

# WATERMARK

Optimizing Irrigation... Maximizing Conservation...  
WORLDWIDE - Since 1951

Soil Water Management Products

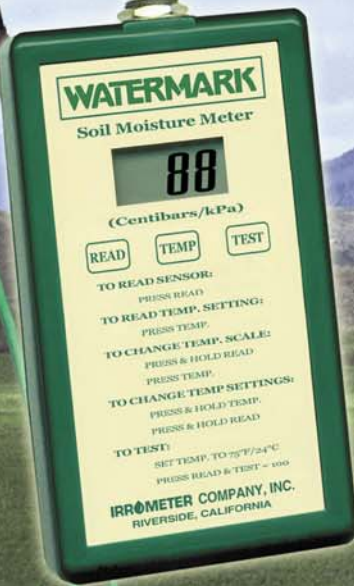


Photo courtesy of USDA NRCS.



**Where Irrigation  
Decisions Should Be Made**



# Soil Moisture Management

Irrigation water management is a critical element in agriculture. Many agronomists, crop consultants and growers agree that monitoring soil moisture is an essential tool to manage irrigation. Since 1951 IRROMETER has been a leader in soil moisture monitoring products that help growers maximize irrigation efficiency and minimize costs.

In 1985 IRROMETER introduced the patented WATERMARK Sensor which uses electrical resistance to measure soil moisture status. Since soil water is an electrical conductor, resistance is lower when the soil is wet and higher when it's dry. The sensor is placed in the soil at the root level and exchanges water with the surrounding soil thus staying in equilibrium with it. As the soil dries, water is removed from the sensor and the resistance measurement increases. This resistance is displayed in centibars (kPa) of soil tension which is a major physical force and direct indicator of how hard the plant's root system has to work to extract water from the soil. The higher the tension reading the drier the soil is.

Deciding when and how long to irrigate can then be based on soil moisture status saving you time, labor, water and energy costs. The sensor can be read manually by the WATERMARK Meter or automatically by the WATERMARK Monitors.



**WATERMARK  
Soil Moisture  
Sensor**  
(200SS)

- Range of 0-200 centibars (kPa) of soil water tension
- Unaffected by freezing temperatures
- Durable construction provides years of service
- Requires no maintenance
- Automatically compensates for varying salinity levels

**Digital Meter**  
(30-KTCD-NL)

- Digital Readout with self test function
- Manual Temperature Compensation
- 9-Volt battery lasts an entire year
- One Meter reads all WATERMARK Sensors



## WATERMARK Sensor Installation Tools

Auger, coring and slide hammer tools available. Insertion tool has ejection rod to ensure proper installation.





# Automatic Data Monitoring

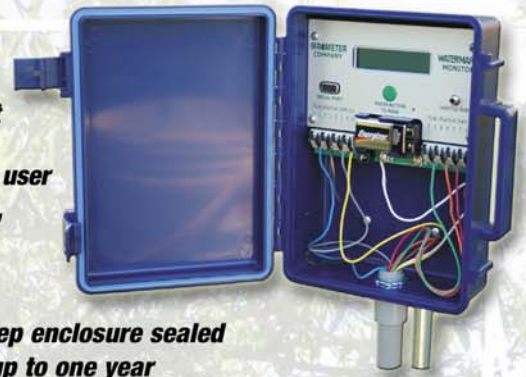
WATERMARK Automatic Data Collection systems provide a graphical record of soil moisture trends to assist the grower in making critical irrigation scheduling decisions. The equipment is simple to install and use. Designed for harsh outdoor installations, our enclosure is weather tight and has spring loaded sensor connections that never need tightening. WaterGraph software is included and takes only a few minutes to set up. Data can be read in the field, downloaded to a Shuttle or directly to a laptop. Remote data access options permit viewing the data in alternate locations via radio transmission or internet (see back panel for details). Readout can be customized to the individual's application by inputting program characteristics such as monitor location, sensor type and location, reading frequency, etc.

(check for model compatibility).



## 900M Monitor

- Collects and records up to eight sensor inputs
- Reading intervals selected by the user
- Display shows the sensor name, type and current status
- Soil moisture readings can be temperature compensated
- Wire strain relief connectors keep enclosure sealed
- Low cost battery (9-volt) lasts up to one year



The WATERMARK Model #900M comes complete with the following items: Monitor in a heavy duty outdoor enclosure, seven WATERMARK soil moisture sensors with 15' (4.5m) wire lead, one soil temperature sensor, 9V battery, WaterGraph software (WG-3), instruction manual, and serial cable. Optional Model #900M-0 is monitor with no sensors. Contact us for more details.

## 950R Wireless Monitor

- FCC license-free\* wireless system reduces wire runs and installation costs
- 1500' transmission range (line-of-sight) between transmitter and receiver modules
- Receiver module networks with as many as 16 transmitter modules
- Collects and records up to a total of 64 sensor inputs
- Receiver module can also read switch closure or rainfall gauge
- Field display shows four sensor readings per screen

The WATERMARK Model #950R comes complete with the following items: Monitor in a heavy duty outdoor enclosure, battery and 5W solar charging panel, WaterGraph software (WG-4), instruction manual and USB cable. Optional Model #950R-0 is monitor with no battery or solar panel. Contact us for more details.

\*License-free to the user.



## 950T Wireless Transmitter

- Four sensor inputs per transmitter module
- Transmitter module can read soil moisture, soil temperature or irrigation system pressure
- Unique design transmits only when the data has changed
- Powered by a low cost battery (9-volt)
- Simple field installation – mounts on 2" pipe
- Spring loaded sensor connections never need tightening

The WATERMARK Model #950T-TW comes complete with the following items: Three WATERMARK soil moisture sensors with 10' (3m) wire lead, one soil temperature sensor and 9V battery. Additional models are available with no sensors or four WATERMARK soil moisture sensors. Contact us for more details.





# Remote Data Access Options — Extend Your Range

Our data access options for the 900M and 950R monitors improve productivity by bringing important soil moisture information to the user. Remote areas and multiple crop locations can be monitored from a central location saving you time and travel expenses. Irrigation decisions can be made after reviewing all monitored locations maximizing utility usage and improving irrigation efficiency. The components are modular in design and can often be combined in order to suit the needs of your unique applications. We offer two methods of accessing data from remote locations: Long Range (Radio) which has a range of several miles and Extended Range (Internet) which provides world-wide access.\*

## **LONG RANGE (Radio) — From monitor location to office**

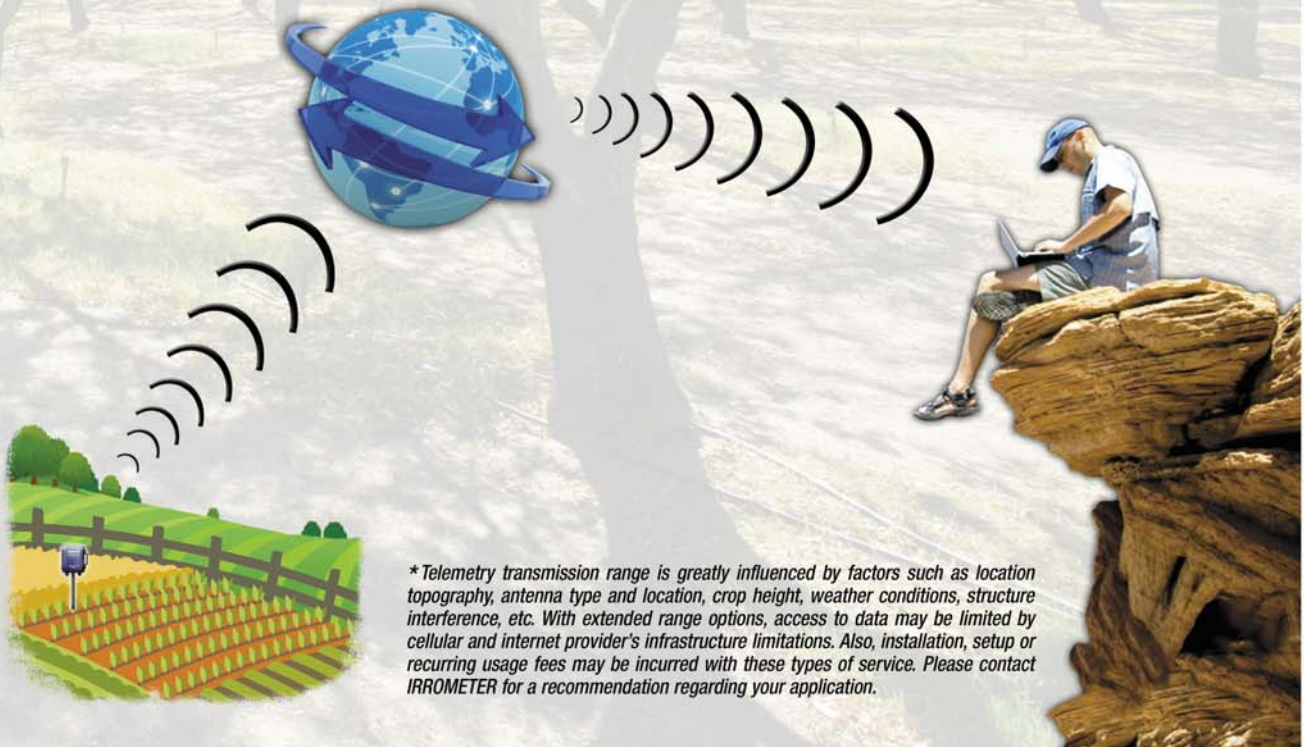
- **POWERFUL** – 1 watt radio\*\* extends range while frequency hopping feature reduces interference
- **SIMPLE** – FCC certified 900MHz spread spectrum radio\*\* is license free to user
- **RELIABLE** – proven radio electronics and low maintenance solar charged battery are field tested
- **FLEXIBLE** – Multiple Field Radios at monitor locations can network with a single Base Radio to connect directly to user's computer or range can be extended by combining radio equipment with a Cellular Gateway for internet access

\*\*USA only, other radios available for international use.



## **EXTENDED RANGE (Internet) — From monitor location to Web**

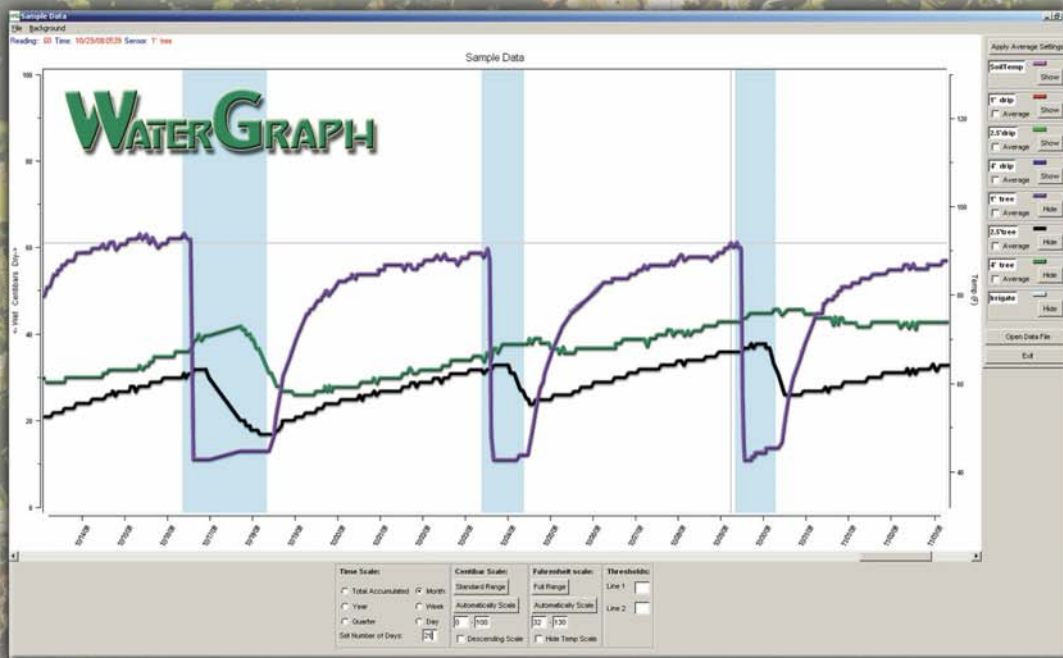
- **COST EFFECTIVE** – View multiple monitor locations from a centralized off-site location
- **CONVENIENT** – View data any time from anywhere
- **SECURE** – Allows multiple users to share the password protected data
- **ACCESSIBLE** – Cellular Data Service provides internet access in areas that can't be served by line of site radio technology. Performance is limited only by service provider's coverage in your locale
- **CONNECTED** – Allows viewing of latest soil moisture readings 24-7. Helps user make strategic decisions in the event of irrigation equipment failures or extreme weather
- **FLEXIBLE** – Can be with a single monitor location or multiple remote monitor locations that are connected via a radio network



\*Telemetry transmission range is greatly influenced by factors such as location topography, antenna type and location, crop height, weather conditions, structure interference, etc. With extended range options, access to data may be limited by cellular and internet provider's infrastructure limitations. Also, installation, setup or recurring usage fees may be incurred with these types of service. Please contact IRROMETER for a recommendation regarding your application.



**WATERGRAPH** is a software program that automatically records and displays sensor readings. This data can be displayed on your computer graphically to provide a vivid picture of the soil conditions. Available sensors indicate soil moisture, soil temperature, irrigation run time, rainfall, and other conditions. This data can be evaluated to determine methods of improving irrigation scheduling for optimum results. For example the graph below indicates soil moisture at three root zone levels before and after irrigation events. This information helps you decide when and how long your irrigation cycles should be. Monitoring the moisture and its “rate of change” will help a grower maximize crop production while minimizing water, power, fertilizer, and labor usage.












### **WaterGraph Features:**

- Soil moisture at multiple depths
- Soil temperature sensor
- Irrigation event (switch position sensor – optional)
- Rain gauge sensor (optional)
- Time scale – view data history as you prefer
- Centibar sale – allows you to view range applicable to crop needs
- Temperature scales (F or C) allows operator to select range
- Threshold limits – allows you to set reference lines for quick review
- Apply average settings – gives you the option of reviewing data as an average
- Individual data control – allows you to highlight or hide individual data points (up to 8 sensor positions)
- Crosshair position – gives you detailed time stamp wherever the cursor is placed.



# Monitor Options and Accessories

SENSING OPTIONS		900M	950R	950T
	<b>200SS- ** — WATERMARK Soil Moisture Sensor.</b> **Specify wire lead length of 5' (1.5m), 10' (3m), 15' (4.5m), no lead or custom length.	?		?
	<b>200TSX — Extended Range Temperature Sensor.</b> Reads range 0° to 239°F (-18° to 115°C).	?		
	<b>E — Electronic Gauge option for IRROMETER.</b> Tensiometer equipped with an Electronic soil tension gauge. (Requires "E" adapter when used with 900M).	?		?
	<b>7- ** - E — Electronic Pressure Gauges.</b> Indicates irrigation pressures by analog (dial/needle) and electronic methods. Monitor records electronic pressure readings. (** Select from 15 to 200 PSI) (Requires "E" adapter when used with 900M).	?	?	
				<b>200TS — Temperature Sensor.</b> Reads range 32° to 122°F (0° to 50°C) on 900M and range 20° to 122°F (-6° to 50°C) on 950T.
				<b>RSU — Remote Sensing Unit option for IRROMETER.</b> Tensiometer equipped with a 4-20mA transducer. Requires a "RSU" wiring adapter for each unit and 12-24v power supply such as 10W battery pack for up to 4 RSU's or the 20W battery pack for up to 8 RSU's. See Power Options below.
				<b>7- ** - AD* — Automatic Switching Pressure Gauges.</b> User rotates switch pointer (mounted on gauge face) to desired set point. Monitor records switch activity (on/off position). (** Select from 15 to 400 PSI and *open or closed switch past setting).
				<b>950RG — Tipping bucket style Rain Gauge.</b> (Requires "900M-RGA" adapter when used with 900M).
OTHER MONITOR OPTIONS		900M	950R	950T
	<b>QD — Quick Disconnect wiring adapter for 900M.</b> Multi pin connector allows monitor removal without disturbing sensor wiring connections.	?		
	<b>900M-PDA — Data shuttle cable and software for downloading data from monitor.</b>	?	?	
				<b>950R-OE — Orchard Extension</b> allows easy access to serial connection when the 950R receiver module is mounted higher in order to establish good signal. Includes an additional enclosure (for battery) and 15' (4.5m) serial cable.
				<b>900M-RGA — Rain Gauge Adapter</b> allows 950-RG Rain Gauge to be read by 900M Monitor. Updated WaterGraph software and 9V battery included. Suitable for outdoor mounting.
REMOTE ACCESS OPTIONS		900M	950R	950T
	<b>*900M-FR—Field Radio —</b> Radio device for remote communication. Includes 15' (4.5m) cable. (See Power Options for power source). <b>*900M-ER — Ethernet Radio Gateway —</b> Radio device for connecting through customer supplied LAN or Internet connection. Includes plug-in transformer and 50' (15m) Ethernet cable. *Mounted in a weatherproof enclosure with aluminum mounting plate.	?	?	
	<b>900M-FR2BR — Field to Base Converter</b> adapts Field Radio to be used as a base when the base radio is mounted outdoors for improved signal reception. Includes 100/240 VAC to 9-12 VDC plug-in style transformer and 50' (15m) serial connection cable.	?	?	
				<b>900M-BR — Base Radio receiver module</b> for mounting indoors at the computer location. Includes 100/240 VAC to 9-12 VDC plug-in style transformer and 6' (1.8m) serial connection cable.
				<b>900M-CG — Cellular Gateway</b> mounts outdoors at the monitor or base radio location and provides dedicated cellular connection hardware for internet access.
POWER OPTIONS FOR REMOTE ACCESS EQUIPMENT		900M and 900M-FR	950R-0 and 900M-FR	950M-CG
	<b>Battery Packs</b> provide power source when line power is not available. Includes solar recharging panel (with charge controller on 10W and 20W models), sealed maintenance-free battery in outdoor enclosure, mounting kit and 9' (2.7 m) cable. <b>900M-BP-5W — Battery Pack</b> <b>900M-BP-10W — Battery Pack</b> <b>900M-BP-20W — Battery Pack</b>	?	?	?
				<b>900AC — Transformer</b> 100/240 VAC to 9-12 VDC plug-in style transformer.



**THE IRROMETER COMPANY, INC.**  
P.O. Box 2424 • Riverside, CA 92516  
PHONE 951-689-1701 • FAX 951-689-3706  
www.IRROMETER.com