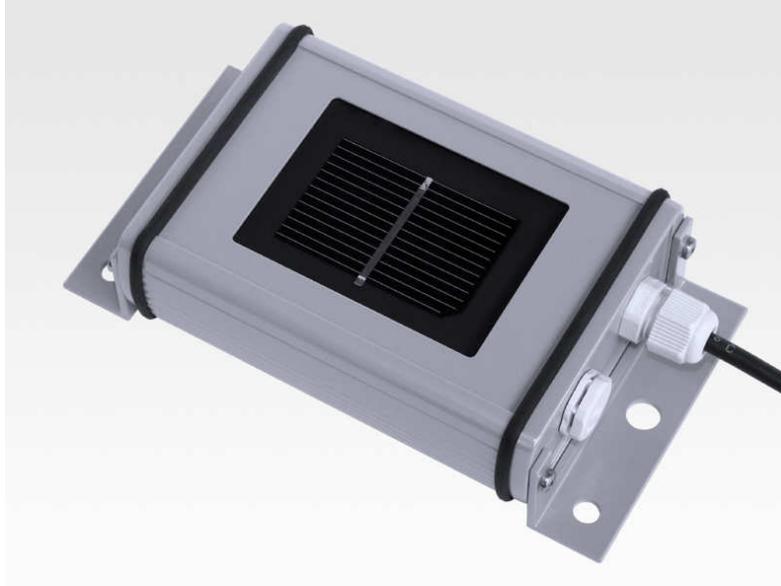




IMT Weather Station

Quick Installation Guide for Field Installers



Overview –

The IMT Weather Station includes a built-in cell temperature sensor and a direct plug-in ambient temperature. An anemometer (wind speed only) can be ordered as an option.

The installation consists of connecting 12 – 28 VDC power and RS-485 (3-wire) wiring to the station, plugging in the direct-connect ambient air temperature sensor (included) and anemometer (optional), and mounting the station and sensors. Please refer the DECK's RS-485 Modbus Wiring Best Practices guide for communication wiring details.

Due to the nature of the IMT Weather Station's communication cable lead, we highly recommend placing this unit at the end of any RS-485 Modbus run, daisy chained as the last device.

Wiring –

From the RS485 wiring from the device just upstream from the weather station, connect the brown wire from the weather station to the RS485 '+' wire from the that device using an appropriate connector. Likewise, connect the weather station orange wire to the RS485 '-' and connect the large-gauge black wire from the weather station to the RS485 'Common'. Leave the un-insulated shield wire from the upstream device (whether it is connected to the device or not) unconnected at the weather station. See Figure 1.

Connect the 12 – 28 V DC power supply '+' terminal to the red wire from the weather station. Connect the power supply's '-' terminal to the small-gauge black wire from the station.

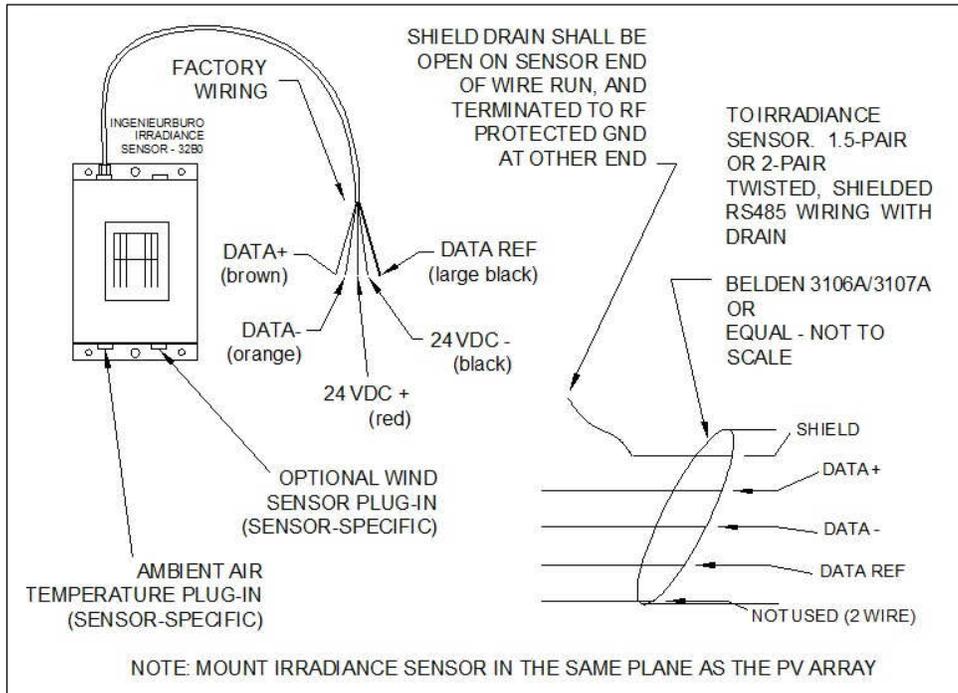


Figure 1 – IMT SiRS485TC weather station wiring (DECK Monitoring)

DECK recommends keeping wire runs to a minimum. The maximum total RS-485 Modbus / RTU run, from the data acquisition server to the last device, is 4000 feet.

External sensors –

The IMT comes from DECK with the ambient air temperature sensor (see Figure 2). The anemometer (wind speed sensor) is optional. Both external sensors are direct plug-in. Both sensors may only plug into one of the two ports (are keyed to their respective ports). Apply dielectric grease to the port and plug the sensor(s) in.

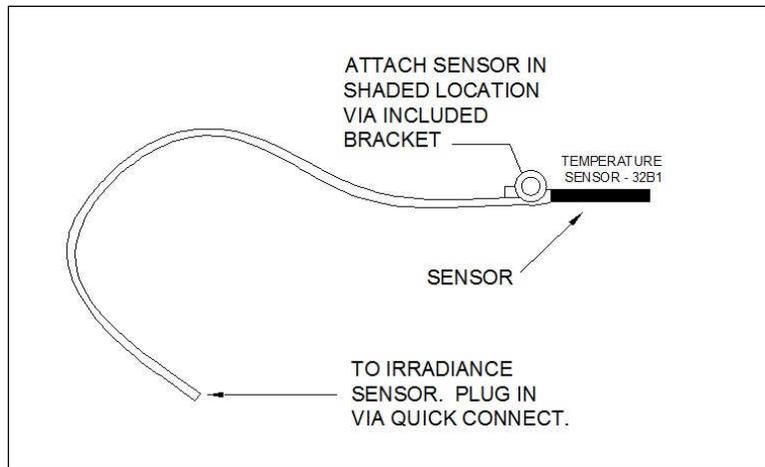


Figure 2 – IMT SiRS485TC ambient air temperature sensor (DECK Monitoring)

Mounting –

Weather station: The weather station body has flanges with mounting holes drilled. If the desired output is solar irradiance in the location and plane of the PV array, the weather station will need to be mounted to a bracket extending out from an edge panel in the PV system to the side. Do not mount the station such that it will shade any part of the PV system.

If global horizontal irradiance values are the desired output, mount the weather station with a level such that the unit is horizontal and the reference cell is facing skyward. Mount the station in a location such that it will be shaded the least.

Air temperature sensor: For accuracy, the air temperature sensor should be mounted such that the sensor itself is protected from confined heat or direct sunlight. Rain exposure is not an issue. The sensor mounts with an attached bracket with one bolt hole.

Anemometer (optional): The anemometer has an included bracket for mounting on a structure’s edge. The unit must be mounted vertically. See Figure 3.

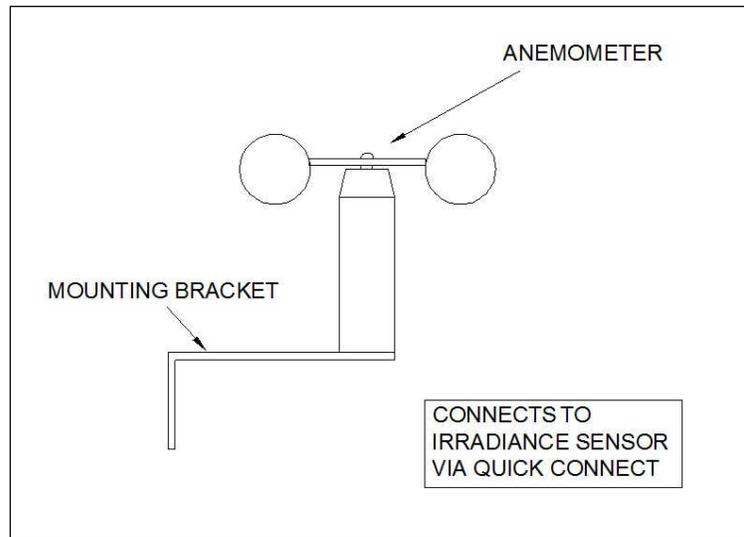


Figure 3 – IMT SiRS485TC optional anemometer (DECK Monitoring)

Modbus Communication and Wiring Specification

DECK Monitoring's Engineering Department has identified approved cables and network wiring methods in an attempt to provide a stable communications bus given that environmental noise has been and will continue to be an issue in the field.

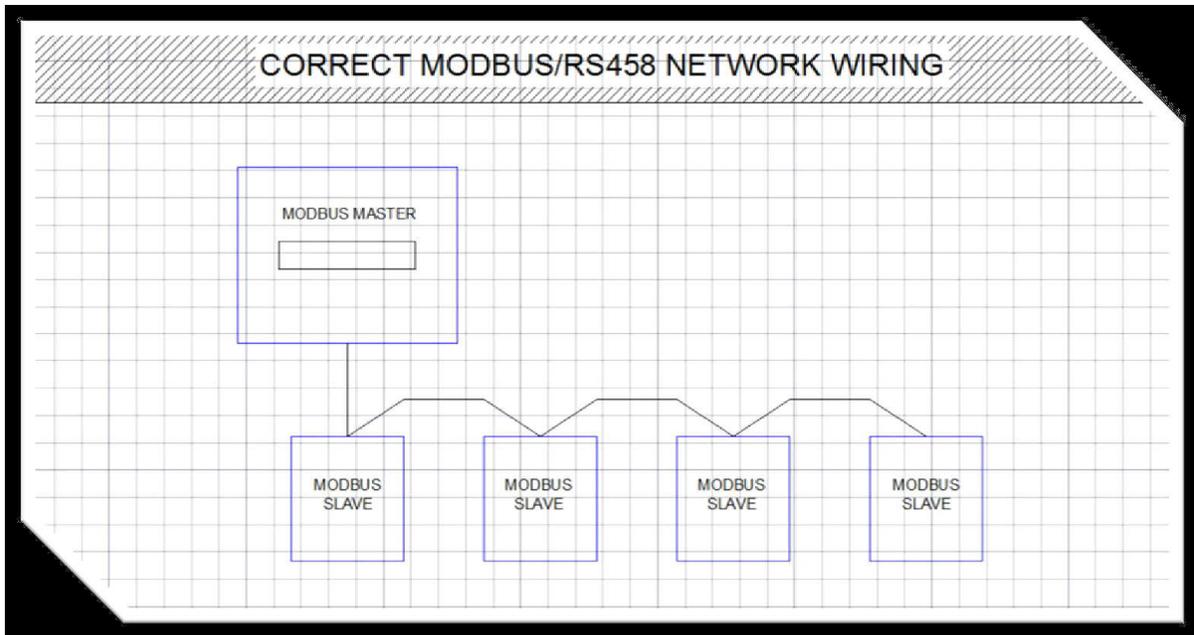
Belden 3106A has been identified as a desirable cable for Modbus communication networks. 3106A carries a 300V dielectric rating and as such must be provided with additional insulation as required when conductors carrying higher voltages are present, as required by the NEC and jurisdictions having authority.

| Belden 3106A | | |
|----------------------------------|-----|--------------|
| Wire Color | AWG | Signal ID |
| Orange/White | 22 | Data + |
| White/Orange | 22 | Data - |
| Blue/White | 22 | DC REF* |
| Tinned Copper (non-insulated) | 22 | Shield Drain |

* **DC REF** provides an effective *reference* for the differential data signals of an RS485 network. This may be referred to as COMMON/COM/REF or SHIELD by individual equipment manufacturers. DECK Monitoring *requires* the use of a stranded copper (Cu) #22 AWG insulated conductor for DC reference for the network. See the applicable sections of this document for more information regarding this topic.

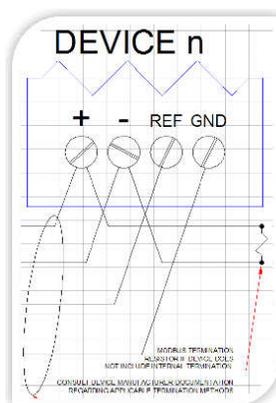
Modbus Network and Layout Requirements

- Devices shall be networked as a single bus
- Network shall originate from a single Bus Master device, here the Acquisuite
- Network shall be include termination per Modbus protocol specifications
- Network wiring shall be executed with an approved cable per DECK Monitoring Engineering
- Devices identified by DECK Monitoring Engineering as inducing noise into the Modbus network shall each require one (1) approved RS-485 Optical Isolator

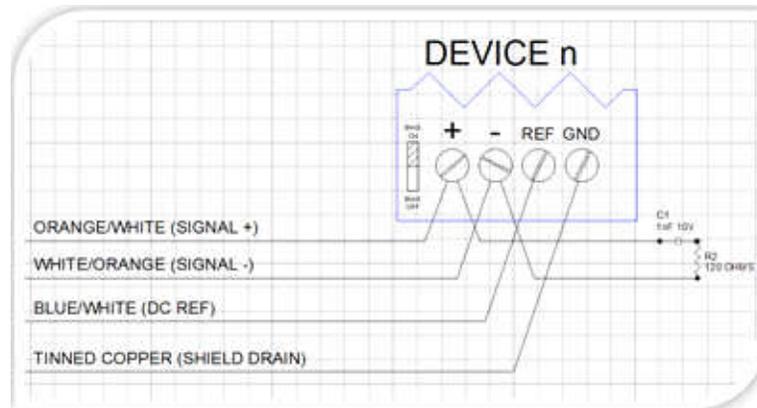


Cable Termination

The Modbus Standard for Serial Communication states that line termination resistors must be placed near each end of the bus. Modbus specifies that a network not requiring line bias shall use a 150Ω $\frac{1}{2}W$ resistor between the differential pair. This resistor value should be selected in accord with the impedance of the cable selected. Recommended cables typically require a 120Ω resistor. Some devices provide integral termination resistors. Before installing termination the installer should verify the absence of integral termination in the devices at each end of the Modbus network.



Networks in a high RF environment may require the use of Line Bias to stabilize communications. The use of line bias requires a change to the termination resistor arrangement. Modbus specifies that a $1nF$ $10V$ capacitor shall be used in series with a 120Ω $\frac{1}{2}W$ resistor.



When the RS485 network is not being actively driven by a device the differential pair is more susceptible to interference and noise. Correct termination of the shield drain to a dedicated ground terminal or chassis should provide noise rejection. In environments where excessive interference and noise still compromises network stability line biasing, the use of pull-up/pull-down resistors on the differential pair is required. Individual equipment manufacturers may or may not provide facilities to bias the network. As such DECK Monitoring Engineering directs installers and technicians to reference the applicable installation documents for the equipment in these environments. In the event that none of the devices on the network provide the requisite bias facilities an approved optical isolator may be used.