Spectrum® Technologies, Inc.

Weather & Environmental Monitoring
Nutrient Management
Water Management
Integrated Pest Management

2011

Environment

Nutrition

Pests & Diseases

Soil & Water

Affordable Measurements
Quality Research
Profitable Decisions

www.specmeters.com

Spectrum® Technologies, Inc.

20 PLUS YEARS OF SERVING YOU!

Welcome!

Thanks to you, it's been another great year for us at Spectrum. Our goal is to be the partner you can count on for affordable **Plant Measurement Technology.**

We're thrilled that the American Society of Agricultural and Biological Engineers has selected two of Spectrum's new products as AE50 award winners as outstanding innovations for our industry.

The new family of award winning WatchDog 1000 Series Micro Stations reflects our continued commitment to research and development. You can depend on this technology to measure soil moisture, plant health, and monitor IPM pressure in the many micro climates in which you grow your crops.

Spectrum works closely with researchers, consultants, industry suppliers and growers to develop products which boost crop production efficiency while safeguarding our environment.

Visit us at www.specmeters.com frequently for technical information and insight on getting maximum value from your investment in our products.

Best wishes for a safe and prosperous year.

Sincerely,

Mike Thurow
President & CEO
Spectrum Technologies, Inc.

CE

Guarantee

Order from Spectrum Technologies with total confidence. If you're not satisfied – for any reason – simply return the item(s) you ordered within 30 days for a prompt and courteous refund or credit, excluding shipping and handling.

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CONTENTS

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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 eighteen 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.

AE50
outstanding innovations
AWARD WINNER
FOR TECHNOLOGY INNOVATION

• **2011** WatchDog 1000 Series Micro Station	• **2003** WatchDog WeatherTracker
LightScout DLI 100 Light Meter	FieldScout SC 900 Soil Compaction Meter
• **2008** WatchDog Sprayer Station	• **2002** WatchDog Weather Station
SpecMaps Web Mapping Utility Software	FieldScout TDR 300 Soil Moisture Meter
• **2007** WatchDog 2000 Series Mini Weather Station	• **2001** FieldScout CM 1000 Chlorophyll Meter
• **2005** SpecWare Software	• **2000** WatchDog Data Logger
• **2004** FieldScout Direct Soil EC Probe	• **1999** StarLogger Data Logger
FieldScout TCM 500 Turf Color Meter	Investigator Soil Compaction Meter
WeatherTracker Greenhouse Growth Tracker	WatchDog Leaf Wetness/Temperature Logger

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3 Easy Ways to Order!

☎ Phone **1 (800) 248-8873** (U.S. & Canada)
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Spectrum Technologies, Inc. reserves the right to change the specifications, features or prices of its products without notice or obligation.

THE IMPORTANCE OF ENVIRONMENT MONITORING...

Weather plays a key role in plant health. Keep your crops healthy and happy by staying on top of your site specific weather conditions. Use customized set-ups to monitor different areas to determine and manage microclimates. Measure key parameters such as light, air temperature, relative humidity, rainfall, wind speed and wind direction. 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 an IPM disease and insect package. Use additional parameters such as leaf wetness to determine when the conditions are right for a particular disease.

> We have purchased over a dozen 2900ET weather stations for our clients and have had no complaints. The 2900ET weather stations are reliable and accurate, which aids us in making better farming decisions for our clients.
>
> Coastal Vineyard Care Assoc.
> Santa Ynez, CA

WatchDog® 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 15 for specific models, and pages 12-13 for sensor information

WatchDog® 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 14 for specific models, and pages 12-13 for sensor information

WatchDog 1000 Series Micro Stations

AF50 AWARD WINNER FOR TECHNOLOGY INNOVATION

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 10,584 intervals (220 days at 30 minute intervals)
• Water-resistant case
• 12 month battery life (CR2450, included)
• Choose from 8 different models

See page 10 for specific models, and pages 12-13 for sensor information
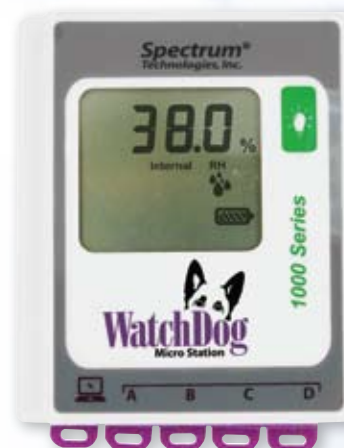
WatchDog A-Series Data Loggers

Most affordable way to track environmental conditions for analysis

• Models include combinations of temperature, humidity, CO_2 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 5 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® Product Line

| | | STANDARD FEATURES | | | | | | | | | | | OPTIONAL SENSORS & ACCESSORIES | | | | |

REFERENCE:
- ✔ STANDARD
- **OPT** OPTIONAL
- **BLANK** NOT AVAILABLE

Item #	Model	ET	LCD	Wireless	Alrm 3672	Tmp	RH	Dew	Wind	Rain 3665R	Solar 3670I	Available Sensor Ports	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	✔	✔	✔	✔	✔			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 Micro Stations (mix and match components for affordable 2-6 channel datalogging units featuring LCD display)																	
3685SM13	Irrigation Station		✔							OPT		1		OPT		✔ (3)	
3680SM12	Irrigation Station		✔									0				✔ (2)	
3684PD1	Plant Disease Station		✔			✔	✔			✔		0			✔		
3684PAR1	Plant Growth Station		✔			✔	✔					1	✔				
3688WD1	1650		✔			✔	✔			OPT	OPT	4	OPT	OPT	OPT	OPT	OPT
3687WD1	1525		✔			✔				OPT	OPT	4	OPT	OPT	OPT	OPT	OPT
3684WD1	1450		✔			✔	✔			OPT	OPT	2	OPT	OPT	OPT	OPT	OPT
3683WD1	1425		✔			✔				OPT	OPT	3	OPT	OPT	OPT	OPT	OPT
3685WD1	1400		✔							OPT	OPT	4	OPT	OPT	OPT	OPT	OPT
3682WD1	1250		✔			✔	✔					0					
3681WD1	1225		✔			✔				OPT	OPT	1	OPT	OPT	OPT	OPT	OPT
3680WD1	1200		✔							OPT	OPT	2	OPT	OPT	OPT	OPT	OPT
A-Series Loggers (economical datalogging units for 1-3 parameters - requires Item 3661A PC Connection Cable)																	
3611A	A160 Temp/RH/CO$_2$					✔	✔					0					+CO$_2$
3612A	A150 Temp/RH					✔	✔					0					
3610A	A130 Leaf Wetness/Temp	✔				✔						0			✔		
3617ARS	A125 Soil/Air Temp Station	✔				✔						0		✔			
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					
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

Sensors	Description	Weather Stations	2000 Mini Stations	1000 Series Micro Stations	Range / Resolution*	Accuracy*
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)	✔	✔	✔	M: -4 to 158°F (-20 to 70°C)	±1°F (±0.6°C)
3667S	Temperature (Micro) Sensor	✔	✔	✔		
3665R	Tipping Bucket Rain Collector	✔	✔	✔	0.01", 0.25 mm	±2%
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 to 4000 ppm	±5% or 50 ppm
3612RHS	Replacement RH Sensor for Weather Stations	✔	✔	✔	10 to 100% at 5 - 50°C	±3% RH
3612RHB	Replacement RH Sensor for Data Loggers				For original loggers only (400 & 200 Series)	
3668I	Quantum Light Sensor	✔	✔	✔	0 to 2500 µmol m^{-2} s^{-1}	±5%
3668I3	3 Sensor Quantum Bar	✔	✔	✔	0 to 2500 µmol m^{-2} s^{-1}	±5%
3668I6	6 Sensor Quantum Bar	✔	✔	✔	0 to 2500 µmol m^{-2} s^{-1}	±5%
3676I	UV Light Sensor	✔	✔	✔	0 to 200 µmol m^{-2} s^{-1}	±5%
3670I	Silicon Pyranometer Sensor	✔	✔	✔	0 to 1500 W/m^2	±5%
3673	Voltage Input Cable	✔	✔	✔	S: 0 to 3.0V, M: 0 to 2.54 V;1mA	S: ±0.005 V, M: ±0.02 V
3674	4-20mA Input Cable	✔	✔	✔	0 to 20.1 mA	±1%
3664	Extension Cable 20 ft (6.1 m)	✔	✔	✔		
Connectivity						
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 Wire Modem Pair	✔	✔			
3387WD96	Dial-up Modem	✔	✔			
Miscellaneous						
3654P	Spec 9 Pro Software	✔	✔	✔		
3654B	Spec 9 Basic Software		✔	✔		
3663A	Radiation Shield			✔		
3658A	Sliding Enclosure			✔		
3659WD1	Waterproof Enclosure			✔		
3396TP	Tripod Mount	✔	✔			
3672	Alarm Output Module	✔	✔			
3419	AutoDialer	✔	✔			

* S=Weather and Mini Stations, M=Micro Stations

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

*** Item 3679WD1 Data Shuttles only

New Model

3612A

3611A

3617A

WatchDog A-Series Loggers

The most affordable way to track environmental conditions for analysis

- Measure temperature, humidity, leaf wetness and CO_2
- 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) A160 is indoor use only and must be protected from moisture
- Removable soft caps keep ports clear of debris
- Includes CR2, 12-month battery life (except A160, which requires A/C; international adapter included)
- **SpecWare 9 (v9.1 or later) (page 18) and the A-Series PC Connection Cable are required. A160 requires SpecWare 9 (v9.3 or later)**

Temperature range: -40 to 185°F (-40 to 85°C)
Accuracy: ±1.1ºF (±0.6°C) at -4 to 122°F (-20 to 50°C), else ±2.2°F (±1.2°C)
RH range: 0 to 100%, Accuracy: ±3% at 77°F (25°C, 10 to 90%), else ±5%
CO_2 range: 0 to 9999 ppm, Accuracy: ±50 ppm ±5% of reading (0 to 2000 ppm), else unspecified

DESCRIPTION	INTERNAL SENSOR	INTERVALS	RADIATION SHIELD	PRICE
MODEL A160 Item 3611A	TEMPERATURE RH, CO_2	5,333	INDOOR USE ONLY (NO SHIELD AVAILABLE)	$349.00
MODEL A150 Item 3612A	TEMPERATURE RELATIVE HUMIDITY	5,333	OPTIONAL	$169.00
MODEL A130 Item 3610A	TEMPERATURE LEAF WETNESS	4,000	INCLUDED	$299.00
MODEL A125 Item 3617A	TEMPERATURE EXTERNAL TEMPERATURE	4,000	RECOMMENDED	$129.00
MODEL A110 Item 3618A	TEMPERATURE	8,000	OPTIONAL	$74.00

Item 3661A	WatchDog A-Series PC Connection Cable	$29.00
Item 3663A	Radiation Shield	$79.00

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 (page 18) and the B-Series Docking Station are required.**

T/RH

Temp 8K

Temp 2K

Ideal for soil temperature

DESCRIPTION	INTERNAL SENSOR	INTERVALS	LCD DISPLAY	PRICE
MODEL 100 T/RH Item 3621WD Temp Range: -4 to 185°F (-20 to 85°C) Temp Accuracy: ±1.1°F from 5 to 149°F (±0.6°C from -15 to 65°C) Humidity: 0 to 100%, ±5%	TEMPERATURE RELATIVE HUMIDITY	4000	NO	$135.00
MODEL 100 8K Item 3620WD Range: -40 to 185°F (-40 to 85°C) Accuracy: ±1.1°F from 5 to 149°F (±0.6°C from -15 to 65°C)	TEMPERATURE	8000	NO	$70.00
MODEL 100 2K Item 3619WD Range: -40 to 185°F (-40 to 85°C) Accuracy: ±1.8°F from -22 to 158°F (±1.0°C from -30 to 70°C) Use included plastic bag when measuring soil temperature	TEMPERATURE	2000	NO	$39.00

Docking Stations

Item 3655K1	WatchDog B-Series Docking Station - USB*	$79.00
Item 3655K	WatchDog B-Series Docking Station - Serial	$79.00

*Requires SpecWare 9 (v9.1)

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) (page 18) 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**   **$299.00**

Mounting post
not included

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) (page 18) and the A-Series PC Connection Cable are required.**
- Pre-configured station saves you $5.00

Item 3617ARS   **Soil/Air Temperature Station**   **$203.00**

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: ±2% at 1 in (2.54 cm) per hour
- **Requires SpecWare software (page 18) to download and report**

Item 3554WD   **Data-Logging Rain Gauge**   **$319.00**

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**   **$149.00**

WatchDog 1000 Series Micro Stations

Affordable and versatile

- 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 10,584 intervals (220 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 (page 18)**

Temperature range: -40 to 185ºF (-40 to 85ºC)
Accuracy: ±1.1ºF (±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	PRICE
MODEL 1650 Item 3688WD1	TEMPERATURE RELATIVE HUMIDITY	4	$430.00
MODEL 1525 Item 3687WD1	TEMPERATURE	4	$350.00
MODEL 1450 Item 3684WD1	TEMPERATURE RELATIVE HUMIDITY	2	$360.00
MODEL 1425 Item 3683WD1	TEMPERATURE	3	$315.00
MODEL 1400 Item 3685WD1	NONE (EXTERNAL ONLY)	4	$300.00
MODEL 1250 Item 3682WD1	TEMPERATURE RELATIVE HUMIDITY	NONE	$290.00
MODEL 1225 Item 3681WD1	TEMPERATURE	1	$245.00
MODEL 1200 Item 3680WD1	NONE (EXTERNAL ONLY)	2	$230.00

Customize your station!
See pages 12-13 for our WatchDog sensors and accessories

Rainfall

Soil Moisture

Leaf Wetness

Air, Soil, Water Temp

Quick and easy sensor connection

Micro Stations for your micro environments!

WatchDog Plant Disease Micro Station

- Data log current and historical plant disease severity indicators
- Includes Watchdog Model 1450 Micro Station, leaf wetness sensor, rainfall sensor and radiation shield
- **SpecWare 9 (v9.2) software (page 18) required to download and analyze data**
- University-validated disease models (sold separately) can be added for more accurate disease and pest monitoring (page 19)
- *Buy this station as a package and save $20.00*

Item 3684PD1   WatchDog Plant Disease Micro Station $667.00

3684PD1

Mounting post not included

3684PAR1

WatchDog Plant Growth Micro Station

- Includes a Watchdog Model 1450 Micro Station, PAR light sensor and radiation shield
- **SpecWare 9 (v9.2) software (page 18) required to download and analyze data**
- *Buy this station as a package and save $20.00*

Item 3684PAR1   WatchDog Plant Growth Micro Station $648.00

WatchDog Irrigation Stations

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

WatchDog 2-WaterScout Irrigation Station - *Save $15.00 when buying as a package*
- Includes WatchDog Model 1200 Micro Station, (2) WaterScout SM 100 Soil Moisture Sensors with 20 ft (6 m) cable, and Protective Sliding Enclosure

Item 3680SM12   WatchDog 2-WaterScout Irrigation Station $448.00

WatchDog 4-WaterScout Irrigation Station - *Save $15.00 when buying as a package*
- Includes WatchDog Model 1400 Micro Station, (4) WaterScout SM 100 Soil Moisture Sensors with 20 ft (6 m) cable, and Protective Sliding Enclosure

Item 3685SM14   WatchDog 4-WaterScout Irrigation Station $712.00

WatchDog 3-Watermark Irrigation Station - *Save $10.00 when buying as a package*
- Includes WatchDog Model 1400 Micro Station, (3) Watermark Soil Moisture Sensors with 11 ft (3.3 m) cable, and Protective Sliding Enclosure

Item 3685WM13   WatchDog 3-Watermark Irrigation Station $524.00

New Models

See our entire selection of WatchDog Irrigation Stations on pages 46 & 47!

Light Sensors - for ALL 1000 & 2000 Series Stations

LightScout™ Silicon Pyranometer
Measure solar radiation between 300 to 1100 nanometers.
Item 3670I $249.00

LightScout™ UV Light Sensor
Measure UV radiation between 250 to 400 nanometers.
Item 3676I $289.00

LightScout™ Quantum Light Sensor
Measure PAR light between 400 to 700 nanometers.
Item 3668I $229.00

LightScout™ 3 or 6 Sensor Quantum Bar
Average PAR readings to minimize the effects of small shadows.
3 Sensor Bar
Item 3668I3 $329.00

6 Sensor Bar
Item 3668I6 $379.00

Customize Your Stations!

**2000 Series
Weather Stations**

**2000 Series
Mini Stations**

**1000 Series
Micro Stations**

Soil Moisture Sensors - for ALL 1000 & 2000 Series Stations

WaterScout® SM 100 Soil Moisture Sensor
Measures soil moisture (VWC) with little or no disturbance to the root zone. **See page 48 for more information.**
Sensor with 6 ft (1.8 m) Cable
Item 6460 $89.00

Sensor with 20 ft (6.1 m) Cable
Item 6460-20 $97.00

Watermark Soil Moisture Sensor
Measures soil moisture tension from 0 to 200 centibars. **See page 49 for more information.**
Sensor with 11 ft (3.3 m) Cable
Item 6450WD $65.00

Sensor with 25 ft (7.6 m) Cable
Item 6450WD20 $73.00

Watermark Adapter (adapter required to connect original Watermarks to weather stations)
Item 6450ADPT $43.00

Pressure Transducer
Adapts to Irrometer tensiometers and allows use of the dial gauge for measurements.
Item 3669 $249.00

Irrigation On/Off Sensor
Record and analyze relationships between irrigation periods and soil moisture.
Item 6451 $119.00

Environmental Sensors - for ALL 1000 & 2000 Series Stations

Tipping Bucket Rain Collector
Measure rainfall in 1/100 inch increments
Self-emptying, freeze resistant.
Item 3665R $149.00

Leaf Wetness Sensor
Measure leaf wetness with grid-like,
resistance-based sensor.
Item 3666 $99.00

CO_2 Sensor
Measure CO_2 levels in ppm using
NDIR technology.
Item 2655 $625.00

For international use
Item 2655X $665.00

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 $40.00

Sensor with 20 ft (6.1 m) Cable
Item 3667-20 $50.00

Barometric Pressure Sensor
Standard
Item 3671 $219.00

High Altitude
Item 3671M $219.00

Temperature (Micro) Sensor
Measure surface temperature of
leaves and other applications.
Item 3667S $75.00

Replacement RH Sensor
Replace your RH sensor and
return to like-new accuracy.
For 1000/2000 Series
Item 3612RHS $40.00

For Original Data Loggers
Item 3612RHB $40.00

Software & Communications
for 1000 & 2000 Series Stations

SpecWare Software
Required to launch and
download data. **See page
18 for more information.**

Wireless Communication
Remotely connect to your
2000 Series Stations.
**See page 16-17 for more
information.**

Tripod Mount
Rugged folding galvanized
steel tripod and 3 ft (1 m) pole.
Item 3396TP $84.00

Accessories - for ALL 1000 & 2000 Series Stations

Radiation Shield
Protect your Micro Station
or logger from rain and
measurement-distorting solar
radiation. **For 1000 &
A-Series Only.**
Item 3663A $79.00

Sliding Enclosure
Water resistant - mounts to pole
or post. **For 1000 Series Only.**
Item 3658A $39.00

Waterproof Enclosure
Clamshell enclosure
accommodates Models 1400 or
1200, plus soil sensors.
For 1000 Series Only.
Item 3659WD1 $99.00

Alarm Output Module
Trigger external device based
on a sensor reading. **For 2000
Series Only.**
Item 3672 $195.00

**WatchDog® 1000/2000 Series
Data Shuttle with Case**
Read out and launch your stations;
bring their data back to your PC.
Item 3679WD1 $329.00

Extension Cable
20 ft (6 m) extension for all sensors.
Item 3664 $20.00

General Input Cables
0-3V Input
Item 3673 $19.00

4-20mA Input
Item 3674 $29.00

Model 2475

AE50 outstanding innovations
AWARD WINNER FOR TECHNOLOGY INNOVATION

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 (page 18)**

> ***Customize your station!***
> **See pages 12-13 for our WatchDog sensors and accessories**

DLI:
PAR 607 uM/m^2s
10.6 Mole/Day
DIF:
DAY NIGHT DIF
38°F 29°F 9°F

Exclusive LCD display on all 2000 Series Mini Stations

Model 2475 Plant Growth Station

- Includes sensors for quantum (PAR) light, air temperature, relative humidity, and 1 available external sensor port
- Computes and displays Daily Light Integral (DLI), day/night average temperatures, dew point, degree days and vapor pressure deficit (VPD)

Item 3686WD   **WatchDog 2475 Weather Station**   **$845.00**

Model 2450 Temperature/RH Station

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

Item 3684WD   **WatchDog 2450 Weather Station**   **$635.00**

Model 2425 Temperature Station

- Measures air temperature and 3 available external sensor ports

Item 3683WD   **WatchDog 2425 Weather Station**   **$585.00**

Model 2400 External Sensor Station

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

Item 3685WD   **WatchDog 2400 Weather Station**   **$535.00**

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	✔	✔			10% to 100% @ 5° to 50°C	±3%
Dew Point	✔	✔			-99° to 140°F (-73° to 60°C)	±4°F (±2°C)
Quantum Light (PAR)	✔	OPT	OPT	OPT	0 to 2500 $\mu mol \cdot m^{-2} \cdot s^{-1}$	±5°
External Sensor Ports	1	2	3	4		

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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

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

Item 3350WD2   WatchDog 2900ET Weather Station $1,795.00

Model 2700

- Affordable and versatile solution for growers, researchers and consultants
- Measures wind direction, wind speed, air temperature, relative humidity, dew point, rainfall and 6 available external sensor ports

Item 3340WD2   WatchDog 2700 Weather Station $1,295.00

Model 2550

- Ideal for fast, on-demand deployment without measuring rainfall
- Measures wind direction, wind speed, air temperature, relative humidity, dew point and 6 available external sensor ports

Item 3320WD2   WatchDog 2550 Weather Station $1,145.00

Model 2800

- Ideal where multiple sensor measurements are required for temperature, soil moisture, crop canopy light or leaf wetness data
- Plug in up to 8 external sensors, plus one optional rainfall sensor

Item 3345WD2   WatchDog 2800 Weather Station $845.00

Model 2900ET
Shown with optional Tripod Mount

Customize your station!
*See pages 12-13 for our WatchDog sensors and accessories*

Tripod not included

Model 2550

Model 2800

WATCHDOG WEATHER STATION FEATURES

Sensors	2900ET	2700	2550	2800	Specifications	Accuracy
Wind Direction	✔	✔	✔		1°	±4°
Wind Speed	✔	✔	✔		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	✔	✔	✔		10% to 100% @ 5° to 50°C	±3%
Dew Point	✔	✔	✔		-99° to 140°F (-73° to 60°C)	±4°F (±2°C)
Rainfall	✔	✔		OPT	0.01 in (0.25 mm)	±2%
Solar Radiation	✔	OPT	OPT	OPT	0 to 1500 W/m²	±5%
Evapotranspiration	✔					
External Sensor Ports	5	6	6	9		

Connect Your WatchDog Station to Your World!

Satellite

GPRS or CDMA Cellular

**900 Mhz or 2.4 Ghz
Mid Range Wireless**
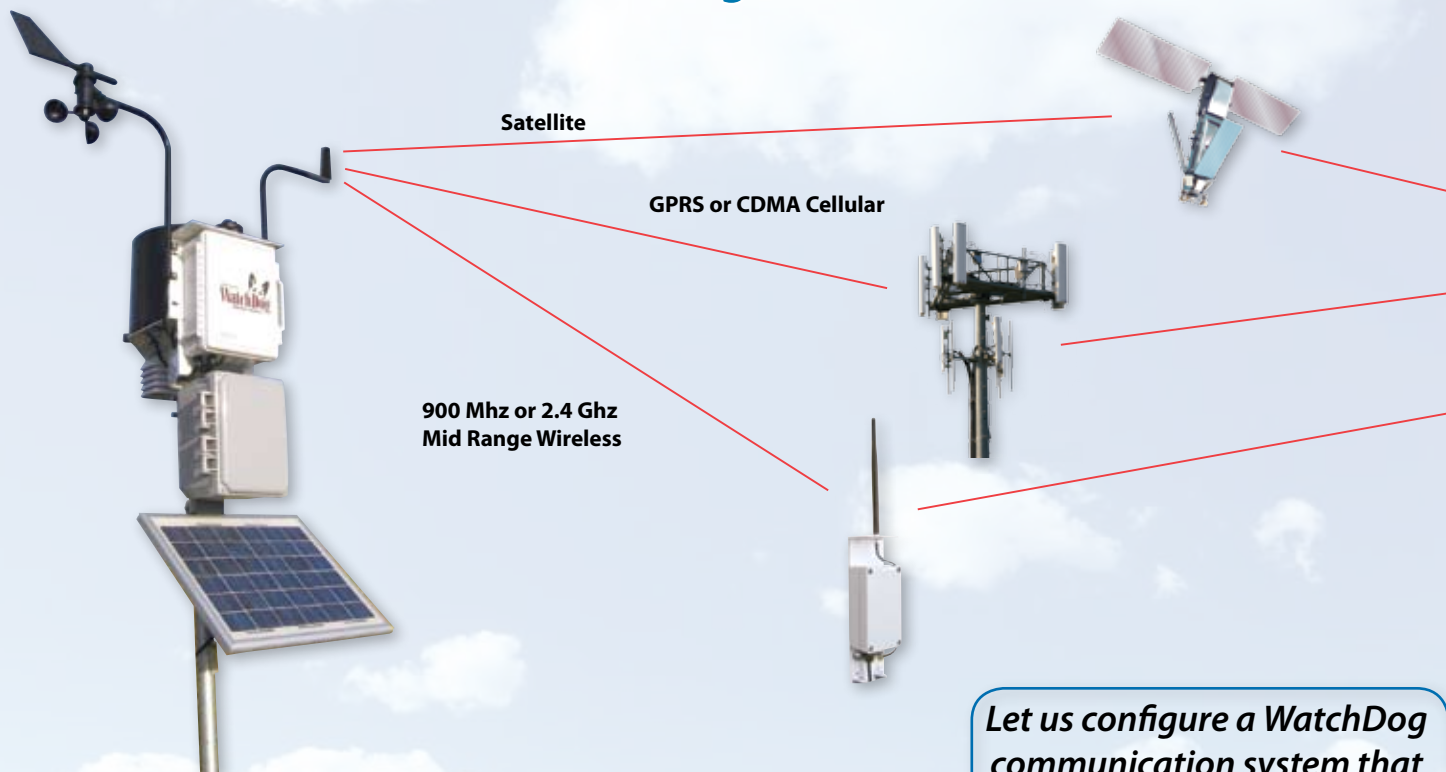
Let us configure a WatchDog communication system that meets your needs - Call us today!

WatchDog 1000/2000 Series Data Shuttle

- Transport weather data from your 2000 Series Stations or 1000 Series Micro Stations to your host PC
- Includes soft-sided case (also available separately [item 7500], **see page 48)**

Item 3679WD1   **$329.00**

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**	**$1,485.00**
Item 3388GE	**WatchDog Comm GPRS - World (International)**	**$1,485.00**
Item 3388C	**WatchDog Comm CDMA**	**$1,695.00**

Satellite

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

Item 3388S	**WatchDog Comm Satellite**	**$2,750.00**

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**	**Call for price!**

SpectrumWeather.com

Spectrum®Weather

- 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 | $100.00 |
| | (1-Year Subscription) | |

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 | $100.00 |
| | (1-Year Subscription) | |
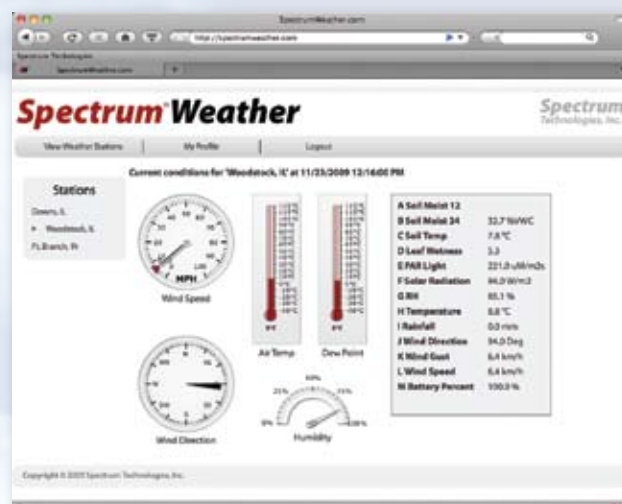
Or send data to your server!

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	$225.00
Item 3392W	Short Range Wireless For Remote Weather Station	$425.00
Item 3392M	Short Range Wireless For Remote Mini Station	$425.00
Item 3392PA	Vehicle Power Adapter	$19.00

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	$575.00
Item 3391W	Mid Range Wireless For Remote Weather Station	$650.00
Item 3391M	Mid Range Wireless For Remote Mini Station	$650.00

Optional Yagi antennas increase line of sight range to 7 mi (11 km)

Item 3390YAGI8	8.2 DBi Yagi Antenna (cable required)	$139.00
Item 3390CABLE10	Yagi Antenna Cable - 10 ft (3 m)	$85.00
Item 3390CABLE20	Yagi Antenna Cable - 20 ft (6 m)	$105.00

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

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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**	**$294.00**
Item 3654P9X	**Spec 9 Pro Extra User License**	**$147.00**
Item 3654P9U	**Spec 9 Pro Upgrade**	**$187.00**
Item 3654P9U8	**Spec 9 Pro Upgrade from Spec 8 Pro**	**$99.00**

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

Item 3661USB	**USB-to-Serial Adapter**	**$35.00**

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

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		✔
1000 Series Micro Stations	✔	✔
Original Stations & Loggers	✔	✔

Spec 9 Basic Software

- Easily download, analyze and produce basic reports from your weather data collected on WatchDog Micro Stations 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**	**$169.00**
Item 3654B9X	**Spec 9 Basic Extra User License**	**$84.50**
Item 3654B9U	**Spec 9 Basic Upgrade**	**$69.00**

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

Item 3661USB	**USB-to-Serial Adapter**	**$35.00**

Spec 9 Pro Models

Disease and Insect Models

- Become more proactive in your management of 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
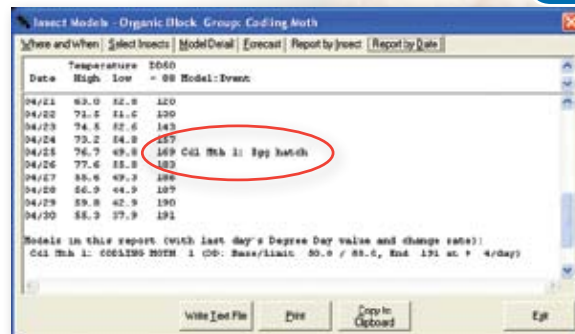
Codling Moth Insect Model

Forecast Model Packages

Item 3656GA   **Grape Alert Package**   **$449.00**

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

Powdery Mildew Report for Grapes

Item 3656AP   **Apple/Pear Alert Package**   **$399.00**

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

Item 3656TU   **Turf Alert Package**   **$349.00**

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
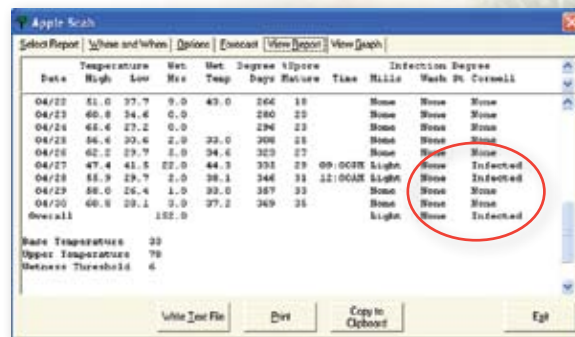
Apple Scab Report

Item 3656PO   **Potato Alert Package**   **$349.00**

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

Item 3656TO   **Tomato Alert Package**   **$249.00**

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

Item 3656CH   **Cherry Alert Package**   **$249.00**

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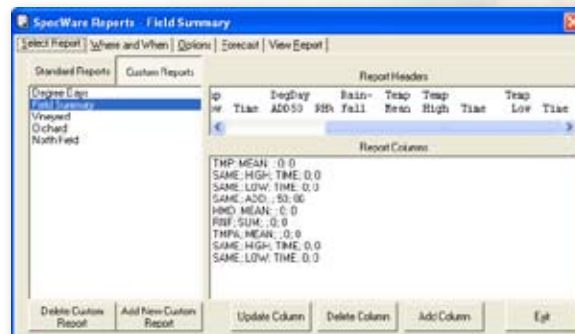
Custom Reports

Displayed on WatchDog 2000 Series Mini Stations

2.75 in (7 cm)

11 in (27 cm)

WatchDog Sprayer Station

WatchDog Sprayer Station

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

Pesticide drift is increasingly important to commercial applicators. Now you can monitor wind speed and direction on-the-go 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.

Item 3349SSC	**WatchDog Sprayer Station with Console**	**$2,095.00**
	Save $49.00 by purchasing the Station and Console together!	
Item 3349SS	**WatchDog Sprayer Station**	**$1,695.00**
	Includes sensor unit with magnetic base, 21 ft (7 m) cable with vehicle power and serial connectors, and display/logging program for Windows Mobile PDA or Windows Laptop	
Item 3349CN	**WatchDog Sprayer Station Console**	**$459.00**
	Includes console with built-in data logger, cable, and software CD	
Item 3661USB	**USB-to-Serial Adapter**	**$35.00**

Also integrates with Raven Viper Pro and Windows Mobile PDA or Windows Laptop

Course and Speed

Apparent Wind Speed

Wind Speed

Drift Direction

WatchDog Sprayer Station Console

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%

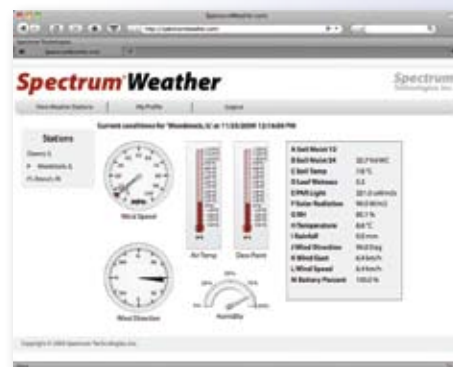**Power Supply Voltage:** 10 to 16 VDC

*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**   **$100.00**
                    (1-Year Subscription)

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 37ºF (2.8°C) to conserve power
- Requires 6V lantern battery (not included)

Item 3430   **WatchDog Frost Alert $229.00**

Frost Alert alarm colors

Green – Above 34ºF (1ºC)

White – 32º to 34ºF (0-1ºC)

Red – Below 32ºF (0°C)
Flashing Red – Below 30ºF (-2ºC)

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**   **$395.00**
Item 3421   **Temp Sensor -20º to 150ºF (-29º to 66ºC)**   **$30.00**

ThermAlarm III
- Hermetically sealed magnetic switches trigger an alarm condition

Item 3424   **ThermAlarm III**   **$49.95**

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**   **$249.00**
Item 3419AC   **AC Adapter (110V)**   **$28.00**

3420A

3424 and 3419

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Actual Size

LIGHTSCOUT™ DLI 100 Light Meter

Measure the light "falling" on your plants

- Compare light between three locations, simultaneously
- Simple, one button operation
- Displays light intensity levels every 4 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 $\mu mol \cdot m^{-2} \cdot s^{-1}$ (or footcandles)
- Packaged in sets of 3 light meters, or individually
- Battery included; water resistant

| Item 3405 | LightScout DLI 100 Meter (set of 3) | $189.00 |
| Item 3405P | LightScout DLI 100 Meter (1 meter) | $89.00 |

"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 ($\mu mol/m^2 \cdot s$)
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

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.

LIGHTSCOUT™ 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
• Includes soft-sided case (also available separately [item 7500]. **See page 48)**

| Item 3412 | LightScout Red/Far-Red Meter | $895.00 |

3412

LIGHTSCOUT™ 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 µmol·m^{-2}·s^{-1} (full sunlight)

| Item 3414F | LightScout UV Meter | $289.00 |
| Item 7500 | Soft-Sided Carrying Case | $32.50 |

LIGHTSCOUT™ 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 to 700 nm
• Range of 0 to 2,000 µmol·m^{-2}·s^{-1}
• Available in a variety of configurations for your convenience

Item 3415F	LightScout Quantum Meter	$199.00
Item 3415FSE	LightScout Dual Solar/Electric Quantum Meter	$249.00
Item 3415FXSE	LightScout Dual Solar/Electric Quantum Meter - External Sensor	$299.00
Item 3415FQF	LightScout Quantum and Foot-Candle Meter	$299.00
Item 7500	Soft-Sided Carrying Case	$32.50

3414F

3415FXSE

LIGHTSCOUT™ Foot-Candle Meter

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

| Item 3413F | LightScout Foot-Candle Meter | $199.00 |
| Item 7500 | Soft-Sided Carrying Case | $32.50 |

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

LIGHTSCOUT™ External Light Sensor Reader

- Read any of Spectrum's light sensors, which come with 6 ft (2 m) cables
- Plug in a sensor, choose it on the LCD, and start measuring UV, Quantum Light, or Solar Radiation
- Sensors can also be used with WatchDog Weather, Mini and Micro Stations
- LightScout External Light Sensor Reader includes soft-sided case (also available separately [item 7500]. See page 48)

Item 3415FX	LightScout External Light Sensor Reader	$279.00

Light sensors sold separately:

Item 3668I	LightScout Quantum Light Sensor (PAR Light)	$229.00
Item 3668I3	LightScout Quantum Light 3 Sensor Bar	$329.00
Item 3668I6	LightScout Quantum Light 6 Sensor Bar	$379.00
Item 3670I	LightScout Silicon Pyranometer Sensor (Solar Radiation)	$249.00
Item 3676I	LightScout UV Sensor	$289.00

WatchDog® Model 2475 Plant Growth Station

- Measure light intensity, Daily Light Integral, 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 DLI and compare to university guidelines (from your extension office or at www.specmeters.com)
- **Requires SpecWare software (page 18)**

Item 3686WD	WatchDog Model 2475 Plant Growth Station	$845.00

For WatchDog Plant Growth Micro Stations, see page 11
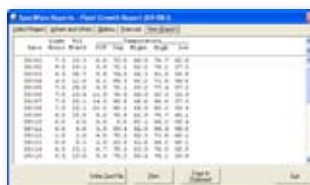
SpecWare plant growth report
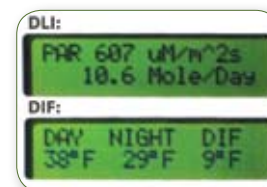
Displays Daily Light Integral (DLI) and Day/Night Temperature Difference on the LCD

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 – without a PC
- One-button review of 30 days of values and 12 months of summaries
- LCD (updates every 20 seconds) with easy-to-use keypad
- 9V battery with 8-month life; memory protection in case of power loss

Item 3501PAR	WeatherTracker Model 305 Greenhouse Growth	$545.00

Vantage Pro 2

- Forecasting, on-screen graphing and much more
- Quick view icons show the forecast at a glance while a moving ticker-tape display gives details
- Innovative, integrated sensor suite combines a rain collector, temperature/humidity sensor and an anemometer into one package – making setup easier than ever and improving performance and reliability
- For improved accuracy, temperature and humidity sensors are housed inside a radiation shield
- Transmits wirelessly up to 1,000 ft (300 m)
- Cabled station includes 100 ft (30 m) cable from console to sensor suite

Item 3340CVP2	**Vantage Pro 2 Cabled**	**$495.00**
Item 3340WVP2	**Vantage Pro 2 Wireless**	**$595.00**

Vantage Vue

- Compact, self-contained and easy to install
- Combines a rain collector, temperature/humidity sensor and an anemometer into one package
- Transmits wirelessly up to 1,000 ft (300 m)
- Includes console

Item 3340VV	**Vantage Vue**	**$395.00**

VANTAGE SPECIFICATIONS

	Accuracy
Wind: Direction: 1°	±3°
Speed: 2 to 150 mph (3 to 241 km/h)	±5%
Wind Chill: -134° to 140°F, -92° to 60°C	±4°F, ±2°C
Humidity: Inside: 0% to 100%	±5%
Outside: 0% to 100%	±3%
Barometer: 8 in to 33.50 in Hg (460 to 820 mm Hg)	±0.03 in Hg, ±1.3 mm Hg
Temperature: Inside: 32° to 140°F, 0° to 60°C	±1°F, ±0.5°C
Outside: -40°F to 150°F, -40° to 65.5°C	±1°F, ±0.5°C
Rainfall: Daily: 0 to 199.99 in (0 to 6553 mm)	±4%
Accumulation: 0 to 199.99 in (0 to 6553 mm)	±4%
Time & Date: 12 or 24 Hour Clock, Time Alarm and Date	

WeatherLink – Windows version

- Upgrade your Vantage Pro 2 or Vantage Vue Station to track and record weather history on your PC
- The included data logger fits neatly into the weather station console, storing weather data at user-defined intervals, even when it's not connected to your PC
- Download the data and create graphs, generate summaries and more
- Plot daily, weekly, monthly and annual data, as well as track degree-days
- Depending on the logging interval, store up to six months of data
- One WeatherLink required for each console connecting to a PC
- Includes USB or serial port adapter, 8 ft (2 m) cable, software and manual

Item 3362VP2	**WeatherLink for Vantage - USB**	**$165.00**
Item 3362VP2S	**WeatherLink for Vantage - Serial Port**	**$165.00**
Item N0006	**Growing Degree Day Software Upgrade**	**$95.00**
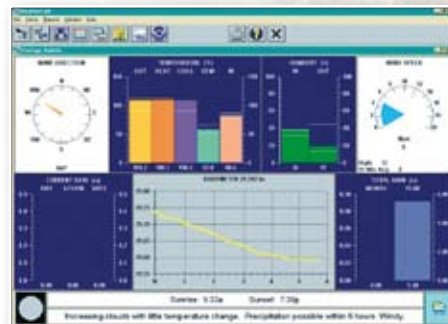
Digital Tipping Bucket Rain Gauge

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 $89.95

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 $89.95

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 $399.00

Temp/RH/CO_2 Meters

• Monitor indoor air quality and carbon dioxide levels in greenhouses
• Displays temperature, relative humidity and CO_2 simultaneously
• CO_2: 0 to 2,000 ppm, Accuracy: ±5%
• Temperature: 14 to 140ºF (-10º to 60ºC), Accuracy: ±0.9ºF (±0.5ºC)
• RH: 0.0% to 99.9%, Accuracy: ±3%

Item 3440   Handheld Temp/RH/CO_2 Meter $345.00
**   (includes 4 AA batteries)**
Item 3445   Wall-mount Temp/RH/CO_2 Meter $245.00
**   (includes 100-220VAC to 12VDC adapter)**

3440

3445

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 to 44.7 mph (0.8 to 72.0 km/h), Accuracy ±5%
- Temperature: 32 to 122°F (0 to 50°C), Accuracy: ± 1°F (±0.6°C)
- RH: 10 to 95% (Accuracy ±4%)

Item 3141	**Digital Wind/Temp Meter**	**$79.00**
Item 3145	**Digital Wind/Temp/RH Meter**	**$159.00**

3141

3145

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: ±1°F (±0.6°C)
- RH: 5 to 95% (3401), 0 to 100% (3402), Accuracy: ±3%

Item 3401	**Temperature/RH Pen**	**$59.00**
Item 3402	**Temperature/RH/Dew Point/Wet Bulb Pen**	**$75.00**

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: ±2% or ±3.6°F (±2°C)

Item 2956	**IR Temp Meter**	**$89.50**

IR Crop Temp/External Soil Temp Meter

Ideal turf and greenhouse tool

- 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: ±2°F (±1°C)
- Probe Temperature: 23 to 149°F (-5 to 65°C), Accuracy: ±1°F (±0.6°C); -40 to 23°F (-40 to -5°C), Accuracy: ±2°F (±1°C)

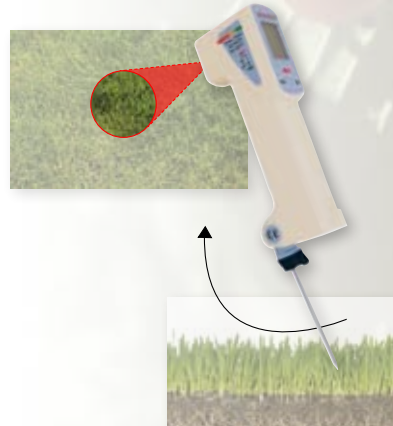|		
Item 2958	**IR Temp/External Temp Meter**	**$119.00**

Soil temperature

THE IMPORTANCE OF PEST AND DISEASE MANAGEMENT...

Pests and diseases can reduce plant quality and yield, and pesticides add significant input costs. 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. SpecWare disease alerts can assist pesticide application timing, facilitate an IPM approach and improve plant health.

3501PAR

3512

DD#1 50-86o 18
SINCE 04/12 0377

APPLE SCAB
INFECT=NONE

POWDERY MILDEW
ASC=NONE CON=070

WatchDog WeatherTrackers

AE50 outstanding innovations
AWARD WINNER FOR TECHNOLOGY INNOVATION

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
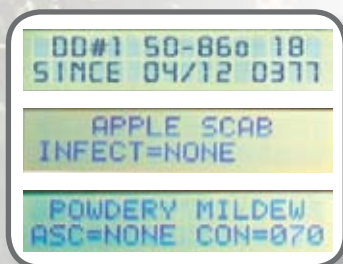
SPECIFICATIONS FOR WEATHERTRACKERS

Item #	Model #	Air Temp	Quantum Light	Leaf Wetness	Disease Forecast	Price
Greenhouse Growth Tracker						
3501PAR	305	Yes	Yes	No	No	**$545.00**
Degree Day Tracker						
3500	300	Yes	No	No	No	**$379.00**
Apple/Pear Pest Alert					Apple Scab	
3504	320	Yes	No	Yes	Sooty Blotch	**$459.00**
Grape Pest Alert					Powdery Mildew	
3512	330	Yes	No	Yes	Black Rot	**$459.00**

Spec 9 Pro Models

Disease and Insect Models

- Turns your logger or weather station into a disease/pest prediction tool
- Each package uses field-tested and validated algorithms
- Quickly produce the documentation when needed to support your IPM decisions
- **See page 19 for more details**

Forecast Model Packages

Item 3656GA   Grape Alert Package $449.00
Powdery Mildew, Black Rot, Downey Mildew, Botrytis,
Phomopsis Cane Leaf Spot, Insect models

Item 3656AP   Apple/Pear Alert Package $399.00
Apple Scab, Fire Blight, Sooty Blotch/Flyspeck, Insect Models

Item 3656TU   Turf Alert Package $349.00
Brown Patch, Pythium, Dollar Spot, Insect Models

Item 3656PO   Potato Alert Package $349.00
Early Blight, Late Blight, Insect Models

Item 3656TO   Tomato Alert Package $249.00
 Tomcast, Insect Models

Item 3656CH   Cherry Alert Package $249.00
Leaf Spot, Insect Models

WatchDog Plant Disease Stations

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

WatchDog 2000 Series Plant Disease Station - *Save $20.00*
- Receive real-time conditions and set condition alarms to your PC
- Includes WatchDog Mini Station Model 2450, leaf wetness sensor and rainfall sensor
- View current conditions as well as track severity indicators from onboard plant disease models
- **SpecWare software (page 18) required to download and analyze data**
- See page 14 for full description of Mini Station
- Wireless communication available (pages 16-17)
- University-validated disease models (sold separately) can be added for more accurate disease and pest monitoring (page 19)

Item 3684WDPD   WatchDog 2000 Series Plant Disease Station $813.00

The WatchDog 1000 Series Plant Disease Station - *Save $20.00*
- Data log current and historical plant disease severity indicators
- Includes a Watchdog Model 1450 Micro Station, leaf wetness sensor and rainfall sensor
- **SpecWare 9 (v9.2) software (page 18) required to download and analyze data**
- University-validated disease models (sold separately) can be added for more accurate disease and pest monitoring (page 19)

Item 3684PD1   WatchDog 1000 Series Plant Disease Station $667.00
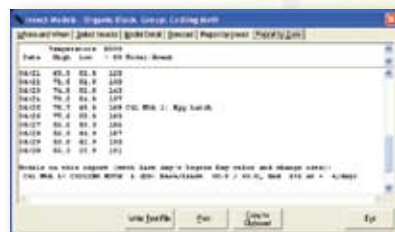
3684WDPD

Mounting post
not included

3684PD1

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
- See our website for more models and accessories

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

Item 2860	IPM Scope	$349.00
Item 2860V	Video Software Upgrade	$49.00
Item 2860UV	IPM Scope-Ultra Violet	$495.00
Item 2860MP	IPM Scope-Mega Pixel	$795.00
Item 2860HS	Plastic Horseshoe-3D images	$25.00

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

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	$595.00

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

Item 2851	**Macroscope 25 with hard carrying case**	**$197.00**
Item 2852	**Macroscope 45 with hard carrying case**	**$219.00**

Refractometers

Digital Refractometer

Easy and convenient to use

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

Item 2812	**Digital Refractometer**	**$299.00**

Handheld Refractometers

Perfect for field or lab

- Measures Brix from 0 to 32.0% (Accuracy ± 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	**Refractometer 0–32% Brix**	**$79.00**
Item 2806	**Refractometer 0–32% Auto Temp. Comp.**	**$99.00**

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)	$449.00
Item 2345	Replacement Nitrate Sensor	$189.00
Item 2311	450 ppm NO_3-N Standard (6 - 14 mL bottles)	$59.00
Item 2312	34 ppm NO_3-N Standard (6 - 14 mL bottles)	$59.00
Item 2330	Soil NO_3 Kit w/30 Samples	$44.50

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: ± 10%

SAMPLE GUIDELINES – (UC Davis)

Crop: Tomato

Stage	Dry Wt. Nitrate-N	Sap Nitrate-N
First bloom	10,000 to 14,000 ppm	700 to 900 ppm
1-inch fruits	8,000 to 9,000	500 to 600
First harvest	5,000 to 6,000	400 to 500
Final harvest	3,000 to 4,000	300 to 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 30-sample soil test kit (except "G" models)

Nutrient Measurement Units

Item 2400	Cardy Potassium K$^+$ Meter	$365.00
Item 2400G	Cardy Potassium K$^+$ (Meter Only)	$345.00
Item 2500	Cardy Sodium Na$^+$ Meter	$365.00
Item 2500G	Cardy Sodium Na$^+$ (Meter Only)	$345.00

Soil Kits and Accessories

Item 2434	Soil K$^+$ Kit w/30 Samples	$39.50
Item 2535	Soil Na$^+$ Kit w/30 Samples	$39.50
Item 2125	Sampling Sheets – 2 Rolls	$20.00
Item 2135	Sampling Sheets – 4 Rolls	$33.00

Standards – Replenishments

Item 2414	150 ppm K$^+$ DI 30 mL	$12.50
Item 2418	2,000 ppm K$^+$ DI 30 mL	$12.50
Item 2510	Solution Set – Na$^+$	$33.00

Replacement Sensors

Item 2440	K$^+$ Potassium Sensor	$124.00
Item 2540	Na$^+$ Sodium Sensor	$124.00

PETIOLE POTASSIUM SUFFICIENCY LEVELS
(University of Florida)

Crop: Greenhouse Tomato

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

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

Handheld Plant Sap Press

- Use with Cardy meters or refractometers (page 31) for on-site testing
- Made of high quality, non-corrosive metal
- Includes cleaning device

Item 2725	Hand Held Plant Sap Press	$14.95

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	$399.00

Why measure pH?
pH levels are important in soils, irrigation water and spray tank solutions. 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	FieldScout SoilStik pH Meter	$149.00
Item 2106	Flat Sensor, Replacement	$49.00
Item 2110	Refill Solutions - pH 4 and 7, (2) 30 mL ea.	$25.00

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 "direct" soil pH measurement tool

- Make direct soil or solution pH readings with either a pointed-tip or pH/Temperature electrode
- ISFET non-glass electrode 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	$715.00
Item 2163S	ISFET Replacement Probe	$349.00
Item 2164S	Field Carrying Case with pH Standards (required)	$49.00
Item 2169	AC Adapter, 110VAC	$49.00
Item 2110	Refill Solutions - pH 4 and 7, (2) 30 mL ea.	$25.00

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

Non-glass ISFET electrode

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

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

Cardy Twin pH Meter

Ideal for testing irrigation water, pesticide water or dairy 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	$265.00
Item 2110	Refill Solutions - pH 4 and 7, (2) 30 mL ea.	$25.00
Item 2143	Twin pH Replacement Sensor	$134.00

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 45)
- 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	$595.00
	Excludes pH Electrode – order separately	
Item 2121	Combination pH/Temp Electrode	$128.00
Item 2124FE	Flat End pH Electrode	$129.00
	For measuring the exposed surface of soil cores	
Item 2950CV5	GPS/DGPS Cable	$39.00
Item 3661USB	USB-to-Serial Adapter	$35.00
Item 2110	Refill Solutions - pH 4 and 7, (2) 30 mL ea.	$25.00

View data as a color map
SpecMaps
See page 45 for details

FieldScout pH 110 shown with optional Flat End pH Probe

ATC Probe

Flat-End Probe

Spear-Tip Probe

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 ±0.02pH)
- 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	$195.00
Item 2130M	pH/mV (Meter Only)	$175.00
Item 2110	Refill Solutions - pH 4 and 7, (2) 30mL ea.	$25.00
Item 2124FE	Flat-End Probe (Soils)	$129.00
Item 2122	Spear-Tip Probe (Soils)	$115.00
Item 2124	ATC pH Probe (Liquids)	$89.00

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, measure 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 to 199.9 µS/cm (resolution 1 µS/cm)
  - 0.0 to 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 45)
- Includes Conductivity Cell (item 2220CC), software, four AAA batteries, PC interface cable and EC 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	$795.00
	Soil EC Probe sold separately	
Item 2254	Conductivity Standard, 2.76 mS/cm, 230 mL	$18.50
Item 2251	Conductivity Standard, 1.41 mS/cm, 230 mL	$18.50
Item 2220CC	Replacement Conductivity Cell (Water)	$59.50
Item 2950CV5	GPS/DGPS Cable	$39.00
Item 3661USB	USB-to-Serial Adapter	$35.00

Soil EC Probe Options

Item 2220FS	8 in (20 cm) FieldScout EC Probe	$245.00
Item 2225FSP	24 in (60 cm) FieldScout T-Handle EC Probe w/ Replaceable Tip	$295.00
Item 2266	Replaceable Tip For T-Handle EC Probe	$95.00

View data as a color map
SpecMaps
See page 45 for details

FieldScout EC 110 Meter shown with 24 in (60cm) T-Handle

AE50 outstanding innovations

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INNOVATION

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 to 19.9 mS/cm (Accuracy ± 2%, resolution 0.01 mS/cm)
- Automatic temperature compensation
- Includes case, battery and EC 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	$365.00
Item 2265PROBE	FieldScout EC 8 in Probe (Replacement)	$245.00
Item 2254	Conductivity Standard, 2.76 mS/cm, 230 mL	$18.50
Item 2251	Conductivity Standard, 1.41 mS/cm, 230 mL	$18.50

24 in (60 cm) Probe Option

Item 2265FSTP	FieldScout Direct Soil EC Meter w/ 24 in T-Handle Probe and Replaceable Tip	$445.00
Item 2265FST24P	FieldScout T-Handle EC 24 in Probe w/ Replaceable Tip	$295.00
Item 2266	Replaceable Tip For T-Handle EC Probe	$95.00
Item 2254	Conductivity Standard, 2.76 mS/cm, 230 mL	$18.50
Item 2251	Conductivity Standard, 1.41 mS/cm, 230 mL	$18.50

Exclusive Paired Sensor

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

FieldScout Direct Soil EC Meter with T-Handle

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 ± 2%
- Measurement ranges:
  – 0.00 to 199 µS/cm (resolution 1 µS/cm)
  – 0.0 to 19.0 mS/cm (resolution 0.01 mScm)
- Includes two CR2032 batteries, case and solution standard

Item 2205	Cardy Twin EC Meter	$294.00
Item 2210	Cardy Twin EC Calibration Solution (1.41 mS/cm)	$42.50
Item 2242	Replacement Sensor	$119.00

Waterproof EC Meter

- Measures four parameters; Conductivity, TDS, Salinity and Temperature
- 6 units of measure: µS/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: ±2%
- Measurement ranges
  – Conductivity: 0.00 to 199 µS/cm, 200 to 1,999 µS/cm or 2.00 to 19.99 mS/cm
  – TDS: 0 to 99.9 mg/L, 100 to 999 mg/L or 1.00 to 9.99 g/L
  – Salinity (fixed ratio of 0.5): 0 to 99.9 ppm, 100 to 999 ppm or 1.00 to 9.99 ppt
  – Temperature: 32 to 194°F (0.0 to 90.0°C)
- Includes conductivity cell, protective sensor cap, sample cup with cap, four SR44W button batteries and 48 in (1.2 m) neckstrap
- Calibration standard sold separately

Item 2246	Waterproof EC Meter	$99.00
Item 2251	Conductivity Standard, 1.41 mS/cm, 230 mL	$18.50

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	$259.00
Item 2183	Replacement pH/EC Probe	$102.00
Item 2110	Refill Solutions - pH 4 and 7, (2) 30 mL ea.	$25.00
Item 2251	Conductivity Standard, 1.41 mS/cm, 230 mL	$18.50

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 measure 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 45)
- Includes hard carrying case

* 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	FieldScout CM 1000 Chlorophyll Meter	$2,490.00
Item 2950S	Software To Activate Data Logger (includes PC cable)	$199.00
Item 2950CV5	GPS/DGPS Cable	$39.00
Item 3661USB	USB-to-Serial Adapter	$35.00

View data as a color map
SpecMaps
See page 45 for details

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

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
- Trend graph stores and displays up to 30 measurements
- 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 45)

* 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	**$2,095.00**
Item 2900PDL	**Minolta SPAD 502DL Plus Chlorophyll Meter** with RS-232 Data Port and Built-In Data Logger (includes software)	**$2,495.00**
Item 2950CV5	**GPS/DGPS Cable**	**$39.00**
Item 3661USB	**USB-to-Serial Adapter**	**$35.00**
Item 2900CASE	**Hard Carrying Case**	**$35.00**

View data as a color map
SpecMaps
See page 45 for details

2900P

SPECIFICATIONS FOR SPAD 502 PLUS

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

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

Light Source: 2 LEDs

Receptor: Silicon Photodiode

Power Source: 2 AA alkaline batteries (1.5V)

Repeatability: Within ±0.3 SPAD unit

SPAD Value: Index of relative chlorophyll content; 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

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)
- Includes hard carrying case

* 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	$2,590.00
Item 2950CV5	GPS/DGPS Cable	$39.00
Item 3661USB	USB-to-Serial Adapter	$35.00

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FIELDSCOUT® TCM 500 NDVI Turf Color Meter

- Measures reflected light from approximately a 3 inch (7.6 cm) diameter section of turfgrass
- Uses an internal light source to negate the effect of sunny versus cloudy conditions
- Measures reflectance in the red (660 nm) and near infrared (850 nm) spectral bands
- 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 45)
- Includes hard carrying case and TCM 500 T-Handle (item 2975H)
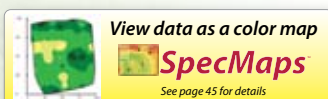
* Spectrum's PC cables connect to a 9-pin serial port. USB-Serial adapter (item 3661USB) required for connection to computers with only USB ports.
** GPS interface requires two cables. The GPS/DGPS cable (item 2950CV5) is available from Spectrum.
A PC serial interface cable supplied by the manufacturer of the GPS receiver is also required.

Item 2975NDVI	FieldScout TCM 500 NDVI Turf Color Meter	$790.00
	Includes TCM 500 T-Handle	
Item 2975H	FieldScout TCM 500 T-Handle	$95.00
Item 2950CV5	GPS/DGPS Cable	$39.00
Item 3661USB	USB-to-Serial Adapter	$35.00

View data as a color map
SpecMaps
See page 45 for details

Turf Color Index:
Grass Index=2.20
N=10   Avg=7.44

NDVI:
NDVI = .784
N=10 Avg = .780

Displays Turf Color Index and NDVI on the LCD

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FOR TECHNOLOGY INNOVATION

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 (page 45)
- Rods sold separately

* 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	FieldScout TDR 300 Soil Moisture Meter	$1,065.00
	Includes soft-sided carrying case	
Item 2950CV5	GPS/DGPS Cable	$39.00
Item 7250	GPS Unit Mounting Bracket	$129.00
Item 3661USB	USB-to-Serial Adapter	$35.00
Item 6430CASE	TDR 300 Carrying Case	$119.00

View data as a color map
SpecMaps™
See page 45 for details
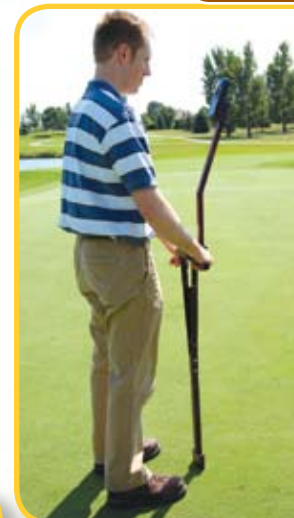
TDR 300 shown with optional GPS bracket
GPS not included

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	FieldScout TDR 100 Soil Moisture Meter	$735.00
	Includes hard-sided carrying case	
Item 6440FSS	Replacement TDR 100 Soil Moisture Probe	$265.00
Item 6440CASE	TDR 100 Carrying Case	$37.50

TDR 300 and TDR 100 Carrying Cases

SPECIFICATIONS FOR TDR SOIL MOISTURE METERS

Measurement Principle: Time-domain measurement methods

Measurement Units: Percent volumetric water content

Resolution: 0.1% volumetric water content

Accuracy: ±3.0% volumetric water content with electrical conductivity < 2 mS/cm

Range: 0% to saturation (Saturation typically around 50% volumetric water)

Battery/Life: 4 AAA alkaline batteries; approximately 12-month battery life

Data Logger: (TDR 300) 3,250 measurements without GPS; 1,350 with GPS/DGPS

TDR Rods

- Sturdy stainless-steel construction
- Field replaceable

Item 6428FS	Two 1.5 inch (3.8 cm) Rods	$58.00
Item 6429FS	Two 3 inch (7.5 cm) Rods	$58.00
Item 6431FS	Two 4.8 inch (12 cm) Rods	$58.00
Item 6432FS	Two 8 inch (20 cm) Rods	$58.00
Item 6430PH	Pilot Hole Maker for TDR Meters	$69.50
	Includes two 3 inch (7.5 cm) rods (item 6429FS)	

Pilot Hole Maker for TDR Meters

FIELDSCOUT + **SpecMaps™** = *Your Irrigation Audit, Simplified...*

Based on proven time-domain measurement technology, The FieldScout TDR 300 accurately measures soil moisture across the full range of soil moisture conditions. This portable meter gives you the flexibility to measure soil moisture content directly, anywhere in the field. With the internal data logger connected to a user-supplied GPS receiver, The TDR 300 captures geo-referenced data that can be readily imported into our spatial mapping software for full analysis over the Internet.

Step 1 - Measure

Connect the TDR 300 to an active GPS receiver. Start collecting your data points along the boundary of the site at 5-step intervals. Once the boundary is set, sample the interior following a grid pattern.

Step 2 - Process Your Data

The TDR 300 connects directly to your PC via the data port on the meter. FieldScout software allows you to download your collected data.

SpecMaps™ web-based software provides a simple tool for turning your TDR 300 measurements into a 2-dimensional color map of soil moisture variability. The location and relative magnitude of wet and dry spots becomes immediately apparent. SpecMaps also displays statistical information about your landscape, fairway, or golf green, including a histogram for another quick assessment of how uniformly moisture is distributed across the field.

Step 3 - Analyze Your Results
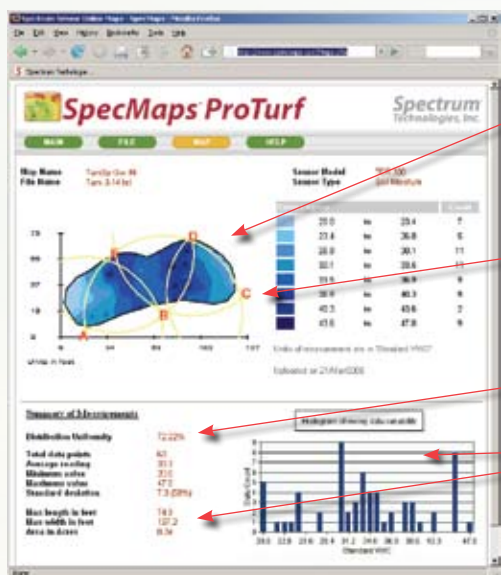
Log onto the SpecMaps website. Upload your stored data file and name your map for easy future reference.

Plot your data points alone or create a 2-dimensional contour map
The chart consists of a contour or a data point map. This map is accompanied by a legend that relates the colors in the map to the soil moisture values. With a few clicks of your mouse, see exactly where your site is being over watered or is in need of irrigation.

Sprinkler head locations - *SpecMaps ProTurf Exclusive Feature*
Plot the location and radius of throw of each sprinkler head. This allows comparison of the soil moisture variability to the expected water application pattern.

Distribution uniformity - *SpecMaps ProTurf Exclusive Feature*
Automatically computes the lower quartile distribution uniformity.

The measurement summary
Includes basic statistical information about the data set as well as a histogram for visualizing the complete soil moisture data range

Our new process is designed to be fast, easy, and accurate. No need for tedious set-up, testing, and re-testing for your results. Get your answers on the spot with true root zone moisture information. You are able to see the complete picture of your turf's irrigation profile in full color and without the need of tiny cups or hand-drawn charts.

See the Irrigation Audit demo in action at: www.specmeters.com/videos

SpecMaps™

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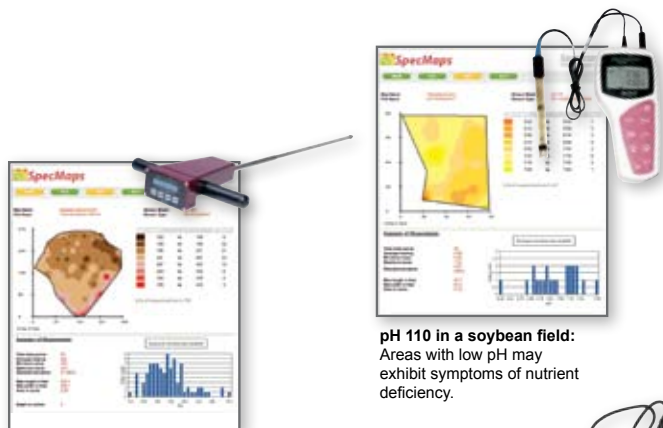*Make management decisions based on your field's spatial variability*

- 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

Item 3652   **SpecMaps Web Mapping Utility**   **$199.00**
    (1-Year Subscription)

Get maximum value out of your portable FieldScout meters!

pH 110 in a soybean field: Areas with low pH may exhibit symptoms of nutrient deficiency.

SC 900 on a baseball field: Yellow and red spots indicate areas of heavier soil compaction.

CM 1000 on a fairway: Greener areas indicate healthier turf.

EC 110 on a fairway : Greener areas represent locations of higher salinity.

TDR 300 on a putting green: The areas with higher soil moisture are shown in deep blue.
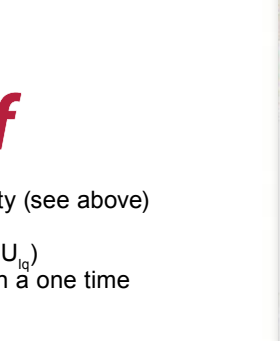
SPAD 502 measuring nitrogen content in corn: Dark green areas indicate higher chlorophyll content.
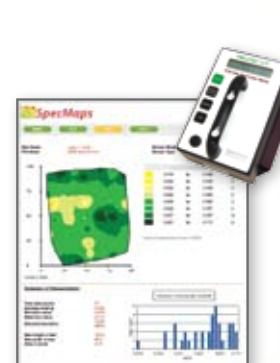
TCM 500 on a lawn: Dark green areas represent healthy turf grass.

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$_{lq}$)
- Current SpecMaps users can upgrade to a ProTurf account with a one time upgrade fee, pleases call for details

Item 3652PT   **SpecMaps ProTurf Web Mapping Utility**   **$299.00**
    (1-Year Subscription)

3685SM23

New Models

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.

WatchDog® Irrigation Stations

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

WATERSCOUT® Irrigation Stations

- • *Save $15.00 when purchasing as an Irrigation Station*
- • Includes WatchDog Station and WaterScout SM 100 Soil Moisture Sensors with 20 ft (6 m) cables
- • Micro Stations also include the Protective Sliding Enclosure
- • Add a cellular or wireless modem to the 2400 Mini Station to remotely monitor current conditions. For more information, see pages 16-17

3685SM13

|	MODEL 1200 MICRO STATION	MODEL 1400 MICRO STATION	MODEL 2400 MINI STATION
2 WaterScout SM 100 Soil Moisture Sensors	Item 3680SM12 $448.00	Item 3685SM12 $518.00	
3 WaterScout SM 100 Soil Moisture Sensors		Item 3685SM13 $615.00	Item 3685SM23 $811.00
4 WaterScout SM 100 Soil Moisture Sensors		Item 3685SM14 $712.00	Item 3685SM24 $923.00

Watermark Irrigation Stations

- • *Save $10.00 when purchasing as an Irrigation Station*
- • Includes WatchDog Station, Watermark Soil Moisture Sensors with 11 ft (3.3 m) cables and Protective Sliding Enclosure

3680WM12

	MODEL 1200 MICRO STATION	MODEL 1400 MICRO STATION
2 Watermark Soil Moisture Sensors	Item 3680WM12 $389.00	Item 3685WM12 $459.00
3 Watermark Soil Moisture Sensors		Item 3685WM13 $524.00
4 Watermark Soil Moisture Sensors		Item 3685WM14 $589.00

Monitor, compare and track soil moisture at multiple levels in the root zone!
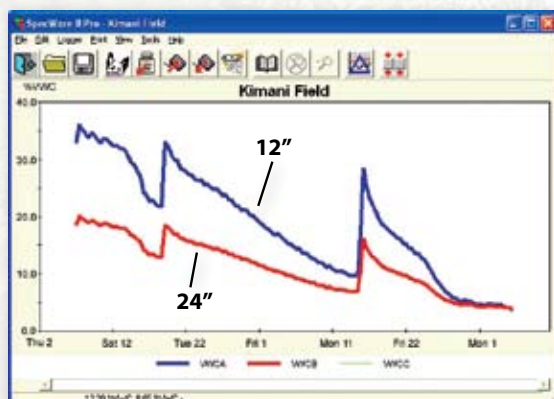
SpecWare Pro showing data from two
WaterScout SM 100 sensors buried at different depths

3680SM12

12"

24"

3685SM13

12"

24"

36"

3685SM24
Shown with wireless option
(see page 17) and antenna
extension cable

12"

24"

36"

48"

WATERSCOUT® SM 100 Soil Moisture Sensor

The key is knowing both <u>when</u> and <u>how much</u> 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 Micro Stations 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. (call for support)

Item 6460	WaterScout SM 100 Sensor - 6 ft (1.8 m)	$89.00
Item 6460-20	WaterScout SM 100 Sensor - 20 ft (6 m)	$97.00

Actual size

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

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

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

FIELDSCOUT® Soil Sensor Reader

- Spot-check WaterScout SM 100 sensors in the field
- Also reads Watermark sensors (requires separate adapter)
- Includes soft-sided case (also available separately)
- Item 7500 will also fit the WatchDog 1000/2000 Series Data Shuttle (item 3679WD), LightScout Red/Far-Red Meter (item 3412), LightScout Quantum Light Meters (four models) and the LightScout External Light Sensor Reader (item 3415FX)

Item 6465	FieldScout Soil Sensor Reader	$279.00
Item 6450FSADPT	Watermark Adapter for Soil Sensor Reader	$35.00
Item 7500	FieldScout Soil Sensor Reader Case	$32.50

7500

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	$37.00
Item 6450FSADPT	Watermark Adapter for Soil Sensor Reader	$35.00

Irrometer Tensiometers

- Scheduling irrigation based on how hard plant roots are working to draw water from the soil
- "R" models (shown) 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 6419	6 in (15 cm) Depth	$75.00
Item 6420	12 in (30 cm) Depth	$78.00
Item 6421	18 in (45 cm) Depth	$81.00
Item 6422	24 in (60 cm) Depth	$85.00
Item 6423	36 in (90 cm) Depth	$89.50
Item 6425	Service Kit - Required	$54.00

- Connect your "R" model tensiometer to your weather station. The Pressure Transducer adapts to the Irrometer tensiometers and allows use of the dial gauge for measurements.

|		
Item 3669	Pressure Transducer	$249.00

Economy Soil Moisture Tester

- Analog soil moisture meter measures any type of soil with just one calibration
- Resistance-type sensor located at the tip of the shaft
- Provides instant results ranging from 0 (dry) to 10 (saturated)
- 3-month warranty

Item 6400	9 in (22 cm) Soil Moisture Tester	$94.00
Item 6405	24 in (60 cm) Soil Moisture Tester	$99.00

AF50
outstanding innovations
AWARD WINNER
FOR TECHNOLOGY
INNOVATION
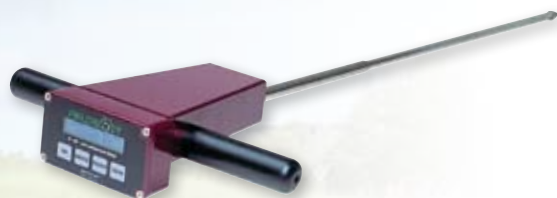
Why measure soil compaction?
The soil is the plant's reservoir of water, nutrients and oxygen. Compacted soil has less pore space to store what the plant needs. Soil compaction prevents moisture penetration, reduces fertilizer and chemical uptake, creates conditions for anaerobic microbes to build up and hinders plant root growth. In some cases, yield losses can run as high as 30% due to compaction alone.

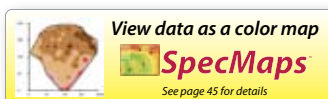# FIELDSCOUT® SC 900 Soil Compaction Meter

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 45)
- Includes depth target

* 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	$1,595.00
Item 2950CV5	GPS/DGPS Cable	$39.00
Item 7250	GPS Unit Mounting Bracket	$129.00
Item 3661USB	USB-to-Serial Adapter	$35.00
Item 6110FST	Replacement Depth Target	$30.00
Item 6106	Replacement Tip	$35.00

View data as a color map
SpecMaps
See page 45 for details

FieldScout SC 900 with
Depth Target
and optional GPS
Mounting Bracket

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 to18 in (0 to 45 cm), 0 to 1,000 PSI (0 to 7,000 kPa)
Battery/Life:	4 AAA alkaline batteries; approximately 12-month life
Data Logger Capacity:	772 profiles without GPS; 579 profiles with GPS

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	$208.50
Item 6106	Replacement Tip	$35.00

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	$235.00
Item 6410	1/2 inch Replacement Tip - Fine Soils	$19.95
Item 6415	3/4 inch Replacement Tip - Coarse Soils	$26.15

6500
6519
6505
6510

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	$59.50
Item 6505	Model J Soil Sampler	$123.00
Item 6519	Model LS Soil Sampler	$122.00
Item 6500	Auger Tube Kit	$399.00
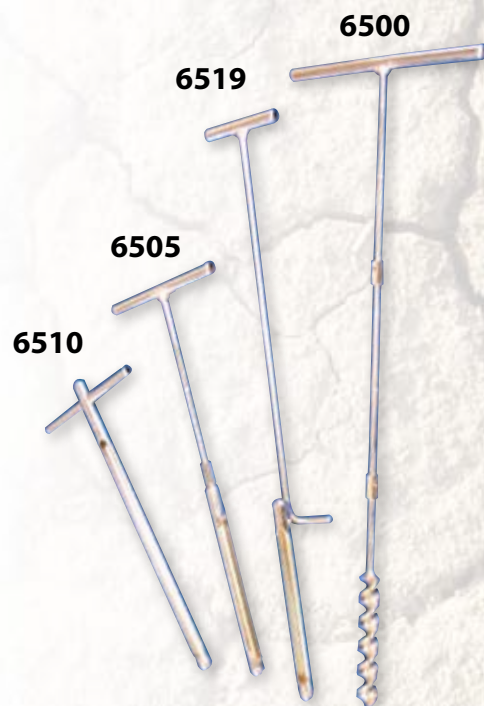
Tough Soil Thermometers

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°

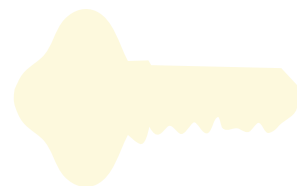| Item 6300	Digital Temperature Tester	$24.50
Item 6305	Analog Temperature Tester	$10.70
Item 6310	Long-Stem Thermometer	$33.50

6300
6305
6310

Spectrum® Technologies, Inc.

"To Measure Is To Know"

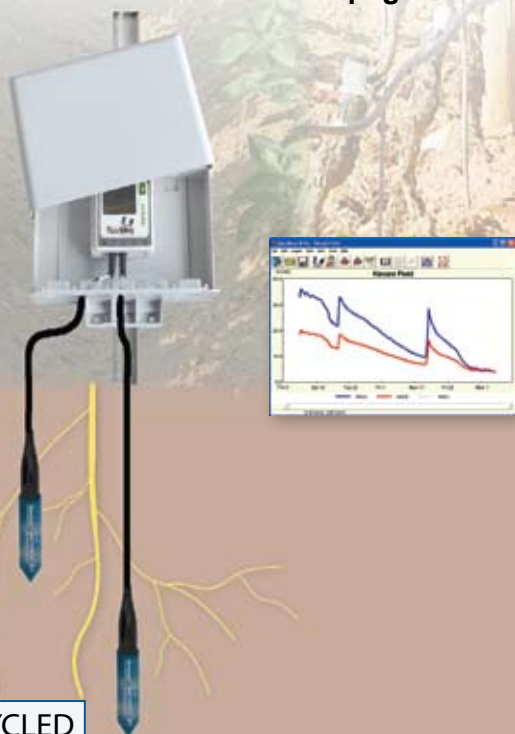12360 South Industrial Drive East
Plainfield, Illinois 60585

Toll Free: (800) 248-8873
Phone: (815) 436-4440
Fax: (815) 436-4460
E-mail: info@specmeters.com
www.specmeters.com

WatchDog®   WATER SCOUT®

Monitor, compare and track soil moisture at multiple levels in the root zone!

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