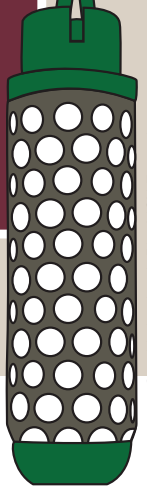


IRRIGATOR WATERMARK SERIES: Measurement Devices



Graphic by Jacob Rix, MSU Extension

This publication series provides information and recommendations pertaining to the Irrigator Watermark 200SS, a granular matrix sensor commonly used in Mississippi for scheduling irrigation. Future publications will discuss other types of soil moisture sensors. Users should choose tools that best fit their needs.

Introduction

A measurement device reads a Watermark sensor by determining the electrical resistance between the electrodes inside that sensor and then reporting the corresponding soil water tension. This publication describes three types of measurement devices and their advantages and disadvantages.

Handheld Meters

A handheld meter has a pair of alligator clips for attaching temporarily to the bare ends of a pair of sensor wires. After a sensor has been connected in this manner, its present reading can be displayed on the screen of the meter by pressing the buttons according to the manufacturer's instructions.



For convenient access, the pair of original sensor wires can be spliced to a pair of extension wires that run along the crop row out to one end of the field. To avoid affecting the readings, the manufacturer recommends using waterproof direct-bury splice kits and underground feeder (UF) wire that is 18 AWG for lengths up to 1,000 feet, 16 AWG for lengths up to 2,000 feet, and 14 AWG for lengths up to 3,000 feet.

Among the three device types, the handheld meter demands the **smallest initial investment** and can read the largest number

of sensors during the same season. Furthermore, **no subscription costs** and **no additional in-field obstructions** are involved. On the other hand, you have to check the sensor in the field, and you will see only its present reading at each visit. Unless you visit frequently enough to capture trends, scheduling irrigation and catching errors may be difficult.

Traditional Dataloggers

A traditional datalogger has several pairs of circuit terminals, and each pair can be joined to a pair of sensor wires throughout the season. The reading from each connected sensor is taken by the datalogger on a programmed schedule. These readings are stored and can be transferred via a cable from the datalogger to a computer. The datalogger can be located near its sensors, or it can be placed at an end of the field by adding extension wires (as described above).



A traditional datalogger requires a **medium initial investment** and **no subscription costs**. Besides financial considerations, criteria for selecting a particular datalogger model may include potential obstructions to field operations, data displays without a computer, system reliability, and maximum number of connected sensors.

Telemetry Units

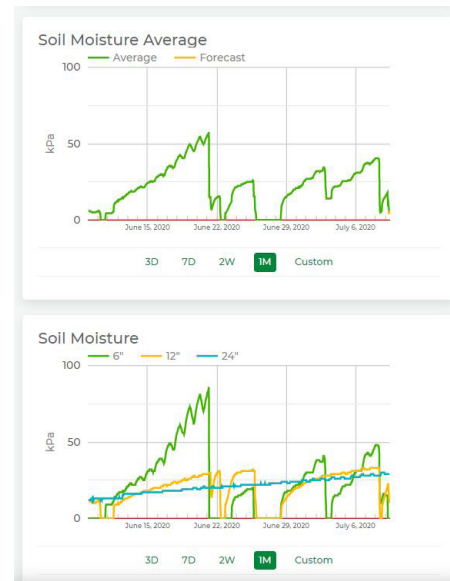
A telemetry unit also connects with sensors by wires and reads those sensors on a programmed schedule. However, it can even transmit the readings wirelessly to an off-site computer server. You can view and download those readings primarily through web browsers or mobile apps.



In some systems, each telemetry unit transmits its data independently over a cellular network. In other systems, multiple nearby “nodes” communicate via radio with the same base station, which transmits the collected data over a cellular network.

The greatest strength of telemetry is that users can **see past and present readings anytime and anywhere with internet access** through a smartphone, tablet, or computer. In addition, some user interfaces have convenient features that can **help with irrigation decision-making (e.g., automatic alerts) and trend visualization**

(e.g., **interactive graphs**). These capabilities are especially desirable for busy users who manage many fields and/or control irrigation systems remotely. To learn more about telemetry systems, visit <https://www.ncaar.msstate.edu/outreach#showcase>.



The tradeoffs to such benefits are the largest initial investment among the three device types, the need for service subscription payments, and the potential need for hardware (e.g., antenna, solar panel) above the canopy. Ultimately, the best measurement device is the one with

characteristics that are most compatible with your operation.



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