IRROmesh
Monitoring System

Solar Powered Wireless Data Logging System

The IRROmesh System is a wireless mesh network data collection system that automatically records soil moisture and other sensor data. This data can be viewed in real time on the WEB or downloaded in the field. Manually collected data can also be uploaded to the WEB. This manual provides detailed instructions for setup and installation.

Planning Your Network Layout

Plan the network layout ahead of time, before installing any hardware. Determine the areas needed to monitor soil moisture. Careful selection of mesh radio Node locations is also critical to establishing good communication of data. Consequently, there is a dual requirement of "where the Sensors should be located" and "where the Nodes should be located." Determine the best layout to satisfy both requirements.

Map out your field and indicate all areas that require monitoring, then identify possible Node locations that correspond to each area being monitored. Determine if the range and placement of Nodes will establish a good communication network. It may be necessary to add Nodes, with or without sensors, to relay the data transmission in acceptable path lengths and offset angles. Mapping out the potential Node/Sensor locations to verify that distances are acceptable and potential obstructions are avoided will make the physical deployment of the hardware much easier.

Avoid installation near areas with potentially strong radio signal interference. Areas such as as airports, cell towers, etc. can pose significant interference.

For best communication:

A – The **Base Node** should be located near the network's center. Install the Base higher than the Nodes reporting directly to it. *(see Figure 1)*

B – Relay/End Nodes, should be at least 10 ft (3m) above ground and a minimum of 5 ft (1.5m) above the mature crop canopy to ensure clear-line-of-sight (CLoS). *(see Figure 1)* The ideal radio wave pathway is not simply a single straight line between two points, but rather, a three dimensional oval-shaped zone. Anything that protrudes into this zone from the sides will
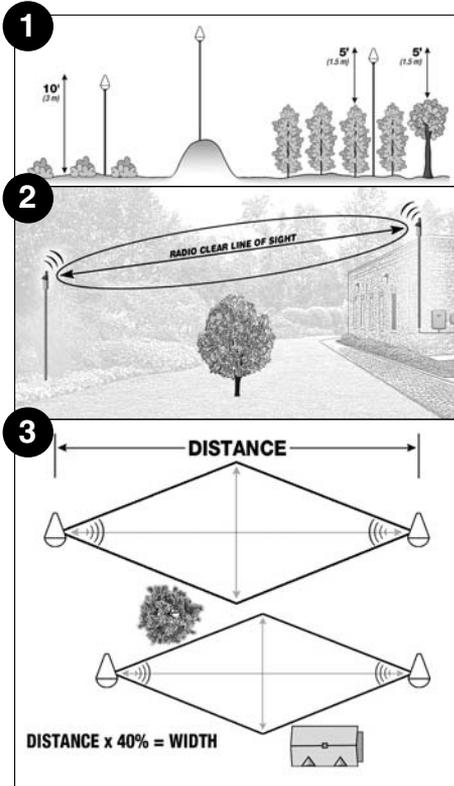
reduce the radio range. The operating range will also be reduced if the Nodes are not installed at adequate heights. *(see Figures 2 & 3)*

C – Relay Nodes form the backbone of the mesh and 'relay' data from the Nodes reporting to them towards the Base. It is important to establish a 'grid' layout so that multiple paths exist between Relay Nodes for data to flow to the Base. End Nodes only send their data to a nearby Relay Node or to the Base and should be
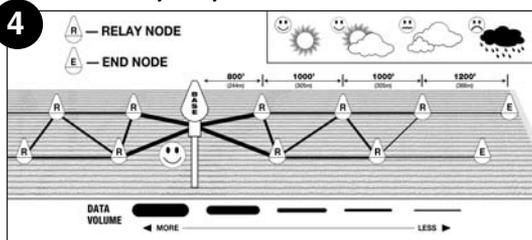
placed at the extremities of the system or located so as to provide in-fill near relaying Nodes. *(see Figure 4)*

D – There is a limitation to the number of Nodes that can be in a 'path' and how many total 'paths' can feed to the Base. If all the data from several Nodes has to route through a single Node along a path, then a 'choking point' is created, diminishing the distance that Node can transmit and reducing reliability of the system.

　– The maximum total number of Nodes = 20

　– The maximum number of Relay Nodes = 12

　– The maximum number of End Nodes
　　　per Relay = 3

　– The maximum number of "hops"
　　　between Relay Nodes = 8

　– The maximum paths to the Base = 4

Relay Nodes should be no more than 800 ft (244m) to 1000 ft (305m) apart (closer together as you get nearer to the Base). End Nodes can be up to 1200 ft (366m) from a Relay Node or the Base.

E – Changing weather and 'radio-noise' conditions will affect range. If the installed distance between Nodes exceeds the suggested range, you may experience intermittent reporting. Nodes log data even during times when the network appears to be 'down.' Data collected during such intervals will be transmitted once communication resumes. During daylight, while charging, Nodes read their Sensors every 30 minutes and synchronize with the network frequently. When sunlight is diminished, Nodes slowly discharge, read their sensors every 30 minutes and only synchronize with the network hourly. When communicating, Nodes are awake and their lights will be flashing. When between communication cycles, they are "asleep" and lights will be off.

System Configurations

Three hardware combinations allow different ways of retrieving data. Installation and operational differences occur depending on which hardware combination you use. Be sure to follow the applicable instructions for your specific hardware combination.
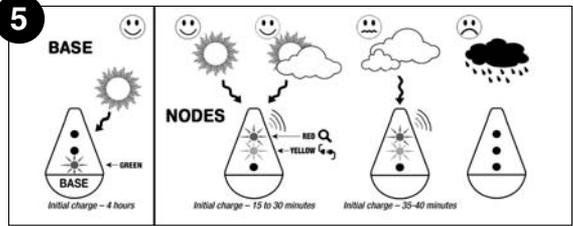
Charging and Associating Base and Nodes

See instructions in the Quick Start Guide to charge and associate the Base and Nodes together.

Charging the Base

Hours or the day before installation:

　Remove the Base Node (975B) from the black
2　　plastic bag, open the cover of the capacitor

enclosure and slide the switch on top of the board to the 'ON' position. Close the cover and temporarily position the Base with both solar panels facing the sun. It will take the longest to charge since it has the largest capacitor power supply. In full sun conditions, it should be exposed for about 4 hours to fully charge. In partly sunny conditions, it will take longer. Whatever the conditions, wait until the bottom light is flashing, which indicates it is fully charged and seeking communication. *(see Figure 5)*

Once the Base is fully charged, slide the power switch inside its enclosure to the 'OFF' position and place the black plastic bag back over the Node to cover the solar panels. Move the Base at least 30 ft (9m) away from the area where Nodes will be charging. This will isolate the Base so Relay/End Nodes cannot inadvertently become associated with it before they are ready.

Charging the Nodes
Minutes before Installation:

Charge the Nodes (975NE and 975NR) by exposing their solar panels to full sunlight for at least fifteen minutes, slightly longer in less than full sun conditions. **Be sure all Nodes are at least 30 ft (9m) away from any operating Base before proceeding.** Remove the black plastic bag from each Node that will be used with the current Base and temporarily support the Node in an upright position with both solar panels facing the sun. Wait until the top two lights, RED and YELLOW, are flashing before proceeding. *(see Figure 5)*

## Associating the Nodes and Data Collection Devices to the Base

*Record and keep your Base ID
and PIN in a safe place.*

All Nodes and data collection devices must be associated with the current Base. To provide security of your data and network, Relay/End Nodes and data collection devices are associated with one specific

Base and will not send data to any other Base. If a Base is lost, you will need to order a new one, specifying the ID and PIN numbers of the original unit.

When all devices to be associated to the Base are powered or fully charged they should have the two top lights, RED and YELLOW, flashing. Place no more than 10 Nodes at a time, and the data collection device, in upright positions in close proximity to one another. Place the still un-powered Base in the center of the components, making all devices no more than 2 ft (60 cm) from the Base. Uncover the Base solar panels and slide the power switch inside the capacitor housing to the 'ON' position. Wait until all devices have become associated, indicated by their lights changing to flashing GREEN only. (This should take about 15 minutes.) *(see Figure 6)*
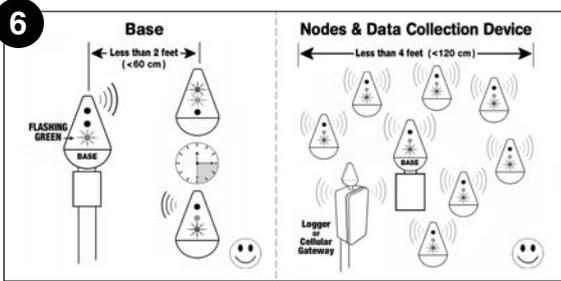
If associating a large number of Nodes, do so in batches of 8-10 at a time. Once each batch is done, turn off the Base, move the first batch of Nodes far enough away (3000'+ [915 m]) so the Base can't 'hear' them anymore, then restart the Base and associate the next batch. A data collection device (Logger, PC Link or Cellular Gateway) is counted as a Node for purposes of association.

NOTE: Always associate components in an upright position. If any device was not fully charged the system may go into sleep mode. If this occurs some of the units will have no lights on. Leave everything in place for an hour and when it wakes up it should associate with the remaining devices. Confirm that each device is flashing GREEN before proceeding. When the whole system is associated slide the Base power switch to 'OFF' and cover the solar panels. (This helps avoid any Nodes making routing associations with other Nodes that they may not be near once installed in the field.)

Data collection devices have their own power supplies and must be powered up in order to associate with the Base. See instructions for your device on pages 4 to 5.

Installation

BASE: At the pre-determined Base location, uncover the solar panels and slide the switch inside the Base enclosure to the 'ON' position. Mount on any sturdy post or pole using supplied mounting brackets. Rigid metallic or wooden poles will provide the best wind and heat resistance. Plastic pipe is not recommended as it will soften in the heat and tend to bend and sway with the breeze. A recommended practice is to install a short post in the ground and sleeve a hollow, lightweight mounting pole over the top of it. This allows you to remove the pole as needed for maintenance or cultural practices. Base enclosures are rainproof but should always be mounted vertically.

NODES: Nodes can now be installed at their predetermined monitoring locations. Begin with locations closest to the Base, which should be 800 ft (244m) or less, then work outwards towards the ends of the network. For optimal range, install the mounting pole and orient the attached Node so that the antenna face (red board above the solar panels) is within 150° of the other Nodes it 'talks' to. Depending on sunlight conditions, it may take up to 24 hours for all Nodes to join the network. An East-West orientation of the Node solar panels will give the best sun exposure *(see Figure 7)*.

When a Node joins it will be displayed on the WEB portal by its ID number (with PC Link or Cell Gateway systems). If after 24 hours all Nodes have not joined, the mesh can be reset by cycling power to the Base *(see page 8)*.

As with the Base, any sturdy post or pole can be used to mount the Nodes since they are small and lightweight. A plastic 3/4" female threaded bushing can be adapted to the top of the pole to accommodate the Node which is then threaded into the bushing. This type of pole will provide the best wind and heat resistance. A recommended practice is to install a short post in the ground and sleeve a hollow, lightweight mounting pole over the top of it. This allows removal of the pole as needed. The 25 ft (7.62m) cable extending from each Node should be routed

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through the mounting pole and brought out at or near the bottom so that the wires can be connected to the sensors. DO NOT connect the sensors yet. Be sure to have the cable exit the pole above the level of the inner post to avoid wire damage. Also leave an adequate length of cable exposed to allow the pole to be lifted off of the inner post without disconnecting from the sensor wires. The use of a small valve box or junction box will protect the wire splices and make them easy to find should anything need to be disconnected in the future. Node cases are rainproof but should always be mounted vertically. The components inside the cases are conformal coated for moisture protection but should not be directly exposed to water.

Use the form on page 10 to record ID numbers, located on the label under each Node's clear cover, and a reference name for its location. This information will be needed later when you configure your system in the WEB portal or WaterGraph Software. Note that these numbers are comprised of only 0 through 9 and letters A through F. Be sure to record them accurately. The geographic reference (latitude/longitude in decimal degree format) for each Node can be input during set-up to enable Nodes to display in the portal's mapping feature (when using SensMitWeb).

Off-Season Shut-Down: *To properly shut a system down during the off-season, slide the power switch inside the Base housing to 'OFF' and cover the solar panels. It is best to remove the Base from the field entirely. If the Base is left operational during non-reporting periods, it will still accumulate data then upload it once connectivity is re-established next season, possibly incurring additional data usage charges.*

SENSORS: Once all Nodes are in place and the network is functioning properly, the sensors can be installed and wired to the Nodes. Refer to the *'Connecting to WATERMARK Sensors'* section on page 6, and the color reference wiring instructions on page 9. When in place, configure them to display using your own alphanumeric descriptive references.

Data Collection Options
LOGGER — 975L

Data is collected from the Base by a stationary Logger in the field and retrieved manually with a laptop computer. A free download of 975L WaterGraph Software is provided to retrieve, view and graph data.

NOTE: The Logger is used to batch download data but cannot be used to 'stream' data.

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Charging and Associating the Logger: The Logger is powered by internal super capacitors that are charged in full sunlight (just like the Base). Slide the power switch inside the enclosure to the 'ON' position, remove the black bag that covers the solar panels and include the Logger when charging and associating the Base and Nodes as described on page 2.

Installation of the Logger: The Logger must be mounted in the field with fully charged capacitors and its power switch in the 'ON' position within 400' (122 m) of the Base, though it is usually mounted on the same pole. Mount the Logger, like the Base, on any sturdy post or pole using supplied mounting brackets, as described on page 3. (**Installation** – Base).

Data Collection with a Logger: 975L software available from the IRROMETER website at
 www.IRROMETER.com/download/975-DL.exe
and running on a Windows® OS laptop is necessary for data download and display. The Logger must be fully charged and associated before connecting to the computer with the 975L software for the first time. The saved data file can then be opened for display with the graphing program included in the 975L software or uploaded to SensMitWeb for later access, archiving and sharing if a subscription is purchased. *(See the 'IRROmesh Logger User Manual' that accompanies each Logger purchase, for detailed Logger instructions.)*

Off-Season Shut-Down of the Logger: Slide the power switch inside the housing to 'OFF' and cover the solar panels. Remove the Logger from the field (optional).

PC LINK — 975P

Data is automatically and continuously 'streamed' to the WEB using your computer's active Internet connection as long as the computer is on and running the SenMitPath software. The PC Link connects to your computer via USB cable and is required to be within 400' (122 m) of the Base. (Range is dependent on what type of structure the signal transmits through.) Data is viewed and stored on the WEB. *(Subscription required)*

Charging and Associating the PC Link: The PC Link must be plugged in to an active computer or any USB socketed power source to supply its power. Once fully charged, it will hold the charge long enough to be

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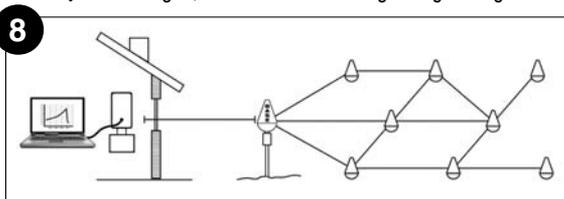
associated to the fully charged Base outside. Take the PC Link to within 2' of the Base and wait for the green light on the PC Link to flash – indicating association when the system is awake. This will typically take about 15 minutes.

Installation of the PC Link: First download SensMitPath software to your Windows® OS computer from

http://www.IRROMETER.com/download/ sensmit_installer.exe

The entire SensMitPath software package is available through this link or on the IRROMETER Products webpage under Data Loggers / 975 Wireless Mesh System / SensMitPath Installer. Downloading SensMitPath from the IRROMETER web site ensures you get the program designed for the IRROmesh firmware version you purchased. Install the program with administrative privileges. You may need to allow SensMitPath access through your anti-virus software in order to access the Internet. Once the program icon appears on your desktop, double-click to open the software. Make sure the numerical universal time indicated at the bottom left of the dialogue box is visible and updating. If not, with some versions of Windows®, you will need to restart your computer after installing SensMitPath. Make sure the software is always running and, if you are streaming real-time, that the computer you are using has all its 'sleep' and 'rest' functions disabled. If your computer turns off/sleeps, the data flow will stop. Placing SensMitPath on your Start Menu will enable the application to restart automatically in the event of a computer reboot.

Plug the PC Link into the host computer by its supplied USB cable. The Base signal will travel to it through non-metallic walls and windows, but range is less than with outdoor device options. The host computer must remain turned on and online in order to continuously stream data. Data can be viewed on any WEB enabled computer, smartphone or tablet device. *(see Figure 8)*

Data Collection with a PC Link: First activate your system at **www.SensMitWeb.com** and become a subscriber *(see 'Subscription Registration' on page 6).* Additional information regarding the software is available on the SensMitWeb.com 'Resources' page. When running, this utility detects your USB connection and automatically connects to the PC Link. This enables any data from your network to upload to SensMitWeb. Once you have completed registration, you will be able to view your Nodes and confirm that the network is operating properly. You will also be able to access a host of diagnostic features.

Off-Season Shut-Down of the PC Link: Unplug the PC Link from the computer and turn off the SensMitPath software.

CELLULAR GATEWAY — 975G-BP

Data is automatically transferred to the WEB by the Cellular Gateway, where it is viewed and stored. *(Subscription required)*

NOTE: Cellular data coverage must be available at the gateway location.

Charging and Associating the Cellular Gateway: The Cellular Gateway is powered by its supplied solar rechargeable battery pack and will be operational when both battery terminals are connected. *(Units are shipped with one battery terminal disconnected for safety.)* To associate, include the Cellular Gateway when charging and associating the Base and Nodes as described on page 2.

Installation of the Cellular Gateway: The Cellular Gateway and accompanying Solar Recharging Battery Pack can be installed in the field at the Base location, usually on the same mounting pole or up to 400' (122 m) from the Base. A minimum clearance distance of 3 ft (1m) should be maintained between the Base and the Cellular Gateway. Mount the Cellular Gateway, like the Base, on any sturdy post or pole using supplied mounting brackets, as described on page 3.

If using the same pole as the Base, mount the Base at the top of the pole, then the Solar Panel, the Cellular Gateway and finally the Battery Pack, in that order. *(for wiring details see the 'IRROmesh Mounting Base & Cell Gateway' video at:*

http://IRROMETER.com/videos.html

Record the 20 digit SIM card identification number from the SIM card for 975G or the MEID for 975G-V from the label on the modem here:

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It will be required to register an account on SensMitWeb.

Data Collection with the Cellular Gateway: To use the Cellular Gateway you will first need to activate your system at www.SensMitWeb.com to become a subscriber *(see 'Subscription Registration' on page 6).* Cellular data charges are included in the subscription rates. During Cellular Gateway registration you will be prompted to enter the 20 digit modem SIM card ID or MEID number in the Registration tab. Once you have completed registration, you will be able to view your Nodes and confirm that the network is operating properly. You will also be able to access a host of diagnostic features. **5**

Off-Season Shut-Down of the Cellular Gateway:

Disconnect one terminal from the battery pack of the Cellular Gateway. Preferably, remove the Base, Cellular Gateway, Solar Panel and Battery Pack from the field.

SensMitWeb Subscription Registration

IRROMETER has partnered with iDUS Controls to provide the WEB storage and display features for data collected by the IRROmesh system. You must register and pay a subscription fee online in order to utilize the features of the WEB portal. All data will be stored within the portal for current and future access. Data will be viewable on any WEB enabled computer, Smartphone or tablet device. To activate your system, go to **www.SensMitWeb.com**. Click on the tab 'Activate your SensMit Web account here' (just under the log-in box) and follow the instructions. Register as the 'Mesh Owner' upon initial set-up if you have the Base ID and PIN (found on the Node label under the clear cover) and you will be responsible for subscription fees. This verifies that you are a certified IRROmesh Owner and that your data can be accepted into the portal. It will also start a free one month trial. Base ID and PIN characters include only numbers 0 to 9 and letters A to F. As the Mesh Owner you can grant certain permissions to 'Mesh Viewers' or users but you alone will be responsible for subscription fees.

NOTE: If you shut down a system during off-seasons to save expense, the minimum monthly Base fee (and Cellular Gateway fee if applicable) still applies, in order to maintain your account.

Changing a Data Collection Device

If a data collection device needs to be changed (such as changing from a PC Link to a Cellular Gateway).

1. Un-power the existing device
2. Re-start the Base by switching the power button 'OFF', covering the solar panels for a few minutes, then switching the power back 'ON'.
3. Associate the new device with the Base.
4. If, after association, data is not being sent, reset the new device. *(see page 8)*

Connecting to WATERMARK Sensors

Follow the wiring color scheme as shown on page 9. Use waterproof wire connectors.

– Insert one side of a Node wire pair and one side of the corresponding sensor wire pair into one connector. Repeat for the other wire in the Node pair and the remaining sensor wire with another connector. One connector per individual Node wire is needed.

Be sure to INDIVIDUALLY insulate ALL unused wires. DO NOT leave unused Node wires un-insulated and allowed to corrode, touch each other or touch the metal pole.

Sensor Insallation Guidelines

SENSOR SITE SELECTION — Often more than one sensor should be placed, at varying depths, in a given location. For instance, one sensor in the upper portion of the plant's effective root zone and other sensors located deeper into the root zone profile. This is referred to as a 'sensing station'. It can give a better representation of the plant's uptake of water. Be sure to use enough "sensing stations" – sensing stations every 10-15 acres is a good rule of thumb.

PLACEMENT

Furrow or Flood Irrigation — Locate sensing stations about 2/3 the way down the run, just ahead of the tail or backup water. This is the area where water penetration is usually the poorest. With tree crops, locate sensors on the southwest side of the tree (in the Northern Hemisphere) as this side gets the hot afternoon sun.

Sprinkler Irrigation — Even though the distribution is typically more uniform with sprinkler irrigation, there can be great differences in penetration and holding capacity due to soil variations, interfaces and contour. These variation sites make good locations for sensor stations. With tree crops, locate sensors at the drip line of the canopy, being sure that they are not obstructed from the sprinkler's distribution. With row crops, locate sensors right in the plant row.

Center Pivot Irrigation — Place sensors in 4 - 5 locations down the length of the pivot (between towers) just ahead of the 'start' point. Additional locations at 'hot spots' or good production areas of the field can help give a better overall view of the field.

Drip or Micro Irrigation — Sensors must be located in the wetted area. With drip emitters, this is usually 12"- 18" (30- 45cm) from the emitter. With micro-sprinklers, usually 24"-36" (60-90cm) is best. Monitor often enough to get a good overall picture of the field, or irrigation 'block', and consider the soil variations which exist. Keep in mind that light soils dry very quickly and heavy soils more slowly.

Depth — This depends on the rooting depth of your crop, but can also be affected by soil depth and texture. With shallow rooted vegetable crops, one depth may be adequate (root system less than 12" [30cm]). With deeper rooted row crops (small grains, vines and trees) measure soil moisture in at least two depths. With

deep, well-drained soils, crops will generally root deeper – if moisture is available. With coarse, shallow or layered soils, root systems may be limited in depth. In general, sensors must be located in the effective root system of the crop. Guidelines on proper depths for specific crops and conditions can be obtained from us as well as from your local farm advisor.

NOTE: Our recommendation for anyone using sensors for the first time is to use an adequate number of 'stations' over a smaller area to begin with to get an accurate picture. Then read them regularly over the season to learn the patterns which normally develop.

SENSOR INSTALLATION — WATERMARK Soil Moisture Sensors must be 'conditioned' prior to installation. The sensors should be soaked to saturation then dried fully twice, then soaked to saturation again prior to installation. This 'conditioning' of the sensors ensures quick response to changing soil moisture conditions. If a sensor is only soaked and then installed, several irrigation cycles must pass before the sensor will respond accurately. Soak the sensors in a bucket of water for several hours to saturate them. Hang them up overnight to dry sufficiently. After 'conditioning' they are ready for installation. Sensors MUST be installed WET in the active root zone of plants that are typical of the area the WATERMARKs monitor. Install either vertically or up to a 45° angle. Bore a 7/8" (22mm) diameter access hole to the desired depth, then insert the sensor. Be careful to ensure a snug fit between the sensor and the surrounding soil then backfill the hole firmly. The access hole can be made by pounding a 7/8" (22mm) diameter bar (or 1/2" [13mm] size IPS pipe) into the soil or using a coring tool or IRROMETER Installation Tool to the desired depth, then extracting the selected tool, being careful not to disturb the soil surrounding the borehole. With hard or rocky soil, a larger diameter hole can be made with a soil auger. Mix the auger cuttings with water to create a slurry and pour into the borehole. Then insert the sensor into the hole. Once the slurry dries, the sensor will have been "grouted" in to ensure good contact with the soil. The sensor can be attached to 1/2" (13mm) class 315 PVC (thin wall SDR 13.5) or 3/4" (19mm) CPVC (SDR 11) pipe with a transition solvent PVC to ABS cement. The pipe becomes a conduit to protect the sensor wires. Also, this makes the sensor easier to push into the access hole and remove, if desired. The top of this pipe section should be capped or plugged so surface water does not travel down to the sensor. Drill a small hole in the side of the pipe just above the sensor to allow water to drain away if it becomes trapped in the pipe. *(See 'IRROMETER Installation Tools' for other options.)* The soil temperature sensor should be installed in the soil near a representative soil moisture sensor. All the soil moisture sensor readings per Node will be compensated by the soil temperature sensor. Bore a 1/2" (13mm) diameter hole in the soil and insert the temperature sensor then backfill the hole. Refer to instructions that accompany all other sensors for proper installation. The switch closure sensor is a pressure gauge with a 1/4" NPT connection and an adjustable switch mounted to its face. The gauge is installed into the irrigation pipeline. The pressure range of the gauge should be selected so that the normal system pressure is in the middle third of the gauge range. The normal system pressure is the set point which will trip the switch, indicating that an irrigation is taking place.

SENSOR WIRING — Additional wire can be added to the sensors for long distances. Please adhere to the following wire size recommendations when adding wire:

DISTANCE	WIRE SIZE
Up to 1000 ft. (300 m)	AWG UF 18 (1.02 mm, 0.82 sq mm)
1001 to 2000 ft. (600 m)	AWG UF 16 (1.29 mm, 1.31 sq mm)
2001 to 3000 ft. (900 m)	AWG UF 14 (1.63 mm, 2.08 sq mm)

Multi-conductor wire can be used and twisted pairs are not necessary. All splices should be made with direct burial type waterproof splices, Spears DBY® or similar. Be sure to record each pair of sensor wires indicating what type of sensor is attached and the placement depth per Node.

NOTE: Videos describing the IRROmesh System and how to install it are available from the **VIDEOS** *tab at:* **www.IRROMETER.com**.

MAINTENANCE — Keep all Node solar panel lenses clean and clear of any shadows to ensure steady charging. Monitor the presence of each Node and their comparative current levels in the WEB display. Units that 'drop-out' or have nontypical voltages likely need to be inspected for shading or cleanliness.

All Nodes can be ordered from the factory with bird deterrent covers or retro-fitted with the purchase of a bird deterrent cap.

TROUBLESHOOTING — Each Node has three lights that will flash in certain sequences. Check these light functions to see what may be causing a problem:

SEEKING NETWORK —
RED, YELLOW + GREEN
 — *Scrolling Rapidly* = Unassociated Node
RED + YELLOW
 — *Blinking* = Active, scanning network

NORMAL OPERATING MODE —
If **GREEN** LED is:
 — *Flashing* = Node awake
 — *Intermittent Blinking / Pulsating* =
   Power save (system napping)
 — *Off* = Sleeping or no power
If **YELLOW** LED is:
 — *On* = Node non-operational
 — *Blinking* = indicates Network activity
 — *Off* = No current Network activity
If **RED** Light is:
 — *Off* = No errors
 — *Blinking* = error in sending message
   through Network
 — *On 1 second or more* = low power

NOTE: A Logger can appear to be fully associated, showing a green flashing light but not collecting data if it has been synced to the computer clock before being associated to the Base. If such is the case, reset it and go through the association process again.

Contact IRROMETER Tech Support regarding the display of any light sequences not mentioned here.

DATA DOESN'T UPLOAD FROM YOUR COMPUTER — Some anti-virus software has been known to block SensMitPath from transmitting data to the Web. To rectify, add SensMitPath to the list of approved programs on your anti-virus exceptions page then click 'OK' or 'Allow' to permit access.

RESETTING PROCEDURES — On occasion, it may become necessary to reset your system. Follow the instructions below to reset any of the components you are using. None of the data stored in the device will be lost when resets occur.

 To reset the entire system, turn off power to the Base Node for 24 hours, then re-power the Base and allow time for each Node to join the system. This may be necessary if incorrect Node routing associations were created when deploying Nodes.
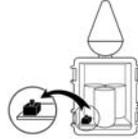
Base Node – Cover the solar panels of the Base Node and slide the power switch inside the capacitor housing to 'OFF'.

PC Link – Temporarily disconnect the USB cable from the computer.
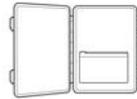
Cell Gateway Battery Pack – Open the blue box and temporarily disconnect the Gateway's BLACK and RED wires from the terminal strip.

Logger – Temporarily cover the solar panels of the Logger and slide the power switch inside the capacitor housing to 'OFF'.

 If the WATERMARK Handheld Digital Meter (#30KTCD-NL) is being used to manually read a sensor that is connected to a Node, the sensor wires MUST be physically disconnected from the Node prior to connecting the meter to take a manual reading.
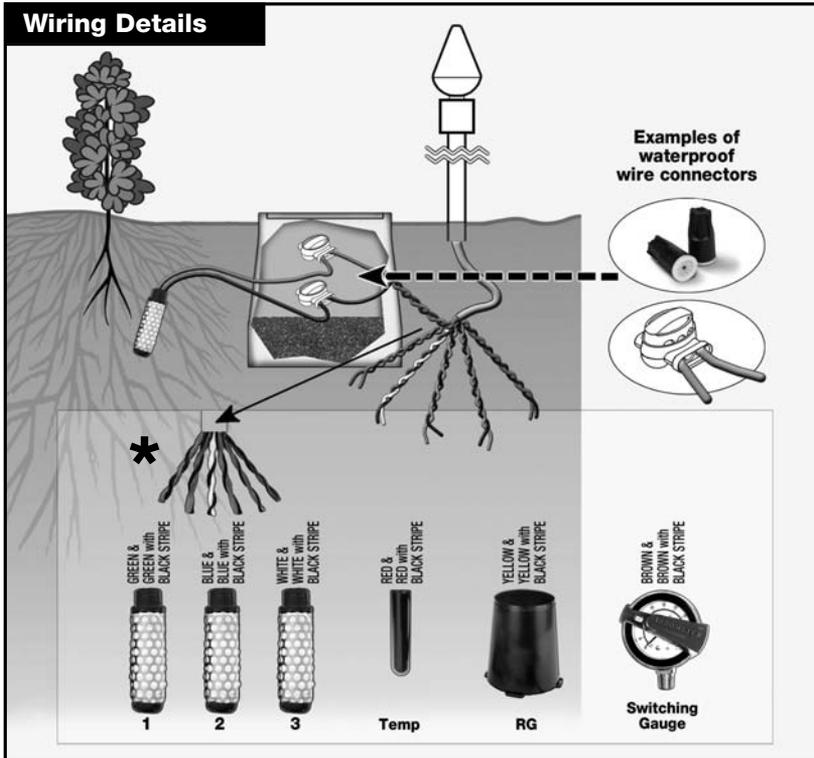
**CONNECTING TO WATERMARK SENSORS**

Use waterproof wire connectors.

1. Insert one side of a Node wire pair and one side of the corresponding sensor wire pair into one connector. Repeat for the other wire in the Node pair and the remaining sensor wire with another connector. One connector per individual Node wire is needed.

Be sure to **INDIVIDUALLY** insulate ALL unused wires. **DO NOT** leave unused Node wires un-insulated and allowed to corrode, touch each other or touch the metal pole.

2. Repeat for each sensor being installed.

Wiring Details

Examples of waterproof wire connectors

GREEN & GREEN with BLACK STRIPE — BLUE & BLUE with BLACK STRIPE — WHITE & WHITE with BLACK STRIPE — RED & RED with BLACK STRIPE — YELLOW & YELLOW with BLACK STRIPE — BROWN & BROWN with BLACK STRIPE

1　　2　　3　　Temp　　RG　　Switching Gauge

***NOTE:** Wires are paired by color. One is a solid color and the other is the same color with a black stripe.*

After registration on SensMitWeb, notice that the sensor data in the graph view is color coded to the wire colors on the Nodes. WATERMARK lines are green, blue and gray (for white), the temperature line is red, the rain event is indicated by yellow vertical bars and irrigation events are brown vertical bars.
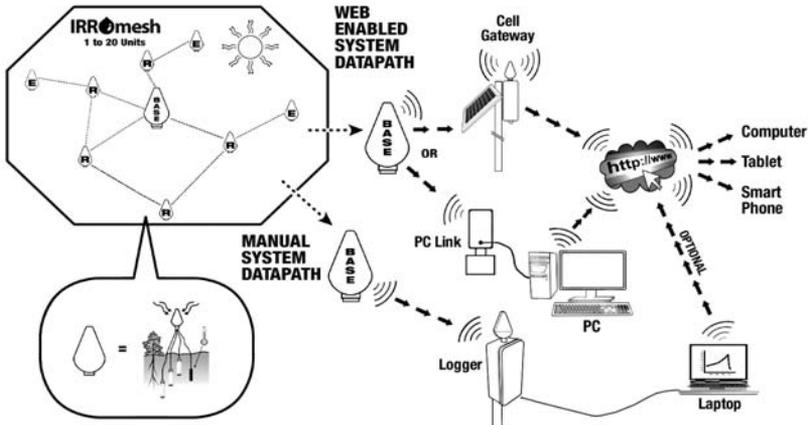
Base Descriptive Name: _____

Base: ID _____ _____ _____ _____ _____ _____ _____ _____   PIN _____ _____ _____ _____

Base Location: *****Longitude _____ Latitude _____

Node Descriptive Name: _____

Node ID: _____ _____ _____ _____ _____ _____ _____ _____   Type: ☐ Relay ☐ End

Node Location: *****Longitude _____ Latitude _____

Sensor Depth: Moisture 1 _____ Moisture 2 _____ Moisture 3 _____

Node Descriptive Name: _____

Node ID: _____ _____ _____ _____ _____ _____ _____ _____   Type: ☐ Relay ☐ End

Node Location: *****Longitude _____ Latitude _____

Sensor Depth: Moisture 1 _____ Moisture 2 _____ Moisture 3 _____

Node Descriptive Name: _____

Node ID: _____ _____ _____ _____ _____ _____ _____ _____   Type: ☐ Relay ☐ End

Node Location: *****Longitude _____ Latitude _____

Sensor Depth: Moisture 1 _____ Moisture 2 _____ Moisture 3 _____

Node Descriptive Name: _____

Node ID: _____ _____ _____ _____ _____ _____ _____ _____   Type: ☐ Relay ☐ End

Node Location: *****Longitude _____ Latitude _____

Sensor Depth: Moisture 1 _____ Moisture 2 _____ Moisture 3 _____

Node Descriptive Name: _____

Node ID: _____ _____ _____ _____ _____ _____ _____ _____   Type: ☐ Relay ☐ End

Node Location: *****Longitude _____ Latitude _____

Sensor Depth: Moisture 1 _____ Moisture 2 _____ Moisture 3 _____

Node Descriptive Name: _____

Node ID: _____ _____ _____ _____ _____ _____ _____ _____   Type: ☐ Relay ☐ End

Node Location: *****Longitude _____ Latitude _____

Sensor Depth: Moisture 1 _____ Moisture 2 _____ Moisture 3 _____

* *Use decimal degree format when entering latitude and longitude for mapping features.*

– Notes or System Layout Diagram –

REGULATORY APPROVAL IN US AND CANADA

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particuar installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment OFF and ON, the user is encouraged to try to correct the interference by one or more of the following measures:

• Reorient or relocate the receiving antenna.

• Increase the separation between the equipment and receiver.

• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

• Consult the dealer or an experienced radio/TV technician for help.

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

1. this device may not cause interference, and

2. this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. l'appareil ne doit pas produire de brouillage, et

2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

US Patent D672712,
US and International Patent Pending.
Contains Transmitter Module FCC ID:
0A3MRF89XAM9A
Contains Transmitter Module IC: 7693A-89XAM9A

To satisfy FCC RF Exposure requirements for mobile and base station transmission devices, a separation distance of 20cm or more should be maintained between antenna of this device and persons during operation. To ensure compliance, operation at closer than this distance is not recommended. The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

REGULATORY APPROVAL EUROPEAN UNION

CE EN 55022 Class A
EN 55024/IEC 61000-4-2: Electrostatic Discharge
EN 55024/IEC 61000-4-3: Radiated Immunity
Contains Transmitter Module: 7693A-89XAM8A
Conforms to the following ETSI standards:
– EN 300 220-2 V2.3.1 (2001-02)
– EN 301 489-3 V1.4.1 (2002-08)

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