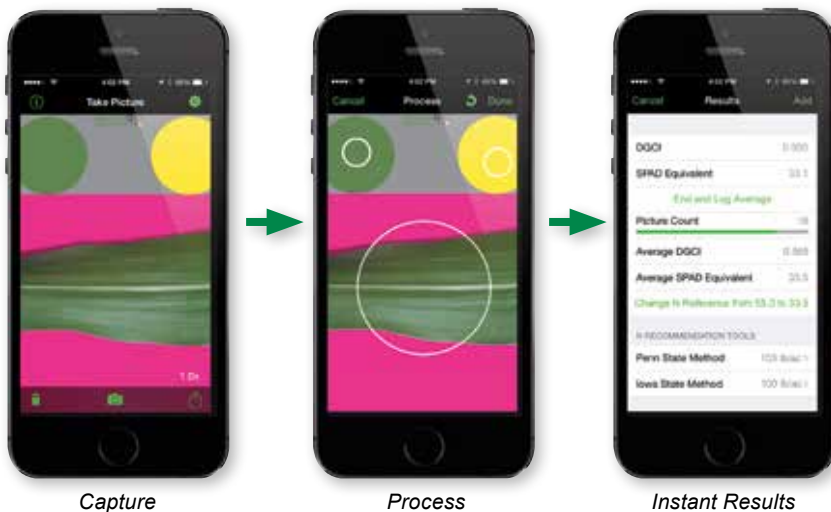
SPECIFICATIONS FOR GREENINDEX+

Compatible Devices: Apple iPhone 3GS and newer
 Apple iPad, 2nd generation and newer
 Apple iPod Touch, 4th generation and newer

Operating System Required: iOS 6.0 and above

GPS: Devices with built-in GPS will embed location metadata

Board: 9 x 11.5 in (23 x 29 cm) aluminum with adjustable hand strap



Capture

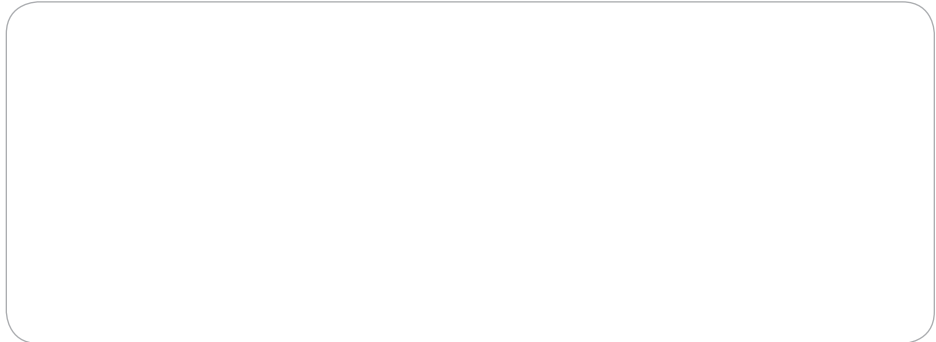
Process

Instant Results

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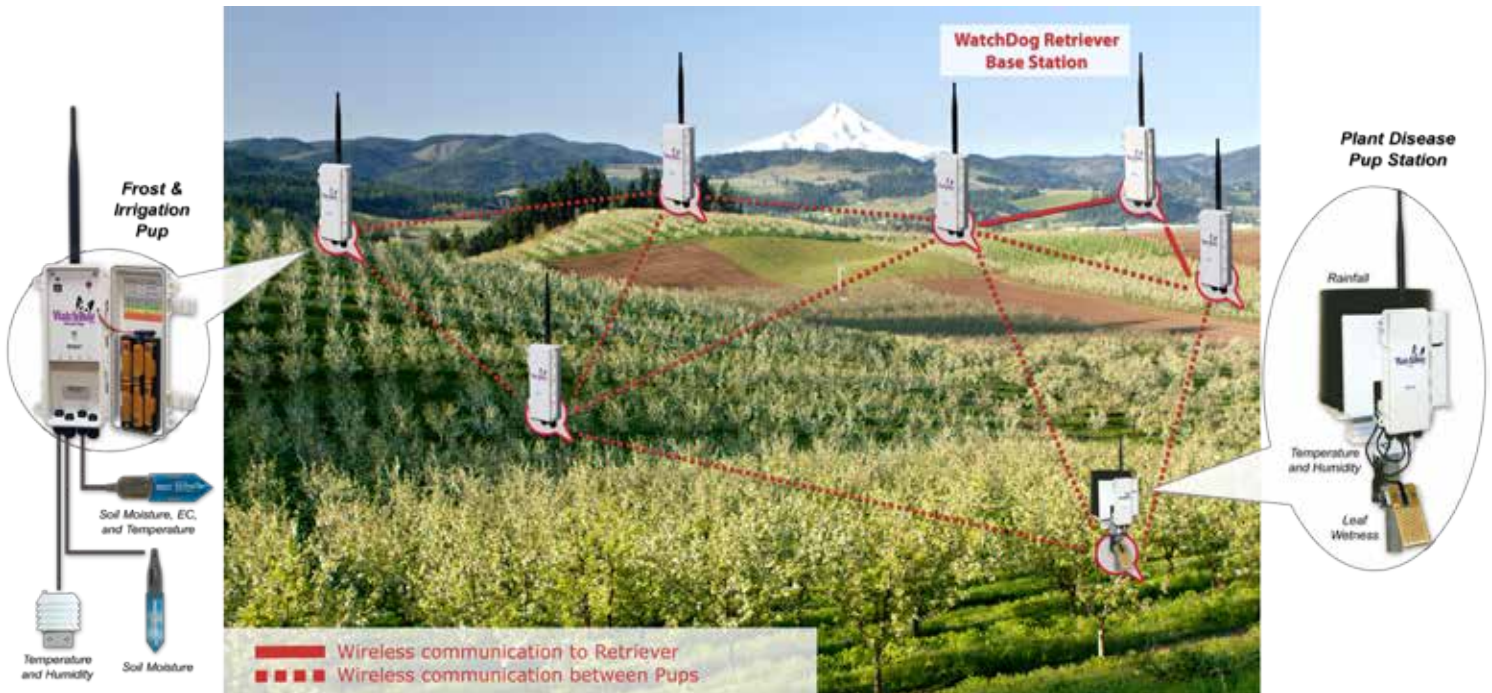


SpecConnect Integrated Wireless Solution

Your Crops. Your Data. Better Decision\$.

Monitor your fields from wherever you are with Spectrum's new
WatchDog Retriever & Pups Wireless Network & SpecConnect Web Portal

See page 4 for more details



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