**Tripod Installation & Grounding**

See the Campbell Scientific Tripod Weather Station Installation Manual (pp 2-1 & 2-3 for tripod set-up; pp. 2-4 & 2-5 for grounding). Our Tripods are model CM10.

* Tools: ½ inch wrench, ½ inch socket and ratchet, crescent wrench (adjustable), teflon tape or pipe lube, 2 pipe wrenches, various flathead, Phillips (+ head), and hexagonal screwdrivers or screwdriver bits, special Campbell screwdriver for dataloggers and electronics, wire cutters & strippers, 15cm of spare narrow gauge wire (for NR-Lite wiring).
* NOTE: Lock washers always go next to (i.e. up against) nuts.
* Ensure the tripod is level (i.e. the mast is vertical), sturdy and secure.
* The mast is the long pipe, about 1 ½ inches in diameter.
* Screw the short narrow pipe into the mast after rubbing a small amount of lube on the threads. Tighten about ½ a turn with a pipe wrench.
* Attach the lightning rod to the narrow pipe part way up.
* If using guy-wires, attach a u-bolt to the base of the narrow pipe now.
* Mount the solar panel to the top of the mast, just below the narrow pipe (see instructions below).
* Screw the mast into the tripod (use lube on threads). Tighten with a pipe wrench. Solar panel faces south.
* Pound the brass grounding rod into the ground near the centre of the tripod. Connect the rod to the lower of two brass grounding screws on the tripod.

**MSX10 Solar Panel Installation & Wiring**

* Mount the Solar panel at the top of the 1 ¼ inch mast, just below the point where it narrows. The mounting hardware consists of two metal pieces.
* Attach the small 3-sided rectangular piece first using two u-bolts. The open side of the rectangle should point toward south.
* Attach the long angled piece to the 1st piece using 4 ½ inch bolts, flat washers, and lock washers. Tighten the nuts only finger tight.
* Slide one half inch bolts into the grooves on the back of the solar panel and centre them.
* Insert the ends of these bolts through the corresponding holes on the long angled mounting piece, use flat washers, lock washers, and tighten the nuts with a wrench (comfortably snug).
* Adjust the angle of the long angled mounting piece so that the solar panel faces 10 degrees up from vertical (80 degrees down from horizontal). This angle is for the Yukon and varies with latitude.
* See pages 3-5 of the MSX solar panel instruction manual for more information.
* WIRING (after enclosure and power supply are installed, below): Insert the ends of the solar panel leads into the charging regulator (left side of battery) where it says CHARGE. The position of black and red leads is unimportant.

**Enclosure, Power Supply & Datalogger Installation & Grounding**

* Install power supply and datalogger inside enclosure using the screws and plastic inserts provided. Power supply (battery) at top of enclosure, datalogger immediately below. Picture on pp. 3-4.
* Attach enclosure to north side of tripod with U-bolts.
* Connect the brass grounding screw on the bottom of the enclosure to the upper grounding screw on the tripod with a green 14AWG ground wire.
* See page 3-1 of the Tripod Installation Manual for more details.
* Ensure the power supply switch is turned OFF.
* Insert the plastic end connected to the battery leads (wires) into the charging regulator (attached to the left side of the battery) in the upper left slot labelled BATTERY – Internal.
* Connect the red and black leads coming from the power supply to the slots labelled G and 12V on the top right of the datalogger. To do this, pull out the green plastic insert labeled G 12V; loosen the screws and insert the red lead into 12V and the black into G (thus 12V on the power supply connects to 12V on the datalogger, and ground connects to ground); tighten the screws finger tight.
* Attach the CFM100 Compact Flash Memory Module to the right hand side of the datalogger.
* Attach the green grounding wire connected to the screw in the bottom of the enclosure to the brass GROUND LUG screw on the datalogger.

**Instrument Installation& Wiring**

**NOTE:**  The wiring instructions included here are for use with a specific LoggerNet CR1 program. If the program is altered, wiring of the instruments may need to be adjusted accordingly.

**NOTE:** Numerous wires or leads can be connected to one signal/analog ground () or one power ground (G) terminal on the datalogger.

**NOTE:** Where cables can be detached from sensors, wire cables into data logger before connecting cable to sensor. This is true for radiation sensors, which generate their own currents.

**61205V Barometric Pressure Sensor**

* Install the BP sensor inside the enclosure beneath the datalogger with the four screws and plastic inserts provided.
* Remove the red rubber cap covering the pressure sensor (hole above the model # sticker) and connect the sensor to the clear hose included. Run the clear tube out the hole in the bottom right of the enclosure so that it protrudes 2 inches out. Insert the one of the white pellets up the bottom of the tube.
* This tube links the pressure sensor directly to the outside environment. If there is not a hole in the bottom right of the enclosure run the clear tube out the wiring hole in the bottom left side.

**Wiring:**

Red to SW-12V Black to G

White to DIFF 5-H Green to DIFF 5-L

Clear to G

**HMP45C212 Temperature & Relative Humidity Sensor**

* The TRH sensor mounts inside a radiation shield.
* First mount the radiation shield on the tripod mast with the U-bolt provided (usually at 2 metres above ground).
* Carefully insert the TRH sensor into the bottom of the radiation shield and tighten the threaded piece into the opening of the radiation shield to secure the sensor. This does not have to be very tight.
* Run the cord from the sensor down the mast and up through the hole in the bottom of the enclosure. Leave slack in the cord strategically so that it does not pull on the sensor. Coil any excess and attach it to the tripod. Inside the enclosure knot the cord to prevent it from being pulled out of the enclosure and ensure that there is sufficient slack to prevent pulling on wires that will be attached to the datalogger.

**Wiring**:

Orange to SINGLE 1 (Temp) Black to EX2 Green to SINGLE 2 (RH)

Red to 12V Yellow to C1 White to Analog ground 

Purple & Clear to Analog ground  (Clear could go to either  or G)

**05103AP-10 R.M Young Wind Monitor**

* **NOTE:** This model is a modified version of the 05103-45.
* The wind monitor mounts on a crossarm pipe that is ¾ inch diameter.
* Attach the crossarm mounting plate to the tripod mast at 2 metres high using 2 u-bolts.
* Attach the crossarm to the mounting plate with 2 more u-bolts.
* Loosen the hexagonal screws on the corner pipe and slide it onto the crossarm. Ensure that the pipe extending from the corner is pointed vertical.
* Slide the black plastic ring with hose clamp onto the vertical part of the corner, then slide the wind monitor itself on.
* Using a compass, point the rectangular junction box at the bottom of the wind monitor due south. Tighten the hose clamp to secure the instrument.
* Slide the black plastic ring up to the wind monitor and insert its peg into the slot on the bottom of the wind monitor. If the wind monitor needs to be removed for any reason this black plastic ring will mark due south so the instrument can be re-installed more easily.

**Wiring (with manufacturer cable)**

Wiring to datalogger:

Red to P1 Green to SINGLE 4 Blue to EX1

Clear & Black to analog ground  White to analog ground 

Wiring to junction box:

Red to WS SIG Green to WD SIG Blue to WD EXC

Black to WS REF White to WD REF Clear to Earth ground

**Wiring (with SFU extension cable):**

Wiring (from junction box to datalogger):

Orange (WS SIG) to P1 Green (WD SIG) to SE 4 Blue (WD EXC) to EX1

Brown (WS REF) to analog ground  White/Green (WD REF) to Analog ground 

White/Blue (Earth ground) to analog ground 

**SR50 Sonic Ranging Sensor**

* Mount the SR50 using a 1 ¼ inch crossarm.
* Mount the crossarm using the mounting plate and u-bolts provided, as for the wind monitor crossarm above.
* Attach the SR50 to the crossarm with the corner piece by loosening the hex screws and sliding it onto the crossarm. Insert the SR50 into the corner and tighten the hex screws. Ensure that the SR50 is oriented vertically (pointed straight down).

**Wiring**:

Green to C7 Red to 12V Black & White & Clear to G

**NR-LITE Net Radiometer**

* The NR-LITE has its own mounting plate and u-bolts so it does not require a crossarm like the wind monitor.
* Attach the mounting plate to the mast near or just below 2 metres using two u-bolts.
* Attach the NR-LITE itself to the mounting plate with two more u-bolts.
* The NR-LITE should be level (use the bubble on the device) and pointed due south. The NR-LITE has a field of view of 180 degrees on the upper side of the sensor and 10h (where h is the mouting height) on the bottow of the sensor. It is thus important to minimize obstructions under the instrument, and shading above.

**Wiring**:

Clear to Analog ground  White to DIFF 3-H Green to DIFF 3-L

Connect 3L to analog ground  with an additional wire; this is called a jumper and protects the data logger from receiving high voltages.

**TE525M Tipping Bucket Rain Gauge**

* For transport, an elastic band should be used to immobilize the tipping mechanism inside the rain gauge. Remove this elastic before installation!
* Install the rain gauge so that it is perfectly level. Push down on the upper lip on all sides to properly seat it on the lower (white) part of the rain gauge.
* Ensure that there are no obstructions above the rain gauge.
* The upper lip of the rain gauge must be at least 30 cm above the ground. The gauge itself is 30cm high so it can be mounted on the ground. However, the rain gauge cannot be placed in a hole in the ground.
* The wire mesh and copper-coloured rim of the rain gauge should be secured to the white bucket with duct tape or something similar.

Wiring:

Black to P2 Clear & White to G

**Kipp and Zonen CMA Pyranometer/Albedometer**

*This instrument cannot be used simultaneously with the CNR4 net radiometer*

* Mounting considerations are the same as for net radiometer: a balance between minimizing shading and obstruction above (therefore mount high) and below (therefore mount low).
* Mount between 1 and 2m above the surface.
* A black shadow with radius = 0.1 H on the field below decreases the signal by 1% and 99% of the signal will originate from an area with radius 10 H.
* Each pyranometer has a unique sensitivity (in uV/Q/m^2) that is technically valid for:
* An ambient temperature of +20°C.
* For a horizontal radiometer and for a tilted radiometer.
* Normal incident radiation of 500 W/m2.

Wiring:

RED to 6H BLUE to 6L

GREEN to 7H YELLOW to 7L

BLACK to Analog ground 

**Kipp and Zonen CNR4 Net Radiometer**

*Note this instrument cannot be used simultaneously with the CMA Pyranometer*

* Mounting considerations are the same as for NR-Lite and CMA Albedometer: a balance between minimizing shading and obstruction above (therefore mount high) and below (therefore mount low). Mount between 1 and 2m above the surface.
* A black shadow with radius = 0.1 H on the field below decreases the signal by 1% and 99% of the signal will originate from an area with radius 10 H.
* Each pyranometer and pyrgeometer has a unique sensitivity (in uV/Q/m^2) detailed in the instrument’s calibration certification.
* Instrument has two cables: one for the four-radiation sensor (goes to S-port), and one for the internal temperature sensor (goes to T-port). Internal temperature in used to correct the longwave radiation to ambient values. (The sensor measures longwave relative to the senor temperature.) A 1k ohm resistor is necessary to make the temperature measurement. The resistor should be included with the instrument. ***MAKE SURE YOU HAVE THE RESISTOR BEFORE LEAVING CAMP!*** Also make sure that jumper cables are long enough to physically connect the required ports.

Wiring for radiation cable (S-port):

RED to 4H BLUE to 4L JUMPER JOINING 4L TO Analog ground 

WHITE to 6H BLACK to 6L JUMPER JOINING 6L TO Analog ground 

GREY to 7H YELLOW to 7L JUMPER JOINING 7L TO Analog ground 

BROWN to 8H GREEN to 8L JUMPER JOINING 8L TO Analog ground 

THICK BLACK to Analog ground 

*Note: jumpers protect the data logger from receiving high voltages.*

*Note: jumpers have to be about 10cm long for easier wiring*

Wiring for temperature cable (T-port):

WHITE to SINGLE 3 BLACK to Analog ground 

RESISTOR to SINGLE 3 RESISTOR to EX3

THICK BLACK to Analog ground 

*Note: other wires are for unused auxiliary temperature sensor (PT-100). Tie off to avoid short- circuit.*

**Compiling and Running a Program**

* Once all the instruments are installed and wired to the datalogger turn the power supply switch to ON to supply power to the datalogger and instruments.
* Insert a Compact Flash card containing the Loggernet CR1 or Shortcut program you wish to run into the Compact Flash CardReader attached to the datalogger (The top of the card faces the datalogger).
* Attach the keypad to the lower of the two 9-pin serial ports on the datalogger.
* Press home when the initial screen appears.
* To start running a new program scroll down to Run/Stop Program and press Enter.
* Select CRD for programs on the Flash card, choose your program and press Enter.
* Scroll down to Run Program Now and Press Enter. Then select scroll to Execute and press Enter.
* Choose Yes when asked to confirm what you want to do.
* The datalogger will then compile the program. When it is finished it will say program running at the bottom of the initial screen.
* To view data press home and then choose Data and press enter.
* Choose Real Time Public to view the most recent samples for each instrument and Real Time 'your table name' to view the most recent samples stored in your table.
* Choose Final Storage Data to view all the samples stored in your table(s). It is important to view Final Storage before leaving a station in order to verify that data are being written to the flash card.
* The keypad display can be disconnected from the datalogger at any time.
* Before removing a Compact Flash card press the button on the Card Reader and wait for the light to turn green before pressing the eject button above the card slot and removing the card.

**Servicing**

Upon arriving at a previously deployed weather station:

* Approach so as not to unnecessarily disturb the surface or enter the line of sight of any instruments (i.e. net radiometer, sonic ranger).
* Visually inspect tripod, instruments, and cables (proper orientation, level, intact, moving parts, etc).
* Open enclosure and inspect (sealed, moisture - desiccant, wires intact, power supply L.E.D, etc).
* Connect keypad to data logger and check current status (ideally, program should be running).
* Check data logger clock and note time (compare to watch).
* Fill out AWS service template to ensure all tasks are completed.

To swap flash cards and continue running the existing program:

* Simply push the button on the flash card reader, when light is green remove card and insert new card. Wait for card to initialize then check data and card fill time.

To swap flash cards and run a new program:

* Press button, wait for green light, remove flash card.
* Select "Run/Stop Program", then "Stop Program, Delete Data", press ENTER.
* Wait while program is stopped and files are deleted then insert new card.
* Wait for card to be initialized. The main (first) keypad screen will say "initializing" until it is ready (Note: GEF observes that this initialization step does not generally occur, but that this is not problematic).
* Once logger is ready choose "Run/Stop Program", then "CRD", then the name of the new program file, select "Run on Powerup" and "Run Now", press EXECUTE.
* Program will be compiled and then begin running.
* Confirm that data are being recorded by looking at "Data" and "Final Storage" or "real time". “Real time” tells you whether the sensors are successfully being read, but only “Final Storage” tells you whether your data are being stored!
* Check "card" to see fill time in seconds (at bottom).
* If all is well and working you are done!

**WIRING SUMMARY**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**BP** Red to SW-12V Black to G

White to DIFF 5-H Green to DIFF 5-L

Clear to G

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**TEMP** Orange to SINGLE 1 (Temp) Black to EX2 Green to SINGLE 2 (RH)

Red to 12V Yellow to C1 White to Analog ground 

Purple & Clear to Analog ground  (Clear could go to either  or G)

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**WIND Wiring (with manufacturer cable)**

Wiring to datalogger:

Red to P1 Green to SINGLE 4 Blue to EX1

Clear & Black to analog ground  White to analog ground 

Wiring to junction box:

Red to WS SIG Green to WD SIG Blue to WD EXC

Black to WS REF White to WD REF Clear to Earth ground

**Wiring (with SFU extension cable):**

Wiring (from junction box to datalogger):

Orange (WS SIG) to P1 Green (WD SIG) to SE 4 Blue (WD EXC) to EX1

Brown (WS REF) to analog ground  White/Green (WD REF) to Analog ground 

White/Blue (Earth ground) to analog ground 

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**NR-LITE** Clear to Analog ground  White to DIFF 3-H Green to DIFF 3-L

Connect 3L to analog ground  with an additional wire

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**SR50** Green to C7 Red to 12V Black & White & Clear to G

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**RAIN** Black to P2 Clear & White to G

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Kipp and Zonen CMA6 Albedometer** RED to 6H BLUE to 6L

GREEN to 7H YELLOW to 7L

BLACK to Analog ground 

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Kipp and Zonen CNR4 Net Radiometer**

Wiring for radiation cable (S-port):

RED to 4H BLUE to 4L JUMPER JOINING 4L TO Analog ground 

WHITE to 6H BLACK to 6L JUMPER JOINING 6L TO Analog ground 

GREY to 7H YELLOW to 7L JUMPER JOINING 7L TO Analog ground 

BROWN to 8H GREEN to 8L JUMPER JOINING 8L TO Analog ground 

THICK BLACK to Analog ground 

Wiring for temperature cable (T-port):

WHITE to SINGLE 3 BLACK to Analog ground 

RESISTOR to SINGLE 3 RESISTOR to EX3

THICK BLACK to Analog ground 

*Note: other wires are for unused auxiliary temperature sensor (PT-100). Tie off to avoid short-circuit.*

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**