

Soil and Plant Moisture Monitoring Systems Irrigation Consumer Bill of Rights™

Note: This supplements the General Irrigation Consumer Bill of Rights™. Discuss these items with your vendor/dealer before purchasing your monitoring system. The discussion will help you to make wiser selections of options, and to appreciate the obligations of both yourself and the vendor in creating and utilizing your monitoring system.

First Steps

Before purchasing and installing any moisture/stress sensors for a field, make sure to:

- Develop and implement a plan to document, for each irrigation block throughout the irrigation season:
 - ✓ Duration of every irrigation
 - ✓ Date of every irrigation
 - ✓ Gross applied every irrigation
 - ✓ Soil moisture stored from rainfall before the first irrigation
 - ✓ Evapotranspiration of healthy plants throughout the season
- Develop a means of examining and understanding all this information during and after the irrigation season

Next, before purchasing your soil/plant moisture system, have you:

- Had a system distribution uniformity (DU) check of your irrigation system, using the comprehensive techniques taught at ITRC?
- Examined the spatial non-uniformity of crop growth in the field with Google Earth, drone images, or other such means, and tried to solve nutrient, soil, disease, and/or insect problems to make the growth more uniform?
- Discussed the cost to maintain the sensors (people plus supplies) and the personnel training needed?
- Discussed how the sensors might interfere with other farming operations? For example, will they need to be removed for pruning, tractor movement, and/or harvest?
- Developed a plan to use the data, recognizing that almost all sensors only measure the plant/soil status within a few inches of their placement, meaning that a slight change in placement will provide a different number? Remember: Sensors do not naturally provide an “average” reading for a field!
- Obtained research results or guidelines that tell you how to interpret specific sensor values for your particular crop?

Sensor Location(s)

- How many sensors will be used per field?
- Will they be placed in very healthy areas, or areas with poor growth?
- Where is the location relative to:
 - an emitter
 - the centerlines of adjacent plant rows
 - the individual plants within a row
- Will there be multiple sensors at multiple depths at a single location?
- At what depths will the sensors be placed at a single location?
- Will you try to install multiple sensors at locations that you think will provide the same results (in order to get a good idea of how consistent the data will be)?

Sensor Types

Remember: two different sensors, spaced only a foot apart, will often give very different values.

- How accurate is the sensor in the lab? Is it important to you that a sensor is very accurate (e.g., within 5%)?
- How durable is the sensor?
- How repeatable is the sensor reading? Does it drift over time, or under various conditions such as high salinity?
- What is the range of the readings, and how does that correspond to the range that you expect to encounter in the field?
- Is the datalogger/recorder resolution sufficient to match the resolution of the instrument itself? Has the vendor discussed this?

The Irrigation Consumer Bill of Rights (ICBR) was developed by:



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Wireless Communication with Sensor

- If a cellular network is involved, how reliable is the cell service in the area?
- If radio or satellite systems are involved:
 - Has a radio test been run, using the same equipment as is being proposed, along the signal routes proposed, that shows the signal strength for all runs and if towers/poles are needed?
 - What is the connection between the radio/satellite and the sensors? Is the connection “sensor-ready”, or must there be some type of interface?
 - Does the radio require FCC licensing? If so, what is the cost?
- What is the monthly communication cost?
- What is additional annual cost to be paid to the vendor?

Data Collection and Storage

- Will the data be collected via the vendor’s website? If so, what is the monthly and initial charge? Is there a charge per station?
- How often will data be transferred from the field to the base station?
- If the data is transferred once per day, as an example, will this contain data for every minute? Every 15 minutes? Or what interval?
- Can a sensor be queried at any time from the office? Or can the user only look at data that has been queried or sent on a fixed time interval?
- If the communication system fails, is there a datalogger on-site that stores data for a while? For an hour? Day? Month? In what storage increments? (Minute? Hour?)
- Who owns the data once it has been collected?

Power Requirements

- What type of power requirements are there at each sensor and each communication station?
- What is the frequency of battery replacement? How much do batteries cost, and where are they purchased?
- How will you know if the power is low before the batteries are dead?
- Are solar panels protected from birds landing on them?
- Who pays for a tower/pole for a solar panel and communications, if it is needed?

Display

- How will the information be displayed? As graphs? Tables?
- Will there be downloadable files with the actual values, or just PDFs? What format?
- If there are graphs, what is shown on the graphs?
- Once the user has accessed the interface, is it easy to change the period of time shown on a graph?
- Can data be automatically downloaded to your computer once/day, for example? Or is this only available on a manual query?

General

- If the vending company goes bankrupt or stops servicing/selling the equipment, exactly what will remain that is still useful for the farmer? What components of the system are owned by the vendor, and what components are owned by the purchaser?
- How expandable is the system? Will it accept equipment/sensors from other vendors?
- What is the procedure for checking the calibration of sensors, and adjusting the calibration?
- Is there protection from vandalism?
- Is there lightning protection?
- How weatherproof are all the field components?
- What training will be provided?
- Is any data interpretation service provided?
- How much field troubleshooting during startup and in the future is provided in the purchase price?

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