



**Met One Instruments, Inc.**

## **WEATHER STATION FOR SOLAR FARM MONITORING**





Met One Instruments' Solar Farm Monitoring System is an automated weather station specifically designed for solar resource applications. The system is easily customized with accessories for additional measurements, wireless communications, and remote power.

## TYPICAL APPLICATIONS:

- Solar Resource Assessment
- Power Generation Monitoring
- Solar Farm Commissioning
- Ambient Weather Monitoring
- Research and Development

## SOLAR FARM MONITORING SYSTEM:

- Measures global, horizontal, & background irradiance.
- Measures wind speed, wind direction, ambient temperature, and relative humidity.
- Includes a surface mounted thermistor to measure solar panel temperature.
- Delivered as a pre-programmed, integrated system for simple installation.
- Utilizes a Met One Instruments 455B Datalogger or 131WP Signal Translator
- Supports TCP/IP, DHCP configuration
- Supports serial (RS-232/422/485, MODBUS) and analog (0-1V, 0-5V, 4-20mA) output
- Modular and easily customized

## SYSTEM DESCRIPTION:

The Met One Instruments Solar Monitoring System includes common meteorological sensors, a 36-IN crossarm, a datalogger (or the signal translator) in a NEMA 4X enclosure, power supply, and communications hardware. In the standard configuration, the NEMA enclosure, sensors, and crossarm, are mounted to a heavy-duty expandable tripod, but can easily be affixed to lattice or mono-pole towers. The equipment can be powered from an AC source (100 to 240 VAC, 50/60 Hz) or a solar panel power system.

The standard sensor array includes two pyranometers, a combined temperature & relative humidity probe, wind speed and wind direction sensors, and a surface mounted thermistor to measure solar panel temperature.

Common enhancements include a rain gauge, a barometric pressure sensor, and an ambient particulate monitor.



## STANDARD COMPONENTS:

The following products are included with each Met One Instruments Solar Monitoring System.

- Two K & Z CMP-3 Pyranometers with 15-ft cables and prewired connectors.
- 034B Wind Speed and Wind Direction Sensor with a 15-ft cable and a prewired connector.
- 083E-1-35 Relative Humidity & Ambient Air Temperature Probe with a 15-ft cable and prewired connector.
- 5980 Naturally Aspirated Radiation Shield.
- Surface Mounted Thermistor to Measure Solar Panel Temperature.
- Met One Datalogger or 131P Signal Translator in NEMA 4X Enclosure (Includes 12 VDC Power Supply).
- 905 Tripod (Expandable from 6-Ft to 10-FT). Supplied with Lightning Rod and Guy-Wires.
- 191-6 Crossarm (36-IN) with Mounting Accessories for Wind Sensor and Pyranometers.

## ADDITIONAL SENSORS & ACCESSORIES:

- 092 Barometer (600 to 1100 hPa) with 5-FT Cable.
- 370 Rain Gauge (8-IN Diameter, 0.01-IN Calibration).
- ES-642 Ambient Dust Monitor (0 to 100 mg/m<sup>3</sup>, 0.1 to 100 micron).
- MX-136 Battery Backup System (Includes 36Ahr Battery & Charger in NEMA Enclosure).
- MX-120/140 Remote Solar Power System (Includes 20/40W Panel & 36Ahr Battery in NEMA Enclosure).

## LOGGER & TELEMETRY ACCESSORIES:

- 500038 Ethernet Interface & Compact Flash Module for 455B Datalogger.
- MX-991 Spread Spectrum Radio Kit (900 MHz, Requires Line of Site).
- MX-911 Cellular Digital Modem Kit for GPRS or CDMA.

## SOFTWARE:

- Air Plus Datalogger Support Software.
- 550117 LoggerNet Datalogger Support Software.
- 550311 Visual Weather, Weather Station Software.





## SPECIFICATIONS:

### CMP-3 Pyranometer

- Spectral Range: 300 to 2800 nm
- Sensitivity: 5 to 20  $\mu\text{V}/\text{W}/\text{m}^2$
- Response Time: 18 s
- Zero offset A:  $<15 \text{ W}/\text{m}^2$
- Zero offset B:  $< 5 \text{ W}/\text{m}^2$
- Directional Error (up to 80 ° with 1000  $\text{W}/\text{m}^2$  beam):  $< 20 \text{ W}/\text{m}^2$
- Temperature Dependence of Sensitivity (-10 °C to +40 °C):  $< 5 \%$
- Operating Temperature Range: -40 °C to +80 °C
- Maximum Solar Irradiance: 2000  $\text{W}/\text{m}^2$
- Field of View: 180
- ISO Classification: Second Class

### 083E-1-35 Rh/Temp Probe

#### Relative Humidity

- RH Sensing Element: Thin film polymer capacitor
- Range: 0 to 100% RH
- Temperature Operation Range: -50°C to +50°C (-58°F to 122°F)
- Response Time: 10 sec. with 2 m/s aspiration
- Accuracy:  $\pm 2.0\%$  from 0 to 100% RH

#### Temperature

- Temperature Sensor: Thermistor
- Temperature Range: -50°C to +50°C (-58°F to 122°F)
- Accuracy:  $\pm 0.10^\circ\text{C}$  (0.18°F)

### 034B Wind Sensor:

- Wind Speed Range: 0 to 75 m/s (0 to 167 mph)
- Starting Threshold: 0.4 m/s (0.9 mph)
- Wind Direction Range:
  - 0° to 360° mechanical
  - 0° to 356° electrical
- Wind Speed Accuracy:
  - $\pm 0.1 \text{ m/s}$  when  $\text{WS} < 10.1 \text{ m/s}$
  - $\pm 1.1\%$  true when  $\text{WS} > 10.1 \text{ m/s}$
- Wind Direction Accuracy:  $\pm 4^\circ$

### Surface Temperature Probe:

- Temperature Sensor: Thermistor
- Temperature Range: 0°C to +100°C (32°F to 212°F)
- Linearity:  $\pm 0.21^\circ\text{C}$  (0.37°F)
- Accuracy:  $\pm 0.15^\circ\text{C}$  (0.27°F)

### 092 Barometric Pressure Sensor

- Sensor: Solid State Transducer
- Digital or Analog Output
- Operating Temperature: -40° to 60°C
- Measurement Range: 600 to 1100 hPa
- Accuracy:
  - $\pm 0.35 \text{ hPa}$  (+20°C)
  - $\pm 1.0 \text{ hPa}$  (over full range) or  $\pm 0.5 \text{ hPa}$  (over any 200 hPa range)
  - Long Term Stability:  $\pm 1.0 \text{ hPa}$  in 1 year



**Model 370 Tipping Bucket Rain Gauge:**

- Sensor: Magnetic reed switch
- Orifice: 8.0-in (20.3 cm) diameter
- Sensitivity: 1 tip per 0.01-in standard (0.2 mm or 0.25 mm optional)
- Accuracy:  $\pm 0.5\%$  @ 0.5-in per hr,  $\pm 1.0$ -in @ 3.0-in per hr

**ES642 Dust Monitor:**

- Concentration Range: 0 to 100 mg/m<sup>3</sup>
- Concentration Sensitivity: 0.001 mg/m<sup>3</sup>
- Particle Size Range: Up to 100  $\mu\text{m}$  (.05 to 10  $\mu\text{m}$  optimal)
- Particle Size Sensitivity: 0.1  $\mu\text{m}$
- Accuracy:  $\pm 5\%$  traceable standard using 0.6  $\mu\text{m}$  PSL
- Flow Rate: 2 LPM

