

WATERMARK



Photo Courtesy of USMA MRC.

**Bringing
Technology
to the Field**

Optimizing Irrigation . . . Maximizing Conservation . . . Worldwide – Since 1951

Soil Moisture Management

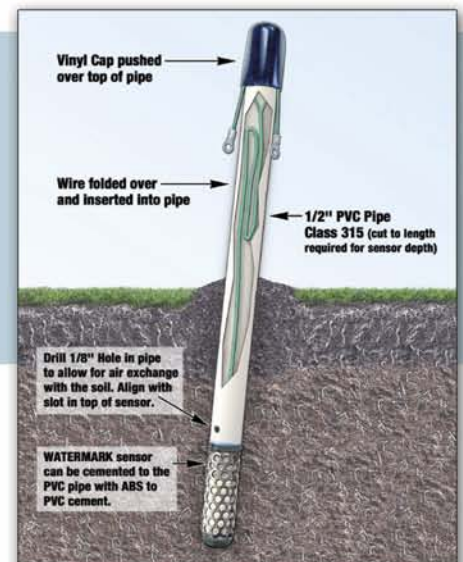
Irrigation water management is a critical element in agriculture. Many agronomists, crop consultants and growers agree that monitoring soil moisture is an essential tool to manage irrigation. Since 1951, IRROMETER has been a leader in soil moisture monitoring products that help growers maximize irrigation 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/kilopascals (cb/kPa) of soil tension and is a 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.

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 WATERMARK Monitoring Systems.

WATERMARK Soil Moisture Sensor – 200SS

- Range of 0-200 centibars (kPa) of soil water tension
- Not affected by freezing temperatures
- Durable construction provides years of service
- Requires no maintenance
- Automatically compensates for varying salinity levels
- Can be installed on pipe (see illustration to right)



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.



WATERMARK Automatic Data Monitoring

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, all our enclosures are weather tight. WaterGraph software is included and takes only a few minutes to set up. Data can be read in the field or downloaded to a shuttle. The remote data access option permits viewing the data in alternate locations via cellular service (see back panel for details). Data display can be customized to the user's application by inputting program characteristics such as monitor location, sensor type and location, reading frequency, etc.



900M Monitor

- **Collects and records up to eight sensor inputs**
- **Reading intervals selected by the user**
- **Soil moisture readings can be temperature compensated**
- **Downloadable WaterGraph software included**
- **Direct USB connection to your computer**
- **Display shows the sensor name, type, current and recent status**
- **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 leads, one soil temperature sensor, 9V battery, and instruction manual. Available without sensors and with other sensor combinations. (WaterGraph software available as a FREE download.)

Remote Data Access Option – Extend Your Range

900 Series remote data access improves productivity by bringing important soil moisture information to the user. Remote areas and multiple crop locations can be monitored from a central location saving time and travel. Irrigation decisions can be made after reviewing all monitored locations, maximizing utility usage and improving irrigation efficiency. The remote access components are modular in design and can easily be added to an existing Monitor installation. World-wide access to 900M data is simple with the use of a Cellular Gateway and the Internet.

EXTENDED RANGE (Internet, 900 Series) — 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. Performance is limited only by service provider's coverage
- **Connected** – allows viewing of latest soil moisture readings 24/7. Helps user make scheduling decisions





SOLAR POWERED - *Wireless* - DATA LOGGING SYSTEM

IRROmesh is a wireless solar powered data logging system that simplifies irrigation management using transmitter Nodes that "talk" to each other along a network that relays site-specific data.

IRROmesh utilizes compact, solar powered wireless radio Nodes for measurement of soil moisture, soil temperature and other environmental data. When deployed in an interactive mesh radio network, Nodes collect data that transmits to the Base Node where it's forwarded to an external device or the Internet for compilation and viewing. Each Relay Node sends data along multiple paths to the Base Node allowing coverage over greater distances. End Nodes provide additional measurement locations and send their data to a Relay Node to be forwarded to the Base.

A complete system includes a Base, the desired number of Nodes with their Sensors and either the Logger, Cellular Gateway or PC Link. The system offers WEB access with data available for management, storage and display in real-time.



**975
Node**

975B – Base

Receives data from Nodes and transmits to selected Data Collection Device.



975P – PC Link

Desktop Data Collection Device continuously streams data to the WEB portal through your computer.



975G – Cellular Gateway

Cellular Data Collection Device mounts outdoors at the IRROmesh Base location and provides dedicated cellular connection hardware for Internet access.



975L – Logger

Manual Data Collection Device to manually download and view data in the field on a laptop.



System Features:

- **No Batteries Required** – Solar Panels on two sides for optimal charging
- **Self-Initializing** – Nodes power up with initial sun exposure and associate themselves with the base receiver
- **Self-Routing** – Nodes route communication for maximum efficiency
- **Self-Healing** – Nodes will re-route for maximum efficiency
- **In-Field Logging Capability**
- **Small Size** – Easy field installation
- **WEB Based Data Management and Display** – Store and analyze data through the Internet
- **Data is Recorded every 30 Minutes**
- **Automatically Manages Power** – Unique sleep/wake cycling ensures continuous reliable transfer during all light conditions



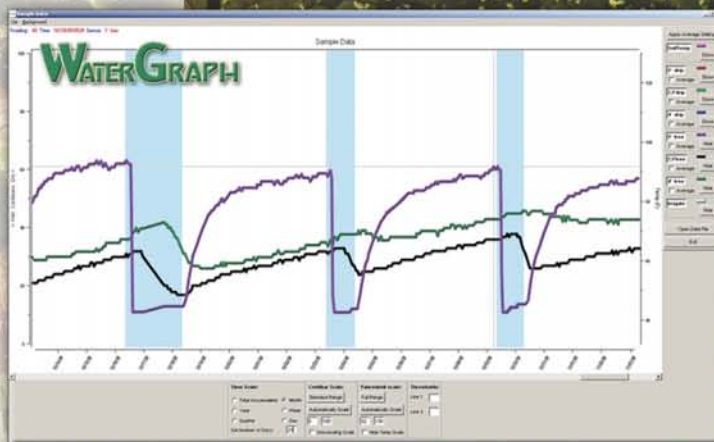
IRROmesh uses a 902–928 and 863–870 MHz Frequency Hopping Spread Spectrum type radio. It is manufactured with license compliance for the US, Canada, Australia, New Zealand and ETSI countries. Frequencies for use in other countries will become available as they are developed. Patented.

Graphing Features

WaterGraph and **SensMit Web Portal** are software programs that automatically record and display sensor readings. This data can be graphically displayed on your computer to provide a vivid picture of the soil conditions. Reporting sensors indicate soil moisture, soil temperature, irrigation run time, rainfall and other conditions. The 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 maximize crop production while minimizing water, power, fertilizer and labor use. The SensMit Web screen shot below shows sensor locations in a map view.

Shared Features –

- Soil moisture at multiple depths
- Soil Temperature Sensor
- Irrigation event
- Rain Gauge Sensor
- Time Scale – view data history as you prefer
- Mouse Over Data Line for detailed time stamp
- Individual Data Control – allows you to highlight or hide sensor records



WaterGraph Features –

- Centibar Scale – allows you to view range applicable to crop needs
- Threshold Limits – allows you to set reference lines for quick review
- Apply Average Settings – gives you the option of reviewing data as an average


















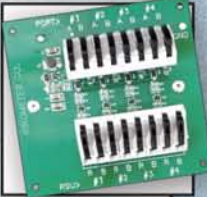


SensMit Web Features –

- Alarm Email notifications
- Dashboard view shows current system status
- Map view shows sensor location and status



The SensMit Web Portal is required with the use of the IRRomesh Cellular Gateway and PC Link systems and optional with the IRRomesh Logger. Subscription fees apply when using SensMit Web.

Monitor Options and Accessories

SENSING OPTIONS		900 SERIES	975 SERIES	
	200SS-**-WATERMARK Soil Moisture Sensor. **-Specify wire lead length of 5' (1.5m), 15' (4.5m), no lead or custom length.			7-**-AD*- Automatic Switching Pressure Gauges. 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.) 
	200SS-**-S — WATERMARK Soil Moisture Sensor with Spigot End to make your own multiple depth profile probes. **-Specify wire lead length of 5' (1.5m), 15' (4.5m), or custom length.			900RG — Tipping bucket style Rain Gauge with integral Bird Spikes and Mounting Bracket. (Requires 900M-RGA adapter when used with older style 900M serial numbered under 20000.) 
	200TS — Temperature Sensor. Reads range 32° to 122°F (0° to 50°C) on 900M and range 14° to 149°F (-10° to 65°C) on 975.			900M-DS — Data Shuttle. For downloading data from monitor. 
	RSU-V — Remote Sensing Unit – Voltage. Option for IRROMETER Tensiometer. Converts sensor reading to a 0.5 - 4.5 linear voltage signal. Can be read by a data-logging device or an A/D card designed to read voltage. Requires an "RSU-V" wiring adapter for every eight units.			900M-RSU-V — RSU Wiring Adapter. Used to read IRROMETER option RSU-V. Accepts up to eight RSU-Vs. 
	RSU-C — Remote Sensing Unit – Current. Option for IRROMETER Tensiometer. Converts sensor reading to 4-20mA loop current signal. Can be read by data-logging device or A/D card capable of reading 4-20mA sensors. Requires an "RSU-C" wiring adapter for every four units.			900M-RSU-C — RSU Wiring Adapter. Used to read IRROMETER option RSU-C. Accepts up to four RSU-Cs. 
900 SERIES DATA ACCESS OPTION		POWER SUPPLIES		
	900M-CG-BP — Cellular Gateway and Battery Pack. Mounts outdoors at the monitor location and provides dedicated cellular connection hardware for Internet access. Includes 5 Watt Battery Pack inside enclosure and Solar Panel.	900M-BP-5W — 5 Watt Battery Pack. For 975 Cellular Gateway, provides power source when line power is not available. Includes solar recharging panel with charge controller, sealed maintenance-free battery in outdoor enclosure, mounting kit and 9' (2.7m) cable. Included with 975CG-BP. 		



IRRROMETER® www.IRRROMETER.com

1425 Palmyrita Ave. • Riverside, CA 92507 • PHONE 951-682-9505

