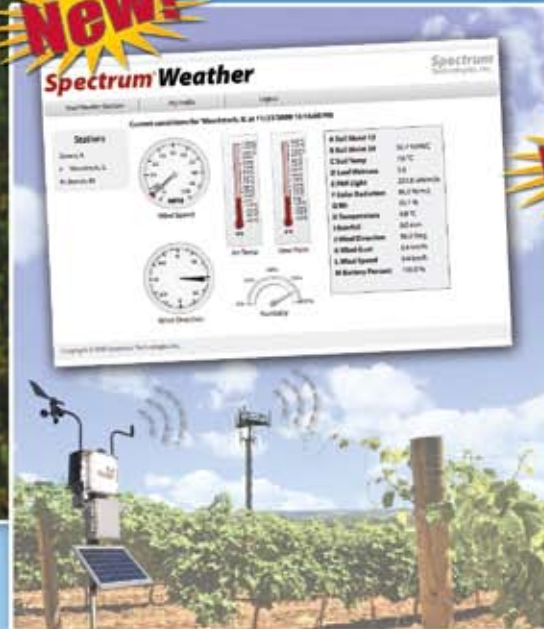


"To Measure Is To Know"



WatchDog 1000 Data Loggers
Our new series of data loggers!
(Pages 10-11)



SpectrumWeather.com
Connect your weather station to your world!
(Page 17)



LightScout DLI 100
Measures light the way plants experience it!
(Page 24)



20 PLUS YEARS OF SERVING YOU!

Welcome, and thank you for your interest in Spectrum Technologies.

For over 23 years, we have remained focused on one primary objective: improving the profitability and efficiency of our customers.

We recognize the challenges you face: the high costs of fertilizer and other crop inputs, scarce water resources, plant disease, insect damage, and more.

Our 2009 catalog features a broad range of solutions that originated by listening to our customers, who include some of the world's leading researchers, growers, and consultants. Our distributors, a select group of the industry's leading suppliers, enhance our solutions by providing expert advice and access to our complete product line in over 80 countries around the world. As a world leader in plant measurement technology, you can count on us for the field measurement tools you need, today and tomorrow.

We wish you a safe and prosperous year, and look forward to serving you.

Sincerely,



David Lau
Vice President – International
Spectrum Technologies, Inc.

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Integrated Plant Management



- **Environment:**
Temperature, Light, Rain, Relative Humidity and Leaf Wetness
- **Nutrition:**
Nutrients, Chlorophyll and pH Levels
- **Pest and Diseases:**
Insects and Diseases
- **Soil and Water:**
Soil Moisture, Soil Compaction and Water Quality

Spectrum Technologies is your source for field measurement technology!

Award Winning Products

The American Society of Agricultural and Biological Engineers has named sixteen Spectrum products AE50 award winners. These products were selected by a panel of experts in the agricultural, food and biological systems industries for the ability to save producers time, cost and labor while operating in an environmentally-friendly fashion.



- | | |
|--|---|
| <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • 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 |
|--|---|

3 Easy Ways to Contact Us!

Phone

To reach us by phone, dial +1 815-436-4440 and speak with our knowledgeable, friendly staff about your application needs, measurement questions, or for information on local Spectrum distributors. Hablamos Español.

Online

Please come visit us online at www.specmeters.com. It's a fast and easy way to find additional information for any product. While you visit, stop by our support library for technical information, product manuals, and more.

Fax

Contact us 24 hours a day by faxing your questions to +1 815-436-4460. Be sure to include your contact information. We'll process your inquiry promptly and contact you with answers to your requests.

ENVIRONMENT



• Environment:

Temperature, Light, Rain, Relative Humidity and Leaf Wetness

THE IMPORTANCE OF ENVIRONMENT MONITORING...

Weather plays a key role in plant health. Keep your crops healthy and happy by staying on top of local level weather conditions. Use customized set-ups to monitor different areas to determine and manage microclimates. Measure key parameters such as air temperature, relative humidity, rainfall, wind speed and wind direction, plus you can add additional sensors to customize your unit. Data log environmental information at user-defined intervals and run detailed reports to make informed decisions.

Take monitoring one step further by adding a disease and insect package. Use additional parameters such as leaf wetness to determine when the conditions are right for a particular disease.



2000 Series Weather Stations

Professional grade solutions

- Sealed NEMA-4 type IP66 enclosure and weatherproof connectors
- Built-in data logger stores your measurements in fail-safe, non-volatile memory
- Enhanced LCD display; check current conditions and historical high/low readings
- 12-month battery power source (four AA alkaline batteries, included)
- Internal sensors measure air temperature, relative humidity, wind speed and direction, rainfall, and solar radiation (depending on model)
- External sensors (up to 9 sensors) and communication ports
- Wide selection of compatible external sensors and communication options
- Choose from 4 different models

See Page 14 for specific model and sensor information



2000 Series Mini Stations

A Mini Station for every micro-climate

- The same power, flexibility and accuracy as the 2000 Series Weather Stations- perfect when wind speed/direction isn't needed
- NEMA-4 type IP 66 enclosure and weatherproof connectors
- Built-in data logger stores your measurements in fail-safe, non-volatile memory
- Enhanced LCD display, check current conditions and historical high/low readings
- 12-month battery power source (four AA alkaline batteries, included)
- Internal sensors measure air temperature, relative humidity and PAR light (depending on model)
- External sensors (up to 4 sensors) and communication ports
- Wide selection of compatible external sensors and communication options
- Choose from 4 different models

See Page 12 for specific model and sensor information

"The WatchDog system has been rock steady and provides reliable data with a minimum of maintenance or downtime."

Mark E. Fuller, Ph.D.
Princeton, NJ

WatchDog® 1000 Series Data Loggers

Affordable and versatile

- The cost-effective choice for recording multiple environmental conditions
- Internal sensors can include temperature and humidity
- Up to 4 external sensor ports lets you choose the sensors you need
- LCD displays current sensor readings and battery level
- Select measurement intervals from 1 to 60 minutes
- Log 10,080 intervals (209 days at 30 minute intervals)
- Water-resistant case
- 12 month battery life (CR2450, included)
- Choose from 7 different models

See Page 10 for specific model and sensor information



WatchDog® A-Series Data Loggers

Most affordable way to track environmental conditions for analysis

- Models include combinations of temperature, humidity and leaf wetness sensors
- LCD display confirms logger operation and displays current sensor readings
- Select measurement intervals from 1 to 120 minutes
- Log 4,000 to 8,000 intervals
- Water-resistant case
- 12-month battery life (CR2, included)
- Choose from 4 different models

See Page 8 for specific model information



WatchDog® B-Series Button Loggers

Don't let their small price and size fool you

- Water resistant (IP56) stainless steel case
- Select measurement intervals from 1 to 120 minutes
- Log 2,000 to 8,000 intervals
- Internal sensors
- Available in temperature-only or temperature/humidity models

See Page 8 for specific model information



Actual size

WatchDog® Sensors and Accessories

WatchDog® Product Line

STANDARD FEATURES

OPTIONAL SENSORS & ACCESSORIES

REFERENCE:

✓	STANDARD
OPT	OPTIONAL
BLANK	NOT AVAILABLE

Item #	Model	Evapotranspiration	LCD Display	Wireless	Alarm Output-Ready	Air Temperature Sensor	Relative Humidity Sensor	Dew Point	Wind Speed and Direction	Tipping Bucket Rain Collector	Solar Radiation Sensor	Available Sensor Ports	Quantum Light Sensor	Ext.(Soil) Temperature Sensor	Leaf Wetness Sensor	WaterScout Soil Moisture	Barometric Pressure Sensor
		ET	LCD		Alrm 3672	Tmp	RH	Dew	Wind	Rain 3665R	Solar 3670I		PAR 3668I	Temp 3667	LW 3666	SM 6460	Bar 3671
Weather Stations (prepackaged units with LCD display, external sensor ports, and wireless communication options)																	
3350WD2	2900ET	✓	✓	OPT	✓	✓	✓	✓	✓	✓	✓	5	OPT	OPT	OPT	OPT	OPT
3345WD2	2800		✓	OPT	✓	✓	✓	✓	✓	OPT	OPT	9	OPT	OPT	OPT	OPT	OPT
3340WD2	2700		✓	OPT	✓	✓	✓	✓	✓	✓	OPT	6	OPT	OPT	OPT	OPT	OPT
3320WD2	2550		✓	OPT	✓	✓	✓	✓	✓		OPT	6	OPT	OPT	OPT	OPT	OPT
2000 Mini Station (affordable 4 channel datalogging units, featuring LCD display and wireless communication options)																	
3684WDPD	Plant Disease Station	✓		OPT	✓	✓	✓	✓	✓	✓		0			✓		
3686WD	2475		✓	OPT	✓	✓	✓	✓	✓	OPT	OPT	1	✓	OPT	OPT	OPT	OPT
3684WD	2450		✓	OPT	✓	✓	✓	✓	✓	OPT	OPT	2	OPT	OPT	OPT	OPT	OPT
3683WD	2425		✓	OPT	✓	✓	✓	✓	✓	OPT	OPT	3	OPT	OPT	OPT	OPT	OPT
3685WD	2400		✓	OPT	✓	✓	✓	✓	✓	OPT	OPT	4	OPT	OPT	OPT	OPT	OPT
1000 Series Data Loggers (mix and match components for affordable 2-6 channel datalogging units featuring LCD display)																	
3685SM1	Irrigation Station	✓								OPT		1		OPT		✓ (3)	
3680SM1	Irrigation Station	✓										0				✓ (2)	
3684PD1	Plant Disease Station	✓				✓	✓	✓	✓	✓		0			✓		
3688WD1	1650	✓				✓	✓	✓	✓	OPT	OPT	4	OPT	OPT	OPT	OPT	
3687WD1	1525	✓				✓	✓	✓	✓	OPT	OPT	4	OPT	OPT	OPT	OPT	
3684WD1	1450	✓				✓	✓	✓	✓	OPT	OPT	2	OPT	OPT	OPT	OPT	
3683WD1	1425	✓				✓	✓	✓	✓	OPT	OPT	3	OPT	OPT	OPT	OPT	
3685WD1	1400	✓				✓	✓	✓	✓	OPT	OPT	4	OPT	OPT	OPT	OPT	
3682WD1	1250	✓				✓	✓	✓	✓			0					
3681WD1	1225	✓				✓	✓	✓	✓	OPT	OPT	1	OPT	OPT	OPT	OPT	
3680WD1	1200	✓				✓	✓	✓	✓	OPT	OPT	2	OPT	OPT	OPT	OPT	
A-Series Loggers (economic datalogging units for 1-2 parameters - requires Item 3661A PC Connection Cable)																	
3612A	A150 Temp/RH						✓	✓	✓				0				
3610A	A130 Leaf Wetness/Temp					✓	✓	✓	✓			0			✓		
3617ARS	A125 Soil/Air Temp Station					✓	✓	✓	✓			0		✓			
3617A	A125 Soil/Air Temp					✓	✓	✓	✓			0		✓			
3618A	A110 Temperature					✓	✓	✓	✓			0					
B-Series Button Loggers (compact data loggers for temperature and humidity - requires Item 3665K Docking Station)																	
3621WD	100 Temp/RH 8K					✓	✓	✓	✓			0					
3620WD	100 Temperature 8K					✓	✓	✓	✓			0					
3619WD	100 Temperature 2K					✓	✓	✓	✓			0					
Rain Loggers																	
3554WD	120 Data-Logging Rain Gauge									✓		0					
3635WD	115 Rain Logger									OPT		1					
Wireless Crop Temperature Monitor (a base station with 1-16 wireless remote sensor units, ideal for greenhouse or frost monitoring)																	
3540	T/RH		✓	✓		✓	✓	✓	✓			0					
3545	Temp		✓	✓		✓	✓	✓	✓			1	OPT	OPT	OPT		
Mobile Sprayer Station (a compact unit providing on-the-go weather monitoring)																	
3349SSC			✓			✓	✓	✓	✓			0					✓

WatchDog® Sensors and Accessories

REFERENCE:

✓ AVAILABLE ON MODEL
 BLANK NOT AVAILABLE

		Weather Stations	2000 Mini Stations	1000 Series Data Loggers		Range / Resolution*	Accuracy*
Soil Sensors	Sensors	Description					
	6460	WaterScout Soil Moisture Sensor 6 ft (1.8 m)	✓**	✓**	✓	0 to saturation (typically 50%)	±3%
	6460-20	WaterScout Soil Moisture Sensor 20 ft (6.1 m)	✓**	✓**	✓	0 to saturation (typically 50%)	±3%
	6450WD	Watermark Soil Moisture Sensor 11 ft (3.3 m)	✓	✓	✓	0 to 200 centibars	
	6450WD20	Watermark Soil Moisture Sensor 25 ft (7.6 m)	✓	✓	✓	0 to 200 centibars	
	3669	Tensiometer Pressure Transducer	✓	✓	✓		±2%
	6450ADPT	Watermark Adapter	✓	✓	✓		
	6451	Irrigation On/Off Sensor	✓	✓	✓	On at 5psi	
	3667	External (Soil) Temperature Sensor 6 ft (1.8 m)	✓	✓	✓	S: -25 to 212°F (-32 to 100°C)	±1°F (±0.6°C)
	3667-20	External (Soil) Temperature Sensor 20 ft (6.1 m)	✓	✓	✓	L: -4 to 158°F (-20 to 70°C)	±1°F (±0.6°C)
	3667S	Temperature (Micro) Sensor	✓	✓	✓	} 0.01", 0.25 mm	} ±2%
	3665R	Tipping Bucket Rain Collector	✓	✓	✓		
	3666	Leaf Wetness Sensor	✓	✓	✓	0 (dry) to 15 (wet)	
	3671	Barometric Pressure Sensor	✓	✓	✓	26 to 32 inHg, 880-1080 hPa	±0.05 inHg, ±1.7 hPa
	3671M	Barometric Pressure Extended Range	✓	✓	✓	18.75 to 33.1 inHg, 635-1121 hPa	±0.057 inHg, ±1.9 hPa
	2655	CO ₂ Sensor	✓	✓	✓	0-4000 ppm	±5% or 50 ppm
3612RHS	Replacement RH Sensor for Weather Stations	✓	✓	✓	10 - 100% at 5 - 50°C	±3% RH	
3612RHB	Replacement RH Sensor for Data Loggers				for original loggers only (400 & 200 Series)		
Light Sensors	3668I	Quantum Light Sensor	✓	✓	✓	0-2500 μmol m ⁻² s ⁻¹	±5%
	3668I3	3 Sensor Quantum Bar	✓	✓	✓	0-2500 μmol m ⁻² s ⁻¹	±5%
	3668I6	6 Sensor Quantum Bar	✓	✓	✓	0-2500 μmol m ⁻² s ⁻¹	±5%
	3676I	UV Light Sensor	✓	✓	✓	0-200 μmol m ⁻² s ⁻¹	±5%
	3670I	Silicon Pyranometer Sensor	✓	✓	✓	0-1250 W/m ²	±5%
	3673	Voltage Input Cable	✓	✓	✓	S: 0-3.0V, L: 0-2.54 V, 1mA	S: ±0.005 V, L: ±0.02 V
	3674	4-20mA Input Cable	✓	✓	✓	0-20.1 mA	±1%
	3664	Extension Cable 20 ft (6.1 m)	✓	✓	✓		
Connectivity							See pages 16-17
3388G	GPRS Cellular Modem	✓	✓				
3388C	CDMA Cellular Modem	✓	✓				
3392B	Short Range Wireless Base Station	✓	✓				
	Short Range Wireless Remote Radio	3392W	3392M		Up to 1,000 Feet (300 Meters)		
3391B	Mid Range Wireless Base Station	✓	✓				
	Mid Range Wireless Remote Radio	3391W	3391M		Up to 2 Miles (3 Kilometers)		
3679WD1	WatchDog 2000 Series Data Shuttle	✓	✓	✓***			
3661USB	USB-to-Serial Adapter	✓	✓	✓			
3365WD2	Short Range Modem Pair	✓	✓				
3387WD96	Dial-up Modem	✓	✓				
Miscellaneous							See pages
3654P	Spec 9 Pro Software	✓	✓	✓		18-19	
3654B	Spec 9 Basic Software		✓	✓		18-19	
3663A	Radiation Shield			✓			
3658A	Sliding Enclosure			✓			
3396TP	Tripod Mount	✓	✓				
3672	Alarm Output Module	✓	✓				
3419	AutoDialer	✓	✓				

* S=Stations, L=Loggers

** WatchDog Stations sold prior to 2009 must be upgraded for the WaterScout

*** Item 3679WD1 Data Shuttles only

WatchDog® Data Loggers

WatchDog® A-Series Loggers

The most affordable way to track environmental conditions for analysis

- Measure temperature, humidity and leaf wetness
- LCD display confirms logger operation and displays current 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)
- Removable soft caps keep ports clear of debris
- Includes CR2, 12-month battery life
- **SpecWare 9 (v9.1) and the A-Series PC Connection Cable are required.**

Temperature range: -40 to 185°F (-40 to 85°C)

Accuracy: $\pm 1.1^\circ\text{F}$ ($\pm 0.6^\circ\text{C}$) at -4 to 122°F (-20 to 50°C), else $\pm 2.2^\circ\text{F}$ ($\pm 1.2^\circ\text{C}$)

RH range: 0 - 100%, Accuracy: $\pm 3\%$ at 77°F (25°C, 10 - 90%), else $\pm 5\%$

DESCRIPTION	INTERNAL SENSOR	INTERVALS	RADIATION SHIELD
MODEL A150 Item 3612A	TEMPERATURE RELATIVE HUMIDITY	5,333	OPTIONAL
MODEL A130 Item 3610A	TEMPERATURE LEAF WETNESS	4,000	INCLUDED
MODEL A125 Item 3617A	TEMPERATURE EXTERNAL TEMPERATURE	4,000	RECOMMENDED
MODEL A110 Item 3618A	TEMPERATURE	8,000	OPTIONAL

Item 3661A

WatchDog A-Series PC Connection Cable

Item 3663A

A-Series Radiation Shield

WatchDog® B-Series Button Loggers

Don't let their small price and size fool you

- Water resistant (IP56) stainless steel case
- Select measurement intervals from 1 to 120 minutes
- Log 2,000 to 8,000 intervals
- Internal sensors
- Integral non-replaceable battery
- Choose from temperature-only or temperature/humidity models
- **SpecWare software and the B-Series Docking Station are required.**

DESCRIPTION	INTERNAL SENSOR	INTERVALS	LCD DISPLAY
MODEL 100 T/RH Item 3621WD Temp Range: -4 to 185°F (-20 to 85°C) Temp Accuracy: $\pm 1.1^\circ\text{F}$ from 5 to 149°F ($\pm 0.6^\circ\text{C}$ from -15 to 65°C) Humidity: 0 to 100%, $\pm 5\%$	TEMPERATURE RELATIVE HUMIDITY	4000	NO
MODEL 100 8K Item 3620WD Range: -40 to 185°F (-40 to 85°C) Accuracy: $\pm 1.1^\circ\text{F}$ from 5 to 149°F ($\pm 0.6^\circ\text{C}$ from -15 to 65°C)	TEMPERATURE	8000	NO
MODEL 100 2K Item 3619WD Range: -40 to 185°F (-40 to 85°C) Accuracy: $\pm 1.8^\circ\text{F}$ from -22 to 158°F ($\pm 1.0^\circ\text{C}$ from -30 to 70°C) Use included plastic bag when measuring soil temperature	TEMPERATURE	2000	NO

Docking Stations

Item 3655K1

WatchDog B-Series Docking Station - USB*

Item 3655K

WatchDog B-Series Docking Station - Serial

*Requires SpecWare 9 (v9.1)



Ideal for soil temperature



WatchDog[®] 130 Leaf Wetness/Temperature Logger

- Monitor and record leaf wetness and temperature within your crop canopy
- Useful for spray scheduling and pest modeling
- Includes Model A130 Data Logger, radiation shield and leaf wetness sensor
- **SpecWare 9 (v9.1) and the A-Series PC Connection Cable are required**
- Use with SpecWare Pro's university-validated disease models for more accurate disease and pest monitoring (page 19)

Item 3610A Leaf Wetness/Temperature Logger

WatchDog[®] Soil/Air Temperature Station

- Install these mini data logging stations across multiple microclimates to study soil and air temperature trends
- Includes Model A125 Data Logger, external temperature sensor and mini radiation shield
- **SpecWare 9 (v9.1) and the A-Series PC Connection Cable are required.**
- Pre-configured station saves you \$5.00

Item 3617ARS Soil/Air Temperature Station

WatchDog[®] 120 Data-Logging Rain Gauge

- High accuracy, low-maintenance tipping bucket rain collector
- Meets NWS guidelines with an 8 in (20.5 cm) diameter collector
- Up to 7,000 rain interval events
- Select intervals from 1 to 120 minutes [maximum 2.55 in (6.5 cm) per interval]
- Rain collector mounting bracket and hardware included
- User-replaceable CR2032 battery lasts 8 months
- Record rainfall in either metric (mm) or US (in) units
- Accuracy: $\pm 2\%$ at 1 in (2.54 cm) per hour
- **Requires SpecWare software (page 18) to download and report**

Item 3554WD Data-Logging Rain Gauge

WatchDog[®] 115 Rain Logger

- Connect to your existing rain gauge
- Records up to 7,000 rain interval events
- Select intervals from 1 to 120 minutes [maximum 2.55 in (6.5 cm) per interval]
- Flashing LED confirms operation
- Includes weatherproof enclosure and 8-month, CR2032 battery
- **Requires SpecWare software (page 18) to download and report**

Item 3635WD WatchDog 115 Rain Logger



ENVIRONMENT

WatchDog® 1000 Series Data Loggers



WatchDog® 1000 Series Loggers

Affordable and versatile

Cost-Effective Mini-Stations For:

- Early pest/disease forecasting
- Soil moisture measurement
- Field research/microclimate data
- Degree-day tracking

- The cost-effective choice for recording multiple environmental conditions
- Internal sensors can include temperature and humidity
- With up to 4 external sensor ports, you choose the sensors you need
- LCD displays current sensor readings and battery level
- Select measurement intervals from 1 to 60 minutes
- Log 10,080 intervals (209 days at 30 minute intervals)
- Data is stored in fail-safe non-volatile memory
- Water-resistant case
- 12-month battery life (CR2450, included)
- Transfer data with a direct-connect cable or Data Shuttle
- **Requires SpecWare 9 (v9.2) software (see pages 18-19)**



Temperature range: -40 to 185°F (-40 to 85°C)
 Accuracy: ±1.1°F (±0.6°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%

DESCRIPTION	INTERNAL SENSOR	EXTERNAL PORTS
MODEL 1650 Item 3688WD1	TEMPERATURE RELATIVE HUMIDITY	4
MODEL 1525 Item 3687WD1	TEMPERATURE	4
MODEL 1450 Item 3684WD1	TEMPERATURE RELATIVE HUMIDITY	2
MODEL 1425 Item 3683WD1	TEMPERATURE	3
MODEL 1400 Item 3685WD1	NONE (EXTERNAL ONLY)	4
MODEL 1250 Item 3682WD1	TEMPERATURE RELATIVE HUMIDITY	NONE
MODEL 1225 Item 3681WD1	TEMPERATURE	1
MODEL 1200 Item 3680WD1	NONE (EXTERNAL ONLY)	2

1000 Series Plant Disease Stations

See page 31 for details

1000 Series Irrigation Stations

See page 45 for details

Customize Your 1000 Series Loggers!

ENVIRONMENT



UV Light Sensor
Measure UV radiation between 250-400 nanometers.
Item 3676I



Silicon Pyranometer Sensor
Measure solar radiation between 300-1100 nanometers.
Item 3670I



CO₂ Sensor
Measure CO₂ levels in ppm using NDIR technology.
Item 2655



Replacement RH Sensor
Replace your RH sensor and return to like-new accuracy.
For 1000 Series Item 3612RHS
For Original Data Loggers Item 3612RHB



Temperature (Micro) Sensor
Measure surface temperature of leaves and other applications.
Item 3667S



Quantum Light Sensor
Measure PAR light between 400-700 nanometers.
Item 3668I



Tipping Bucket Rain Collector
Measure rainfall in 1/100 in increments. Self-emptying, freeze resistant.
Item 3665R



3 or 6 Sensor Quantum Bar
Average PAR readings to minimize the effects of small shadows.
3 Sensor Bar Item 3668I3
6 Sensor Bar Item 3668I6



Leaf Wetness Sensor
Measure leaf wetness with grid-like, resistance-based sensor.
Item 3666



Irrigation On/Off Sensor
Record and analyze relationships between irrigation periods and soil moisture.
Item 6451



Extension Cable
20ft extension for all sensors.
Item 3664



Watermark Soil Moisture Sensor
Measures soil moisture tension from 0 to 200 centibars.
Sensor with 11 ft (3.3 m) cable Item 6450WD
Sensor with 25 ft (7.6 m) cable Item 6450WD20
Item 6450ADPT adapter required to connect original Watermarks to weather stations



Pressure Transducer
Adapts to Irrrometer tensiometers and allows use of the dial gauge for measurements.
Item 3669



Sliding Enclosure
Water resistant - mounts to pole or post
Item 3658A



Radiation Shield
Protect your logger from rain and measurement-distorting solar radiation
Item 3663A



External (Soil) Temperature Sensor
Measure soil, air, or water temperature with a resistance-based sensor.
Sensor with 6 ft (1.8 m) cable Item 3667
Sensor with 20 ft (6.1 m) cable Item 3667-20



WaterScout™ SM 100 Soil Moisture Sensor
Measures soil moisture (VWC) with little or no disturbance to the root zone.
Sensor with 6 ft (1.8 m) cable Item 6460
Sensor with 20 ft (6.1 m) cable Item 6460-20



Data Shuttle
Readout and launch 1000 Series Data Loggers; bring their data back to your PC
Item 3679WD1

WatchDog® 2000 Series Mini Stations



Model 2475

WatchDog® 2000 Series Mini Stations

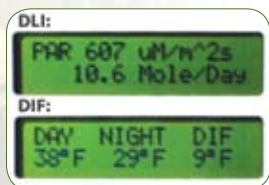
Monitor microclimates with four sensor channels of power

- Same power, flexibility, and accuracy as the 2000 Series Weather Stations
- Measure temperature, humidity, quantum light and more (varies by model)
- Customize your mini station with 1-4 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 183 days of data with a 30 minute interval)
- 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
- Alarms: send a warning if a sensor exceeds high and low limits
- 12-month battery power source (four AA alkaline batteries included)
- Communicate via wireless, cellular, shuttle, or direct connect (see pages 16-17)
- **Requires SpecWare software (see pages 18-19)**

Model 2475 Plant Growth Station

- Measure PAR light intensity, Daily Light Integral, day/night average temperatures and degree days

Item 3686WD WatchDog 2475 Weather Station



Exclusive LCD display on all 2000 Series Mini Stations

Model 2450 Temperature/RH Station

- Measure air temperature, relative humidity, dew point and up to two external sensors

Item 3684WD WatchDog 2450 Weather Station

Model 2425 Temperature Station

- Measure air temperature and up to three external sensors

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
- Up to four plug-in sensors

Item 3685WD WatchDog 2400 Weather Station



Model 2425
with wireless option
(see page 17)

WATCHDOG WEATHER STATION FEATURES

Sensors	2475	2450	2425	2400	Specifications	Accuracy
Air Temperature	✓	✓	✓	OPT	-25° to 212°F (-32° to 100°C)	±1°F (±0.6°C)
Relative Humidity	✓	✓	✓	N/A	10% to 100% @ 5° to 50°C	±3%
Dew Point	✓	✓	✓	N/A	-99° to 140°F (-73° to 60°C)	±4°F (±2°C)
Quantum Light (PAR)	✓	OPT	OPT	OPT	0 to 12500 μMol·m ⁻² ·s ⁻¹	±5°
External Sensor Ports	1	2	3	4		

Customize Your 2000 Series Mini Station!



UV Light Sensor
Measure UV radiation between 250-400 nanometers.
Item 3676I



Silicon Pyranometer Sensor
Measure solar radiation between 300-1100 nanometers.
Item 3670I



CO₂ Sensor
Measure CO₂ levels in ppm using NDIR technology.
Item 2655



Replacement RH Sensor
Replace your RH sensor and return to like-new accuracy.
For Weather Stations Item 3612RHS



Quantum Light Sensor
Measure PAR light between 400-700 nanometers.
Item 3668I



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



Temperature (Micro) Sensor
Measure surface temperature of leaves and other applications.
Item 3667S



3 or 6 Sensor Quantum Bar
Average PAR readings to minimize the effects of small shadows.
3 Sensor Bar
Item 3668I3
6 Sensor Bar
Item 3668I6



Tipping Bucket Rain Collector
Measure rainfall in 1/100 in increments. Self-emptying, freeze resistant.
Item 3665R



Irrigation On/Off Sensor
Record and analyze relationships between irrigation periods and soil moisture.
Item 6451



Leaf Wetness Sensor
Measure leaf wetness with grid-like, resistance-based sensor.
Item 3666



Watermark Soil Moisture Sensor
Measures soil moisture tension from 0 to 200 centibars.
Sensor with 11 ft (3.3 m) cable
Item 6450WD
Sensor with 25 ft (7.6 m) cable
Item 6450WD20
Item 6450ADPT adapter required to connect original Watermarks to weather stations



Pressure Transducer
Adapts to Irrrometer tensiometers and allows use of the dial gauge for measurements.
Item 3669



Extension Cable
20 ft extension for all sensors.
Item 3664



External (Soil) Temperature Sensor
Measure soil, air, or water temperature with a resistance-based sensor.
Sensor with 6 ft (1.8 m) cable
Item 3667
Sensor with 20 ft (6.1 m) cable
Item 3667-20



WaterScout™ SM 100 Soil Moisture Sensor
Measures soil moisture (VWC) with little or no disturbance to the root zone.
Sensor with 6 ft (1.8 m) cable
Item 6460
Sensor with 20 ft (6.1 m) cable
Item 6460-20



Tripod Mount
Rugged folding galvanized steel tripod.
Item 3396TP



Alarm Output Module
Trigger external device based on a sensor reading.
Item 3672

WatchDog® 2000 Series Weather Stations



WatchDog® 2000 Series Weather Stations

Base your growing decisions on your weather, not the airport's

- Full-featured weather stations measure temperature, humidity, rain, wind, and solar radiation (varies by model)
- Customize your station with plug-in sensors to meet your needs
- Accurate, real-time weather information directly from your orchard or vineyard
- Monitor, record and analyze over a dozen important growing conditions
- 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 a master data collection plan.
- Use the LCD Display to check current and daily high/low readings without a PC
- 12-month battery power source (four AA alkaline batteries included)
- Communicate via wireless, cellular, shuttle, or direct connect (see pages 16-17)
- **Requires SpecWare Pro software (see page 18)**

Model 2900ET
with optional tripod



Model 2900ET

- The most powerful package for optimizing your irrigation and IPM decisions
- [Item 3350WD2](#) [WatchDog 2900ET Weather Station](#)

Model 2700

- Affordable and versatile solution for growers, researchers and consultants
- [Item 3340WD2](#) [WatchDog 2700 Weather Station](#)

Model 2550

- Ideal for fast, on-demand deployment without measuring rainfall
- [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
 - Up to eight plug-in sensors, plus one optional rainfall sensor
- [Item 3345WD2](#) [WatchDog 2800 Weather Station](#)



Model 2550

Model 2800

WATCHDOG WEATHER STATION FEATURES

Sensors	2900ET	2700	2550	2800	Specifications	Accuracy
Wind Direction	✓	✓	✓	N/A	1°	±4°
Wind Speed	✓	✓	✓	N/A	0, 2 to 150 mph (0, 3 to 241 km/h)	±2 mph (±3 km/h) , ±5%
Air Temperature	✓	✓	✓	OPT	-25° to 212°F (-32° to 100°C)	±1°F (±0.6°C)
Relative Humidity	✓	✓	✓	N/A	10% to 100% @ 5° to 50°C	±3%
Dew Point	✓	✓	✓	N/A	-99° to 140°F (-73° to 60°C)	±4°F (±2°C)
Rainfall	✓	✓	N/A	OPT	0.01 in (0.25 mm)	±2%
Solar Radiation	✓	OPT	OPT	OPT	0 to 1250 W/m²	±5%
Evapotranspiration	✓	N/A	N/A	N/A		
External Sensor Ports	5	6	6	9		

Customize Your 2000 Series Weather Station!

ENVIRONMENT



UV Light Sensor
Measure UV radiation between 250-400 nanometers.
Item 3676I



Silicon Pyranometer Sensor
Measure solar radiation between 300-1100 nanometers.
Item 3670I



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



CO₂ Sensor
Measure CO₂ levels in ppm using NDIR technology.
Item 2655



Replacement RH Sensor
Replace your RH Sensor and return to like-new accuracy.
For Weather Stations Item 3612RHS



Quantum Light Sensor
Measure PAR light between 400-700 nanometers.
Item 3668I



Temperature (Micro) Sensor
Measure surface temperature of leaves and other applications.
Item 3667S



3 or 6 Sensor Quantum Bar
Average PAR readings to minimize the effects of small shadows.
3 Sensor Bar Item 3668I3
6 Sensor Bar Item 3668I6



Irrigation On/Off Sensor
Record and analyze relationships between irrigation periods and soil moisture.
Item 6451



Watermark Soil Moisture Sensor
Measures soil moisture tension from 0 to 200 centibars.
Sensor with 11 ft (3.3 m) cable Item 6450WD
Sensor with 25 ft (7.6 m) cable Item 6450WD20
Item 6450ADPT adapter required to connect original Watermarks to weather stations



External (Soil) Temperature Sensor
Measure soil, air, or water temperature with a resistance-based sensor.
Sensor with 6 ft (1.8 m) cable Item 3667
Sensor with 20 ft (6.1 m) cable Item 3667-20



WaterScout™ SM 100 Soil Moisture Sensor
Measures soil moisture (VWC) with little or no disturbance to the root zone.
Sensor with 6 ft (1.8 m) cable Item 6460
Sensor with 20 ft (6.1 m) cable Item 6460-20



Pressure Transducer
Adapts to Irrrometer tensiometers and allows use of the dial gauge for measurements.
Item 3669



Extension Cable
20 ft extension for all sensors.
Item 3664



Leaf Wetness Sensor
Measure leaf wetness with grid-like, resistance-based sensor.
Item 3666



Tipping Bucket Rain Collector
Measure rainfall in 1/100 in increments. Self-emptying, freeze resistant.
Item 3665R



Tripod Mount
Rugged folding galvanized steel tripod.
Item 3396TP

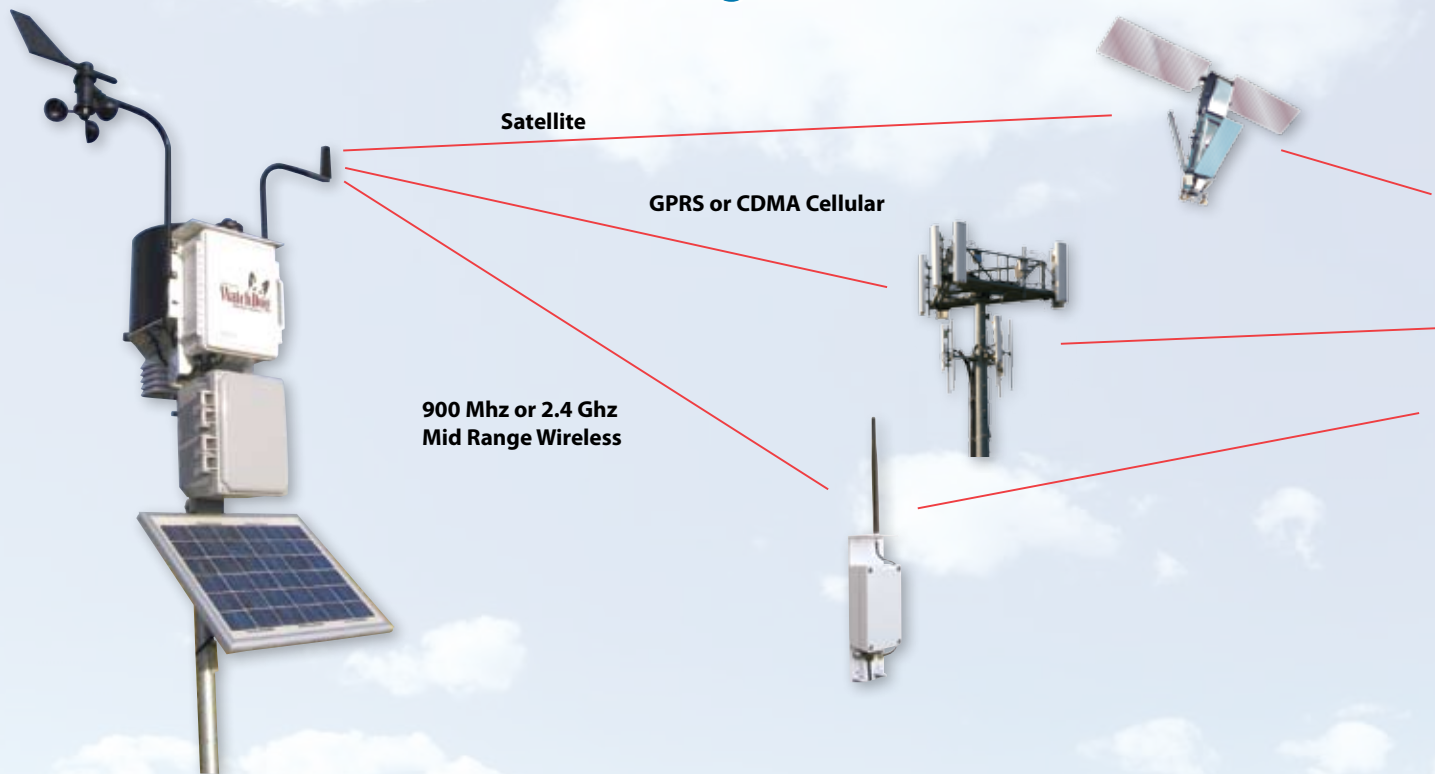


Alarm Output Module
Trigger external device based on a sensor reading.
Item 3672



WatchDog® Wireless Communication Options

Connect Your WatchDog Station to Your World!



Let us configure a WatchDog communication system that meets your needs - Call us today!

GPRS or CDMA Cellular

If you can talk on your cell phone, your weather data can reach the web from where you grow.

- Item 3388GU WatchDog Comm GPRS - USA
- Item 3388GE WatchDog Comm GPRS - World (International)
- Item 3388C WatchDog Comm CDMA

Satellite

The WatchDog Satellite communications system gets your weather data to the web - anywhere there's sky.

- Item 3388S WatchDog Comm Satellite

900 Mhz or 2.4 Ghz - Mid Range Wireless

Send your data to the web using spread-spectrum wireless to a network-attached base station and avoid recurring transmission charges.

- Item 3391LAN Wireless Base LAN



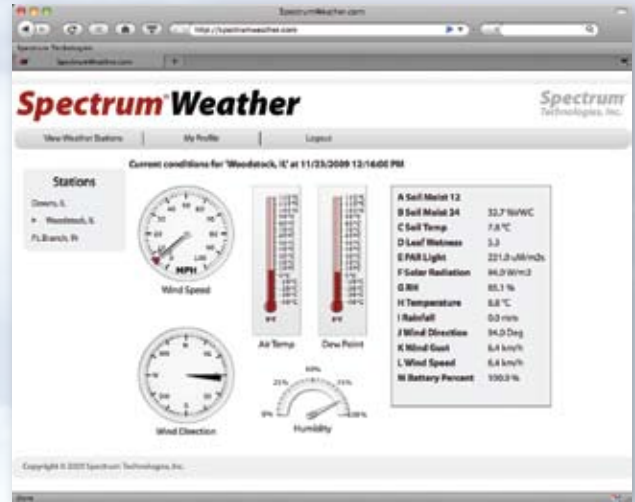
Transport your weather data from your 2000 Series Stations or 1000 Series Loggers to your host PC.

- 2000 Series Data Shuttle
- Item 3679WD1

SpectrumWeather

- See current conditions for all your stations
- Customize sensor and station names
- Control who sees how much of your data
- Download data to SpecWare 9 Pro for reports (page 18)

Item 3650 SpectrumWeather.com
(1-Year Subscription)



ENVIRONMENT

FROST ALERTS!



- Receive text messages when limits are reached
- Define limits for frost and other alerts
- Requires SpectrumWeather.com subscription

Item 3650A SpectrumWeather.com Text Alerts
(1-Year Subscription)

Or send data to your server!

Wireless - Direct to your PC



Short Range Wireless - up to 1,000 ft (300 m)

Spend less time retrieving data from your weather stations. Connect your PC to one or more remote weather stations up to 1,000 ft (300 m) away. Set it up indoors, or head for the fields in your vehicle with your laptop, base station, and optional power adapter for "drive-by wireless". The base station includes a 6 ft serial cable, and connectors for a standard cat-5 cable to extend up to 50 ft (15 m) from the PC. The remote radio mounts within the station's enclosure for greater protection and ease of field implementation. Remote radios include whip antenna, solar panel and rechargeable batteries.

- Item 3392B [Short Range Wireless Base Station](#)
- Item 3392W [Short Range Wireless For Remote Weather Station](#)
- Item 3392M [Short Range Wireless For Remote Mini Station](#)
- Item 3392PA [Vehicle Power Adapter](#)



Mid Range Wireless - 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. The base station features a weatherproof case and 50 ft (15 m) cable to allow high mounting for the greatest range. Remotes include whip antenna, solar panel and rechargeable batteries.

- Item 3391B [Mid Range Wireless Base Station](#)
- Item 3391W [Mid Range Wireless For Remote Weather Station](#)
- Item 3391M [Mid Range Wireless For Remote Mini Station](#)

- Optional Yagi antennas increase line of sight range to 7 mi (11 km)
- Item 3390YAGI8 [8.2 DBi Yagi Antenna \(cable required\)](#)
- Item 3390CABLE10 [Yagi Antenna Cable - 10 ft \(3 m\)](#)
- Item 3390CABLE20 [Yagi Antenna Cable - 20 ft \(6 m\)](#)



Above items are 900 Mhz; 2.4 Ghz also available for international use

SpecWare™ Software and Disease Models



Spec 9 Pro Software

Powerful Tools - Easy to use

- Download data from SpectrumWeather.com
- Enter the adjustment values for calibrated sensors, and Spec 9 Pro will apply them before saving the data.
- Graph on-the-fly with an interactive graphing window.
- Build, customize and save your most important report formats or choose from thirteen 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 mobile phone or pager 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, setting English or other languages, and Metric or US measurements.

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

Connect WatchDog Stations and Loggers to PCs or laptops lacking a serial port

Item 3661USB

USB-to-Serial Adapter

COMPARING SPEC 9 BASIC TO SPEC 9 PRO

	Basic	Pro
View Data		
On-demand graphing	✓	✓
Manage Data		
Download data from SpectrumWeather		✓
Calibration adjustment		✓
Automatic data append	✓	✓
Single file per logger	✓	✓
International data format	✓	✓
Log option for web uploads		✓
Reports		
Standard reports	✓	✓
Custom reports		✓
Sensor (frost) alarm		✓
"Pest Alert" report models		OPT
Communications		
Direct connect or modem	✓	✓
Wireless capability		✓
Dial up modem		✓
Auto download		✓
Supported Products		
2000 Series Stations		✓
Data Loggers	✓	✓

Keep your software up to date!
Download free updates at
www.specmeters.com

Spec 9 Basic Software

- Easily download, analyze and produce basic reports from your weather data collected on WatchDog Data Loggers and older series WatchDog Weather Stations
- Eliminate valuable time exporting the data and performing calculations in tedious spreadsheet programs
- Spec 9 Basic automatically assigns each WatchDog Data Logger or Weather Station to its own "logger location" directory, which is appended every time you download new data
- Includes CD, PC interface cable and manual

Spec 9 Basic does not support disease models or the 2000 Series Weather Stations

Item 3654B9

Spec 9 Basic Software

Item 3654B9X

Spec 9 Basic Extra User License

Item 3654B9U

Spec 9 Basic Upgrade

Connect WatchDog Stations and Loggers to PCs or laptops lacking a serial port

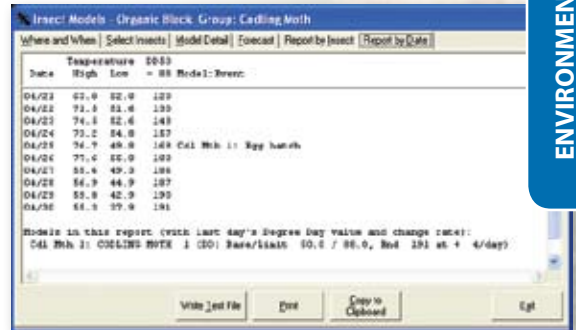
Item 3661USB

USB-to-Serial Adapter

Spec 9 Pro Models

Disease and Insect Models

- Become more proactive in the fight against disease and insects by adding a disease and insect forecast module to your Spec 9 Pro software
- Save money by spraying only when necessary
- Quickly produce the documentation needed to support your IPM decisions
- 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



Codling Moth Insect Model

ENVIRONMENT

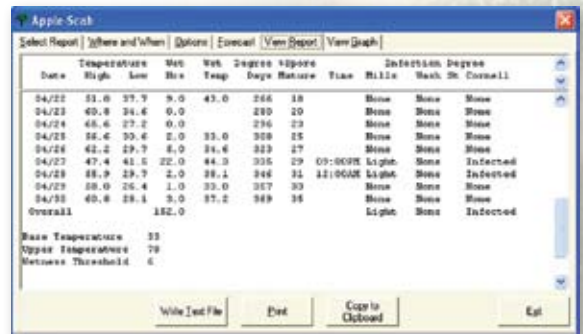
Forecast Model Packages

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 3656AP Apple/Pear Alert Package

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



Apple Scab Report

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

Item 3656PO Potato Alert Package

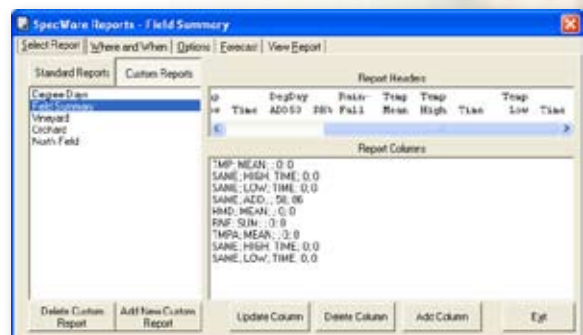
Required Sensors: Temperature, relative humidity and rain
Models Included: Early Blight
 Late Blight (BliteCast)
 Insect Models

Item 3656TO Tomato Alert Package

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

Item 3656CH Cherry Alert Package

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



Custom Reports

*Displayed on WatchDog 2000 Series Mini Stations

WatchDog® Sprayer Station




WatchDog Sprayer Station



Reduce pesticide drift complaints...and monitor your current conditions

Effective management of pesticide drift is increasingly important to pesticide applicators. Now you can monitor 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.

- Smaller than a can of soda, this all-in-one weather station measures air temperature, humidity, dew point, wind chill, barometric pressure and apparent wind speed and direction
- It 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

The WatchDog Sprayer Station is more than a compact and capable weather station. While on-the-go, the station uses its internal compass and GPS to adjust the wind sensor values by subtracting the vehicle speed and direction to compute the true wind speed and direction.

Display current conditions:

Wind speed & direction, temperature, humidity, barometric pressure and GPS parameters (vehicle speed & direction, location and satellite signal strength) Continuously log your weather parameters at a user-selectable rate or hit the snapshot button to capture current conditions.

The WatchDog Sprayer Station with console includes the sensor unit with magnetic mount, display console with built-in data logger, CD with all software, 21 ft (7 m) cable with vehicle power and serial connectors.

Three display/logging options



Sprayer Station Console



Windows Mobile PDA
or Windows Laptop



Integrates with
Raven Viper Pro



Item 3349SSC
Item 3349SS

WatchDog Sprayer Station with Console
WatchDog Sprayer Station

Includes display/logging program for Windows Mobile PDA or Windows Laptop

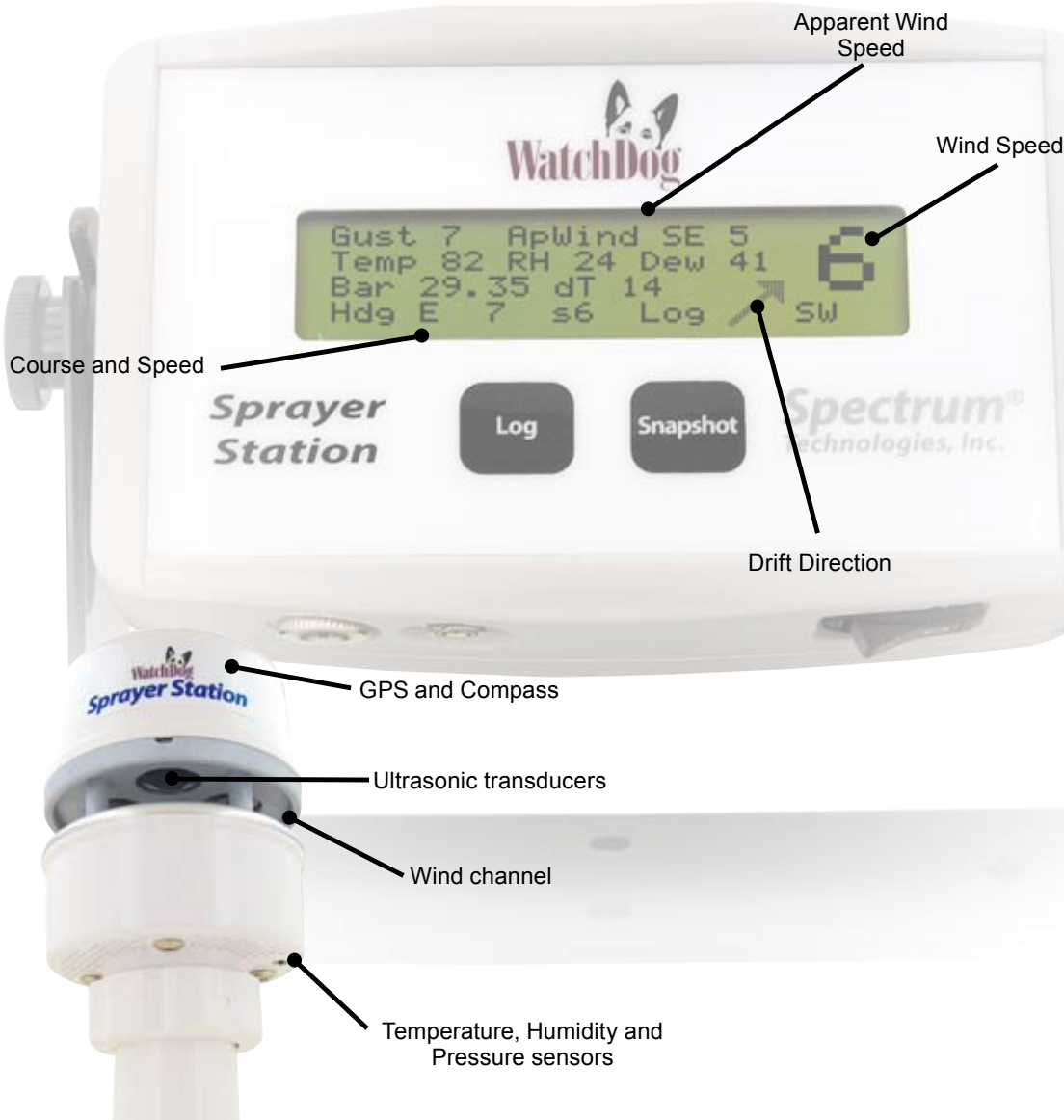
Item 3349CN

WatchDog Sprayer Station Console

Console displays & logs conditions and downloads them to your PC

Item 3661USB

USB-to-Serial Adapter



Ground condition monitoring



SPECIFICATIONS FOR SPRAYER STATION

- Wind Speed Range:** 0.6 to 114 mph (1 to 184 km/h)
- Wind Speed Resolution:** 0.1 mph (0.2 km/h)
- Wind Speed Accuracy:** ±1.1 mph (±1.9 km/h) or ±4% @ 32 - 122°F (0-50°C)
- Wind Direction Resolution:** 1°
- Wind Direction Accuracy:** ±1.5° above 32°F (0°C)
- Operating Temperature:** -22° to 122°F (-30° to 50°C)
- Temperature Accuracy:** ±2.7°F (±1.5°C) with wind above 2.3 mph (3.7 km/h)
- Relative Humidity Range:** 10 to 95%
- Relative Humidity Accuracy:** ±5% with wind above 2.3 mph (3.7 km/h)
- Barometric Pressure Range:** 25 to 34 in-Hg (850 to 1150 hPa)
- Barometric Pressure Accuracy:** ±1.5%
- Power Supply Voltage:** 10 to 16 VDC

"Wouldn't be without it! It works great for seeing which way the wind is going around small bush areas by high dollar crops. It will change how you spray. When you see super dry air coming in (under 20%) you can change water volume to compensate...A custom applicator looked at mine and is putting 2 in his machines."

Doug Pettman
Underhill Farm Supply
Ontario, Canada

Rain Gauges and Hand-Held Meters



Digital Tipping Bucket Rain Gauge

Provides NWS accuracy with a self-emptying design

- High accuracy, low-maintenance tipping bucket rain collector
- Meets NWS guidelines with an 8 in (20.5 cm) diameter collector
- Automatically records and displays up to 9.99 in (25 cm) of rain
- Includes long-life lithium battery and 60 ft (18 m) of cable
- Displays in inches only

Item 3525R

Digital Tipping Bucket Rain Gauge



Wireless Rain Collector With Temperature

- Cumulative and daily precipitation totals for up to seven days
- Collector can be placed up to 100 ft (30 m) from the main unit
- Includes indoor and wireless outdoor thermometers and rain alarm
- LCD displays in/mm rainfall

Item 3526WT1

Wireless Rain Collector with Temperature



ET Gauge

Optimizes your water use

- Monitor your crop and soil water loss through evapotranspiration
- Helps you know precisely when to irrigate
- Fill it with distilled water and check the level periodically
- Stands approximately 2 ft (0.6 m) tall

Item 3710

ET Gauge



3440



3445

Temp/RH/CO₂ Meters

- Monitor indoor air quality and carbon dioxide levels in greenhouses
- Displays temperature, relative humidity and CO₂ simultaneously
- CO₂: 0 to 2,000 ppm, Accuracy: ±5%
- Temperature: 14 to 140°F (-10° to 60°C), Accuracy: ±0.9°F (±0.9°C)
- RH: 0.0% to 99.9%, Accuracy: ±3%

Item 3440

Handheld Temp/RH/CO₂ Meter
(includes 4 AA batteries)

Item 3445

Wall-mount Temp/RH/CO₂ Meter
(includes 100-220VAC to 12VDC adapter)

Digital Wind/Temp Meter

- Essential for pesticide applicators
- Palm sized, tough and affordable
- Compact temperature and wind meter detects the slightest wind movement
- Measures mph, m/s, km/h, knots, ft/m
- Averages wind speed every 2 seconds
- Features auto power off and hold button
- Wind speed: 0.5 - 44.7 mph (0.8 - 72.0 km/h) (Accuracy $\pm 5\%$)
- Temperature 32 - 122°F (0 - 50°C) (Accuracy $\pm 1^\circ\text{F}$)
- RH: 10 - 95% (Accuracy $\pm 4\%$)

Item 3141 Digital Wind/Temp Meter
 Item 3145 Digital Wind/Temp/RH Meter



3141

3145

ENVIRONMENT

Temperature/RH Pens

- Fast and accurate temperature and humidity readings from a pocket sized meter
- Features °F or °C scales, min/max memory, data hold and auto power-off
- Patented rotating cap to protect the sensor
- CR2032 battery included
- Item 3402 also displays dew point and wet bulb temperature
- Temperature: 14 to 140°F (-10 to 60°C), Accuracy: $\pm 1^\circ\text{F}$ ($\pm 0.6^\circ\text{C}$)
- RH: 5 to 95% (3401), 0 to 100% (3402), Accuracy: $\pm 3\%$

Item 3401 Temperature/RH Pen
 Item 3402 Temperature/RH/Dew Point/Wet Bulb Pen



3401

3402

IR Crop Temp Meter

- Infrared technology makes difficult measurements fast, easy and affordable
- An excellent tool for measuring the temperature of turf and plant canopies
- Use selectable laser pointer to identify target spot
- Backlit LCD display
- Includes 9V battery, wrist strap and case
- Distance to Target Ratio: 8:1
- Fixed emissivity: 0.95
- Temperature: -40 to 600°F (-40 to 316°C), Accuracy: $\pm 2\%$ or $\pm 3.6^\circ\text{F}$ ($\pm 2^\circ\text{C}$)

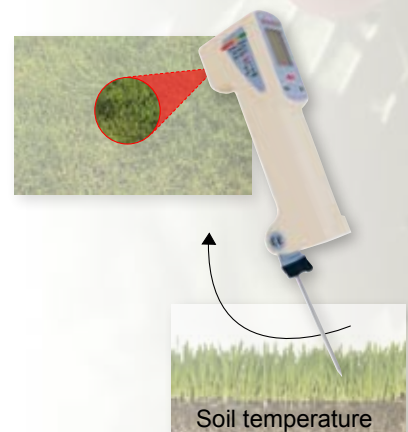
Item 2956 IR Temp Meter



IR Crop Temp/External Soil Temp Meter

- One lightweight handheld device easily measures both leaf and soil temperatures
- Backlit LCD display
- Includes 9V battery, wrist strap and case
- Distance to Target Ratio: 3:1
- Fixed emissivity: 0.97
- IR Temperature: -40 to 149°F (-40 to 65°C), Accuracy: $\pm 2^\circ\text{F}$ ($\pm 1^\circ\text{C}$)
- Probe Temperature: 23 to 149°F (-5 to 65°C), Accuracy: $\pm 1^\circ\text{F}$ ($\pm 0.5^\circ\text{C}$); -40 to 23°F (-40 to -5°C), Accuracy: $\pm 2^\circ\text{F}$ ($\pm 1^\circ\text{C}$)

Item 2958 IR Temp/External Temp Meter



Soil temperature

LightScout™ Light Meter

New!**LIGHTSCOUT™ DLI 100 Light Meter**

Measure the light "falling" on your plants

- Simple, one button operation
- Displays light intensity levels every 10 seconds for 24 hours
- An affordable, first step in measuring light
- Measure PAR light (Photosynthetically Active Radiation)
- With the push of a button, the meter runs for 24 hours and calculates your Daily Light Integral (DLI)
- Real-time intensity levels are shown every 4 seconds in $\mu\text{mol m}^{-2} \text{s}^{-1}$ (or footcandles)
- Packaged in sets of 3 light meters
- Battery included; water resistant

Item 3405

LightScout DLI 100 Meter (set of 3)



Actual Size



"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 (500 to 1,000 fc)	Poor quality
Low	5 to 10	200 to 400 (1,000 to 2,000 fc)	Minimum acceptable quality
Medium	10 to 20	400 to 800 (2,000 to 4,000 fc)	Good quality
High	20 to 30	800 to 1,200 (4,000 to 6,000 fc)	Excellent quality
Very High (outdoors)	30 to 60	1,200 to 2,000 (6,000 to 10,000 fc)	Excellent quality

* Micromoles ($\mu\text{mol/m}^2 \text{s}$)
fc = foot candles

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.



Sold in sets of three (3). Position the meters throughout your greenhouse (or in different crops) and outside the greenhouse, too. Compare differences in light levels and the effect on plant growth and quality.



Simple way to monitor shaded or full sun golf greens

FieldScout® Light Meters

Light has economic value!

As the driving force for photosynthesis, light is fundamentally important to crop production. Plant growth and development is significantly influenced by both the quantity and the quality of light. Light energy is relevant to other factors too. The ET calculation (evapotranspiration) for irrigation scheduling uses solar radiation as a key variable. Leaf wetness periods or high humidity, which affect disease pressure, can be mitigated with sunny days versus cloudy days. It is essential that growers understand this important variable in order to efficiently produce quality plants.



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

ENVIRONMENT

FIELDSCOUT® Red/Far-Red Meter

Plants use the Red/Far-Red light ratio to determine how crowded they are, and grow tall or full accordingly.

- 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

Item 3412 FieldScout Red/Far-Red Meter

FIELDSCOUT® UV Meter

- Monitor critical UV radiation (250-400 nm) with this handheld meter
- Determine UV filtering capacity of greenhouse shades and glass barriers
- Range is 0-200.0 $\mu\text{mol m}^{-2} \text{s}^{-1}$ (full sunlight)

Item 3414F FieldScout UV Meter

FIELDSCOUT® Quantum 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 400-700 nm
- Range of 0-2,000 $\mu\text{mol m}^{-2} \text{s}^{-1}$
- Available in a variety of configurations for your convenience

- Item 3415F FieldScout Quantum Meter
- Item 3415FSE FieldScout Dual Solar/Electric Quantum Meter
- Item 3415FXSE FieldScout Dual Solar/Electric Quantum Meter - External Sensor
- Item 3415FQF FieldScout Quantum and Foot-Candle Meter

FIELDSCOUT® Foot-Candle Meter

- An affordable light measurement solution
- Displays immediate light level in terms of foot-candles
- Precision photo diode with cosine correction

Item 3413F FieldScout Foot-Candle Meter



3414F



3412



3415FXSE



Red/Far-Red Meter

FieldScout® Light Meters



FIELDSCOUT® External Light Sensor Meter

- Read any of Spectrum's light sensors, which come with 6 ft (2 m) cables
- Plug in a sensor, choose it on the LCD display, and start measuring UV, Quantum Light, or Solar Radiation
- Sensors can also be used with WatchDog Weather Stations and Data Loggers

Item 3415FX FieldScout External Light Sensor Reader

Light sensors sold separately:

Item 3668I Quantum Light Sensor (PAR Light)
 Item 3668I3 Quantum Light 3 Sensor Bar
 Item 3668I6 Quantum Light 6 Sensor Bar
 Item 3670I Silicon Pyranometer Sensor (Solar Radiation)
 Item 3676I UV Sensor

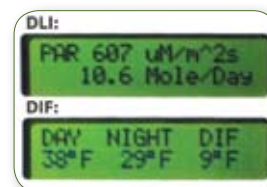
WatchDog® Model 2475 Plant Growth Station

- Measure light intensity, DLI, average temperatures, degree days and more!
- Monitor and record temperature, humidity and light conditions anywhere
- Easily check current and up to 12-months of historical data on the LCD display
- Calculate Daily Light Integral and compare to university guidelines (from your extension or at www.specmeters.com)
- **Requires SpecWare software (page 18)**

Item 3686WD WatchDog Model 2475 Plant Growth Station

Date	Time	Temp	Humidity	Light	DLI	Temp	Humidity	Light	DLI
2008-01-01	00:00	65.0	65	100	10.0	65.0	65	100	10.0
2008-01-01	01:00	65.0	65	100	10.0	65.0	65	100	10.0
2008-01-01	02:00	65.0	65	100	10.0	65.0	65	100	10.0
2008-01-01	03:00	65.0	65	100	10.0	65.0	65	100	10.0
2008-01-01	04:00	65.0	65	100	10.0	65.0	65	100	10.0
2008-01-01	05:00	65.0	65	100	10.0	65.0	65	100	10.0
2008-01-01	06:00	65.0	65	100	10.0	65.0	65	100	10.0
2008-01-01	07:00	65.0	65	100	10.0	65.0	65	100	10.0
2008-01-01	08:00	65.0	65	100	10.0	65.0	65	100	10.0
2008-01-01	09:00	65.0	65	100	10.0	65.0	65	100	10.0
2008-01-01	10:00	65.0	65	100	10.0	65.0	65	100	10.0
2008-01-01	11:00	65.0	65	100	10.0	65.0	65	100	10.0
2008-01-01	12:00	65.0	65	100	10.0	65.0	65	100	10.0
2008-01-01	13:00	65.0	65	100	10.0	65.0	65	100	10.0
2008-01-01	14:00	65.0	65	100	10.0	65.0	65	100	10.0
2008-01-01	15:00	65.0	65	100	10.0	65.0	65	100	10.0
2008-01-01	16:00	65.0	65	100	10.0	65.0	65	100	10.0
2008-01-01	17:00	65.0	65	100	10.0	65.0	65	100	10.0
2008-01-01	18:00	65.0	65	100	10.0	65.0	65	100	10.0
2008-01-01	19:00	65.0	65	100	10.0	65.0	65	100	10.0
2008-01-01	20:00	65.0	65	100	10.0	65.0	65	100	10.0
2008-01-01	21:00	65.0	65	100	10.0	65.0	65	100	10.0
2008-01-01	22:00	65.0	65	100	10.0	65.0	65	100	10.0
2008-01-01	23:00	65.0	65	100	10.0	65.0	65	100	10.0
2008-01-02	00:00	65.0	65	100	10.0	65.0	65	100	10.0

SpecWare plant growth report



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

WatchDog® WeatherTracker Model 305 Greenhouse Growth Tracker

No Computer Needed

- Keep tabs on the conditions affecting your plants
- Temperature sensor tracks degree-days
- Quantum light sensor measures your plants' light exposure over time (in moles/day)
- Comprehensive tool to assess physiological maturity of your plants
- Stand-alone device – see important information on the LCD screen – without a PC
- One-button review of 30-days of values and 12-months of summaries
- LCD display (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

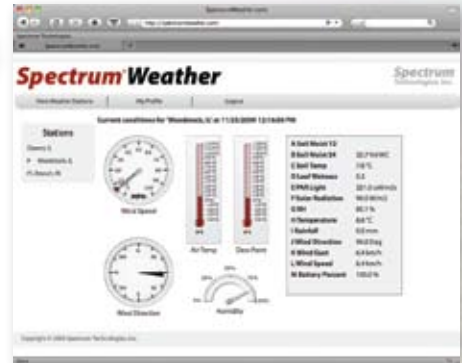
Frost Alarms

Spectrum Weather

FROST ALERTS!

- Receive text messages from SpectrumWeather.com
- Define temperature limits for frost or other sensors
- Requires SpectrumWeather.com subscription (see page 17)

Item 3650A SpectrumWeather.com Text Alerts
(1-Year Subscription)



ENVIRONMENT

WatchDog Frost Alert

- Spot frost conditions easily in your vineyard or orchard
- When the temperature approaches 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 Frost Alert

Frost Alert alarm colors



Temperature Alarms and Dialers

Sensaphone Alarm and Dialer

- Remote frost & security alarm alerts you to weather events or equipment failures that can result in crop loss
- Monitor up to 4 sensors
- Calls up to four pre-programmed numbers to alert you to unsafe conditions
- Call in to check current conditions or listen to on-site sounds
- Powered by 110V Adapter (included) or on six C batteries (not included)

Item 3420A Sensaphone 400 Frost Alarm System
Item 3421 Temp Sensor -20° to 150°F (-29° to 66°C)



3420A

ThermAlarm III

- Hermetically sealed magnetic switches trigger an alarm condition

Item 3424 ThermAlarm III

AutoDialer

- Dials up to four phone numbers with a pre-recorded message when actuated by opened or closed circuit
- Auto Dialer runs on battery (not included) or AC Adapter

Item 3419 AutoDialer
Item 3419AC AC Adapter (110V)



3424 and 3419

WatchDog Wireless Crop Monitor



WatchDog Wireless Crop Monitor



- Monitor temperature and humidity wireless
- Wireless sensing units transmit up to 1,000 ft (300 m)
- Add up to 15 additional sensing units

Monitoring Unit:

- Receives the transmitted data from the wireless remote sensing units
- Displays the current temperature and humidity values
- Define high or low temperature conditions which will trigger the red alarm indicators and sound a real-time alarm

Wireless Remote Sensing Unit:

- Measures the temperature and humidity value
- Transmits the data wirelessly over the 426MHz radio frequency band
- Uses 2 AA batteries (included)
- Remote units require a radiation shield
- Temperature-Only Remote Sensing Units feature an external sensor port to connect an External Temperature, PAR Light or Leaf Wetness sensor



Starter Packages – Include 1 Base Unit and 1 Remote Unit:

Item 3540 [WatchDog Wireless Crop Monitor - Temp/RH](#)

Item 3545 [WatchDog Wireless Crop Monitor - Temp](#)

Additional Remote Units, Sensors, and Accessories:

Item 3541 [WatchDog Remote Temp/RH Unit](#)

Item 3546 [WatchDog Remote Temp Unit](#)

Item 3663WCM [WatchDog Radiation Shield \(required\)](#)

Item 3542 [External T/RH Sensor with 6 ft \(2 m\) cable \(for 3541\)](#)

Item 3667 [External Temp Sensor \(for 3546, requires SpecLog\)](#)

Item 3668WCM [PAR Light Sensor \(for 3546, requires SpecLog\)](#)

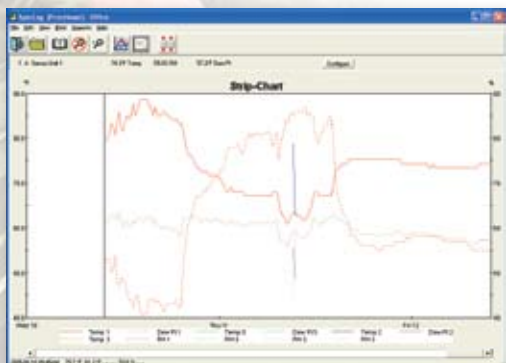
SpecLog™ Crop Monitor Software

SpecLog works hand-in-hand with your Wireless Crop Monitor system by recording your weather data on to your PC, giving you the ability to produce the reports that you need to evaluate and manage your plants' growth. It can also monitor multiple alarm conditions, sending alert notifications to a phone or pager.

Reports include:

- T/RH hours
- DIF temperature
- Daily & monthly summaries
- DLI: Daily Light Integral
- Degree-days

Item 3653 [SpecLog Crop Monitor Software](#)



Water Quality

Multi-Parameter U-50 Series Meters

Design and performance that makes measurement easy for a wide variety of applications

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
- Backlight display

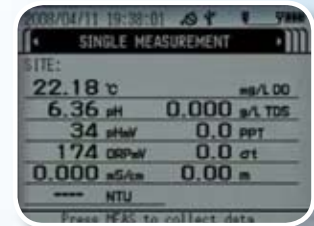
Sensor Probe Unit Features:

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



ENVIRONMENT



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			✓		✓

Water Quality

Multi-Function D-54 Meter

Provides lab accuracy in a durable, in-field model

The D-54 is a multi-function pH/temperature/ORP/conductivity meter with PC/printer output capability. With a waterproof casing, automatic temperature compensation and shock/break resistant pH electrode, the D-54 is ideal for measurement in severe environments.

Includes meter, pH and conductivity electrodes, calibration standards and 9V battery.



SPECIFICATIONS FOR D-54 PH/EC Meter

Range: pH - 0 - 14

Conductivity: 1 μ S/cm to 100 mS/cm mV — \pm 1999

Calibration: pH — one to three points automatic

Accuracy/Repeatability: \pm 0.01 pH \pm 1 digit

Conductivity: \pm 0.05% ES or EC

Auto Temp Compensation: 0° to 100°C

Item 2172

D-54 pH/EC Meter System

Item 2173

pH Electrode Replacement

Item 2174

Conductivity Electrode Replacement

ORP Meter

ORP (oxidation reduction potential, also known as redox) measurement is used to indicate the presence of oxidizing or reducing conditions in water. This technology has gained recognition worldwide and is found to be a reliable indicator of bacteriological water quality.

Some applications for ORP or redox measurement include chlorine testing, bleaching operations, estimation of bacteria kill times, or reduction of chromate wastes. For example: with a value of 600mV, the life of E.Coli in water is about 2 minutes; with a value of 700, the bacteria is killed in seconds.

This handheld ORP meter is designed for the field, combining accurate electronics and a rugged, field-ready design.

Features:

- ORP measurement from -999 to 999mV with a resolution of 1mV, +/-4mV accuracy.
- Automatic electronic self-calibration and data validation.
- Simulated analog bargraph display of ORP reading change.
- Waterproof floating case



Item 2010

ORP Meter

Item 2011

ORP Replacement Sensor

Dissolved Oxygen Meter

This heavy duty meter provides a dual display of oxygen concentration and temperature, making it an ideal tool for in-field and laboratory water monitoring requirements. Typical applications include industrial and municipal waste water monitoring, aquariums, fish hatcheries, and other environmental applications.

The meter also monitors oxygen in air for indoor air quality and confined space applications. Features automatic temperature compensation. Both oxygen and temperature readings are simultaneously displayed.

Features:

- Measures dissolved oxygen, oxygen, and temperature
- Min/Max/Avg, Data Hold, Auto Power Off
- Automatic Temperature Compensation
- Large 1.4" (36mm) LCD display
- Built-in RS-232 PC interface with optional Data Acquisition Software and Datalogger

The Heavy Duty Dissolved Oxygen meter comes with a polarographic probe with a built in temperature sensor, battery, spare membranes, and electrolyte - all in a hard carrying case ready for in-field dissolved oxygen testing.



- 2005 [Dissolved Oxygen meter](#)
- 2007 [Replacement Membrane for DO meter \(5 per pack\)](#)
- 2008 [Replacement KCl Solution](#)

Waterproof Chlorine Meter

Fast and easy to use, and a great alternative to the messy powders currently being used with color dependent meters. Simply drop a reagent tablet into your solution, shake to dissolve, and then insert your meter for direct measurements.

Designed with a waterproof, rugged housing and flat surface electrode that can withstand harsh environments while offering lab precision accuracy-no matter where you take your readings. Unlike colorimeters, the revolutionary new direct measurement technique takes quantitative measurements — which means it is not affected by light, scratched vials, color or turbidity of samples. Specially designed to eliminate error factors to give you precise readings wherever a measurement is needed.

- Item 2015 [Waterproof Chlorine Meter](#)
- Item 2016 [Reagent Tabs - 10pk \(100 tests\)](#)
- Item 2017 [Chlorine Standard - 1ppm - 3 ampules](#)



PESTS AND DISEASES



- **Pest and Diseases:**
Insects and Diseases

THE IMPORTANCE OF PEST AND DISEASE MANAGEMENT...

Pests and diseases can reduce plant quality and yield. Protect your plants by submitting environmental conditions to disease and insect models. These models forecast disease and insect pressure using field-tested and validated algorithms. Forecasts can assist pesticide application timing, facilitate an IPM approach and improve plant health.



WatchDog WeatherTrackers

No computer required

- 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
- A solar radiation shield and 15-minute degree-day data point interval results in exceptionally accurate degree-day calculation

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

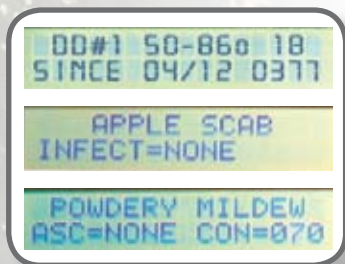
LCD display:

- 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 DIF temperature aid in growing greenhouse plants)
- 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



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

IPM Scopes



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



IPM Scope

Portable digital microscope solution at an affordable price

- Combines a digital camera, precision optics and LED lighting into a powerful handheld microscope
- Connects to your computer's USB port
- 40X and 140X magnification
- View magnified image right on your computer screen
- Includes software required to capture and archive your still images
- Software allows you to customize your images with labels, markers, time stamps and measurement scale
- Archive still images or send files via e-mail
- 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

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	

View the online presentation of the IPM Scope at:

www.specmeters.com/videos



New!

IPM Scope CAM

View images in the field

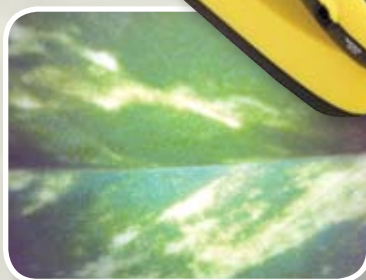
The 5 megapixel IPM Scope CAM allows you to capture high resolution pictures and videos in the field. View pictures instantly on the built-in LCD display and then transfer them via SD CARD or USB cable to a PC. The LED lighted unit magnifies objects by 3-25X on the display and up to 300X digitally on a PC. The scope has a battery life of up to 5 hours and folds to a compact size.

- Easy to use touch pad controls
- 6 built in white-light LED's with adjustable illumination
- Rechargeable lithium ion battery
- Rotatable lens tube
- 2 inch LCD display

Item 2860CAM	IPM Scope CAM
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SPECIFICATIONS FOR IPM SCOPE CAM

Image Sensor: 1/2.5 in CMOS	Pixels: 5.1 M
Power: Rechargeable lithium	Light Source: White-light LEDs
Magnification: Digital zoom: 1x to 4x	
Optical zoom: 3x to 13x	



Macroscopes

Macroscopes

- Macroscope 25 provides 25X magnifications 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
Item 2852

Macroscope 25 with hard carrying case
Macroscope 45 with hard carrying case



Refractometers

Digital Refractometer

Easy and convenient to use

- 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
- Operates on two AAA batteries

Item 2812

Digital Refractometer



Handheld Refractometers

Perfect for field or lab

- Measures Brix from 0 to 32.0% (Accuracy $\pm 0.5\%$)
- 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
Item 2806

Refractometer 0–32% Brix
Refractometer 0–32% Auto Temp. Comp.



NUTRIENT MANAGEMENT



• Nutrition:

Nutrients, Chlorophyll and pH Levels

THE IMPORTANCE OF NUTRIENT MANAGEMENT...

All crops require proper nutrient levels to maintain top quality and achieve maximum economic yield. Measure NO_3^- , Na^+ , K^+ , chlorophyll, pH and EC to monitor nutrients in the soil and plant. Measurements can be made quickly, accurately and easily with in-field handheld meters. Immediately analyze soil or plant tissue and increase profits with well timed fertilizer applications that produce a higher quality crop.

Why measure nitrogen?

Nitrogen is essential for healthy and high yielding crops. The current cost of nitrogen fertilizers requires growers to make well-educated and accurate decisions regarding when and how much nitrogen is needed. Immediate in-field testing determines how much nitrate is already present, minimizing the possibility of wasted fertilizer.



Cardy Twin Nitrate Meter

Put the power of a laboratory right in your hands

- Measure nutrient solutions, soils, greenhouse soilless media, water samples and tissue sap
- Waterproof pocket-sized meter
- Sensor stores dry and is field replaceable
- Measures from 14 to 1,400 ppm
- Accuracy correlates well with laboratory analysis
- Includes two CR2032 batteries, case and calibration standards

Item 2305G

Cardy Nitrate NO_3^- (Meter Only)

Item 2345

Replacement Nitrate Sensor

Item 2311

450 ppm NO_3^- -N Standard
(6 - 14 mL bottles)

Item 2312

34 ppm NO_3^- -N Standard
(6 - 14 mL bottles)

Item 2330

Soil NO_3^- Kit w/30 Samples



SPECIFICATIONS FOR CARDY NITRATE METER

Measurement Principle: Ion electrode method

Sample Volume Required: 0.3 mL to 2.0 mL

Measurement Range: 14 to 1400 ppm NO_3^- -N (62 to 6200 ppm NO_3^-)

Calibration (2 Point): 450 ppm NO_3^- -N (2000 ppm NO_3^-)

34 ppm NO_3^- -N (150 ppm NO_3^-)

Reproducibility: $\pm 10\%$

SAMPLE GUIDELINES – (UC Davis)

Crop: Tomato

Stage	Dry Wt. Nitrate-N	Sap Nitrate-N
First bloom	10,000–14,000 ppm	700–900 ppm
1-inch fruits	8,000–9,000	500–600
First harvest	5,000–6,000	400–500
Final harvest	3,000–4,000	300–400

University guidelines available for your vegetable crop at www.specmeters.com.

Cardy Potassium & Sodium Meters

- Exceptionally small and portable
- Sensor stores dry and is field replaceable
- Automatic range switching from 0 to 9,900 ppm
- Accuracy correlates well with laboratory analysis
- Includes carrying case, standards, accessories and a 15-sample soil test kit (except "G" models)

Nutrient Measurement Units

- Item 2400 Cardy Potassium K⁺ Meter
- Item 2400G Cardy Potassium K⁺ (Meter Only)
- Item 2500 Cardy Sodium Na⁺ Meter
- Item 2500G Cardy Sodium Na⁺ (Meter Only)

Soil Kits and Accessories

- Item 2434 Soil K⁺ Kit w/30 Samples
- Item 2535 Soil Na⁺ Kit w/30 Samples
- Item 2125 Sampling Sheets – 2 Rolls
- Item 2135 Sampling Sheets – 4 Rolls

Standards – Replenishments

- Item 2414 150 ppm K⁺ DI 30 mL
- Item 2418 2,000 ppm K⁺ DI 30 mL
- Item 2510 Solution Set – Na⁺

Replacement Sensors

- Item 2440 K⁺ Potassium Sensor
- Item 2540 Na⁺ Sodium Sensor



PETIOLE POTASSIUM SUFFICIENCY LEVELS (University of Florida)

Crop: Greenhouse Tomato

Dry Wt. Potassium - K ⁺	Stage
4,500 - 5,000 ppm	Transplant to second fruit cluster
4,000 - 5,000	Second cluster to fifth fruit cluster
3,500 - 4,000	Harvest season (Dec. - June)

University guidelines available for your vegetable crop at www.specmeters.com.

NUTRIENT MANAGEMENT

Handheld Plant Sap Press

- Use with Cardy meters or refractometers (page 33) for on-site testing
- Made of high quality, non-corrosive metal
- Includes cleaning device

Item 2725 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



pH Meters



Why measure pH?

pH levels are important in soils, irrigation water and spray tank water. Soil and water pH is the single most important aspect in determining nutrient availability to crops. pH levels in spray tanks determine the effectiveness of pesticides.

FIELDSCOUT® SoilStik pH 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. Ensures 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 environment
- Includes flat surface pH electrode, protective sensor cap, rinse bottle, two CR2032 batteries, 4 & 7 pH standard solutions and soft case

Item 2105
Item 2106
Item 2110

FieldScout SoilStik pH Meter
Flat Sensor, Replacement
Refill Solutions - pH 4 and 7, (2) 30 mL ea.



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

SPECIFICATIONS FOR SOILSTIK pH METER

pH: 0.00 to 14.00 pH

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

Resolution: 0.01 pH, 0.1°

Accuracy: ±0.01 pH, ±1.8°F/±1°C

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

Weight: 3.8 oz (110 g)



SoilStik shown in use with Item 6510, Model HC Soil Sampler (page 51)

Low Soil* pH Makes Fertilizers Work Less Efficiently

SOIL ACIDITY	NITROGEN	PHOSPHATE	POTASH	FERTILIZER WASTED
Extremely Acid 4.5 pH	30%	23%	33%	71.34%
Very Strong Acid 5.0 pH	53%	34%	52%	53.67%
Strongly Acid 5.5 pH	77%	48%	77%	32.69%
Medium Acid 6.0 pH	89%	52%	100%	19.67%
Neutral 7.0 pH	100%	100%	100%	00.0%

* Mineral soils



View the online presentation to learn how to use the SoilStik at:

www.specmeters.com/videos

IQ 150 pH Meter

Fast, easy and accurate soil pH measurement tool

- Make direct soil or solution pH readings with either a pointed-tip or pH/Temperature electrode
- Stainless steel probe stores dry
- Instant, accurate measurement of pH in soil media, water, or nutrient solutions
- Narrower (3/16 inch [0.474 cm]) point is ideal for small plug trays
- Engineered to withstand a 10 ft (3 m) drop onto concrete
- Automatic or manual temperature compensation
- 1- or 2-point calibration
- Includes one 9V battery

- Item 2162S **IQ 150 pH Meter with ISFET Probe**
- Item 2163S **ISFET Replacement Probe**
- Item 2164S **Field Carrying Case with pH Standards (required)**
- Item 2169 **AC Adapter, 110VAC**
- Item 2110 **Refill Solutions - pH 4 and 7, (2) 30 mL ea.**



SPECIFICATIONS FOR IQ 150 pH METER

pH Sensor: Stainless steel probe with silicon chip pH sensor

Range: pH - 0 to 14; mV - ±1999; Temp - 0° to 100°C

Calibration: One or two point, automatic

Accuracy/Repeatability: ±0.01 pH ± 1 digit

Auto Temp. Compensation: 0° to 100°C

View the online presentation
of the IQ 150 at:
www.specmeters.com/videos



NUTRIENT MANAGEMENT

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

Cardy Twin pH Meter

Ideal for testing irrigation water, pesticide water or rumen pH

- The dual-action sensor guard protects the electrode and captures samples from buckets and bodies of water
- Flat sensor allows measurement of small samples
- Auto calibrates to pH 4 and 7 standard solutions
- Sensor is replaceable and stores dry
- Automatic temperature compensation, waterproof, auto power-off
- pH range: 2.0 to 12.0 (Accuracy/Repeatability: ±0.1 pH)
- Includes case, two 3V batteries and pH 4 & 7 standards

- Item 2103A **Cardy Twin pH meter**
- Item 2110 **Refill Solutions - pH 4 and 7, (2) 30 mL ea.**
- Item 2143 **Twin pH Replacement Sensor**



pH Meters



FieldScout pH 110 shown with optional Flat End pH Probe

FIELDSCOUT[®] pH 110 Meter

- Two probe options available, flat end or pH/temp electrodes
- Geo-reference your data by connecting to any GPS receiver with serial output*
- 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 (page 46)
- Includes hard carrying case, software, PC cable, four AA batteries, and pH 4 and 7 standards

* Spectrum's PC cables connect to a 9-pin serial port. USB-Serial adapter (item 3661USB) required for connection to computers with only USB ports.

** 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.

Item 2120

FieldScout pH 110 Meter

Excludes pH Electrode – order separately

Item 2121

Combination pH/Temp Electrode

Item 2124FE

Flat End pH Electrode

For measuring the exposed surface of soil cores

Item 2950CV5

GPS/DGPS Cable

Item 3661USB

USB-to-Serial Adapter

Item 2110

Refill Solutions - pH 4 and 7, (2) 30 mL ea.

pH/mV Meter

- Economically measure soil surface or solution pH
- Flat-end or spear-tip probes options
- Backlit LCD screen
- Automatic temperature compensation (when ATC Probe is attached)
- Automatic buffer recognition,
- Hold function to capture current readings
- Recall of min/max readings.
- pH Range: 0.00 to 14.00 (Accuracy ± 0.02 pH)
- mV Range: -499 to 499 mV
- 6-month warranty on probe
- Includes a 9V battery, pH 4 and 7 calibration standards and hard case.

Item 2130

pH/mV Meter with pH ATC Probe

Item 2130M

pH/mV (Meter Only)

Item 2110

Refill Solutions - pH 4 and 7, (2) 30mL ea.

Item 2124FE

Flat-End Probe (Soils)

Item 2122

Spear-Tip Probe (Soils)

Item 2124

ATC pH Probe (Liquids)



EC Meters

Why measure EC?

The salinity of the soil, irrigation water or fertilizer solution is an important parameter affecting the root zone environment of your plants. Any of these factors can have a significant effect on plant growth and quality. The presence of high salt levels is your warning sign to make adjustments. Low-salt levels could lead to nutrient deficiencies. Don't wait for trouble, forecast before the damage shows in your plants.

FIELDSCOUT[®] EC 110 Meter

Geo-reference EC measurements with built-in data logger

- Combines Spectrum's patented direct-insert EC probe with a built-in data logger
- Accuracy of ± 2%
- Measurement ranges:
 - 0.00 - 199.9 µS/cm (resolution 1 µS/cm)
 - 0.0 - 19.9 mS/cm (resolution 0.01 mS/cm)
- Geo-reference your data by connecting to any GPS receiver with serial output*
- 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 (page 46)
- Includes software, four AAA batteries, PC interface cable and 2.76 mS/cm calibration standard

* Spectrum's PC cables connect to a 9-pin serial port. USB-Serial adapter (item 3661USB) required for connection to computers with only USB ports.

** 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.

- Item 2220** **FieldScout EC 110 Meter**
Excludes EC Electrode - order separately
- Item 2254** **Conductivity Standard 2.76 mS/cm**
- Item 2950CV5** **GPS/DGPS Cable**
- Item 3661USB** **USB-to-Serial Adapter**

- Probe Options**
- Item 2220FS** **8 in (20 cm) FieldScout EC Probe**
 - Item 2225FSP** **24 in (60 cm) FieldScout T-Handle EC Probe w/ Replaceable Tip**
 - Item 2266** **Replaceable Tip For T-Handle EC Probe**
 - Item 2220CC** **Conductivity Cell (Water)**



NUTRIENT MANAGEMENT



EC Meters



FIELDSCOUT[®] Direct Soil EC Meter

Instant and accurate direct EC measurement

- Patented paired sensor tip provides maximum soil-sensor contact and higher accuracy
- Sample directly in plug trays, pots, containers, or solutions
- 0 - 19.9 mS/cm (Accuracy \pm 2%, resolution 0.01 mS/cm)
- Automatic temperature compensation
- Includes case, battery and 2.76 mS/cm calibration standard

U.S. PATENT NO. 7,183,779

8 in (20 cm) Probe Option

- Item 2265FS** FieldScout Direct Soil EC Meter w/ 8 in Probe
- Item 2265PROBE** FieldScout EC 8 in Probe (Replacement)
- Item 2254** Conductivity Standard 2.76 mS/cm

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



Exclusive Paired Sensor



FieldScout Direct Soil EC Meter w/T-Handle

View the online presentation of the Direct Soil EC Meter at:
www.specmeters.com/videos



Cardy Twin EC Meter

Ideal for water quality and greenhouse applications

- Ultra-slim meter features push-button auto-calibration, and automatic temperature compensation
- Accurately measures even a single drop of saturated media extract
- Accuracy of $\pm 2\%$
- Measurement ranges:
 - 0.00 - 199 $\mu\text{S}/\text{cm}$ (resolution 1 $\mu\text{S}/\text{cm}$)
 - 0.0 - 19.0 mS/cm (resolution 0.01 mS/cm)
- Includes two CR2032 batteries, case and solution standard

- Item 2205** **Cardy Twin EC Meter**
Item 2210 **Cardy Twin EC Calibration Solution**
 (1.41 mS/cm)
Item 2242 **Replacement Sensor**



Waterproof EC Meter

- Measures four parameters; Conductivity, TDS, Salinity and Temperature
- 6 units of measure: $\mu\text{S}/\text{cm}$, 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: $\pm 2\%$
- Measurement ranges
 - Conductivity: 0.00 - 199 $\mu\text{S}/\text{cm}$, 200 - 1,999 $\mu\text{S}/\text{cm}$ or 2.00 - 19.99 mS/cm
 - TDS: 0 - 99.9 mg/L , 100 - 999 mg/L or 1.00 - 9.99 g/L
 - Salinity (fixed ratio of 0.5): 0 - 99.9 ppm, 100 - 999 ppm or 1.00 - 9.99 ppt
 - Temperature: 32 - 194°F (0.0 - 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 2251 **Conductivity Standard, 1.41 mS/cm , 230 mL**



NUTRIENT MANAGEMENT

Economy pH/EC Meter

- 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
- Includes handheld meter, calibration solution and carrying case

- Item 2182** **Economy pH/EC Meter**
Item 2183 **Replacement pH/EC Probe**
Item 2110 **Refill Solutions - pH 4 and 7, (2) 30 mL ea.**
Item 2251 **Conductivity Standard, 1.41 mS/cm , 230 mL**



Chlorophyll Meters

**Why measure chlorophyll?**

Chlorophyll is the green pigment that allows plants to photosynthesize. This process uses sunlight to convert carbon dioxide and water into the building blocks of plants. Because nitrogen is a part of chlorophyll, by measuring chlorophyll, one can indirectly measure the amount of nitrogen in the plant. This allows for more efficient scheduling of fertilizer applications.

FIELDSCOUT[®] CM 1000 Chlorophyll Meter



- Based on an exclusive patent license from NASA
- Detects stress earlier than visual monitoring
- “Point-and-shoot” technology to instantly measures relative chlorophyll content
- Laser guides outline the edges of the measured sample area
- Calculates and displays a running average for multiple readings
- Connects to any GPS receiver with serial output*
- 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 (page 46)

* Spectrum's PC cables connect to a 9-pin serial port. USB-Serial adapter (item 3661USB) required for connection to computers with only USB ports.

** 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.

Item 2950
Item 2950S

FieldScout CM 1000 Chlorophyll Meter
Software To Activate Data Logger
(includes PC cable)

Item 2950CV5
Item 3661USB

GPS/DGPS Cable
USB-to-Serial Adapter



$$\text{Chlorophyll Index} = \frac{\text{NIR}}{\text{R}} \times 100$$



Learn how we partnered with NASA to create the CM 1000:

www.specmeters.com/videos

SPECIFICATIONS FOR FIELDSCOUT CM-1000

Measurement Sample: Plant leaves, turf grass canopy

Measurement System: Reflectance; Ambient and reflected 700 nm and 840 nm light are used to calculate the relative chlorophyll index

Measurement Area: Conical viewing area between 12 and 72 in

Minimum Distance: 12 in (30.5 cm) from lens

Maximum Distance: Accuracy is unknown beyond 72 in from lens

Distance From Lens:	Sample Area (Diameter):
12 in (30.5 cm)	0.53 in (1.35 cm)
18 in (45.7 cm)	1.21 in (3.07 cm)
48 in (1.22 m)	4.65 in (11.8 cm)

Receptor: (4) photodiodes; (2) for ambient light and (2) for reflected light from the sample (leaf)

Measurement Units: Index of relative chlorophyll content; 0 to 999

Measurement Interval: 2 seconds per measurement

Repeatability: ±5% of reading

Data Logger: Requires software and PC interface cable; Capacity: 1,350 measurements with GPS/DGPS; 3,250 measurements without GPS/DGPS; nonvolatile memory

Battery/Life: 2 AAA batteries (included); approx. 3,000 measurements

SPAD 502 Plus Chlorophyll Meter

SPAD 502 Plus Chlorophyll Meters quantifies the health of your crops

- Instantly measures chlorophyll content or "greenness" of your plants on a scale of 0.0 to 99.9
- Non-invasive, non-destructive measurement
- **NEW** - Trend graph stores and displays up to 30 measurements.
- **NEW** - Waterproof design
- Compare in-field SPAD readings to university guidelines (available at www.specmeters.com)
- Research shows a strong correlation between SPAD measurements and leaf N content
- Available with or without a built-in data logger

Data-logging unit (2900PDL)

- Connects to any GPS receiver with serial output*
- 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 (page 46)

* Spectrum's PC cables connect to a 9-pin serial port. USB-Serial adapter (item 3661USB) required for connection to computers with only USB ports.
 ** 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.

- Item 2900P** **Minolta SPAD 502 Plus Chlorophyll Meter**
Basic version, no Data Logger
- Item 2900PDL** **Minolta SPAD 502DL Plus Chlorophyll Meter**
with RS-232 Data Port and Built-In Data Logger
(includes software)
- Item 2950CV5** **GPS/DGPS Cable**
- Item 3661USB** **USB-to-Serial Adapter**
- Item 2900CASE** **Hard Carrying Case**



2900P



NUTRIENT MANAGEMENT



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; 0.0 to 99.9



2900CASE

The SPAD 502 meter has been identified as the best plant diagnostic tool for nitrogen.

Blackmer, T.M., and J.S. Schepers. 1994. Techniques for monitoring crop nitrogen status in corn. *Commun. Soil Sci. Plant Anal.* 25:1791-1800.
 Scharf, P.C. 2001. Soil and plant tests to predict optimum nitrogen rates for corn. *J. Plant Nutr.* 24:805-826.



Non-invasive measurement with readings in less than 2 seconds

NDVI Meters



Why measure NDVI?

One indicator of plant stress is light absorption and reflectance. Since chlorophyll absorbs red light, low reflectance in this band indicates a healthy plant. Conversely, the cellular structure of healthy plants reflects light in the near infrared band. When plants are under stress, red band reflectance increases and near infrared band reflectance decreases. The Normalized Difference Vegetation Index (NDVI) is a unit of measure designed to factor both red and near infrared reflectance. NDVI measurements can range from -1 to 1, with higher values indicating greater plant health.

FIELDSCOUT[®] CM 1000 NDVI Meter

An essential tool for effectively managing your nitrogen program

- Detects stress earlier than visual monitoring
- "Point-and-shoot" technology to instantly measures red (660 nm) and near infrared (840 nm) spectral bands
- 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 with serial output*
- 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)

* Spectrum's PC cables connect to a 9-pin serial port. USB-Serial adapter (item 3661USB) required for connection to computers with only USB ports.

** 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.

Item 2953 FieldScout CM 1000 NDVI Meter
 Item 2950CV5 GPS/DGPS Cable
 Item 3661USB USB-to-Serial Adapter



TCM 500 NDVI shown with optional T-Handle



FIELDSCOUT[®] TCM 500 NDVI Turf Color Meter

- Measures reflected light from approximately a 3 in diameter section of turfgrass
- Uses 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
- Measurement diameter of 3 in (7.6 cm)
- Displays result as NDVI, percent reflectance, or as a user-adjustable grass index from 1 to 9
- Connects to any GPS receiver with serial output*
- 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 (page 46)

* Spectrum's PC cables connect to a 9-pin serial port. USB-Serial adapter (item 3661USB) required for connection to computers with only USB ports.

** 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.

Item 2975NDVI FieldScout TCM 500 NDVI Turf Color Meter
 Item 2975H FieldScout TCM 500 T-Handle
 Item 2950CV5 GPS/DGPS Cable
 Item 3661USB USB-to-Serial Adapter



Displays Turf Color Index and NDVI on the LCD

SOIL AND WATER



• Soil and Water:

Soil Moisture, Soil Compaction and Water Quality

THE IMPORTANCE OF SOIL AND WATER MANAGEMENT...

Plant growth is supported by a strong root system. Along with proper nutrition levels, plants need access to adequate air and water in the soil to develop a strong root system. Determine soil strength by measuring compaction levels at multiple depths. Monitor soil moisture over time with *in situ* sensors and in multiple locations with portable soil moisture meters. Utilize compaction and soil moisture data to make informed management decisions.

Why measure soil moisture?

Soil moisture plays a key role in the life of the plant. Nutrients in the soil solution provide the plant with the food it needs to grow. Water is also essential for regulating plant temperature through the process of transpiration. Plant root systems are better developed when growing in moist soil. Excessive levels of soil moisture, however, can lead to anaerobic conditions that can promote the growth of plant and soil pathogens.



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

WatchDog 2400 WaterScout Irrigation Station

- Includes WatchDog Model 2400 Mini Station and (2) WaterScout SM 100 Soil Moisture Sensors
- Monitor current conditions remotely using optional wireless communications

Item 3685SM2 WatchDog 2400 WaterScout Irrigation Station

WatchDog 3-WaterScout Irrigation Station

- Includes WatchDog Model 1400 Data Logger, (3) WaterScout Soil Moisture Sensors and Protective Sliding Enclosure

Item 3685SM1 WatchDog 3-WaterScout Irrigation Station

WatchDog 2-WaterScout Irrigation Station

- Includes WatchDog Model 1200 Data Logger, (2) WaterScout Soil Moisture Sensors and Protective Sliding Enclosure

Item 3680SM1 WatchDog 2-WaterScout Irrigation Station

WatchDog 3-Watermark Irrigation Station

- Includes WatchDog Model 1400 Data Logger, (3) Watermark Soil Moisture Sensors and Protective Sliding Enclosure

Item 3685WM1 WatchDog 3-Watermark Irrigation Station

WatchDog 2-Watermark Irrigation Station

- Includes WatchDog Model 1200 Data Logger, (2) Watermark Soil Moisture Sensors and Protective Sliding Enclosure

Item 3680WM1 WatchDog 2-Watermark Irrigation Station



3685SM2



3685SM1



3680WM1

SOIL & WATER

Soil Moisture Meters



FIELDSCOUT® TDR 300

Manage water responsibly and reduce operating expenses



- Instantaneous readings of root zone soil moisture
- Connects to any GPS receiver with serial output**
- 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 (see below)
- Rods sold separately



Works with
SpecMaps
See page 48 for details

* Spectrum's PC cables connect to a 9-pin serial port. USB-Serial adapter (item 3661USB) required for connection to computers with only USB ports.

** 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.

Item 6430FS	TDR 300 Soil Moisture Meter
Item 2950CV5	GPS/DGPS Cable
Item 7250	GPS Unit Mounting Bracket
Item 3661USB	USB-to-Serial Adapter
Item 6430CASE	TDR 300 Carrying Case



Protect your investment with the TDR 300 Carrying Case

"For 14 years, I struggled to convince a client that his lawn's extreme irrigation runoff problem was due to poor soil quality. The TDR 300 meter and SpecMaps Software visually confirmed that there were extensive soil quality problems. The client was able to make an educated decision to replace the 12,000 sq foot area with sandy-loam soil, 12 inches deep."

Tom Campbell
Water Scout, Inc
Sebastopol, California

TDR 300 shown with optional GPS bracket



SpecMaps™

Make management decisions based on your field's spatial variability

- Create 2-dimensional color charts of geo-referenced data
- Generate interpolated contour plots or maps of individual data points
- Includes data point summary and histogram
- Nothing to install - load data to and view maps directly on any PC with internet access
- Get maximum value out of your portable FieldScout® meters

SpecMaps™ ProTurf

- All the functionality of the original SpecMaps web mapping utility (see above)
- Map sprinkler head locations and plot radius of throw
- Automatically computes lower quartile distribution uniformity (DU_{1q})

Item 3652	SpecMaps Web Mapping Utility (1-Year Subscription)
Item 3652PT	SpecMaps ProTurf Web Mapping Utility (1-Year Subscription)
Item 3652PTUP	Upgrade to SpecMaps ProTurf





Visit
www.specmeters.com
 and view our
 Irrigation Audit
 Brochure and Video!



FIELDSCOUT® TDR 200

- Instantaneous readings of root zone soil moisture
- Probe block integrated with digital reader and handles for easy insertion and withdrawal
- Configure meter with FieldScout software (included)
- Rods sold separately

Item 6435FS TDR 200 Soil Moisture Meter

FIELDSCOUT® TDR 100

- 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)
- Rods sold separately

Item 6440FS TDR 100 Soil Moisture Meter
 Item 6440FSS Replacement TDR 100 Soil Moisture Probe



SPECIFICATIONS FOR TDR SOIL MOISTURE METERS

- Measurement Principle: Time-domain measurement methods
- Measurement Units: Percent volumetric water content
- Resolution: 1.0% 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

TDR Rods

- Sturdy stainless-steel construction
- Field replaceable

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

Item 6430PH Pilot Hole Maker for TDR Meters



Pilot Hole Maker for TDR Meters



SOIL & WATER

Soil Moisture Meters



Actual size

WATERSCOUTSM 100 Soil Moisture Sensor

The key is knowing both when and how much to water!

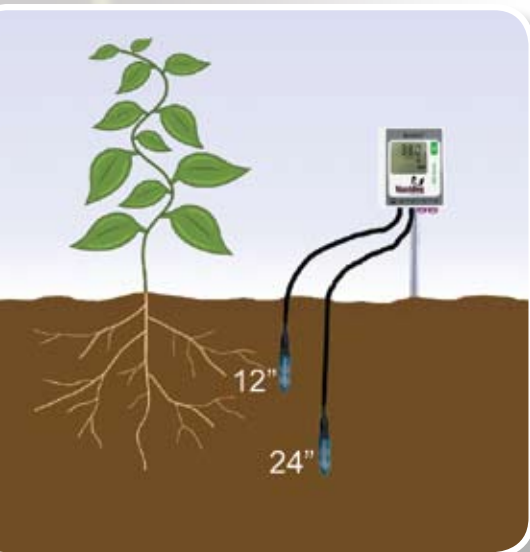
- Capacitance-type sensor responds immediately to changes in soil moisture content
- Calibrated for mineral soils or soilless media
- Installs easily into 3/4 in (1.9 cm) hole
- Install permanently or use to take spot measurements
- Can be read with hand-held digital reader or connected to data logging weather station
- Compatible with 1000-series loggers and all 2000-series weather stations and mini stations
- Connect up to 8 sensors to one station

Not compatible with 400/200 loggers.

WatchDog Stations sold prior to 2009 must be upgraded.

Item 6460 WaterScout SM 100 Sensor - 6 ft (1.8 m)

Item 6460-20 WaterScout SM 100 Sensor - 20 ft (6 m)



WatchDog 1000 Series Logger
shown with two WaterScout SM
100 Soil Moisture Sensors.

See page 45



SPECIFICATIONS FOR WATERSCOUT SM 100 SENSOR

Standard Interface: WatchDog weather station, 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 and 20 ft standard, extendable up to 50 ft

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

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



FIELDSCOUTSM Soil Sensor Reader

- Spot-check WaterScout SM 100 sensors in the field
- Also reads Watermark sensors (requires separate adapter)

Item 6465 FieldScout Soil Sensor Reader

Item 6450FSADPT Watermark Adapter for Soil Sensor Reader

Understanding Soil Moisture Tension

Soil moisture tension is the measurement of how strongly water is held in the soil. Water is held in the soil by capillary forces as well as the attraction of the water molecule to itself and to electrically charged clay particles. Soil moisture tension is measured in units of pressure (centibars or kilopascals). The tension at which irrigation is recommended depends on the soil and crop, but typically falls somewhere between 30 and 50 centibars*.

* 1 centibar = 1 kPa

Watermark Soil Moisture Sensor

- Works with FieldScout Soil Sensor Reader (Item 6465)
- Reads moisture tension from 0 (saturated) to 200 (dry) centibars
- Includes a 5 ft (1.5 m) extendable cable

Item 6450 Watermark Sensor
 Item 6450FSADPT Watermark Adapter for Soil Sensor Reader



Irrrometer Tensiometers

- Scheduling irrigation based on how hard plant roots are working to draw water from the soil
- "R" models (shown below) are for general use with field or tree crops
- "LT" models (see www.specmeters.com) are for coarse soils or greenhouse media
- Can be connected to WatchDog Data Loggers and Stations with Pressure Transducer (Item 3669)
- Service kit required

Item 6420 12 in (30 cm) Depth
 Item 6421 18 in (45 cm) Depth
 Item 6422 24 in (60 cm) Depth
 Item 6423 36 in (90 cm) Depth

Item 6425 Service Kit - Required



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)
- 6-month warranty

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



SOIL & WATER

Soil Compaction Meters



Works with
SpecMaps
See page 48 for details



FieldScout SC 900 with
Depth Target
and optional GPS
Mounting Bracket

Why measure soil compaction?

The soil is the plant's reservoir of water, nutrients and oxygen. Compacted soil has less pore space to store what the plant needs. Soil compaction prevents moisture penetration, reduces fertilizer and chemical uptake, creates conditions for anaerobic microbes to build up and hinders plant root growth. In some cases, yield losses can run as high as 30% due to compaction alone.

FIELDSCOUT® SC 900 Soil Compaction Meter

Improve your yield potential by locating and monitoring soil compaction

- Takes compaction readings to a depth of 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 with serial output**
- Equipped with internal data logger and RS-232 port
- Records 772 measurements (579 with added GPS/DGPS option*)
- Configure and download meter with FieldScout software (included)
- Compatible with SpecMaps online web-mapping application (page 46)

* Spectrum's PC cables connect to a 9-pin serial port. USB-Serial adapter (item 3661USB) required for connection to computers with only USB ports.

** 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.

Item 6110FS	FieldScout SC 900 Soil Compaction Meter
Item 2950CV5	GPS/DGPS Cable
Item 7250	GPS Unit Mounting Bracket
Item 3661USB	USB-to-Serial Adapter
Item 6110FST	Replacement Depth Target
Item 6106	Replacement Tip

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:	0-18 in (0-45 cm), 0-1,000 PSI (0-7,000 kPa)
Battery/Life:	4 AAA alkaline batteries; approximately 12-month life
Data Logger Capacity:	772 profiles without GPS; 579 profiles with GPS

Spectrum Soil Compaction Meter

- Super-affordable analog tester
- Takes compaction readings to a depth of 18 inch (45 cm)
- Easy-to-read display and durable design
- Stainless steel rod marked at depths of 3, 6, 9, 12, 15 and 18 inch (7.6, 15.2, 22.9, 30.5, 38.1 and 45.7 cm)

Item 6101	Spectrum Soil Compaction Tester
Item 6106	Replacement Tip



Soil Compaction Meter

- Takes compaction readings to a depth of 18 inch (45 cm)
- Stainless steel rod marked at depths of 3, 6, 9, 12, 15 and 18 inch (7.6, 15.2, 22.9, 30.5, 38.1 and 45.7 cm)
- Use 1/2 inch tip for fine soils or 3/4 inch tip for coarse soils

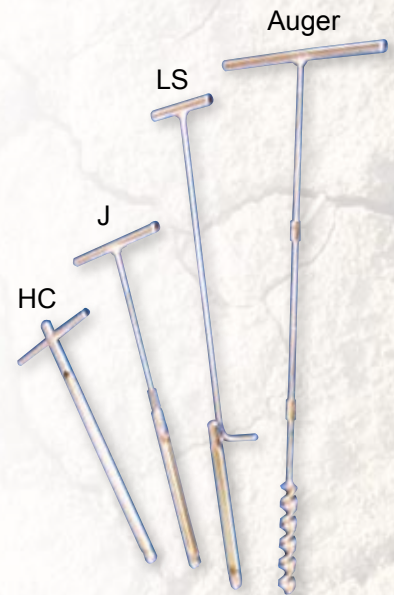
- Item 6100 Soil Compaction Tester
- Item 6410 1/2 inch Replacement Tip - Fine Soils
- Item 6415 3/4 inch Replacement Tip - Coarse Soils



Soil Sampler Probes

- Draw uniform samples for use with your own on-site tests or to send to a lab
- Model HC: overall length of 20.5 in (50 cm), an 18 in (46 cm) sampling tube and an 8 in (20 cm) wide handle
- Model J: overall length of 24 in (61 cm), a 12 in (30 cm) removable sampling tube and an 8 in (20 cm) wide handle
- Model LS: 3 ft (1 m) heavy-duty sampler with an 11 in (28 cm) sampling tube, cut-out sleeve and foot step
- Auger Tube Kit: overall length of 3 ft (1 m) assembled with 8 in (20 cm) auger length and 12 in (30 cm) wide handle

- Item 6510 Model HC Soil Sampler
- Item 6505 Model J Soil Sampler
- Item 6519 Model LS Soil Sampler
- Item 6500 Auger Tube Kit



Tough Soil Thermometers

Pocket-sized meters built of tough, corrosive-resistant stainless steel

- Digital meter (model 6300)
 - Dual-mode LCD updates in 1- or 15-second intervals
 - Adjustable nut provides quick calibration
 - Measures from 0° to 160°F (-17° to 71°C)
 - Accuracy ± 2°
- Analog meter (model 6305)
 - Easy-to-read dial
 - Measures from 25° to 125°F
 - Accuracy ± 1°
- Digital meter, Long-Stem (model 6310)
 - Extended 8 in (20 cm) stem
 - Measures from -58° to 302°F (-50° to 150°C)
 - Accuracy ± 1.8°

- Item 6300 Digital Temperature Tester
- Item 6305 Analog Temperature Tester
- Item 6310 Long-Stem Thermometer



Spectrum[®] Technologies, Inc.

"To Measure Is To Know"

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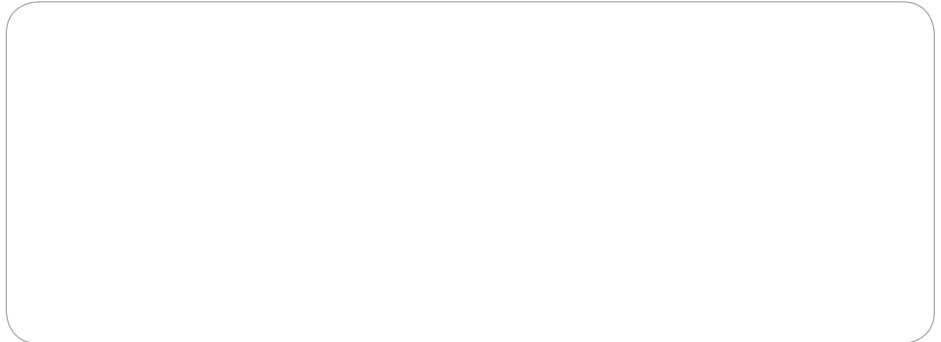
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E-mail: info@specmeters.com

www.specmeters.com

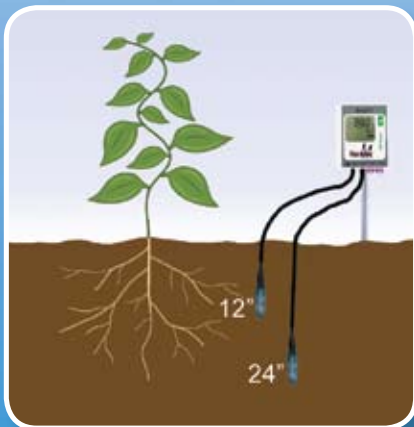
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 **WatchDog** **WATER SCOUT** 

Affordably monitor, compare
and evaluate moisture levels
from different soil depths!

See page 47 for more details!



Become a fan



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