

## Temperature and Humidity

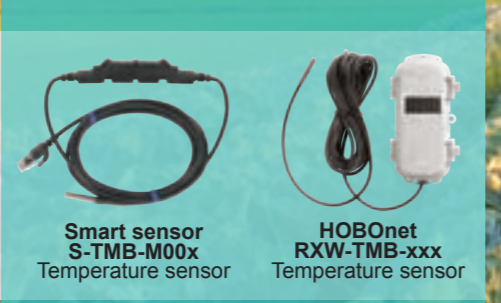
Measure temperature – monitor frost risk, excess heat, chill hours, degree days, soil temp

Measure temperature and relative humidity – determine frost risk, excess heat, chill hours, degree days

### On-Site Monitoring (Using Bluetooth BLE and HOBOMobile)



### Remote Monitoring (Wired and wireless sensors for RX series stations using HOBOLink)



## Two ways to monitor your crops



**On-site monitoring**  
(Using Bluetooth BLE and HOBOMobile)

- Alarms/alerts: none
- Annual fee: none
- Measurements: temp/RH, water level, water flow, pH



**Remote monitoring**  
(Wireless and wired sensors for RX series stations using HOBOLink)

- Text and email alerts at user-set thresholds.
- Measurements: All measurements listed below

## Light and wind speed & direction

Light – measure light intensity for frequencies relevant to solar radiation, and to photosynthesis (PAR)

Wind speed & direction – record wind speed, wind gust, and wind direction

### Remote Monitoring (Wired sensors for RX series stations using HOBOLink)



### Remote Monitoring (Wireless sensors for RX series stations using HOBOLink)



## Rainfall and leaf wetness

Rainfall – low-maintenance/ low-cost rainfall gauges (available in US and metric units)

Leaf wetness – monitor pest and disease risk conditions based on leaf moisture

### Remote Monitoring (Wired sensors for RX series stations using HOBOLink)



### Remote Monitoring (Wireless sensors for RX series stations using HOBOLink)

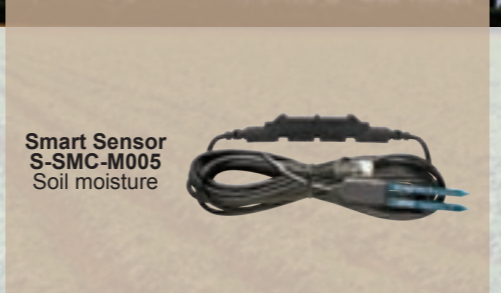


## Soil Moisture

**5cm Soil Moisture Sensor** – volumetric soil moisture sensor for small volume

**10cm Soil Moisture Sensor** – volumetric soil moisture sensor for larger volume

### Remote Monitoring (Wired sensors for RX series stations using HOBOLink)



### Remote Monitoring (Wired and wireless sensors for RX series stations using HOBOLink)



## Water level, flow, and pH

Water level and flow<sup>1</sup> – monitor water level in tanks or wells, and water flow in irrigation channels

Water pH – monitor the pH of the water used for irrigation

### On-Site Monitoring (Using Bluetooth BLE and HOBOMobile)



### Remote Monitoring (Wireless sensors for RX series stations using HOBOLink)



N/A

<sup>1</sup>To measure flow in irrigation channels or drainpipes, a 3rd-party flume or weir is required

# RX Series Station Comparison



	RX2100	RX3000
	The right solution for most sensor networks. Easiest to deploy, lowest cost	The solution for most flexibility and integration
Internet connection	Cellular	Ethernet, Wi-Fi, or Cellular
Sensor input types	Wired or wireless + water level	Wired or wireless + water level
Inputs	5 (wired) + 50 (wireless)	10 (wired) + 50 (wireless)
Power	Battery or solar	Solar (requires purchase of solar panel)
Mobile alerts	Yes	Yes
Expansion modules	None	Accommodates two modules: <ul style="list-style-type: none"> <li>• Water level (limit one)</li> <li>• HOBOnet wireless</li> <li>• 4-channel analog input</li> <li>• 3-channel relay output</li> </ul>

	Data Loggers			RX Series Sensors						
	MX	RX3000	RX2100	Temp/RH	Soil Moisture	Solar Radiation	Leaf Wetness	Rainfall	Water Level/Flow	Wind
For irrigation planning efficiency		✓	✓		R			O		
Evapotranspiration <sup>1</sup>		✓	✓	R		R				R
Integrated Pest Management (IPM)	✓	✓	✓	R		O	O	O		O
Pesticide application compliance		✓	✓	R			O			R
Crop planning	✓	✓	✓	R		O		O		
Water level tracking (well/tank)	✓	✓	✓						R <sup>2</sup>	
Water runoff	✓	✓	✓							
Remote monitoring of conditions		✓	✓	O	O	O	O	O	O	O
Real-time alerts of critical points		✓	✓	O	O	O	O	O	O	O

<sup>1</sup> Evapotranspiration calculation included with HOBOLink. Wind, solar radiation, and temp/RH sensors must be installed together on same location. Solar radiation shield required.

<sup>2</sup> To measure flow in irrigation channels or drainpipes, a 3rd-party flume or weir is required.

R = Required

O = Optional/Nice to have

## Factors to consider

### Size and location of the farm

For small, easily-accessible farms, HOBOnet MX2303 data loggers are a cost-effective solution. With Bluetooth connectivity, data are easily offloaded to a mobile device within a 100-foot range. These loggers work best in frequently-accessed locations, or when real-time alerts are not required.

For large-acreage farms, the time required to reach each location to collect data may be a concern. HOBOnet RX series stations and the HOBOnet Field Monitoring System provide broad coverage. And then upload data to the cloud remotely, for easy accessibility anywhere.

### Changes in elevation and slope

Variations in elevation and slope lead to changes in air and soil temperature, soil moisture, and sunlight exposure. Soil moisture sensors and temperature probes should be added to high and low terrain points. To increase connectivity and extend range, consider adding additional devices to points of interest in between.

### Bodies of water on the property

To better understand changes in conditions near water bodies, consider adding additional temperature and soil moisture measurement points close to rivers, streams, and ponds.

### Direction of sloping sides

Hillside land, which has multiple facing directions, will experience varied sun exposure that can lead to changes in temperature, soil moisture, and sunlight required by plants. Sensors should be added to each side of the terrain to account for these changes.

### Soil types

Each soil type retains water differently (e.g. sandy soils retain less water loam). If multiple soil types are present, soil moisture probes should be added for each type to account for differences in drainage rates and water retention.

### Type of irrigation

The type of irrigation used will impact the uniformity of soil moisture and water absorption rates. For pivots, it is best to have one set of sensors after the start of the pivot, and one set at the end of the pivot. At the end of the rotation, the sensor placed just after the start of the pivot will be in drier soil and will best determine when to restart irrigation. For drip irrigation, place one sensor for every 12 inches of crop-rooting depth.

## Definitions

**HOBOnet mobile** – A mobile device application for easy offloading and quick viewing of sensor data. HOBOnet mobile is available for iOS and Android devices, and can quickly send data in Excel and CSV formats for easy viewing and manipulation in other programs and devices.

**HOBOLink** – A web-enabled software platform that makes it easy to view and manage data remotely. HOBOnet devices automatically push sensor data to the HOBOLink service.

**Smart Sensor** – A wired, plug-and-play sensor with built-in self-identification. Does not require any setup or programming.

**HOBOnet** – A wireless sensor suite for use with RX3000 (requires HOBOnet manager) and RX2106 stations.

**PAR (Photosynthetic Active Radiation) sensor** – A sensor to measure light intensity for frequencies relevant to photosynthesis.

**Solar radiation sensor** - A sensor calibrated to measure light intensity for frequencies relevant to solar radiation.

**ONSET**  
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## Did you know HOBOnet data loggers can help you farm more efficiently?

Save time, money, and the environment by using Onset's HOBOnet products to:

- ✓ Reduce water usage
- ✓ Cut down on pesticide applications
- ✓ Plan crops and harvests
- ✓ Avoid crop losses due to climate risks



### Irrigation Planning

Make irrigation decisions based on soil and weather conditions.



### Integrated Pest Management

Identify peak application timing to combat pests with a targeted approach.



### Verify Before Spraying

Avoid waste and spray drift by confirming wind, temperature, and humidity conditions before spraying.



### Crop Planning

Determine optimal crop placement based on measured conditions such as temperature and soil moisture.



### Water Level Monitoring

Monitor wells and tanks remotely and track water flow in irrigation channels and streams.



### Real-Time Alerts

View crop conditions remotely, with real-time alarm notifications when parameters reach user-set thresholds.