INSTRUCTION MANUAL

MET200 Meteorological System

Revision: 07/15

Warranty

"Products manufactured by CSI are warranted by CSI to be free from defects in materials and workmanship under normal use and service for twelve months from the date of shipment unless otherwise specified in the corresponding product manual. (Product manuals are available for review online at *www.campbellsci.com.au*.) Products not manufactured by CSI, but that are resold by CSI or one of its affiliates, are warranted only to the limits extended by the original manufacturer. Batteries, fine-wire thermocouples, desiccant, and other consumables have no warranty. CSI's and its affiliates obligation under this warranty is limited to repairing or replacing (at CSI's option) defective Products, which shall be the sole and exclusive remedy under this warranty. The Customer assumes all costs of removing, reinstalling, and shipping defective Products to CSI or the affiliate the goods were purchased through. CSI will return such Products by surface carrier prepaid within the continental United States of America. To all other locations, CSI will return such Products best way CIP (port of entry) per Incoterms ® 2010. This warranty shall not apply to any Products which have been subjected to modification, misuse, neglect, improper service, accidents of nature, or shipping damage. This warranty is in lieu of all other warranties, expressed or implied. The warranty for installation services performed by CSI or its affiliates such as programming to customer specifications, electrical connections to Products manufactured by CSI, and Product specific training, is part of CSI's product warranty. **CSI EXPRESSLY DISCLAIMS AND EXCLUDES ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE**. **CSI hereby disclaims, to the fullest extent allowed by applicable law, any and all warranties and conditions with respect to the Products, whether express, implied or statutory, other than those expressly provided herein.**"

Assistance

Products may not be returned without prior authorisation. The following contact information is for Australian and International customers residing in countries served by Campbell Scientific Australia Pty Ltd (CSA) directly. Affiliate companies handle repairs for customers within their territories. Please visit www.campbellsci.com.au to determine which Campbell Scientific company serves your country.

When sending back equipment to CSA for repair or calibration, you will need to follow the below procedure:

Contact CSA and obtain an RMA number for the items to be returned. This RMA number allows CSA to track your device when received at our shipping dock. CSA will create a ticket (http://helpdesk.campbellsci.com.au/) for this repair/calibration so that it can be followed by all people involved in the process (customer, administration, shipping, repair and application engineering group)

Fill in an RMA form (including the RMA number provided) and the decontamination form.

Email back the filled RMA form and Decontamination form through the ticketing system.

Send the unit(s) to CSA with a printed copy of the RMA form and decontamination form.

When shipping equipment back to CSA, please use the following delivery address:

Campbell Scientific Australia
411 Bayswater Road
Garbutt QLD 4814
AUSTRALIA
Contact: Shipping Coordinator (info@campbellsci.com.au)

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MET200 Meteorological System

1. Introduction

Thank you for purchasing a Campbell Scientific MET200 Weather Station. We recommend that you begin by reading this Installation Manual carefully before attempting to assemble, set-up and use the weather station, as it contains important information about siting, assembly and maintenance.

The manual also includes introductory information about setting up communications with your weather station. Using this information you will be able to start making measurements straight away.

1.1 Documentation

The documentation supplied with your MET200 Weather Station consists of the following:

- MET200 System Manual (this document)
- Campbell Scientific Resource CD containing PC200W software

PC200W and the MET200 Configurator software are available to download free of charge:

www.campbellsci.com.au/met200-support

1.2 Component Parts

Carefully unpack your MET200 shipment and check you have the following:

- MET200 pre-wired System Enclosure
- 7Ahr Sealed Lead Acid Battery
- 10W Solar Panel and Bracket
- Serial to USB Cable
- 1.2m galvanised sensor cross-arm with CM210 mounting bracket

Optional Components – only supplied if ordered with MET200 system

- GM10 Mounting Pole or CM106B Tripod (if ordered)
- CS215-MET2 Air Temperature and Relatvie Humidity Probe with 6 plate radiation shiled
- 03002-MET2 Wind Sentry with CM220 right angle mounting bracket
- SP-212-MET2 Solar Radiation sensor with AL-100 Levelling plate and CM225 mounting
- CS703-MET2 Tipping Bucket Rain Gauge with CM240 Levelling plate and mounting pole
- CS106-MET2 Barometric Pressure sensor (installed in MET200 System Enclosure)

2. What You Get With Your MET200 Weather Station

2.1 Standard Equipment

- MET200 Core Unit consisting of:
    - Pre-wired fibreglass enclosure with integral CR200X, rechargeable sealed lead acid battery supply unit with in-line power fuse, surface mount antenna and antenna ground plane, pre-wired mil-spec connectors
    - 10W Solar Panel and solar panel mounting bracket
    - 17394 USB-Serial Cable
    - CM204 1.2m galvanised instrument cross-arm with CM220 mounting bracket
    - Resource CD containing PC200W datalogger software. Please note, PC200W and the MET200 Configurator Software can be downloaded from the following webpage:

      http://www.campbellsci.com.au/met200-support

2.2 Optional Equipment

- **-3M** Mounting Option consisting of:
    - GM10 3 metre galvanised mounting pole with lightning protection kit
- **-TPK** Mounting Option consisting of:
    - CM106B galvanised tripod with guy wire kit and lightning protection kit
- **-IP** Communication Option consisting of:
    - Intelimax modem
    - RS232 Intelimax Cable
    - SMA to FME Adapter
- CS215-MET2 Sensor consisting of:
    - CS215 Air Temperature and Relative Humidity Probe
    - RAD06 6 Plate Radiation Shield
- 03002-MET2 Sensor consisting of:
    - 03002 Wind Sentry
    - 17953 Nu-Rail Mounting Bracket
- SP-212-MET2 Sensor consisting of:

  - SP-212 Solar Radiation Sensor
  - A100 Solar Sensor Levelling Plate
  - CM225 Solar Sensor Mounting Bracket

- CS703-MET2 Sensor consisting of:
  - CS703 Tipping Bucket Rain Gauge
  - CM240-KT Levelling plate and mounting pole

- CS106-MET2 Sensor consisting of:
  - CS106 (PTB110) Barometric Pressure sensor (in MET200 enclosure)

The MET200 Weather Station is a complete turnkey system that is supplied ready programmed for immediate use, configured to measure the sensors ordered with the system. The specific sensor configuration of your MET200 system will determine the active data table outputs (See Section 6). Campbell Scientific PC200W datalogger software can be used for a simple direct connection to the MET200 Weather Station via the supplied Serial-USB Cable (see Section 5.1 for further information on configuring PC200W software for communicating with a MET200 system). Should additional compatible sensors be ordered for your MET200 system at a later date, the MET200 Configurator Software can be used to easily reconfigure your MET200 system (See Section 7).

3. Installation

3.1 System Enclosure

When a MET200 Weather Station is ordered with the -3M Mounting Option, the system comes supplied with a GM10 3 metre galvanised mounting pole with lightning protection kit. The -3M mounting option requires a concrete footing of approximately 600 mm deep, as shown in FIGURE 3-1.

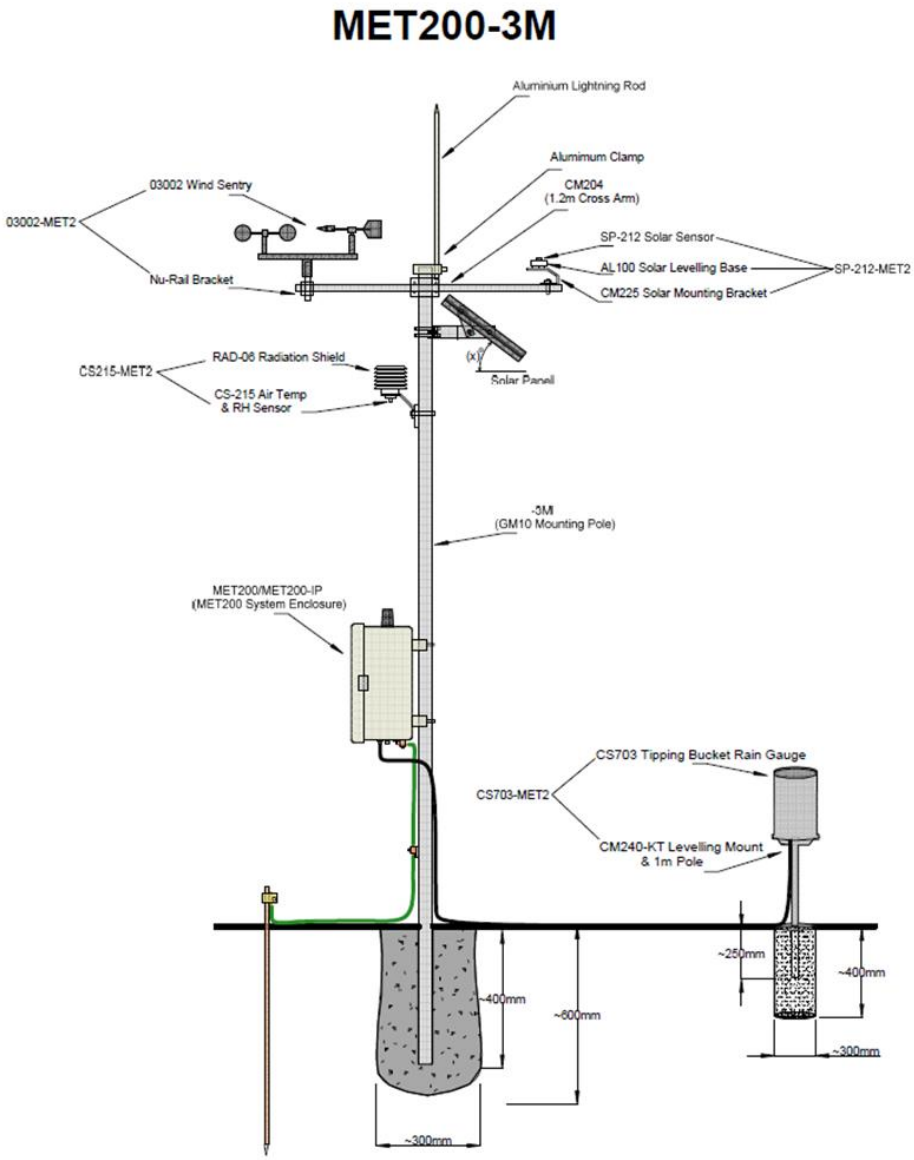

FIGURE 3-1. Typical MET200-3M station mounting

To install the MET200 enclosure and sensors you will require:

- A tape measure
- A spirit level
- An adjustable spanner
- A flat blade screwdriver
- A compass (for wind direction orientation of 03002-MET2)
- Cable Ties for securing sensor cables
- Laptop computer
- PC200W software installed and configured on user laptop
- Rapid set pre-mix concrete (or similar) and water if installing CS703-MET2

Mount the MET200 System Enclosure onto the GM10 pole (-3M option) or CM106B tripod (-TPK option) using the supplied U-bolts, ensuring the top of the enclosure is approximately 1 metre from the ground. Using an adjustable spanner, secure the enclosure by tightening the U-bolt nuts onto the flat and spring washers as shown in FIGURE 3-2 below. U-bolts (supplied) are required at the top and bottom to fully secure the enclosure.

FIGURE 3-2. Mounting the MET200 System Enclousre to a vertical pole

3.2 CM204 Cross-arm

Mount the CM204 (1.2m) cross-arm to the vertical pole or mast as shown in FIGURE 3-3 using the supplied CM210 cross-arm to pole mounting bracket. The CM210 bracket is supplied with U-bolts, lock washers and nuts.

FIGURE 3-3. CM204 cross-arm mounted to vertical pole using CM210 cross-arm to pole mounting bracket

3.3 CS215-MET2

The CS215-MET consists of a CS215 combined air temperature and relative humidity probe, and a RAD-06 6 plate non-aspirated radiation shield. Install the RAD-06 radiation shield to the GM10 pole or CM106 tripod mast above the system enclosure using the U-bolt attached to the RAD-06 shield. Ensure the U-bolt on the RAD-06 is mounted on the pole or mast at a height of approximately 1.8 metres. Loosen the RAD-06 gland and insert the CS215 sensor into the gland as shown in FIGURE 3-4 then tighten the gland to secure the CS215 sensor in place.

FIGURE 3-4. CS215-MET2 mounted on a tripod mast

For optimum cable management, loop the CS215 cable and secure with cable ties as shown in FIGURE 3-4.

3.4 03002-MET2

The 03002-MET2 consists of an RM Young 03002 Wind Sentry sensor, a 12 inch long mounting pipe and a CM220 right-angle mounting bracket. Attach the mounting pipe to the 03002 wind sentry, using a flat blade screwdriver to temporarily tighten the hose clamp on the 03002 so it compresses onto the mounting pipe (FIGURE 3-5).

FIGURE 3-5. 03002 Wind Sentry attached to supplied mounting pipe via hose clamp.

Next, attach the mounting pipe to the station cross-arm using the CM220 bracket as shown in FIGURE 3-6.

FIGURE 3-6. CM220 right angle bracket used to attach 03002 Wind Sentry vertical mounting pipe to the 1.2m CM204 horizontal cross-arm.

Ensure the cross-arm of the 03002 sensor is oriented North-South with the wind vane to the North.

Alignment of the wind vane is now required. Two people are recommended for initial wind vane alignment, one to adjust the instrument position and the other to observe the wind direction reading on a laptop connected to the MET200 system.

To align the wind vane, select a known azimuth reference point on the horizon. Next, sighting down the wind vane centreline, point the wind vane counterweight at the reference point on the horizon. While holding the vane in position, slightly loosen the hose clamp to allow you to slowly turn the base of the wind vane until the wind direction reading displays the correct azimuth value. Tighten the hose clamp to fix the sensor into position.

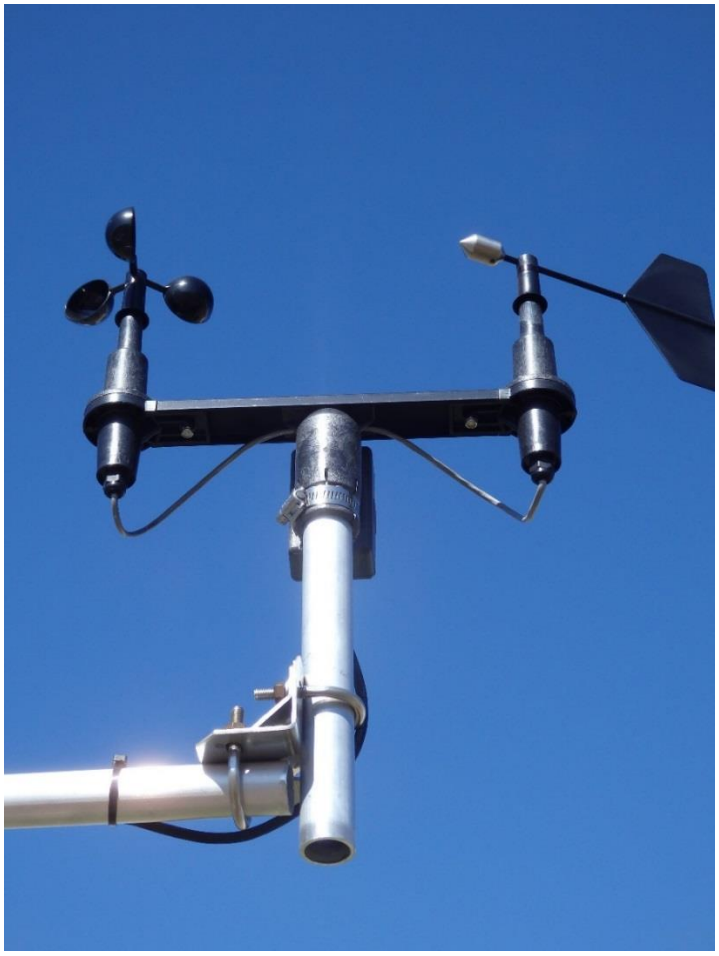

FIGURE 3-7. Installed 03002 Wind Sentry

3.5 SP-212-MET2

The SP-212-MET consists of an SP-212 pyranometer, an AL-100 solar levelling base and a CM225 (P/N 17906) solar sensor mounting bracket. The pyranometer should be mounted such that no shadows or reflections are cast on the sensor by the weather station mounting equipment or other sensors. The sensor should be mounted with the cable pointing towards the nearest magnetic pole, e.g. in the Southern Hemisphere point the cable towards the South Pole.

Firstly, mount the CM225 to the cross-arm using the supplied U-bolt, nuts and washers. Next, place the SP-212 pyranometer in the centre of the AL-100 levelling base, and loosely mount the AL-100 to the CM225 bracket. Turn the levelling screws as required on the AL-100 to bring the level bubble within the ring. Once level, tighten the mounting screws on the underside of the CM225 bracket to secure the assembly in its final position, giving a final check of the level bubble to ensure the pyranometer is still correctly levelled. Route the cable along the underside of the cross-arm to the main weather station mast, and down the mast to the main MET200 system enclosure. Secure the cable with cable ties.

FIGURE 3-8. Installed SP-212 Pyranometer

3.6 CS703-MET2

The CS703-MET2 consists of a CS703 (TB6) tipping bucket rain gauge and a CM240-KT levelling base and mounting pole. The CM240 base helps level the rain gauge, ensuring a more accurate measurement. The CM240 base attaches to the supplied 1 m mounting pole which should be concreted into the ground, as shown in FIGURE 3-9.

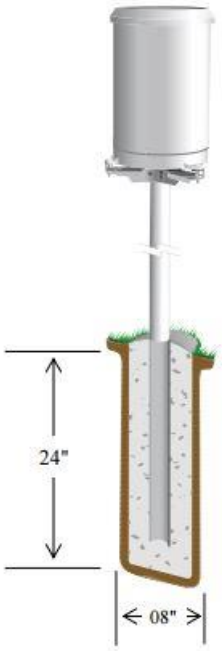

FIGURE 3-9. Installation Requirements for CS703-MET2

The rain gauge should be levelled after mounting. To level, remove the housing assembly from the base by loosening the three housing screws and lifting the housing upward. Adjust the three nuts on the CM240 bracket to level the gauge – a bullseye level is mounted on the rain gauge base to facilitate levelling.

Whilst the housing assembly is removed, ensure to remove the rubber shipping band and cardboard packing securing the tipping bucket assembly. Tip the bucket mechanism several times to ensure the tipping mechanism is moving freely. Replace the housing assembly and tighten the three screws to secure the housing to the base.

3.7 CS106-MET2

The CS106-MET consists of a CS106 barometric pressure sensor which, if ordered with a MET200 Core Unit, is supplied pre-installed inside the MET200 System Enclosure. The CS106-MET requires no installation by the user.

3.8 Sensor Connectors

All external sensors supplied with MET200 systems have mil-spec connectors for connecting to the underside of the system enclosure (see FIGURE 3-10). A diagram on the inside of the system enclosure (see FIGURE 3-11) indicates where each sensor connects to the enclosure. The system has also been designed with unique pin configurations for each sensor to ensure a connector cannot be inserted into the wrong mating connector. To attach a sensor to its mating connector, unscrew the protective cap, then gently insert the female sensor connector into its mating male connector on the underside of the enclosure. Align the vertical notch on both the female and male connectors, which will allow the connectors to mate together. Then screw the sensor connector onto the enclosure connector to ensure a secure fitting.

FIGURE 3-10. MET200 Mil-spec connectors

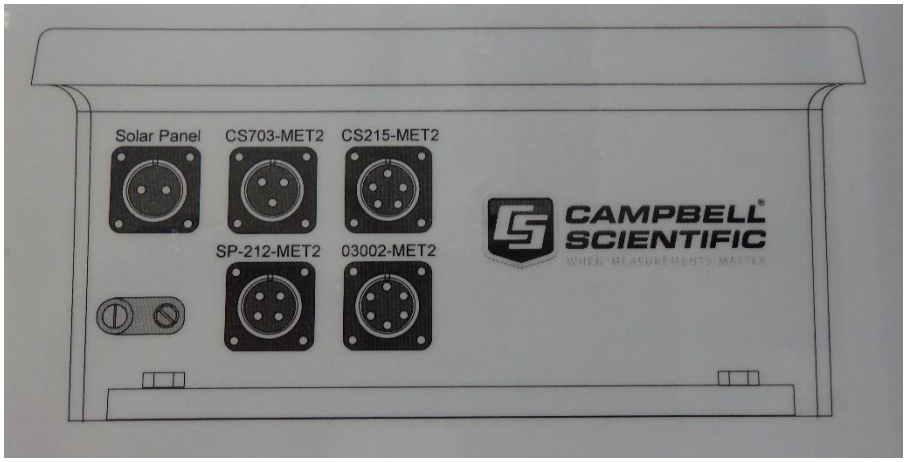

FIGURE 3-11. Diagram Showing MET200 Sensor Connections

3.9 Final Installation Details

Secure grounding wire and all sensor cables to the mast and cross-arm using cable ties. It is essential to secure any excess sensor cables with cable ties. Unsecured cables can blow around in the wind and may cause the wires inside to break, often without any external signs of damage. Ensure that the protective caps are kept on any enclosure connectors that are not used to ensure connectors are water tight.

4. Powering the MET200

MET200 systems are supplied with a 10W solar panel and 12V 7Ahr SLA Battery for powering the system.

The 10W solar panel is supplied pre-mounted to a solar panel mounting bracket (FIGURE 4-1). Mount the solar panel bracket to the main pole or mast using the mounting bracket U-bolt, and angle the solar panel to suit the installation location. In the Southern hemisphere, ensure solar panel is mounted facing North.

FIGURE 4-1. 10W solar panel and mounting bracket attached to a vertical mast

To protect the MET200 Core Unit in shipping, the 12V battery is left out of the enclosure and requires installation when the system is installed. Simply place the battery into the battery holder inside the MET200 System Enclosure, and use the supplied velcro strap to secure the battery to the bracket (FIGURE 4-2). To power the system, simply attach the black (-ve) and red (+ve) spade connectors to the battery, observing the correct polarity, and ensure the inline power fuse on the DIN Rail terminals is connected (FIGURE 4-3). When the system is powered up, the red Scan light on the CR200X datalogger in the system enclosure will light up every 10 seconds to indicate the system program in running.

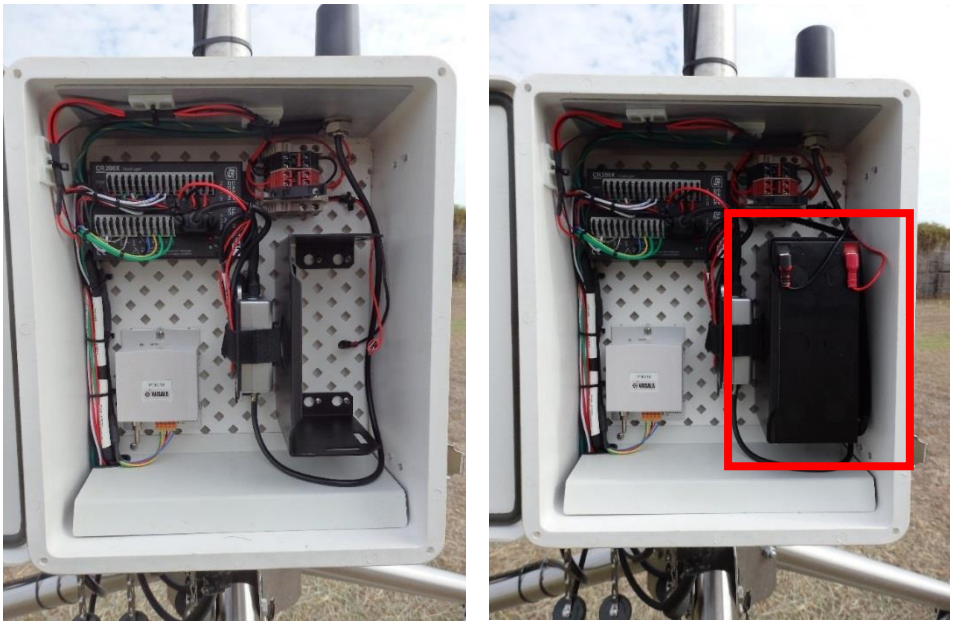

FIGURE 4-2. Installing the 12V 7Ahr system battery

FIGURE 4-3. In-line power fuse needs to be connected for system to Power

Congratulations, your MET200 system is now installed and powered up ready for operation.

5. Establish Communications

5.1 Using a Personal Computer running PC200W

Your MET200 Station comes ready configured for the sensor options ordered with the system. Supplied with your MET200 system is a Resource CD which contains the PC200W datalogger support software package. Once installed on your PC, this windows program will allow you to communicate with the MET200 weather station, view the MET200 station data and collect data from the station.

Prior to installing PC200W on your PC, install the driver for the Serial-USB cable supplied with your MET200 System. A CD is supplied with the Serial-USB cable. Should your PC not have a CD Rom Drive, the driver for this cable can be downloaded from the following web page:

www.sabrent.com/downloads.php

The model number Serial-USB cable supplied with the MET200 system is Sabrent CB-FTDI. Once the Sabrent driver has been successfully installed, connect the USB end of the Serial-USB cable into a USB port on your PC, and it should be assigned a ComPort number by Windows. Take note of this ComPort number as it will be required in the setup procedure for PC200W. Proceed to installing PC200W.

Install PC200W onto your computer by following the instructions on screen. Once installed, open PC200W on your computer and you will be presented with the EZSetup Wizard. Following the onscreen prompts, configure your MET200 system connection as follows:

PC200W EZSetup Settings for MET200

Communication Setup

Choose the CR200 Series datalogger from the scrolling list

Datalogger name: Enter a name up to 12 digits, e.g. MET200 (CR200X is default but can be overwritten)

CLICK NEXT >>

COM Port: Select the ComPort that your Serial-USB cable was assigned by Windows (e.g. COM4). Please note, when connecting to a different USB port on your computer, Windows may assign different ComPort numbers, so it is best to always connect your Serial-USB cable to the same USB port.

COM Port Communication Delay: 00 Seconds

CLICK NEXT >>

Datalogger Settings

Baud Rate: 9600

Security Code:

Extra Response Time: 00 Seconds

CLICK NEXT >>

Setup Summary

CLICK NEXT >>

Communication Test

Check Yes

CLICK NEXT >>

If communication is unsuccessful then

a) ensure power is switched on (see Section 4)

b) ensure you have the correct ComPort selected for your Serial-USB cable

c) contact Campbell Scientific Australia

Datalogger Clock

Check the dataloggers clock and reset if required.

CLICK NEXT >>

Send Program

Do not send a program. Your MET200 station comes pre-configured with a measurement program.

CLICK NEXT >>

Wizard Complete

CLICK NEXT >>

If you have more than one MET200 weather station, you will have to set up a different datalogger (with a different, unique name) for each station to ensure the data from each station is collected properly. By default MET200 stations ordered individually are shipped with PakBus Address 1. When multiple MET200 stations are purchased on the same order, the PakBus Address for each MET200 station on the order will be unique and set at factory prior to shipping. You can check the PakBus Address configured for your MET200 station by checking the PakBus Address label located on the front of the connector cover plate inside the system enclosure (FIGURE 5-1).

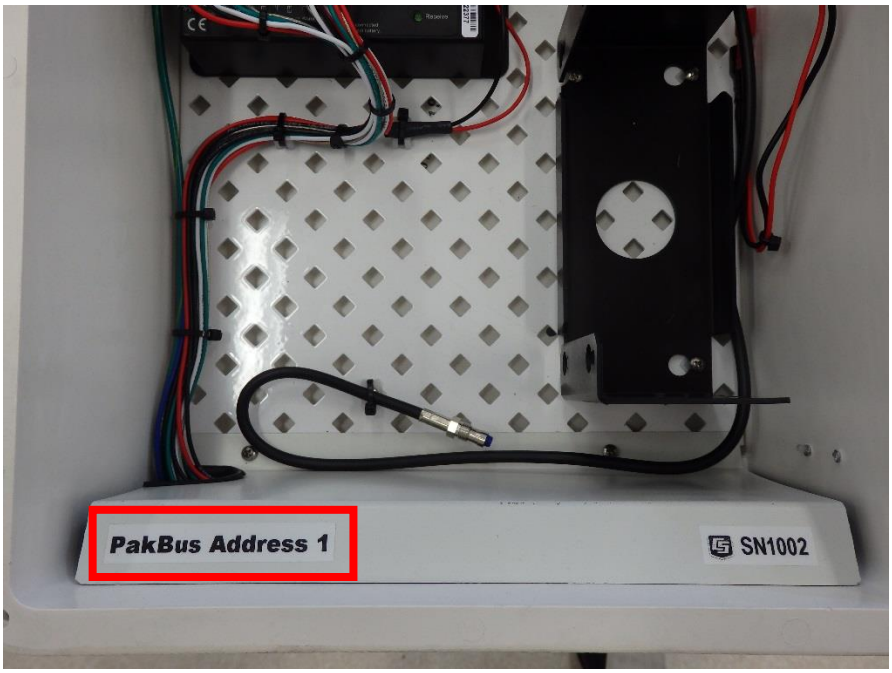

FIGURE 5-1. PakBus Address and Serial Number for MET200 stations are located on the front of the internal connector cover plate.

5.2 Setting the MET200 Datalogger Clock

The CR200X datalogger used in the MET200 weather station contains the system program in non-volatile flash memory, and this will be retained even when the main battery power supply is removed (e.g. in shipping). The clock (data and time) settings are also battery-backed, and will be retained when the datalogger is powered down. Although your MET200 datalogger will have the data and time set before dispatch (to AEST time), you should check the current settings to ensure that they conform to your specific location requirements.

You can synchronise the MET200 datalogger clock with your computer clock by pressing the 'Set Clock' button on the PC200W main connect screen when connected to the datalogger. PC200W will communicate with the CR200X Series Datalogger and set its clock time to match your computer time, so make sure your computer clock is correct prior to setting the MET200 system clock.

6. Viewing and Collecting Measurements

6.1 Viewing Real-time Public data table

Now that you have established communications and set the MET200 datalogger clock to local time (via PC200W), you are ready to view the measurements being obtained by your MET200 weather station. Measurements can be easily viewed in real-time on your computer via direct connection to the datalogger using PC200W. Real-time measurements from the sensors are stored as publicly accessible variables located in the Public data table:

TABLE 6-1. Public Table

Variable Name	Description
Record No	Data Record Number in Public data table
Time Stamp	Data Record Timestamp
MET200_Dec	Ignore this value – used for diagnostic purposes only
Longitude	Longitude of the station (See Section 7)
Latitude	Latitude of the station (See Section 7)
Altitude	Altitude above MSL of the station (See Section 7)
batt_volt	Sample battery voltage
AirTemp	Sample Air Temperature
RH	Sample Relative Humidity
DewPoint	Calculated Dew Point Temperature
AppTemp	Calculated Apparent Temperature
DeltaT	Calculated Delta T
WS_ms	Sample Wind Speed in metres per second
WS_kmh	Sample Wind Speed in kilometres per hour
WindDir	Sample Wind Direction
Solar_Wm2	Sample Solar Radiation in Watts per square metre
Solar_MJ	Sample Solar Radiation in Mega Joules per square metre
Rain_mm	Sample Rainfall in millimetres
Rain_Since_9am	Total Rainfall since 9am
Rain_Intensity	Rain Intensity in millimetres per hour based on 5 minute running sample period
BP_hPa	Sample Barometric Pressure in hectopascal

To monitor the Public data table in real-time:

1. Connect your PC to the CR200X datalogger in the MET200 system enclosure using the supplied Serial-USB cable
2. Open up PC200W
3. Click on “Setup/Connect” tab on the main PC200W screen
4. Click on the “Connect” button to initiate communication with the datalogger
5. Once connected, click on the “Monitor Values” tab on the main PC200W screen
6. Click on the “Add” button
7. From the Add Selection box, click on the “Public” Table
8. Click “Paste” to paste all the Public variables into the Monitor Data Screen.
9. If a warning appears saying “Please select a cell to paste the selection into”, hit OK, then select the top left cell in the Monitor Data tab, then click “Paste” in the Add Selection box.
10. You can observe the Public variables changing every 10 seconds (you will see Record Number increment).

A typical screenshot for the MET200 Weather Station Public table is shown in FIGURE 6-1.

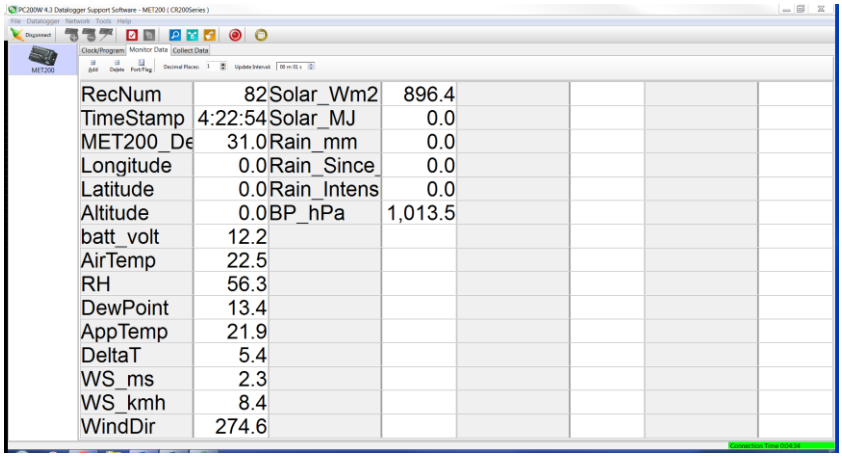

FIGURE 6-1. Screenshot of MET200 Public data table with all sensor options configured on the weather station

6.2 Collecting Recorded Data

To initiate data collection, click on the “Collect Data” tab in the main PC200W window. In the Collect Data window you will be given the option to collect data from the datalogger by clicking the “Start Data Collection” tab. You can configure what data to collect and where to output the data to.

Irrespective of MET200 station sensor configuration, you should choose to collect data from all data tables except the Public and Status tables, so in total 6 tables should be ticked (Bkp, Daily, ET_Daily, ET_Hourly, Min15, Min30) as shown in FIGURE 6-2. Whether these tables are populated with data will depend on the specific sensor configuration of your MET200 station.

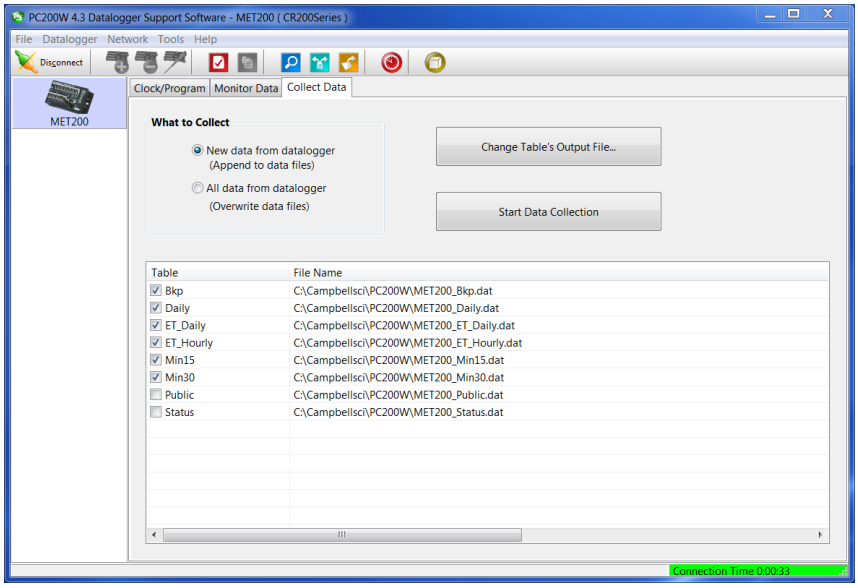

FIGURE 6-2. Collect Data Window in PC200W

In the Collect Data window, you can choose to collect:

- New data from datalogger (Append to data files) – this is the normal mode of operation
- All data from datalogger (Overwrite data files)

The default file output location for data files is usually C:\Campbellsci\PC200W\

To change the default file output location for a particular data table, highlight the table and then select the "Change Table's Output File" tab. This will open a window where you can change the File name and output location for the file. Click "Save" to save any changes you make.

All data files collected from a MET200 station are comma separated values (CSV) files with a .dat file extension. These files can be opened in standard software packages such as Microsoft Excel, or you can view data using the View Software package built into PC200W (Tools >> View).

6.3 Data Storage

There are three standard data tables in a MET200 weather station, a 15 minute table (Min15), 30 minute table (Min30) and a daily data table (Daily). In addition to these standard tables, two Evapotranspiration (ET) data tables (ET_Hourly and ET_Daily) will be populated with data only when the MET200 system is configured to measure air temperature and relative humidity (CS215-MET2), wind speed and direction (03002-MET2) and solar radiation (SP-212-MET2).

Another data table containing station configuration information (Bkp) should be collected, but this data is only meaningful to a Campbell Scientific Application Engineer for system diagnostic purposes.

The specific sensor configuration of a MET200 system will determine the data table outputs. Data tables in the MET200 are structured as follows:

6.3.1 Min15 Table

The Min15 data table provides the following data at 15 minute resolution:

TABLE 6-2. Min 15 Table

Variable	Description	Units
Timestamp:	Timestamp of data	yyyy-mm-dd hh:mm:ss
Record	Data Record ID	INT
Batt_volt_Min	Minimum battery voltage	Volts
AirTemp_Avg	Average Air Temperature	°C
RH_Avg	Average Relative Humidity	%
DewPoint_Avg	Average Dew Point Temp	°C
DeltaT_Avg	Average Delta T	°C
AppTemp_Avg*	Average Apparent Temp	°C
WS_kmh_Avg	Mean Hz Wind Speed	km/hr
WindDir	Unit Vector Mean Wind Direction	Degrees
SigmaTheta	Standard deviation of Wind Direction	Degrees
Solar_Wm2_Avg	Average Solar Radiation	W/m2
Rain_mm_Tot	Total 15 minute Rainfall	mm
Rain_Since_9am	Total Rainfall since 9am	mm
Rain_Intensity	Rainfall Intensity (5 min running period)	mm/hr
BP_hPa_Avg	Average Barometric Pressure	hPa

*Apparent Temp data only available when the CS215-MET2 and 03002-MET2 sensors are configured on a MET200 system, otherwise NAN will be reported for AppTemp.

6.3.2 Min30 Table

The Min30 data table provides the following data at 30 minute resolution:

TABLE 6-3. Min30 Table

Variable	Description	Units
Timestamp:	Timestamp of data	yyyy-mm-dd hh:mm:ss
Record	Data Record ID	INT
Batt_volt_Min	Minimum battery voltage	Volts
AirTemp_Avg	Average Air Temperature	°C
RH_Avg	Average Relative Humidity	%
DewPoint_Avg	Average Dew Point Temp	°C
DeltaT_Avg	Average Delta T	°C
AppTemp_Avg*	Average Apparent Temp	°C
WS_kmh_Avg	Mean Hz Wind Speed	km/hr
WindDir	Unit Vector Mean Wind Direction	Degrees
SigmaTheta	Standard deviation of Wind Direction	Degrees
Solar_Wm2_Avg	Average Solar Radiation	W/m2
Rain_mm_Tot	Total 30 minute Rainfall	mm
Rain_Since_9am	Total Rainfall since 9am	mm
BP_hPa_Avg	Average Barometric Pressure	hPa

*Apparent Temp data only available when the CS215-MET2 and 03002-MET2 sensors are configured on a MET200 system, otherwise NAN will be reported for AppTemp.

6.3.3 Daily Table

The Daily data table provides the following data at daily resolution, output at midnight:

TABLE 6-4. Daily Table

Variable	Description	Units
Timestamp:	Timestamp of data	yyyy-mm-dd hh:mm:ss
Record	Data Record ID	INT
Batt_volt_Min	Minimum battery voltage	Volts
AirTemp_Max	Maximum Air Temperature	°C
AirTemp_Min	Minimum Air Temperature	°C
RH_Max	Maximum Relative Humidity	%
RH_Min	Minimum Relative Humidity	%
DewPoint_Max	Maximum Dew Point Temp	°C
DewPoint_Min	Minimum Dew Point Temp	°C
WS_kmh_Max	Maximum Wind Speed	km/hr
WS_kmh_Min	Maximum Wind Speed	km/hr
Solar_MJ_Tot	Total Solar Radiation	MJ/m2
Rain_mm_Tot	Total 24hr Rainfall	mm
BP_hPa_Max	Maximum Barometric Pressure	hPa
BP_hPa_Min	Minimum Barometric Pressure	hPa

6.3.4 Additional Evapotranspiration Data tables

If a MET200 system has the CS215-MET2, 03002-MET2 and SP-212-MET2 sensors configured on the system, in addition to the three standard data tables listed above, ET_Hourly and ET_Daily data tables will also be populated with data. If the MET200 system ordered does not have the required measurements for ET calculation as described above, the ET data tables will not be populated with data.

6.3.4.1 ET_Hourly Table

TABLE 6-5. ET Hourly Table		
Variable	**Description**	**Units**
Timestamp:	Timestamp of data	yyyy-mm-dd hh:mm:ss
Record	Data Record ID	INT
AirTemp_Avg	Average Air Temperature	°C
RH_Avg	Average Relative Humidity	%
WS_ms_Avg	Average Wind Speed	m/s
Solar_Wm2_Avg	Average Solar Radiation	W/m2
ETo	Hourly Evapotranspiration	mm

6.3.4.2 ET_Daily Table

TABLE 6-6. ET Daily Table		
Variable	**Description**	**Units**
Timestamp:	Timestamp of data	yyyy-mm-dd hh:mm:ss
Record	Data Record ID	INT
AirTemp_Max	Maximum Air Temperature	°C
AirTemp_TMx	Time of Maximum Air Temperature	yyyy-mm-dd hh:mm:ss
AirTemp_Min	Minimum Air Temperature	°C
AirTemp_TMin	Time of Minimum Air Temperature	yyyy-mm-dd hh:mm:ss
RH_Max	Maximum Relative Humidity	%
RH_Min	Minimum Relative Humidity	%
WS_ms_Avg	Average Wind Speed	m/s
Solar_Wm2_Tot	Total Solar Radiation	MJ/m2
ETo	Daily Evapotranspiration	mm

6.3.5 NAN Values

The MET200 system is pre-programmed to output NAN values in the data columns of any sensors that are not present on the system. If columns in a data table show NAN values, it is advisable to firstly visually confirm which sensors you have connected into the MET200 system using the connector diagram on the inside of the enclosure as a guide, and compare this to the MET200 output data chart (TABLE 6-7) to confirm what measurements the system should be reporting. If there is a discrepancy, then you can use the MET200 Configurator software (See Section 7) to check the current MET200 system configuration and change the configuration if required. Since MET200 sensor configuration is pre-configured at factory prior to shipping, changes to the sensor configuration using the MET200 Configurator software should only be required if additional sensors (not ordered with the original system) are later added to the system.

TABLE 6-7. MET200 Output Data based on system sensor configuration

CS215-MET2	03002-MET2	SP-212-MET2	CS703-MET2	CS106-MET2
Air Temperature Relative Humidity Dew Point Temperature Delta T	Wind Speed Wind Direction Sigma Theta	Solar Radiation (W/m2) Solar Radiation (MJ/m2)	Total Rainfall Rain Since 9am Rainfall Intensity	Barometric Pressure
Apparent Temperature				
Hourly Evapotranspiration				
Daily Evapotranspiration				

As an example, Hourly and Daily Evapotranspiration will only be output if the CS215-MET2, 03002-MET2 and the SP-212-MET are all present on the MET200 weather station.

6.3.6 Data Table Storage Limits

The data storage limits for MET200 weather stations are shown in TABLE 6-8. All data tables are configured for ring memory, meaning once the table storage limit is reached, the oldest data in the table will be overwritten.

TABLE 6-8. MET200 Data Table Storage Limits

Table Name	Storage Limit (Days)
Min15	50
Min30	50
Daily	120
ET_Hourly	50
ET_Daily	120

7. MET200 Configuration Software

MET200 systems are supplied from Campbell Scientific pre-configured for measuring the sensor suite ordered with the system. However, site specific location information required for ET data calculation (Altitude, Latitude, Longitude) must be user-configured in the MET200 if the sensor configuration supports ET output. This configuration is done through the MET200 Configurator software GUI, downloadable from the following web page:

https://www.campbellsci.com.au/met200-support

Download and install the MET200 Configurator software on your PC, then open the software and you will be presented with the GUI interface as shown in FIGURE 7-1.

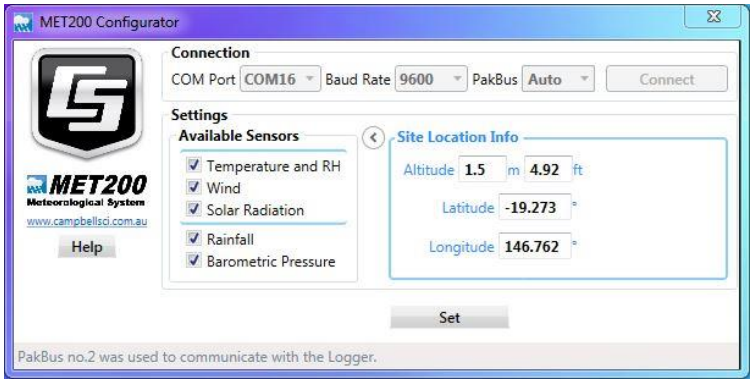

FIGURE 7-1. MET200 Configurator GUI

Select the appropriate ComPort on your PC to connect to the MET200 system via the supplied Serial-USB cable. Ensure Baud Rate is set to 9600 (default setting), and click Connect. Once connected, the software will display which sensors are currently configured on the MET200 system. A tick next to the sensor indicates the sensor is configured. When the CS215-MET2, 03002-MET2 and SP-212-MET sensors are all present and configured, the Site Location Information boxes on the right hand side of the GUI become available to configure the site specific station information for the ET data.

Enter the Altitude (above Mean Sea Level) of the weather in metres into the Altitude box. The software will automatically input a conversion to units of feet (ft). Next, enter the Latitude of your MET200 station into the Latitude box. The range of values for Latitude is 0 to ±90° (positive for the Northern Hemisphere and negative for the Southern Hemisphere). Next enter the Longitude of your MET200 station, ranging from -180 to +180°. Locations East of the Greenwich Meridian require a positive Longitude value, whilst values West of the Greenwich Meridian require a negative Longitude value. For example, a MET200 station located in Townsville, North Queensland, Australia would require a Latitude value of -19.256° and a Longitude value of 146.818°. A MET200 station located in Logan, Utah, USA would require a Latitude value of 41.738° and a Longitude value of -111.831°.

Once the Site Location Information has been entered, click the "Set" button to send these settings to the MET200 system. If successful, you will receive a confirmation box confirming the settings have been saved to the MET200. Site Location Information setup is complete and you can close the application. You can connect to the MET200 with your datalogger software (e.g. PC200W) to check the latitude, longitude and altitude values you entered in the Public data table. If the settings are not successfully saved to the MET200 when you click the "Set" button, an Error box will appear informing you that settings were not saved to the MET200. Follow the on-screen prompts to rectify the issue.

The MET200 Configurator software should only be required to configure site specific location information for ET data output, or when adding a sensor to an existing in-situ MET200 station. For normal day to day operation of the system, PC200W (manual data collection) or LoggerNet (manual and/or remote data collection) datalogger software should be used.

8. System Maintenance

MET200 weather stations are designed for prolonged use in field conditions and require minimal maintenance. However, some recommendations for specific items of equipment are given below. If your weather station site is subject to particularly severe environmental conditions, you may wish to devise your own maintenance schedule based on these conditions.

8.1 Enclosure

The MET200 system enclosure is made from fibreglass and is completely weatherproof. The enclosure contains packages of desiccant which should be regularly replaced. The desiccant bags help to reduce water vapour, protecting the internal electronics from damage. The frequency of replacement will depend on how often, and for low long, the enclosure door is opened. In

general the desiccant will last for about 4-6 months if the enclosure door is opened for a few minutes each week. More frequent changes of desiccant may be required in very wet or humid conditions. Used desiccant packs may be re-used if dried by placing in an oven at 120°C for 16 hours.

MET200 systems are supplied with a humidity indicator card for the user to insert into the enclosure once the system is in-situ. It is recommended to change the desiccant if the middle indicator turns pink. Please note, when the MET200 system is first received, the indicators on the card may already be pink. This is not a cause for alarm, and just a result of atmospheric humidity. Once installed into the enclosure with desiccant bags, the indicator card should turn blue again as the desiccant starts to absorb water vapour inside the enclosure.

8.2 Regular Inspection

MET200 weather stations are designed to operate remotely, without attention, for extended periods of time. However, regular preventative maintenance will pay dividends, and so the station should be visited at regular intervals depending on environmental conditions, its usage and the accuracy of the measurements required from the station.

Suggested schedules are given below, but these can be modified to suit your own requirements.

8.2.1 General

At least twice a year, check all parts for misalignment and damage. Check for any corrosion and apply suitable rust inhibitors, and check and where necessary change the desiccant packs in the enclosure as detailed above. More regular inspections are advised in very wet or humid conditions, or after severe storms. It is important to not allow any contact between rust proofing compounds and the datalogger or sensors. In particular, avoid spraying such compounds close to the CS215-MET2 temperature and relative humidity sensor.

8.2.2 Sensors

Inspect and carry out routine maintenance and calibration of sensors at regular intervals. This frequency will depend on environmental conditions and the accuracy you wish to achieve from your particular installation.

Individual sensor manuals will give further advice on maintenance and calibration etc…

CS215-MET2: CS215 Manual

03002-MET2: 03002 Manual

SP-212-MET2: SP-212 Manual

CS703-MET2: CS703 Manual

CS106-MET2: CS106 Manual

8.2.2.1 Weekly

Visually inspect the wind sensors and radiation shield

8.2.2.2 Monthly

Do a more thorough visual inspection of the wind sensors, and listen to the anemometer bearings at low wind speeds for audible signs of bearing wear

Check, and clean if necessary, the CS215-MET2 sensor and radiation shield

Check the rain gauge funnel for debris and ensure the gauge is level and operating correctly

8.2.2.3 Six-Monthly

Clean the CS215-MET2 sensor and radiation shield as per the CS215 manual

8.2.2.4 Yearly

Thoroughly check the 03002-MET2 anemometer bearings and replace if any signs of wear

Calibrate the CS703-MET2 rain gauge

8.2.2.5 Every Two Years

Thoroughly check the 03002-MET2 wind vane potentiometer and bearings, and replace as necessary

Consider replacing the CS215-MET2 sensor humidity chip – this should be replaced at a maximum of 3 years

8.2.2.6 Every Four to Five Years

Thoroughly check all sensor cables for abrasion or other damage and replace as necessary.

8.2.3 Power Supply

At every site visit check the solar panel for dirt and debris such as bird droppings and clean as required. Keep a close check on battery voltage – the daily minimum values are stored in the Daily data table to aid with checking this. If the battery voltage ever drops below 11.5V then please consult the troubleshooting section of this manual (Appendix A) for possible remedial action. Please note that a weather station performing well in the height of summer may not be able to sustain its charge during the middle of winter if items such as batteries have started to degrade over time.

9. Thank you

Thank you for purchasing a MET200 weather station from Campbell Scientific Australia. We hope that your turnkey weather station will give you many years of accurate data and trouble free use. If you have any problems with the weather station, remember to first check out the troubleshooting guide in this manual. Further help and advice is available from Campbell Scientific Australia as shown below:

Campbell Scientific Australia Pty Ltd
411 Bayswater Road
Garbutt
Queensland, 4814
Australia

Tel: +61 (0)7 4401 7700
Fax: +61 (0)7 4755 0355

Email: support@campbellsci.com.au
Web: https://www.campbellsci.com.au/

Appendix A. Troubleshooting

If your MET200 weather station seems to be operating incorrectly, there are a number of checks you can make to help isolate the problem. These checks may enable you to solve the problem, but, in any case, will give you some basic facts to pass on to an Application Engineer if you need to contact Campbell Scientific.

A.1 Loss of Power

The MET200 datalogger Scan LED should flash every 10 seconds to indicate that the system is powered and running. Should the Scan LED on the CR200X datalogger in the system enclosure fail to flash, power to the system will need to be checked.

If you are operating the station in conditions of low solar irradiance (far South or North for example) the power consumption may not be balanced by charge from the solar panel. To prevent the battery discharging, carefully monitor the minimum battery voltage in the data tables. If it is seen to decline continuously over a period of several days, steps should be taken to redress the balance.

A.2 No Response from the Datalogger

Do the following steps:

1. Make sure the system battery has been installed and connected properly. Ensure that the spade connectors are attached to the correct battery terminals (Black –ve, Red +ve). Ensure the in-line power fuse is connected.

2. Use a voltmeter to measure the voltage between the battery terminals. The voltage should be greater than 11.5V. A voltage lower than this may be an indicator that the battery is faulty or not getting enough charge.

3. When using the supplied Serial-USB cable to connect to the MET200 datalogger in the field, ensure the driver for the Serial-USB cable is installed on the PC (CD supplied with cable), and that Microsoft Windows detects the Serial-USB cable.

4. Ensure that the correct ComPort is selected in PC200W or LoggerNet for connecting to the CR200X datalogger (see Section 5). The ComPort number is assigned by Microsoft Windows when the driver for the Serial-USB cable is installed.

5. Make sure that the PC200W or LoggerNet software is correctly installed and the station configured correctly on your PC.

If you still cannot communicate with the MET200 datalogger, please contact Campbell Scientific.

A.3 Some NAN fields in the data tables

MET200 weather stations are programmed to display NAN in any data fields where the sensor is not present and configured on the system. If NAN is displayed in a data table field when you believe it should display actual sensor readings, connect to the station using the MET200 Configurator software (see Section 7) to check the sensors are correctly configured for your station. A tick in the box next to a sensor type indicates that the station is configured to measure that sensor.

If the MET200 Configurator software indicates a sensor is being measured (and the sensor is present on the station) but you are still getting NAN values for that sensor, check the sensor connection (disconnect and reconnect) on the underside of the MET200 system enclosure. Should NAN continue to be output for that sensor, please contact Campbell Scientific for further troubleshooting.

A.4 Hourly and Daily ET tables have no values written to table

The Hourly_ET and Daily_ET data tables will only have data output to the data tables if your MET200 station is configured to measure (as a minimum) the CS215-MET2, 03002-MET2 and SP-212-MET2 sensors (see Section 6.3.4 for further details).

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