

SC-110 Solar Controller SUMMARY

08/12/20

- CruzPro Ltd. has developed Solar Monitor and Controller that optimizes the use of available solar energy by automatically controlling up to eight mains powered circuits in either a wired or wireless manner. The system consists of one or more Measurement Units (MU), a Display Unit (DU) and up to eight voltage controlled contactors connected to the measurement unit(s).
- All operations are performed with explanatory menus using four buttons on the front of the Display Unit.
- The display normally shows six values, MAINS VOLTAGE, LOAD POWER (the amount of total power that the installation is using), EXPORT POWER (the amount of energy being drawn from the grid in RED or being exported to the grid in GREEN, SOLAR POWER (the amount of energy being created by the solar array), TODAY KWH (the amount of energy created since midnight) and TOTAL KWH (the total amount of energy that your array has created. In addition to the six values there are eight colored boxes numbered 1 to 8 that show what circuits are OFF in GREEN and ON in RED.
- The controller has two modes MANUAL and AUTO.
- In MANUAL mode you can turn up to eight circuits ON and OFF with the press of a few buttons.
- In AUTO mode the controller turns up to eight circuits ON and OFF according to rules that you specify.
- For ease of remembering the function of each circuit you can give names to each of the eight circuits.
- The rules for when to turn a circuit ON or OFF are entered and saved to a non-volatile memory from the SETUP menu. To prevent accidental modification of the rules the SETUP menu is protected with an ACCESS CODE.
- From the SETUP menu you can change the ACCESS CODE, set the DATE and TIME, calibrate the various values that are displayed on the MAIN screen, ZERO TODAY KWH and edit the CIRCUIT RULES.
- On the CIRCUIT RULES page you tell the controller how much power each circuit draws, when to turn a circuit on (based on available power), the minimum number of minutes to run that circuit after it has been turned on, the total number of (accumulated) minutes to run that circuit, and optionally a programmed time to turn on a circuit and turn off a circuit (timed mode).
- Each of the eight circuits have a priority with CIRCUIT #1 having the highest priority and CIRCUIT #8 having the lowest priority. When enough solar power is available CIRCUIT #1 will be turned on. Lower priority circuits will also be turned on if there is enough excess power available. If the available solar power drops (e.g. due to clouds, etc.) the lowest priority circuit will be turned off first.
- The Solar Controller can log Date, Time, Export Power and Solar Power data to a memory ten times an hour for 31 days.
- More details of what the Solar Controller is doing can be seen on a smart phone or tablet through a BLUETOOTH connection.
- BLUETOOTH can be used to more easily edit circuit names, set the date and time, set the number of Measurement Units (1-4), send the logdata and zero the log memory.

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Operation

The Solar Controller consists of two units the Measurement Unit (MU) and Display Unit (DU). The Measurement Unit measures the Mains Voltage, Mains Current using an AC current transformer and Inverter Current using a second AC current transformer.

The Measurement Unit uses a long range 433Mhz radio transceiver to send the data to the Display Unit.

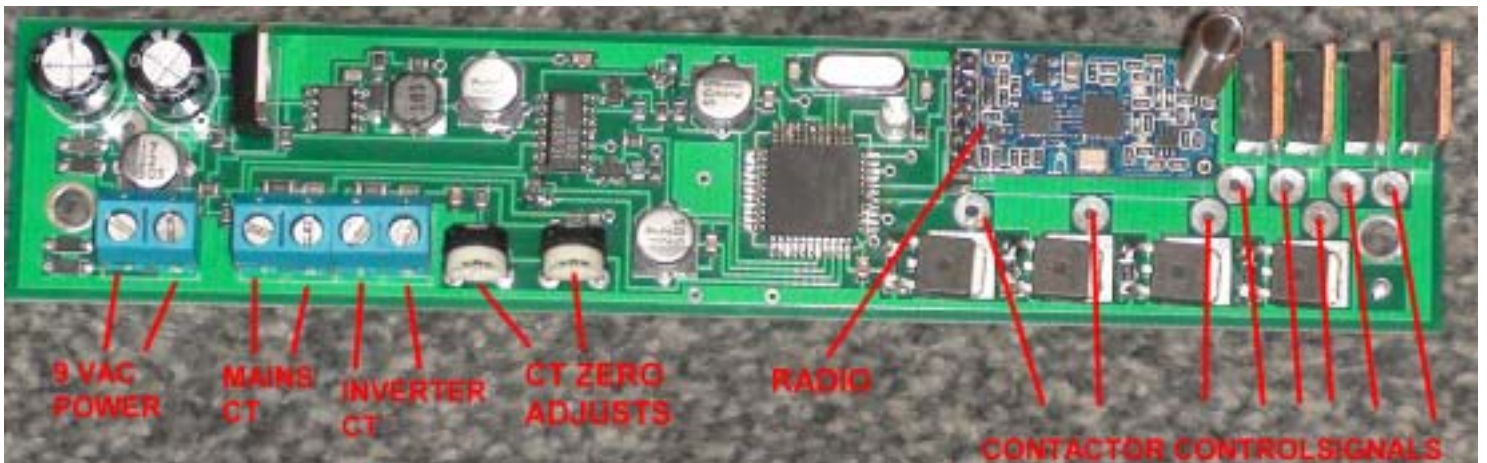
The Display Unit applies calibration values to the Mains Voltage, Mains Current and Inverter Current. The calibration values are stored in a non-volatile memory in the DU.

The Display Unit calculates and displays six values, MAINS VOLTAGE, LOAD POWER (the amount of total power that the house is using), EXPORT POWER (the amount of energy being drawn from the grid in RED or being exported to the grid in GREEN, SOLAR POWER (the amount of energy being created by the solar array), TODAY KWH (the amount of energy created since midnight) and TOTAL KWH (the total amount of energy that your array has created). In addition to the six values there are eight colored boxes numbered 1 to 8 that show what circuits are OFF in GREEN and ON in RED.

Display Unit

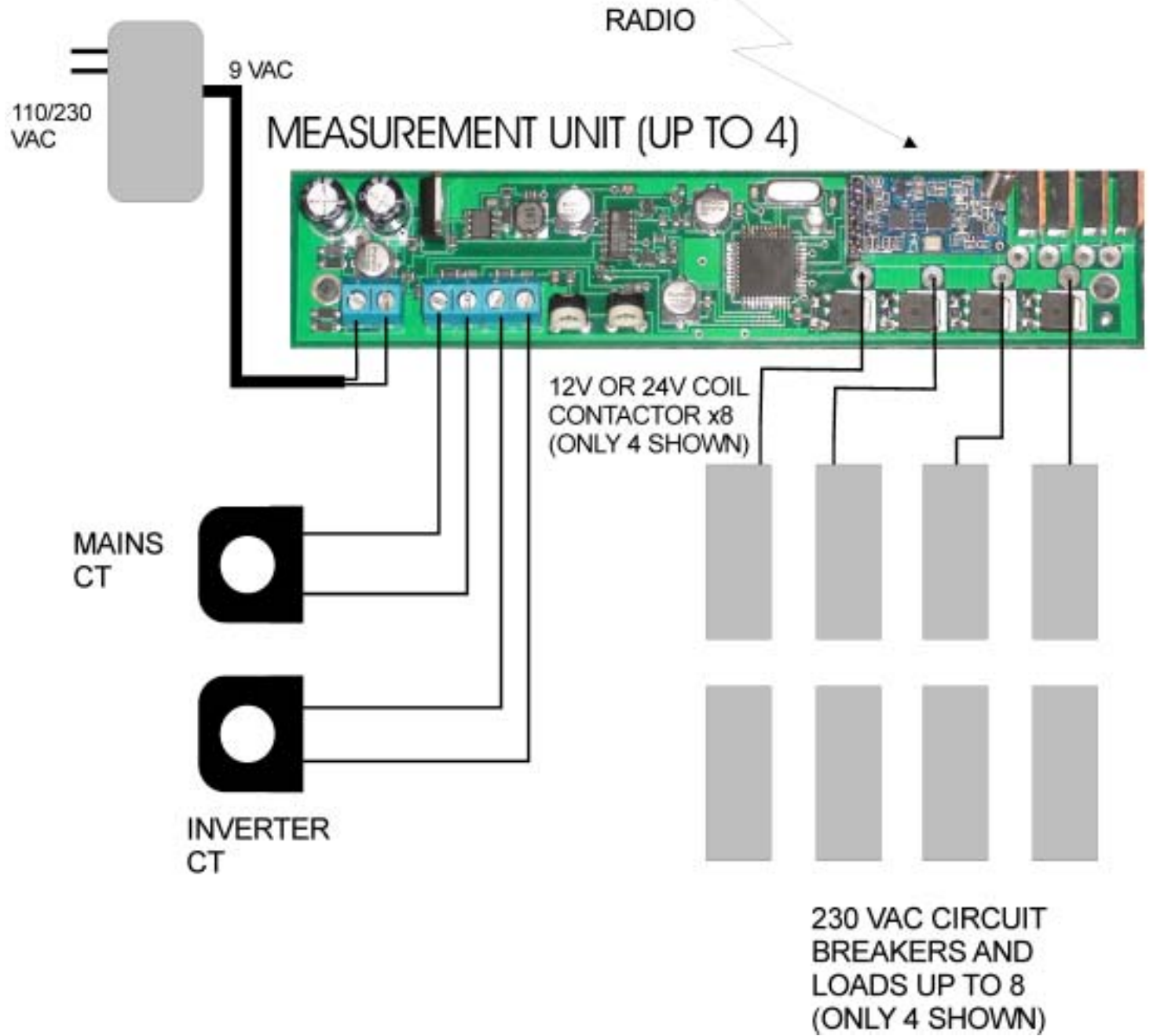


Measurement Unit



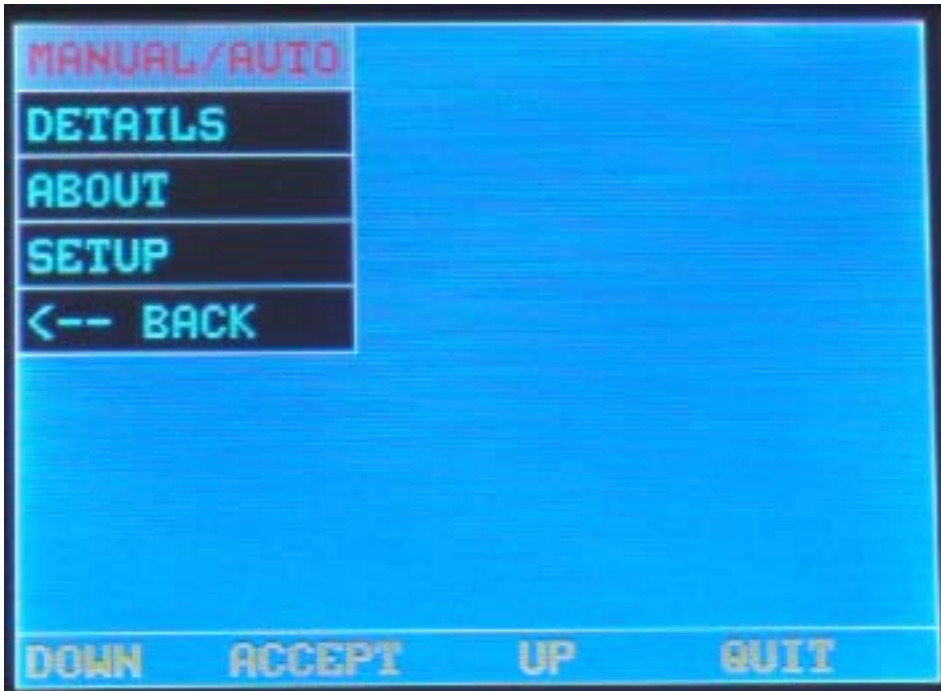
Wiring Diagram

DISPLAY UNIT

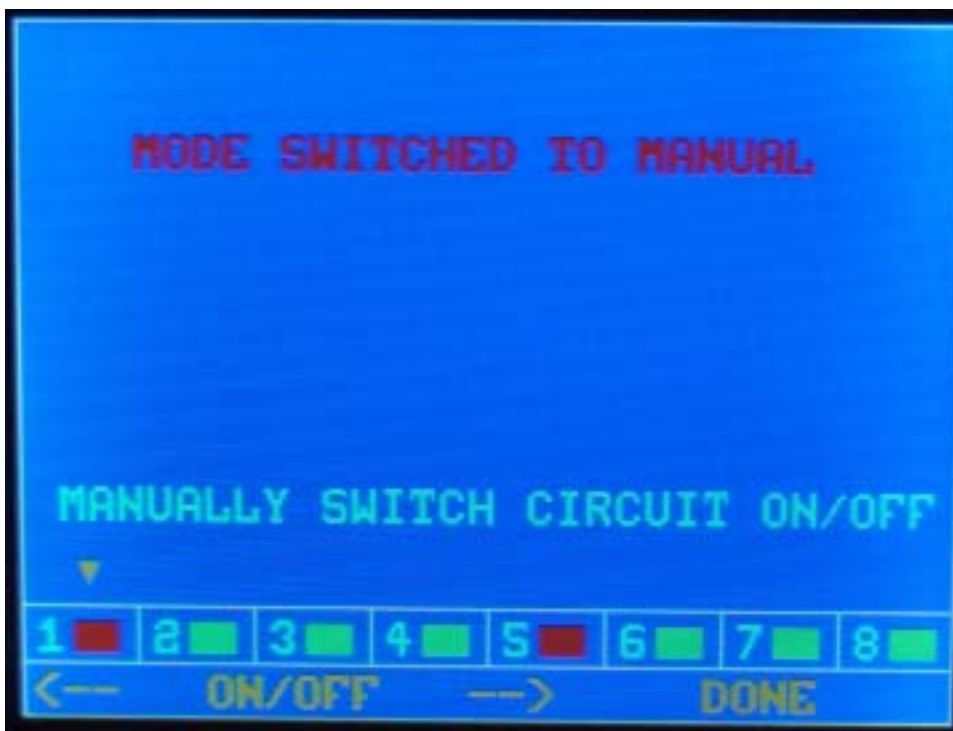


Menus

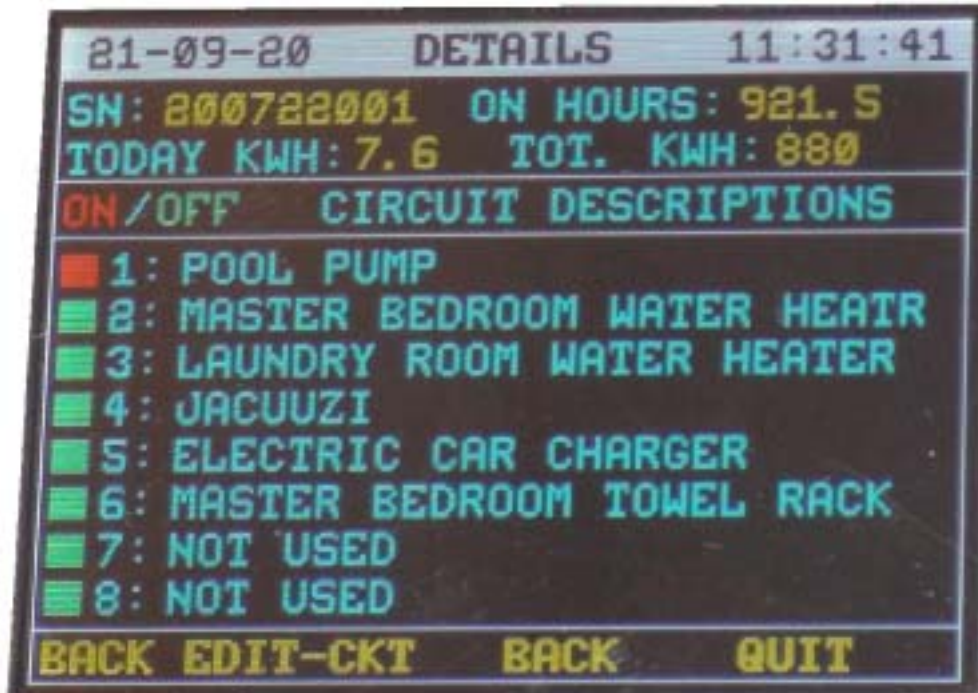
The Display Unit is menu driven using four buttons. Pressing the * key brings up the following Main Menu. Press the DOWN and UP keys to move between the menu items. Irregardless of what Menu is being displayed, the Display Unit will automatically revert back to the Main Menu if no key has been pressed for 60 seconds.



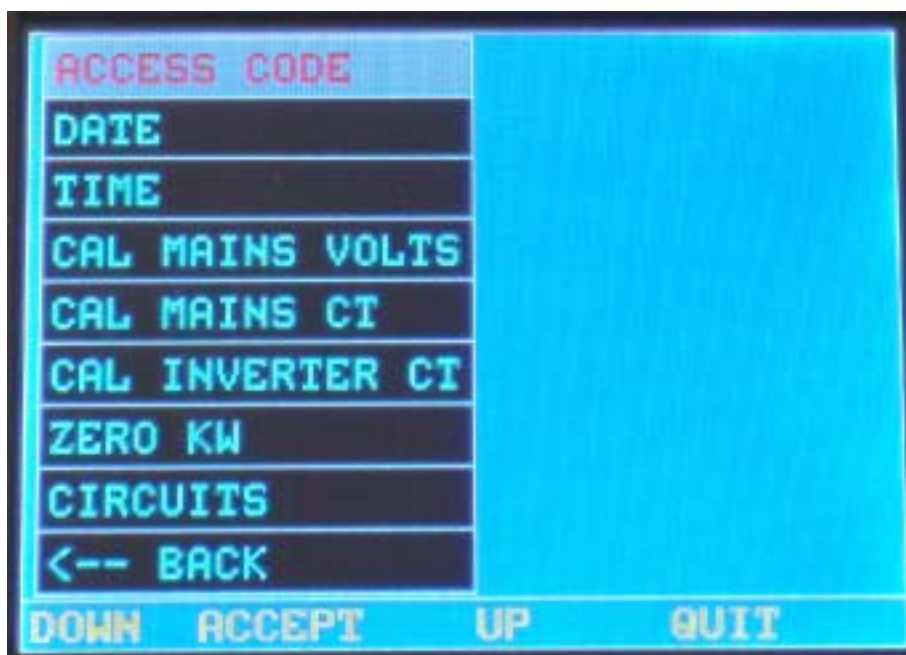
The MANUAL/AUTO menu enables switching between the MANUAL and AUTO modes. In MANUAL mode you can turn up to eight circuits ON and OFF with the press of a few buttons. In AUTO mode the controller automatically turns up to eight circuits ON and OFF according to rules that you specify.



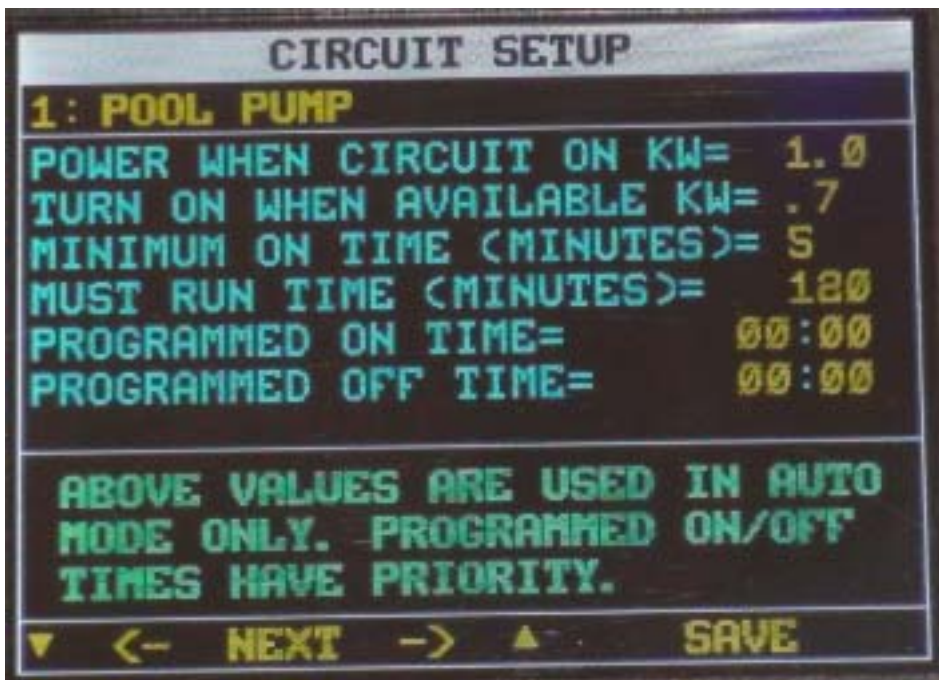
For ease of remembering the function of each circuit you can give names to each of the eight circuits as shown on the DETAILS page:



An access code is required to enter the SETUP page where you can change the access code, set the Date and Time, calibrate the mains voltage, mains current transformer and inverter current transformer. The factory default access code is 5001.



You can also zero Today Kw and go to the CIRCUITS page where you create/edit the rules that turn circuits ON or OFF based on available power or time of day:

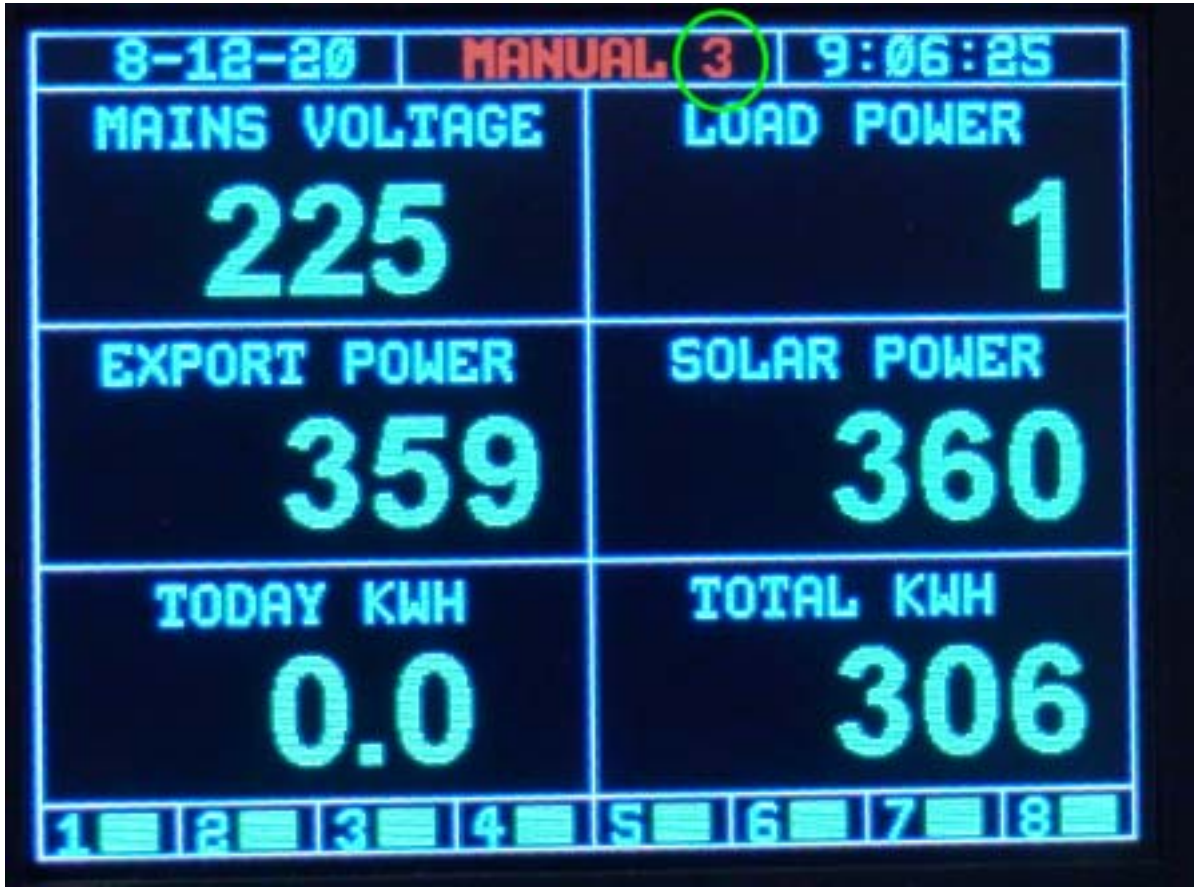


In addition to using the buttons to modify the circuit names, rules and programmed ON/OFF times a Bluetooth enabled smart phone or tablet can be used to monitor additional Solar Controller data. The Bluetooth pairing code for the SC-110 is '1358'.

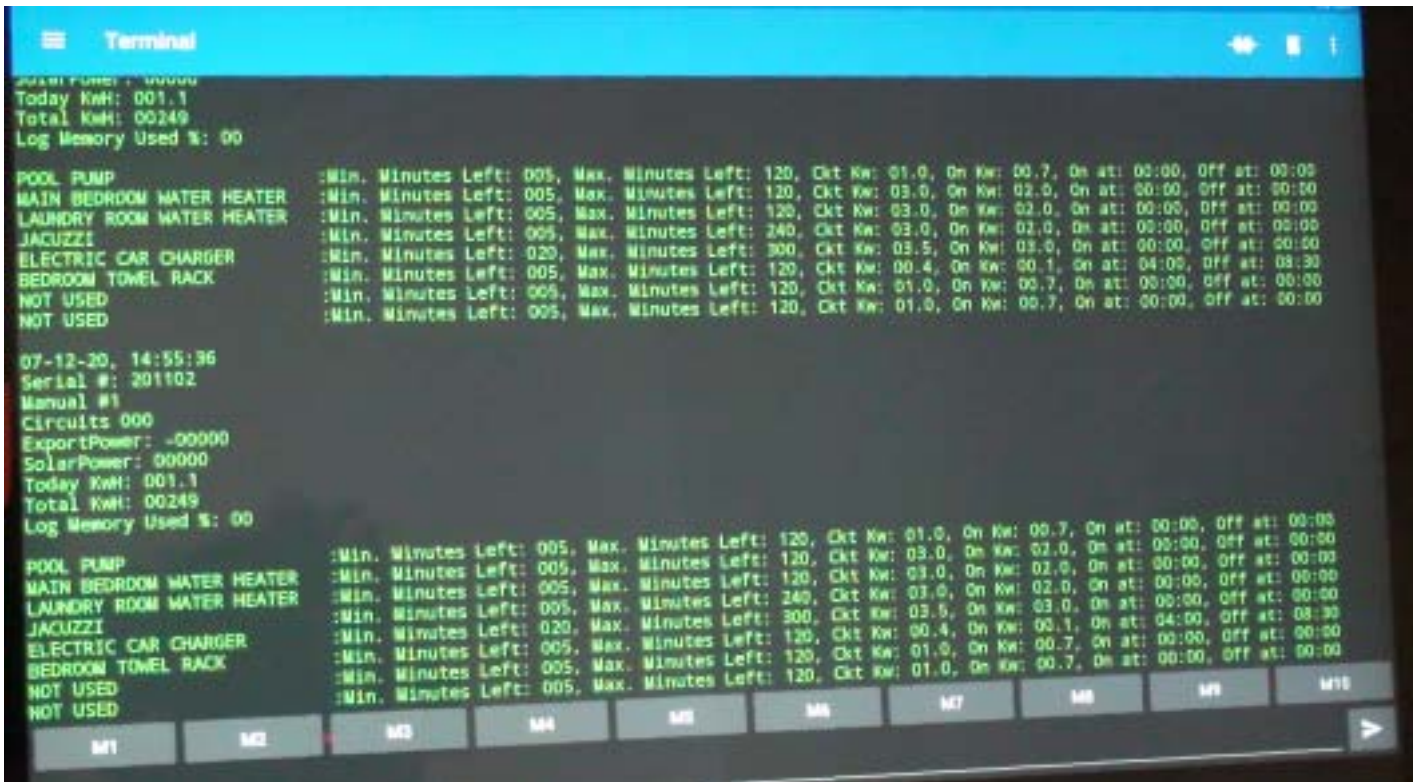
To enable bluetooth data output press and hold the '*' key for three seconds. The Main display will show a 'B' before the date to indicate that Bluetooth data output is active. Pressing the * key for three seconds again will turn off sending of Bluetooth data.



The Display Unit is able to communicate with up to four Measurement Units. Three Measurement Units would enable monitoring of three phase inverters/installations. TODAY KWH and TOTAL KWH will show the sum power delivered by all Measurement Units communicating with the Display Unit. If more than one Measurement Unit is being monitored then the power of each individual Measurement Unit is displayed sequentially with the Measurement Unit currently being displayed identified as shown here:



Data sent via Bluetooth can be displayed on your phone/tablet using a Serial Bluetooth Terminal program downloaded from PayStore. Data will look like this:

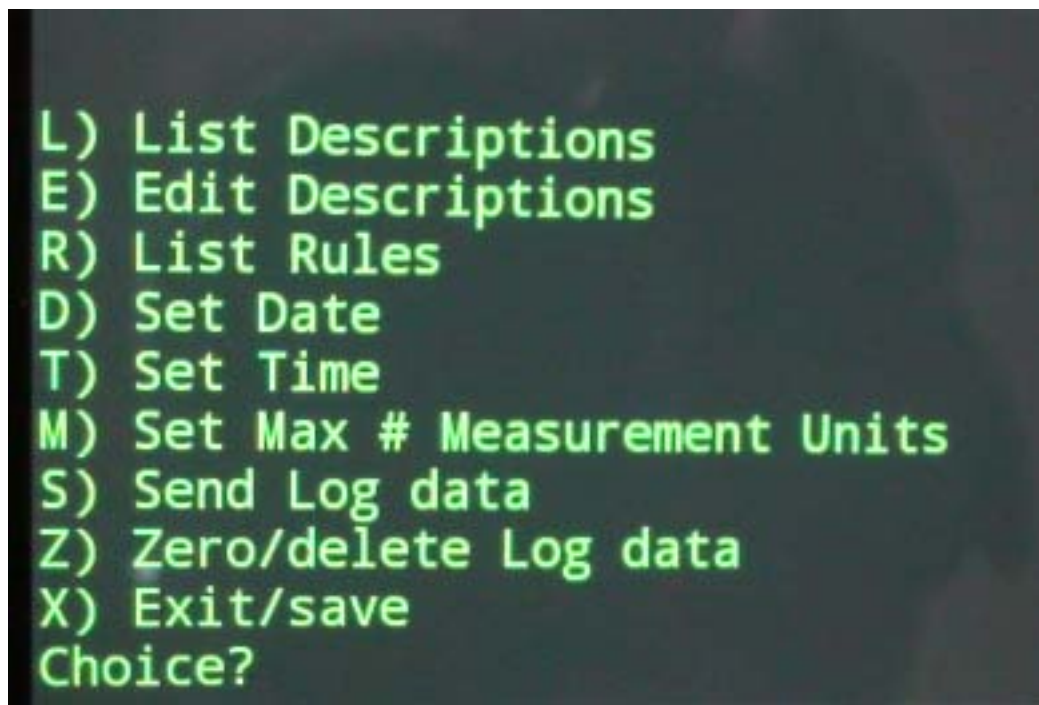


Bluetooth can also be used to communicate information to the Display Unit. The circuit names can be edited, the Date and Time can be set, the sending of serial log data via Bluetooth can be activated and the Log memory can be cleared/reset.

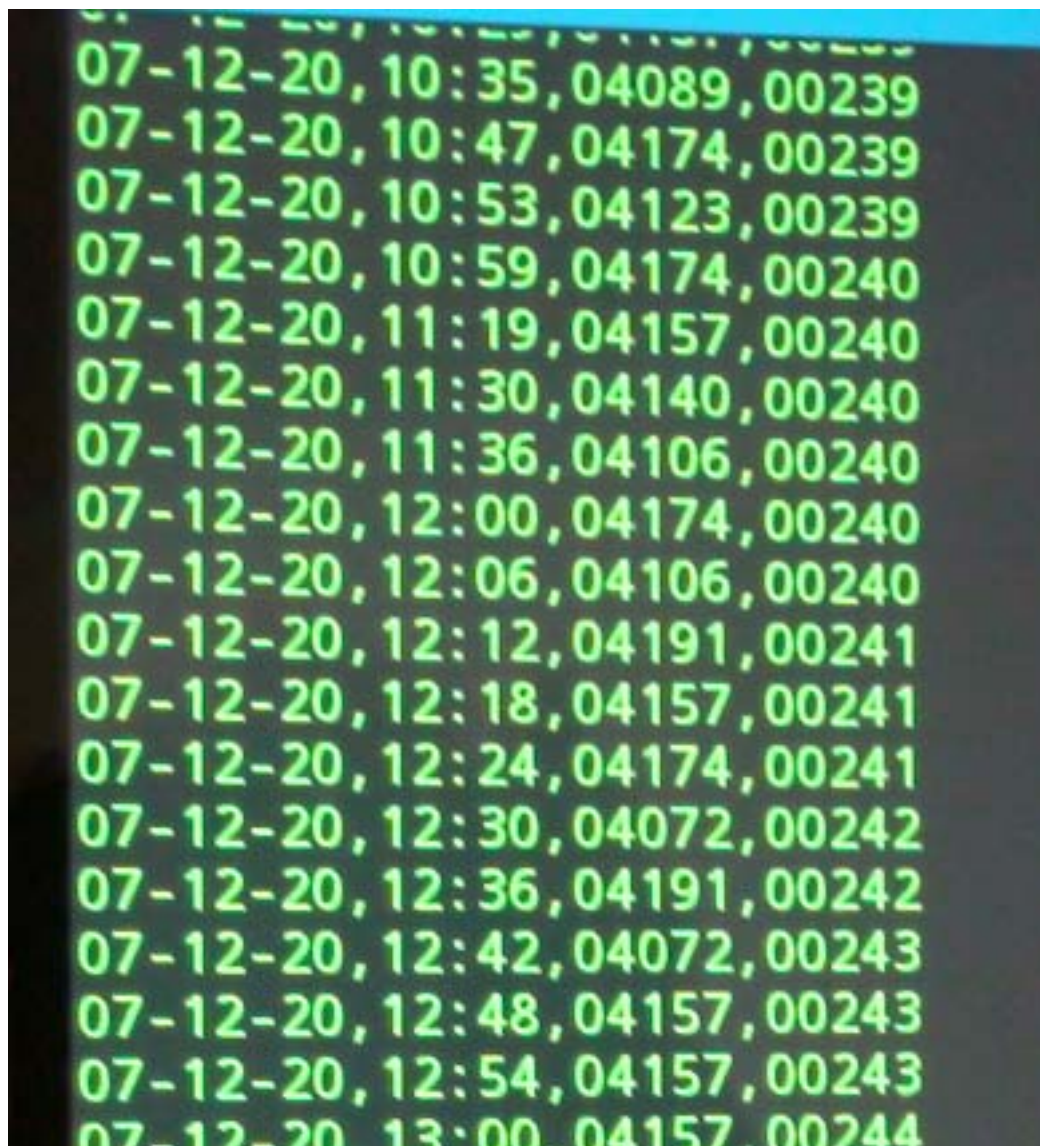
To activate two communications with the Display Unit via Bluetooth, press and hold the * key for ten seconds (until you hear a long beep). Two way communications is enabled when the Display Unit shows this screen:



Two way communications with the Display Unit is menu driven and the following menu will be shown on your device:



Select from the menu items above to make the desired changes. Either lower or upper case letters are accepted. Choosing 'S' caused all the log data to be sent out in Microsoft Excel compatible format like this:



When done, select 'X' to exit two way Bluetooth communications and save the results to the non-volatile memory in the Display Unit.

KEY FUNCTIONS

The four front panel keys are used to select Menus and different modes of operation. The Display Unit responds differently based on the length of time a key is pressed. Here is a list of the available key functions:

Keys	Time (Seconds)	Function
* Quick Press		Display the Main Menu.
+	1/2	Scroll through 4 backlight levels.
+	10	Send Log data to smartphone/tablet via Bluetooth.
* 3		Enable sending of Bluetooth data.
* 10		Enable two way communications between Display Unit and smartphone.
+ ▲	10	Save setup data to backup Favorites #1 memory location.
▼ +	10	Recall Favorites #1 setup data.
▲ *	10	Save setup data to backup Favorites #2 memory location.
▼ *	10	Recall Favorites #2 setup data.

The ten second presses are acknowledged by a long beep of the internal buzzer.