Power Master

Premium MPPT Series 50AMP~160AMP

Installation and Operation Manual

USER MANUAL

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Introduction

The Premium MPPT is essentially a smart DC to DC converter which has been optimized to harvest maximum energy from the PV array in battery based solar electric systems by using a variety of maximum power point tracking (MPPT) strategies. It is designed to charge lead acid batteries of flooded, GEL and AGM chemistries from 12 to 48 Vdc nominal. The controller's secondary objective is to ensure that the batteries receive a full charge without becoming overcharged. This is accomplished through a four stage charging process. Built into the Premium MPPT is a comprehensive data logging system which tracks battery state of charge (SOC) and power produced by the PV array.

The DC to DC converter feature of the Premium MPPT allows for a wide variety of input and battery voltage configurations. Batteries may be configured from 12 to 48 Vdc nominal (12, 24, 36, and 48 are the factory default settings). PV arrays of PM-SCC-50AM and PM-SCC-80AM may be wired in up to 112Vdc nominal and it automatically shuts down above 140 Voc. PV arrays of PM-SCC-80AMW and PM-SCC-160AMW may be wired in up to 192 Vdc nominal and it automatically shuts down above 240 Voc. This feature allows system designers considerable flexibility with respect to wire sizing and module location.

This controller may be used in hybrid systems which have PV and wind or micro hydro generators. In these systems the auxiliary relays are utilized to control dump loads. These relays have a host of other control uses and functions and can be custom programmed to suit the system operator's needs.

Please carefully read the Chapter 1 *"Planning Your System"* section of this manual and all warnings before beginning installation of your Premium MPPT . To ensure best performance of the Premium MPPT follow all installation instructions and wiring guidelines. Always install equipment in accordance to local codes and bylaws. We recommend that external lightning protection be installed along with the Premium MPPT .

Features

- Integrates Maximum Power Point Tracking (MPPT), battery charge management, state of charge information.
- Continuous output Power Rating without de-rating at up to 50℃ ambient temperature.
- Built-in Battery Energy Monitor tracks power production and consumption to calculate the energy remaining in battery state of charge (SOC) is displayed in percent full, Amp-hours, Watt-hours, and 90 days of energy-harvest history is stored in the solar charger.
- Supports Flooded Lead Acid (FLA), GEL, and Absorbed Glass Mat (AGM) batteries,

Four-stage charging with adjustable set points for all parameters.

- Wire the PV modules in series up to 112VDC normal (140VDC Max) (PM-SCC-50AM and PM-SCC-80AM) and 192VDC normal (240VDC Max) (PM-SCC-80AMW and PM-SCC-160AMW).
- Easy stacking of up to 16 units of PM-SCC-50AM / PM-SCC-80AM / PM-SCC-80AMW / PM-SCC-160AMW in parallel for high currents.
- Precision charging of 12V/ 24V/36V/48V batteries with easy set-up and using battery voltage sense (BVS) wires.
- Built-in temperature compensation function for safe and complete charging.

Specification

Model No.	PM-SCC-50AM	PM-SCC-80AM	PM-SCC-80AMW	PM-SCC-160AMW
Maximum output current (Continuous at up 50℃ ambient temperature)	50Amps	80 Amps	80Amps	160 Amps
Battery Voltages	12,24,36,48 VDC Normal			
Max PV Input Current	40Amps	70 Amps	70 Amps	140 Amps
Input Voltage Range	16~112VDC Operating		16~192VDC Operating	
	140VDC Maximum Open Circuit Voltage		240VDC Maximum Open Circuit Voltage	
Max PV Array Power	3250 Watts (Maximum when equalizing a 48V battery to 64V at 50 Amps)	5200 Watts (Maximum when equalizing a 48V battery to 64V at 80 Amps)	5200 Watts (Maximum when equalizing a 48V battery to 64V at 80 Amps)	10400 Watts (Maximum when equalizing a 48V battery to 64V at 160 Amps)
Charge Regulation Modes	Bulk, Absorption, Float, Auto/ Manual Equalization			
Battery Temperature Compensation	5.0 mV per℃, per 2 volt cell			
DC to DC Conversion Capability	12V Battery: 16~112VDC		12V Battery: 16~192VDC	
	24V Battery: 32~112VDC		24V Battery: 32~192VDC	
	36V Battery: 48~112VDC		36V Battery: 48~192VDC	
	48V Battery: 64~112VDC		48V Battery: 64~192VDC	
Display Status	Built-in 2-line, 20-character LCD with backlight, LCD status screen displays input voltage and current, output voltage and current, charge-mode, Battery SOC			
Data Logging	Logs energy harvested for 90 days, LCD displays WH, KWH, AH			
Energy Monitor	LCD shows SOC, AH, WH, and present charge or discharge current. A 50mV/ 500Amp shunt is required to use			
Auxiliary Relays	Two independent relays with from A (SPST) contacts for control of external devices. Contact rating is 3 Amps, 50VDC			

Operation Temperature	Full Power Output to +50℃ ambient			
Standby Power	< 2Watts			
Dimension	267.6 x 196 x 147 mm	414.8 x 225 x 147 mm	414.8 x 225 x 147 mm	498 x 392.6 x 147 mm
Weight	4.3 Kgs	7.1 Kgs	7.1 Kgs	17 Kgs

Dimension for PM-SCC-50AM

Unit: mm

Dimension for PM-SCC-80AM / PM-SCC-80AMW

Unit: mm

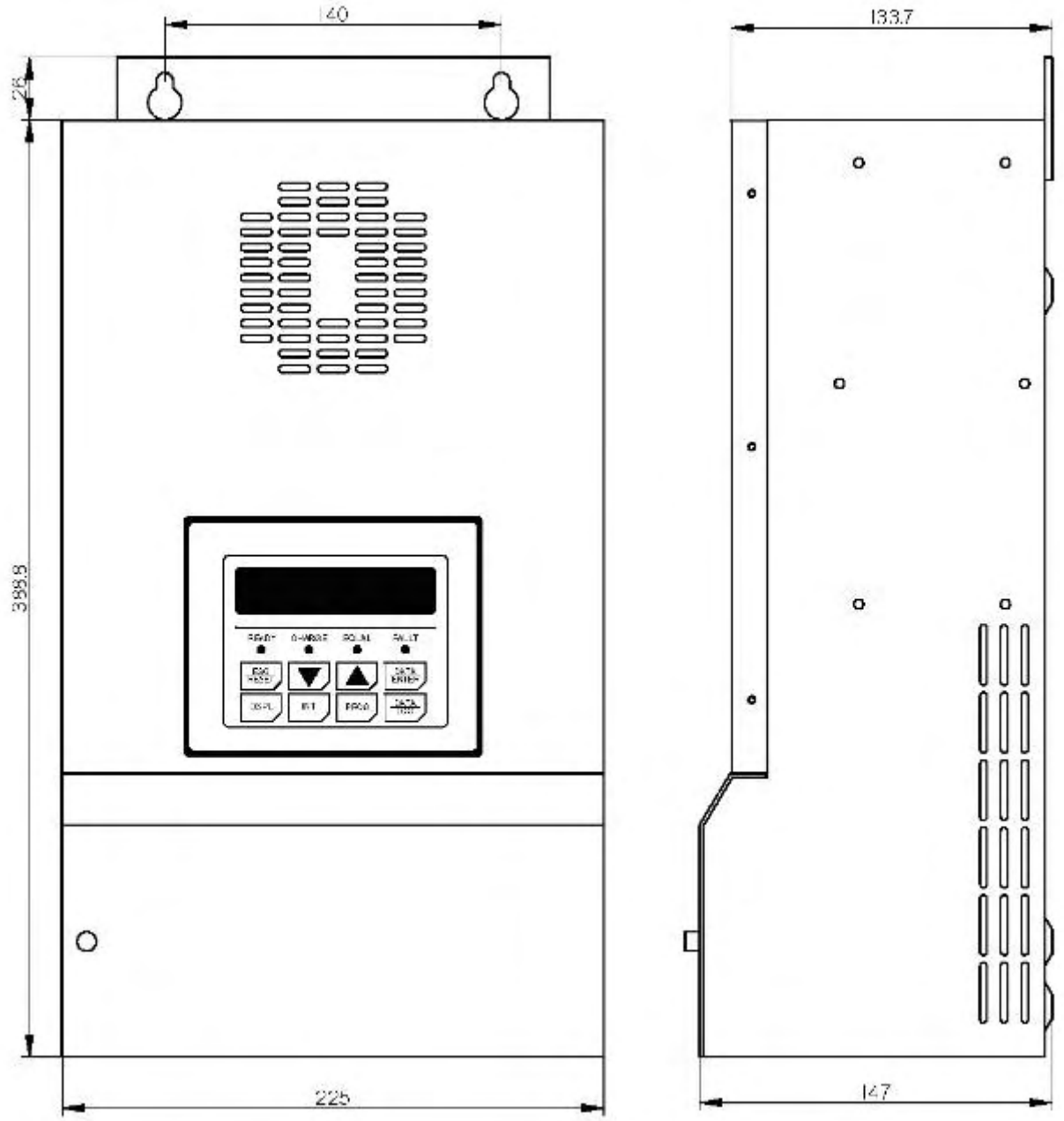


Fig-1

Dimension for PM-SCC-160AMW

Unit: mm

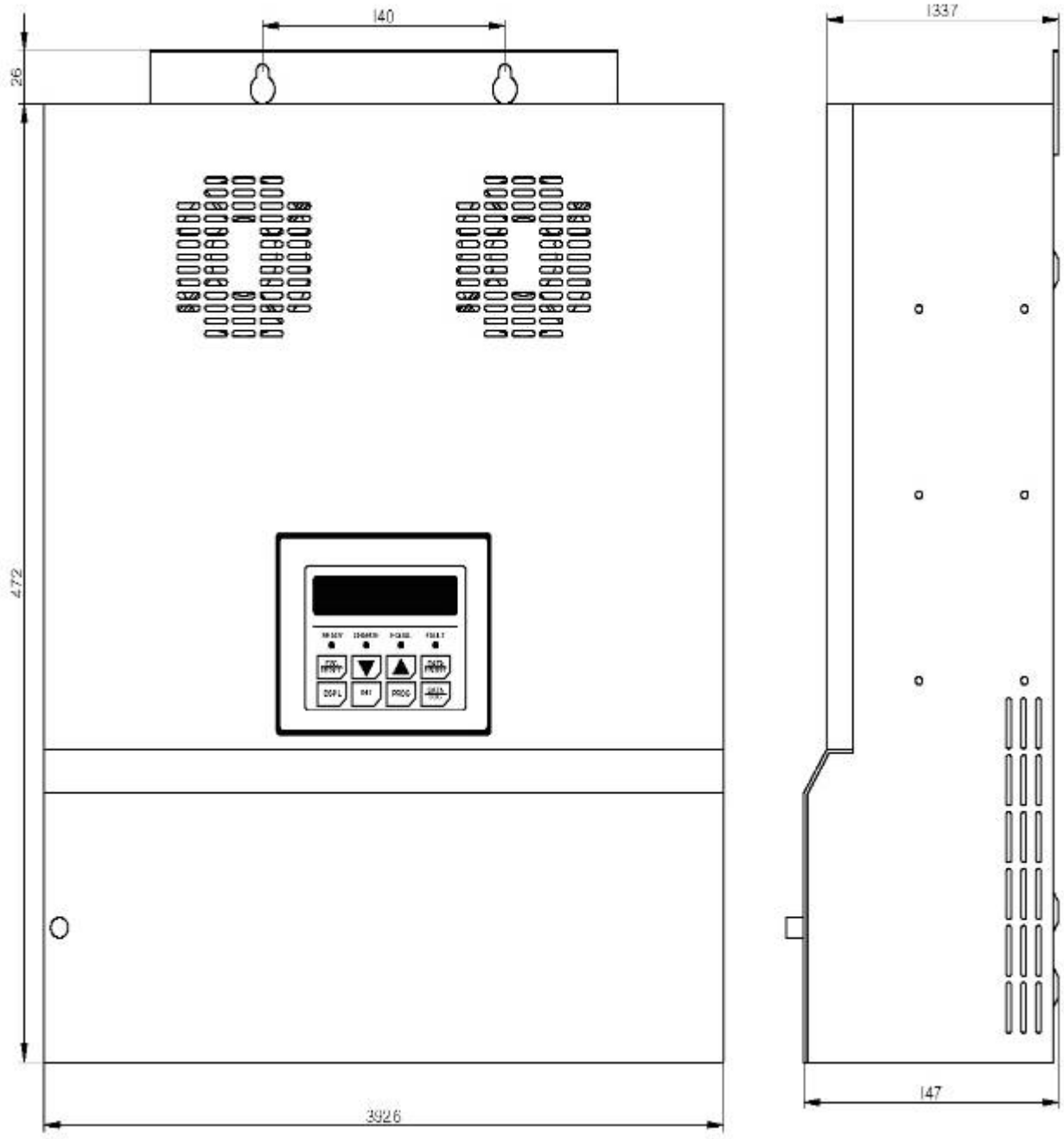


Fig-2

Chapter 1 Installation

1.1 Planning Your System

Loads

The Premium MPPT is a key component in your PV system. From a system planners perspective the Premium MPPT is very flexible with its ability to accept a wide range of input voltages and produce a similarly wide range of output voltages. Never the less some planning and choice is required when deciding on the components and configuration of your PV system.

The first step in planning a PV system is to know something about the load. There are many resources available in print and on-line to help determine average and peak load requirements we recommend using these resources to calculate anticipated load requirements. We also recommend that planners design for load growth. Experience has shown that loads rarely remain static and are reduced even less frequently. Once the load characteristics are determined the system planner may move to make decisions about the appropriate battery voltage.

Determining Battery Voltage

A major factor in making this decision is how much power will be required from the batteries. As power demands increase it is advisable to raise the battery voltage. A limiting factor in system design is current – it is expensive to move and provide circuit protection for large amounts of current (amps). A basic rule of electricity states "current = power/voltage". This means that the higher the battery voltage the lower the current will be for any given load. For example a 96 watt load at 12 Volts draws 8 amps the same load at 48 Volts draws only 2 amps of current.

The table below shows rule-of-thumb recommendations for battery system voltage choices and maximum inverter sizes.

Load in kWh per day	**Battery Voltage**	**Suggested Inverter Size**
Under 2 kWh per day	12 Vdc	Up to 2.5 kW

2 to 6 kWh per day	24 Vdc	2-4 kW
Over 6 kWh per day	48 Vdc	3 kW and larger

Other factors in making this decision will include the size of the inverter.

The above is the example of PM-SCC-80AM. A final factor in this decision is how much power will be required from the PV array. The PM-SCC-80AM is designed to produce 80 amps of output current. The amount of power will be dependent on the output voltage (battery bank voltage). At 12 Vdc output 80 amps is 1600 watts of power, at 48 Vdc output 80 amps is 4800 watts of power. The example above demonstrates that the amount of current or input power the Premium MPPT will accept is limited by the system battery voltage.

Determining PV Array Voltage

One of the great advantages of the DC to DC converter design of the Premium MPPT is that PV array voltages are no longer dictated by the battery voltage. Sizing a PV array for the Premium MPPT is much like sizing a grid tie inverter, the same questions apply: What is the max. and min. Vmp and Voc of each string, how many strings will I need.

Maximum Voc

The maximum operating voltage of the PM-SCC-80AM is 140 Vdc and of the PM-SCC-160AMW is 240Vdc. Above this, the unit will shut down to avoid damage. Each PV module has specific ratings for voltage and current at standard test conditions and temperatures, the manufacturers also publish current and temperature coefficients. The Voc for any PV module increases in cold temperatures. Modules are rated with an assumed cell temperature of 25℃, when calculated at 0℃ there may be as much as a 25% increase in the rated Voc. The Voc voltage temperature coefficient for the specific location of the installation must be calculated from known weather data. Once the maximum Voc of the module is found a series string voltage may be determined.

WARNING

The Voc maximum on the coldest brightest day of the year must not exceed 150 Vdc

for PM-SCC-80AM and must not excced 250Vdc for PM-SCC-160AMW. Input voltage in excess of 150 Vdc /250 Vdc will result in internal damage which is NOT covered by warranty. We recommend a maximum design Voc of 140 Vdc for PM-SCC-80AM and of 240Vdc for PM-SCC-160AMW. This will result in the most effective energy harvest.

Determining Maximum Current

The PM-SCC-80AM is designed to handle a maximum input current of 70 amps and a maximum output current of 80 amps – both of these ratings are continuous at 50℃. The PM-SCC-160AMW is designed to handle a maximum input current of 140 amps and a maximum output current of 160 amps – both of these ratings are continuous at 50℃. The Premium MPPT input voltage will be higher than output voltage hence input current (amps) will be lower than output current. For example twelve 6.5 amp 12 Vdc nominal PV modules wired in series and parallel to produce 36 Vdc would equate to an input current of 26 amps – the rated current of each string times 4. (In series wiring the voltage increases and the current remains constant.) The output current of the controller will be dependent on the voltage of the battery bank. If the array in this example was connected to a 12 Vdc battery system the output current would be 78 amps. (Current in x V nom / V Bat = Current out).

When calculating the maximum input or output current, remember to add 25% to the rated current of the PV array, this is the NEC required “headroom” to account for the PV’s ability to produce more than the rated output under some conditions.

Circuit Protection

All electrical circuits require protection from over current and shorts and the Premium MPPT is no exception. The Premium MPPT should be installed with a circuit breaker or a fused disconnect on the input and output. The Premium MPPT has a maximum current limit of 80 amps for PM-SCC-80AM and current limit of 160 amps for PM-SCC-160AMW on the output. It is designed and listed to run at its maximum rating continuously. The continuous rating of the Premium MPPT does not reflect the 80% derating required by the NEC for conductors, fuses, and many circuit breakers.

The NEC requires that the output conductors have an amperage capacity of 1.25 x the rated current after all temperature and fill corrections are calculated. The minimum cable necessary to carry the full rated output of the PM-SCC-80AM MPPT is #3AWG, and PM-SCC-160AMW is #1AWG, corrections for conduit fill and temperature could result in a large wire size being necessary.

PV input circuits require a double correction factor for over current so PV Isc (short circuit current) must be multiplied by 1.56. All PV input wires must be sized accordingly. This apparent over sizing is done to reflect the fact that solar modules can, and often do, produce more than their rated power in conditions of heightened insolation and cold temperatures. Any PV input disconnect or circuit breaker must also be rated at 1.56 of array Isc. For the PM-SCC-80AM, the maximum allowable PV array according to the NEC would have an Isc of 56 amps. The circuit would require a 90 amp input breaker. For the PM-SCC-160AMW, the maximum allowable PV array according to the NEC would have an Isc of 112 amps. The circuit would require a 180 amp input circuit breaker.

1.2 Shunt (BCS)

The Shunt is essential for the Premium MPPT to operate at optimal levels and it serves as a hub for connecting critical measurement sensors. The main purpose of the shunt is to allow the Premium MPPT to measure current flowing into and out of the battery.

Locating the Shunt is important for safety and practicality the DC load center is the recommended location for the Premium MPPT Shunt. Most popularly available DC load centers have provisions to accept the shunt. If no load center is available or there is no room in the load center, install the shunt in a code compliant electrical enclosure. The capacity of the Shunt is 50mV, 500Amp. See page 2-3 for wiring connection terminal.

1.3 Battery Temperature Sensor (BTS-3)

The battery temperature sensor is used for temperature compensate charging by adjusting charging voltage up or down according to the temperature read by the sensor, see page 2-3 for wiring connection terminal.

The Premium MPPT requires that the BTS-3 to be connected for all charging features to be available. The controller will operate without the sensor but Absorption Trigger set points will be lower and equalization stage will be disabled. The sensor is designed to be mounted on batteries one of two ways, onto a battery terminal or onto the side of a battery case.

1.4 Battery Voltage Sensing (BVS)

Connecting the red wire to a battery positive bus and the black wire to a battery negative bus within the DC load center, see page 2-3 for wiring connection terminal. Be sure to observe correct polarity when installing voltage sense wires or damage will result.

1.5 Installation Wiring Diagram

Keep all breakers in the OFF position until ready to initiate the Premium MPPT. When you are ready to start the Premium MPPT, turn on ONLY the Battery breaker. Do NOT turn on the PV breaker until instructed during Premium MPPT initialization. Premium MPPT will not be damaged if the PV breaker is turned on first, but it will not operate. The internal power supply of the Premium MPPT can only be powered by the batteries.

Batteries give off explosive gasses during charging. All battery enclosures should be vented to the outside. Never locate the Premium MPPT in a poorly ventilated battery area. Do not locate the Premium MPPT within 1.2 meters of the batteries.
See next page for the wiring diagram of PM-SCC-80AM as an example.

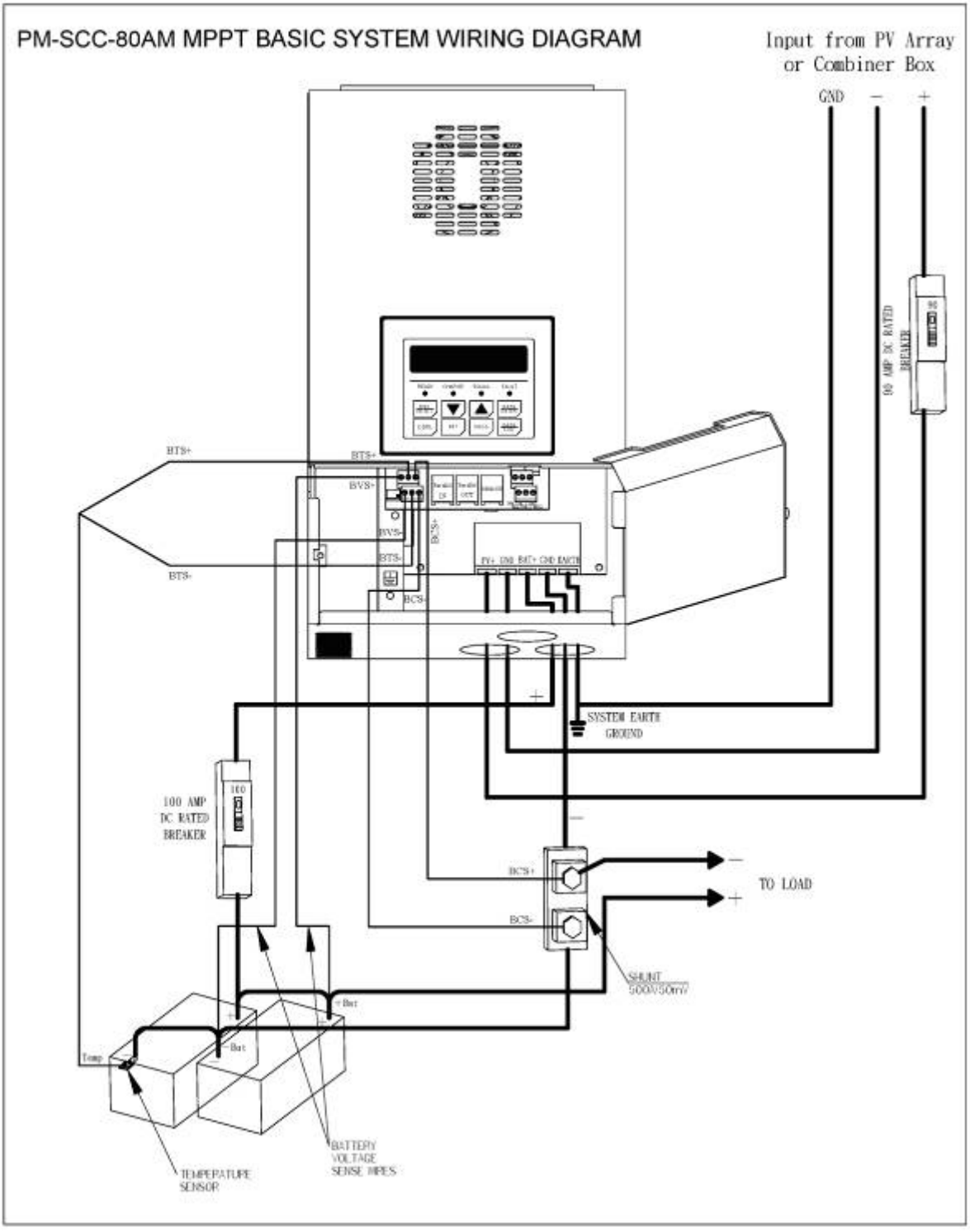
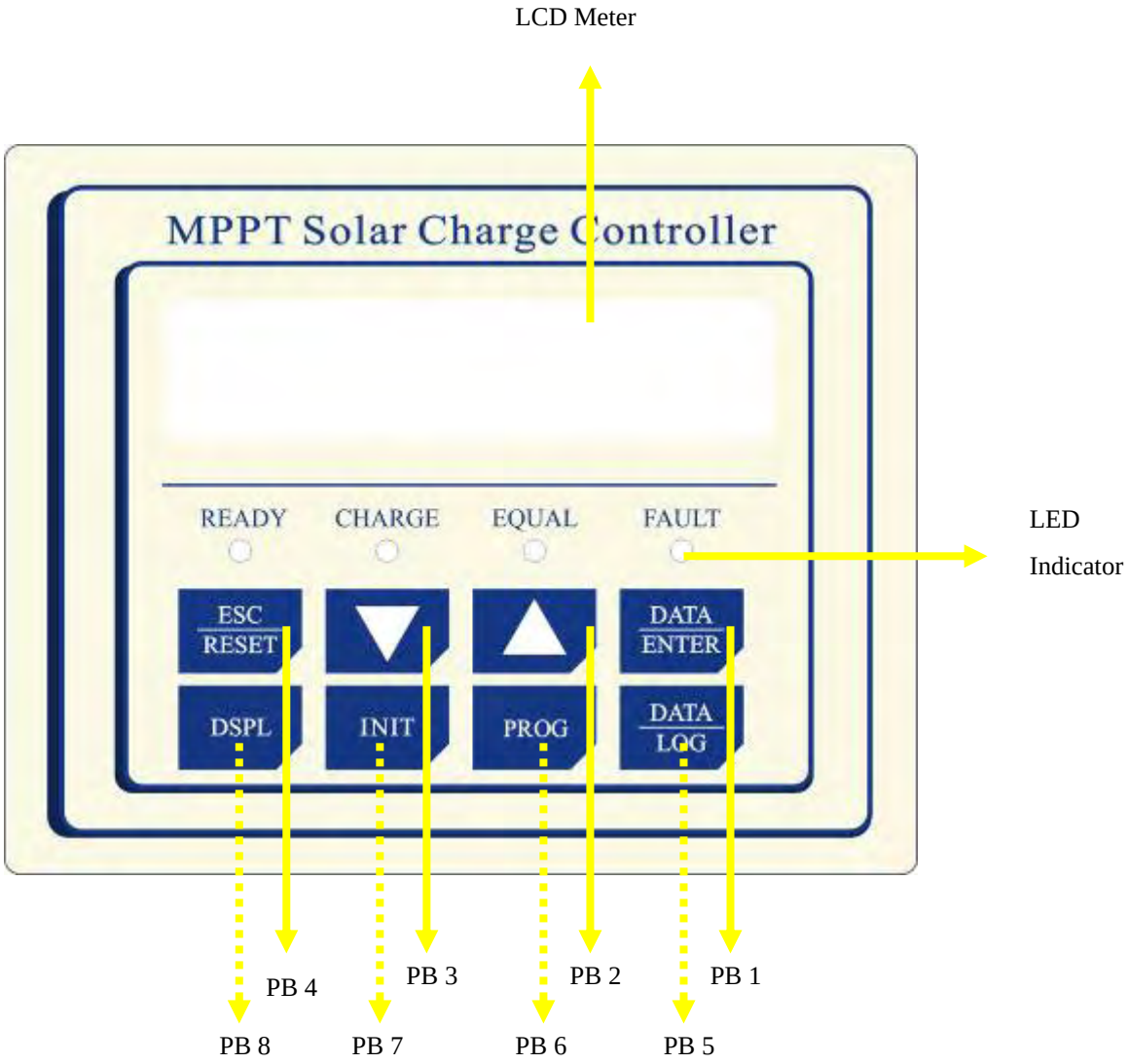

PM-SCC-80AM MPPT BASIC SYSTEM WIRING DIAGRAM
Input from PV Array
or Combiner Box
GND
−
+
60 AMP DC RATED
BREAKER
BTS+
BTS+
BVS+
BVS-
BCS+
BTS-
BTS-
BCS-
PV+ GND BAT+ GND EARTH
SYSTEM EARTH
GROUND
100 AMP
DC RATED
BREAKER
100
BCS+
BCS-
TO LOAD
SHUNT
500A/50mV
+ Bat
- Bat
Temp
TEMPERATURE
SENSOR
BATTERY
VOLTAGE
SENSE WIRES

Fig-3

Chapter 2 Wiring

2.1 Front Panel Display



8 Push Buttons

Push buttons	Name	Description
PB1	DATA ENTER	Data write-in key
PB2	▲	UP key to increment setting values. UP key to go to the next selection or constant.
PB3	▼	DOWN key to decrement setting values. DOWN key to go to the last selection or constant.

PB4		Reset key to reset the fault. ESC key to return to the last selection level.
PB5		Quick function key to the Main Menu: Data Log
PB6		Quick function key to the Main Menu: Programming
PB7		Quick function key to the Main Menu: Initialize
PB8		Quick function key to the Main Menu: Operation

4 LED Indicators

LEDs	Flashing/ Solid	Description
FAULT	Solid Red	Read the LCD meter for fault condition displayed. 4 fault conditions could be displayed as follows: ERROR!!! High Input Voltage ERROR!!! Premium MPPT ERROR!!! Parallel COM Failed ERROR!!! Battery Over-Temp.
EQUAL	Flashing Orange	Premium MPPT Series unit is in equalization mode. Refer to constant B-09~B-12 for the setting details.
CHARGE	Flashing Green	Premium MPPT unit is in charge mode. This indicates that it is functioning properly.
READY	Solid Green	When the voltage from the PV array is first received, the Premium MPPT is in standby mode to charge.

LCD Meter

1 LCD Meter of 20 x 2 characters is built in each Premium MPPT unit.

2.2 Control Terminal Connection

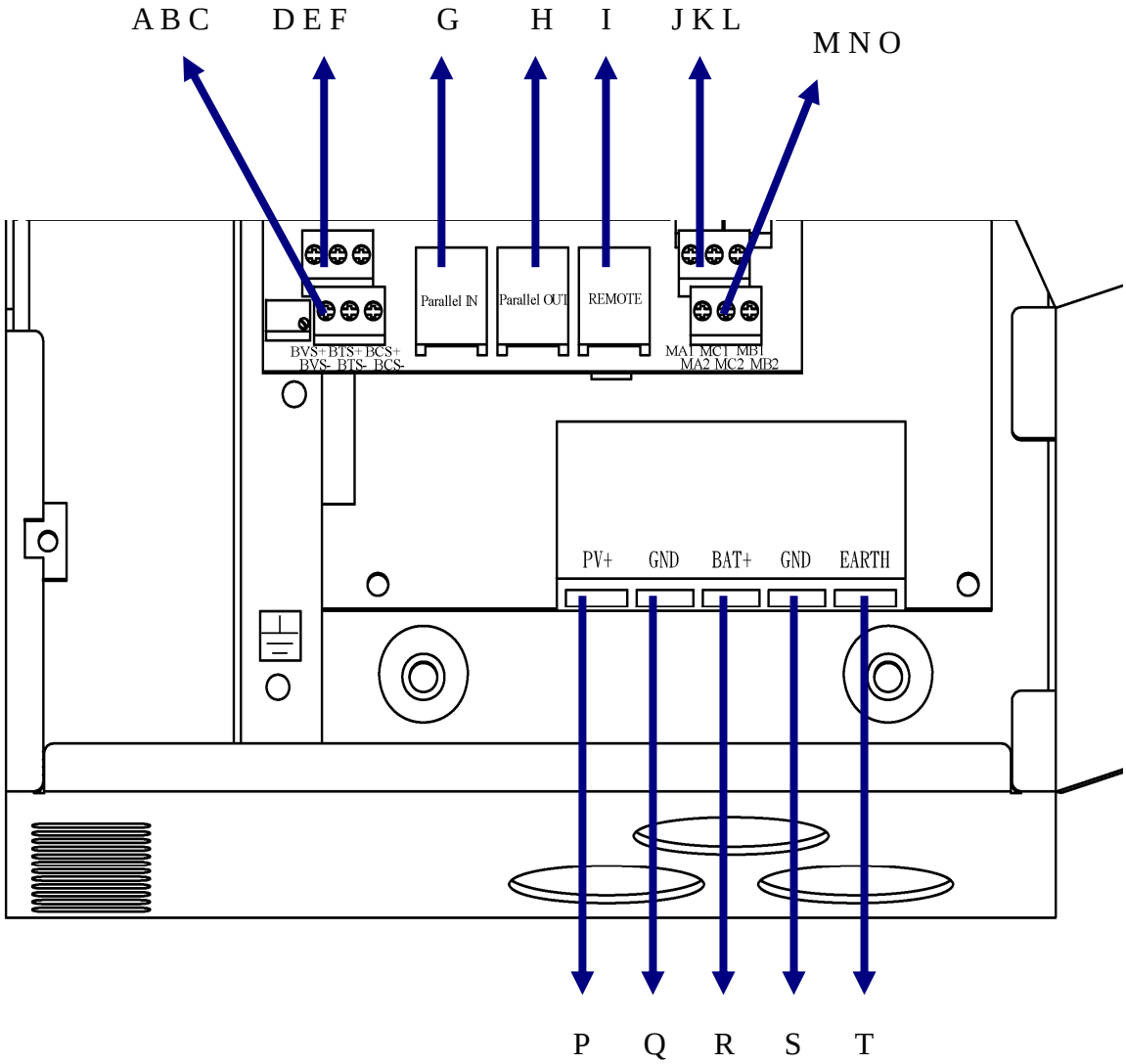


Fig-4

Connections		Details
A	BVS-	Connecting terminal to Battery Voltage feedback Negative
B	BTS-	Connecting terminal for Battery Temperature Sensor Negative
C	BVS-	Connecting terminal for optional Shunt Negative
D	BVS+	Connecting terminal to Battery Voltage feedback Positive
E	BTS+	Connecting terminal for Battery Temperature Sensor Positive
F	BCS+	Connecting terminal for optional Shunt Positive
G	Parallel IN	Connections for parallel input from last Premium MPPT
H	Parallel OUT	Connections for parallel output
I	Remote	Connecting terminal to Remote Panel Display

J	MA1	Connecting terminal for the contact A of auxiliary 1
K	MC1	Connecting terminal for the common contact of auxiliary 1
L	MB1	Connecting terminal for the contact B of auxiliary 1
M	MA2	Connecting terminal for the contact A of auxiliary 2
N	MC2	Connecting terminal for the common contact of auxiliary 2
O	MB2	Connecting terminal for the contact B of auxiliary 2
P	PV+	Connecting terminal for Solar Array Positive
Q	GND	Connecting terminal for Solar Array Negative
R	BAT+	Connecting terminal for battery cable Positive
S	GND	Connecting terminal for battery cable Negative
T	EARTH	Connecting for ground

2.3 Parallel Connection

The parallel connection of Premium MPPT series can be up to 16 units (1 Master and 15 Slaves) and in the parallel system, there is only one Shunt which needs to be connected to the Master unit to measure the total accumulated current.

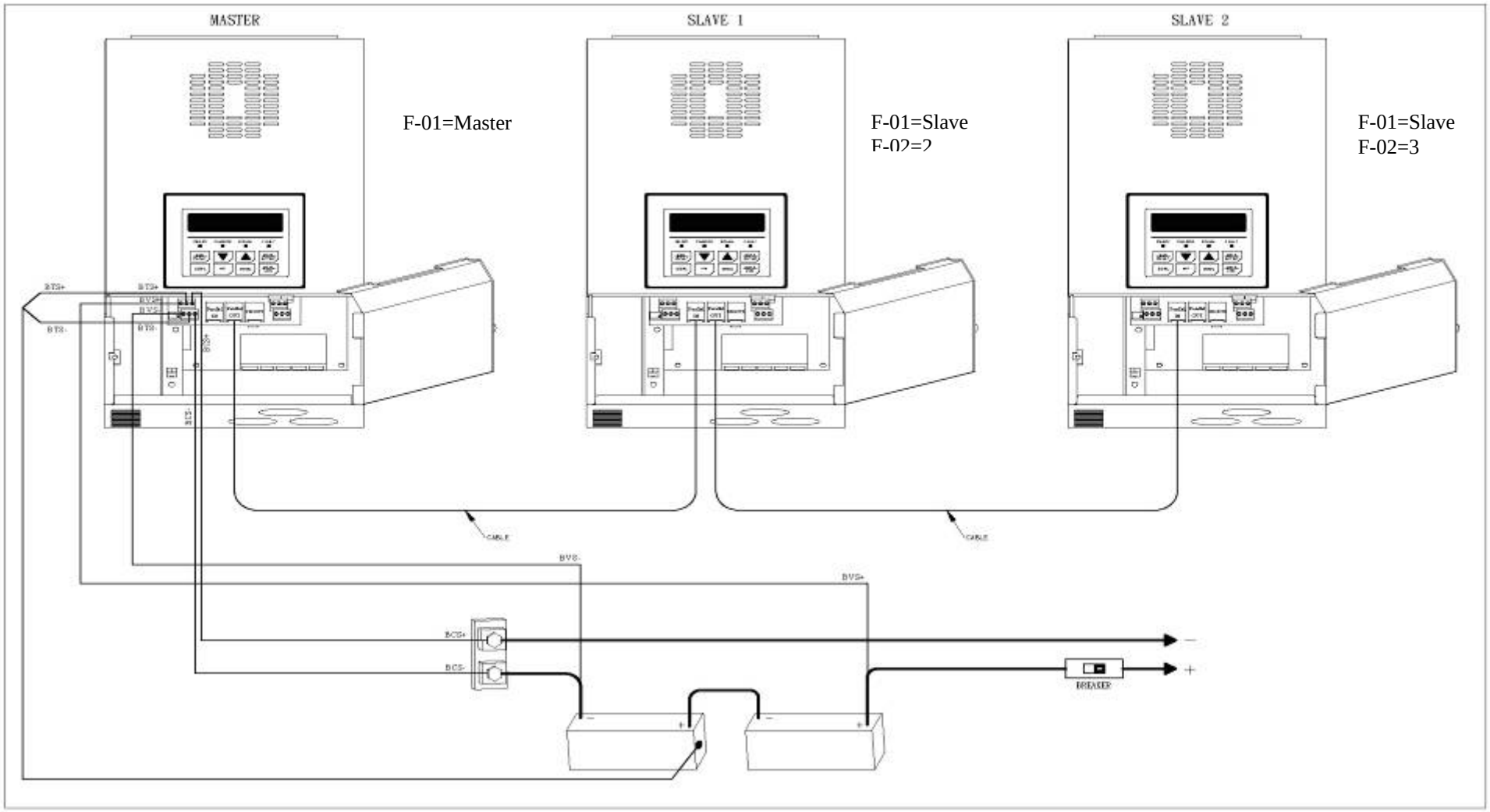
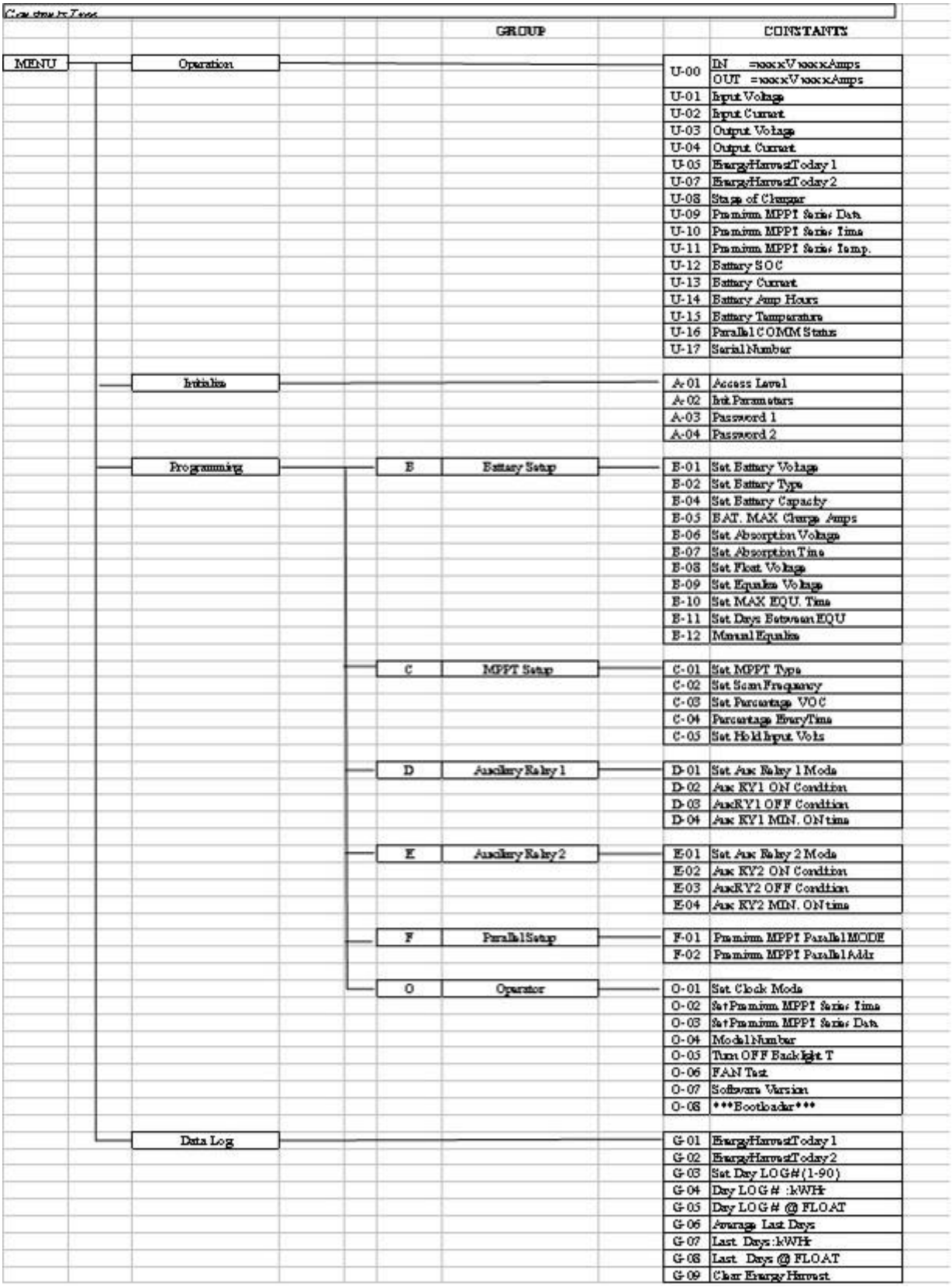


Fig-5

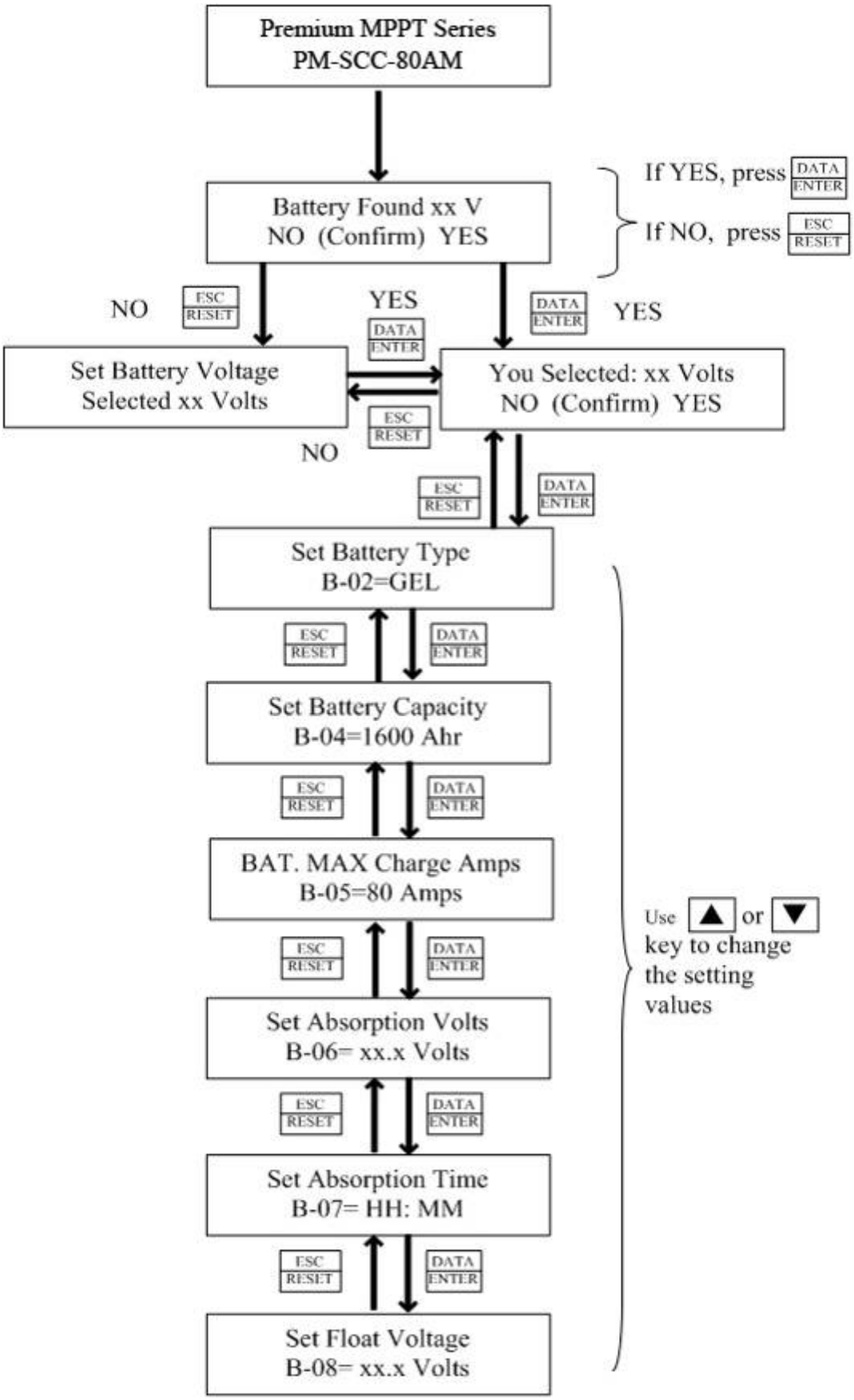
Chapter 3 User Constants

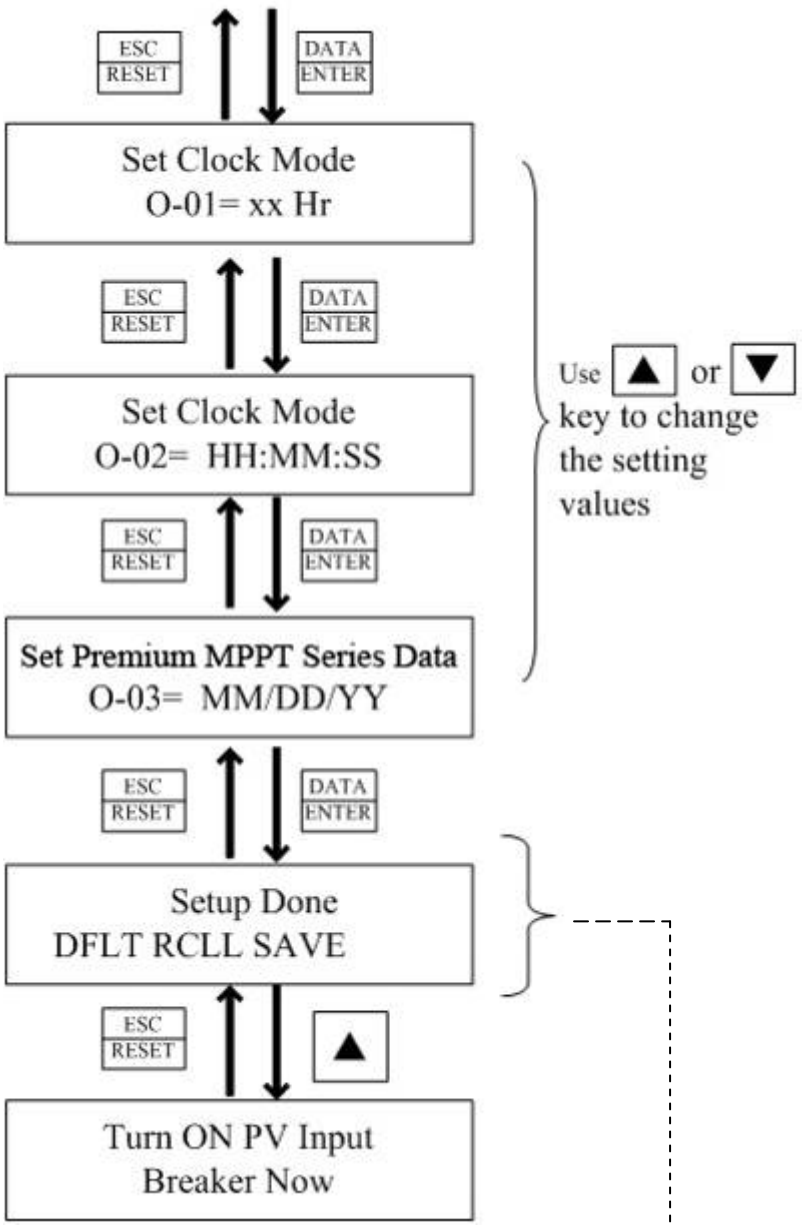
3.1 The following is the structure of user constants.



MENU	GROUP		CONSTANTS	
Operation			U-00	IN =xxxxVxxxxAmps OUT =xxxxVxxxxAmps
			U-01	Input Voltage
			U-02	Input Current
			U-03	Output Voltage
			U-04	Output Current
			U-05	EnergyHarvestToday 1
			U-07	EnergyHarvestToday 2
			U-08	Stage of Charger
			U-09	Prominm MPPT Series Data
			U-10	Prominm MPPT Series Time
			U-11	Prominm MPPT Series Temp.
			U-12	Battery SOC
			U-13	Battery Current
			U-14	Battery Amp Hours
			U-15	Battery Temperature
			U-16	Parallel COMM Status
			U-17	Serial Number
Initialize			A-01	Access Level
			A-02	Init Parameters
			A-03	Password 1
			A-04	Password 2
Programming	B	Battery Setup	B-01	Set Battery Voltage
			B-02	Set Battery Type
			B-04	Set Battery Capacity
			B-05	BAT. MAX Charge Amps
			B-06	Set Absorption Voltage
			B-07	Set Absorption Time
			B-08	Set Float Voltage
			B-09	Set Equalize Voltage
			B-10	Set MAX EQU. Time
			B-11	Set Days Between EQU
			B-12	Manual Equalize
	C	MPPT Setup	C-01	Set MPPT Type
			C-02	Set Scan Frequency
			C-03	Set Percentage VOC
			C-04	Percentage EnergyTime
			C-05	Set Hold Input Volts
	D	Auxiliary Relay 1	D-01	Set Aux Relay 1 Mode
			D-02	Aux RY1 ON Condition
			D-03	AuxRY1 OFF Condition
			D-04	Aux RY1 MIN. ON time
	E	Auxiliary Relay 2	E-01	Set Aux Relay 2 Mode
			E-02	Aux RY2 ON Condition
			E-03	AuxRY2 OFF Condition
			E-04	Aux RY2 MIN. ON time
	F	Parallel Setup	F-01	Prominm MPPT Parallel MODE
			F-02	Prominm MPPT Parallel Addr
	O	Operator	O-01	Set Clock Mode
			O-02	SetProminm MPPT Series Time
			O-03	SetProminm MPPT Series Data
			O-04	Model Number
			O-05	Turn OFF Backlight T
			O-06	FAN Test
			O-07	Software Version
			O-08	***Bootloader***
Data Log			G-01	EnergyHarvestToday 1
			G-02	EnergyHarvestToday 2
			G-03	Set Day LOG#(1-90)
			G-04	Day LOG# :kWHr
			G-05	Day LOG# @ FLOAT
			G-06	Average Last Days
			G-07	Last Days :kWHr
			G-08	Last Days @ FLOAT
			G-09	Clear Energy Harvest

3. 2 The following is the “Initialization Stage Flow Chart”.





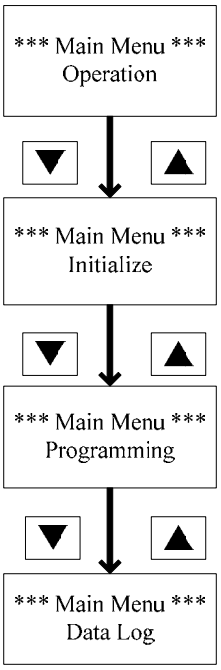
SAVE: If SAVE is selected by pressing ▲ key, the controller will save the entered settings and operate with them

RCLL (RECALL): Pressing ▼ key will return to the last setting prior to entering setup.

DFLT (DEFAULT): If DFLT is selected by pressing ESC RESET key, the controller will revert to and operate at default settings based on the original voltage, battery type and capacity entered in the initialization process.

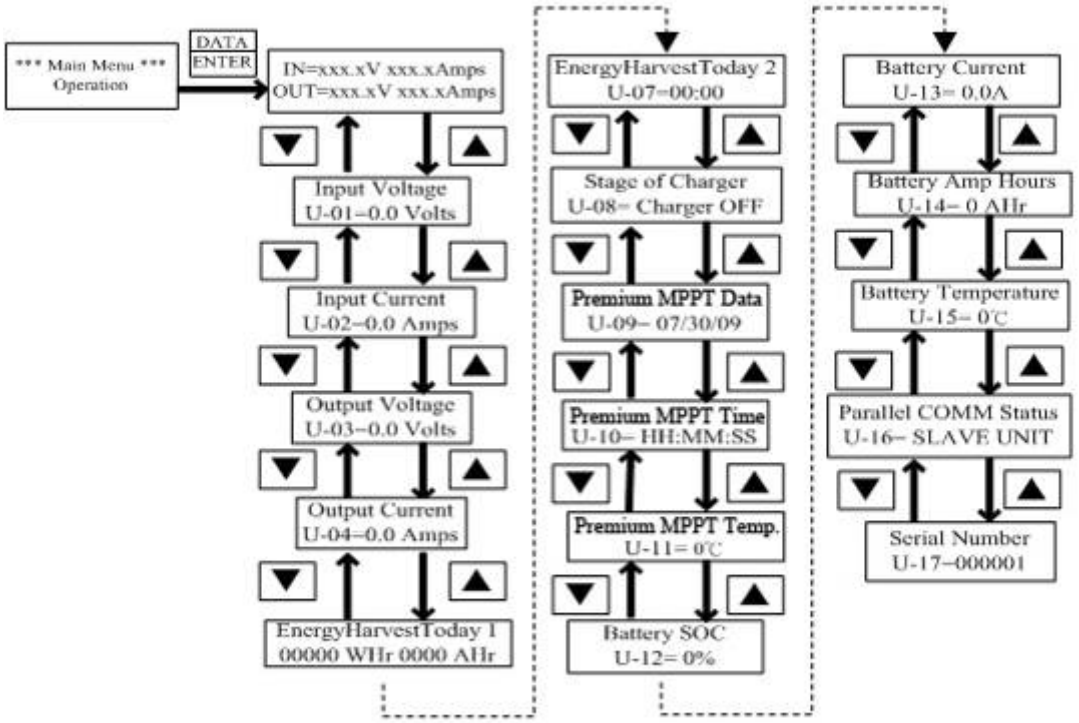
3.3 The following is the “Operation Stage Flow Chart”.

Main Menu



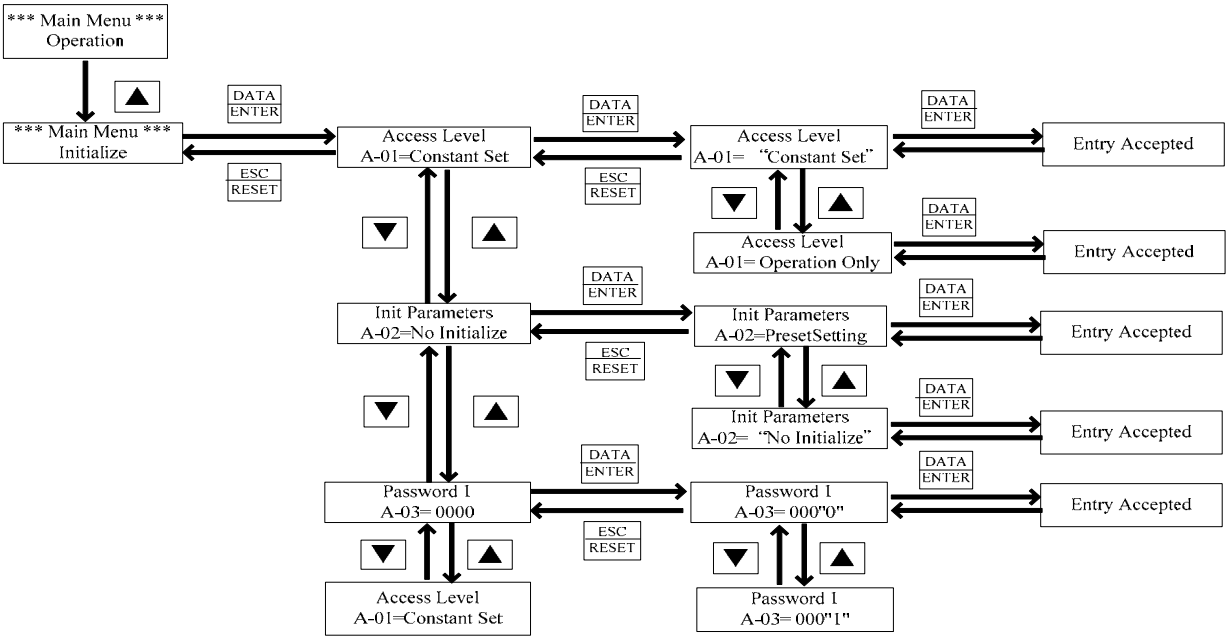
Main Menu-Operation

Menu Constants



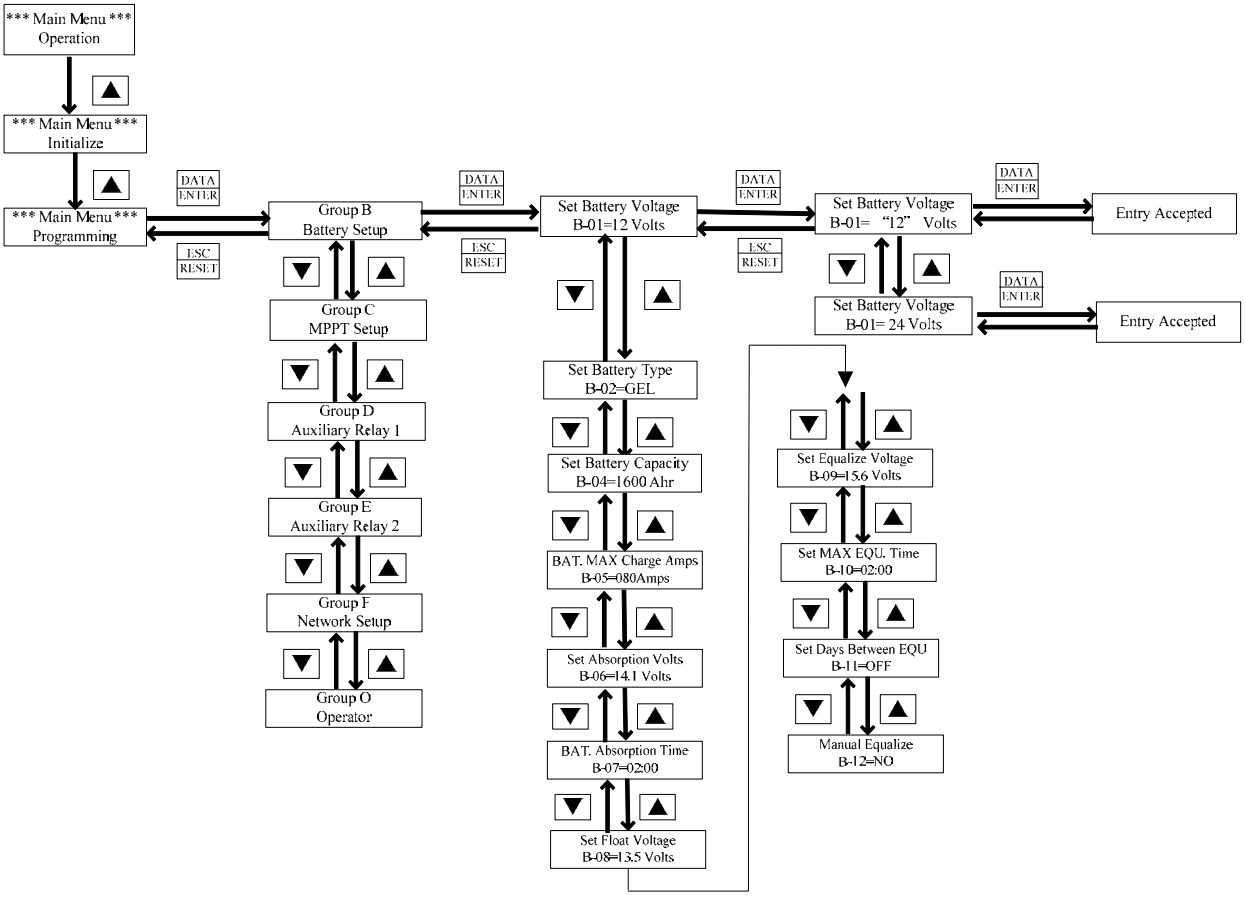
Main Menu-Initialize

Menu Constants Constants Edit Data Enter



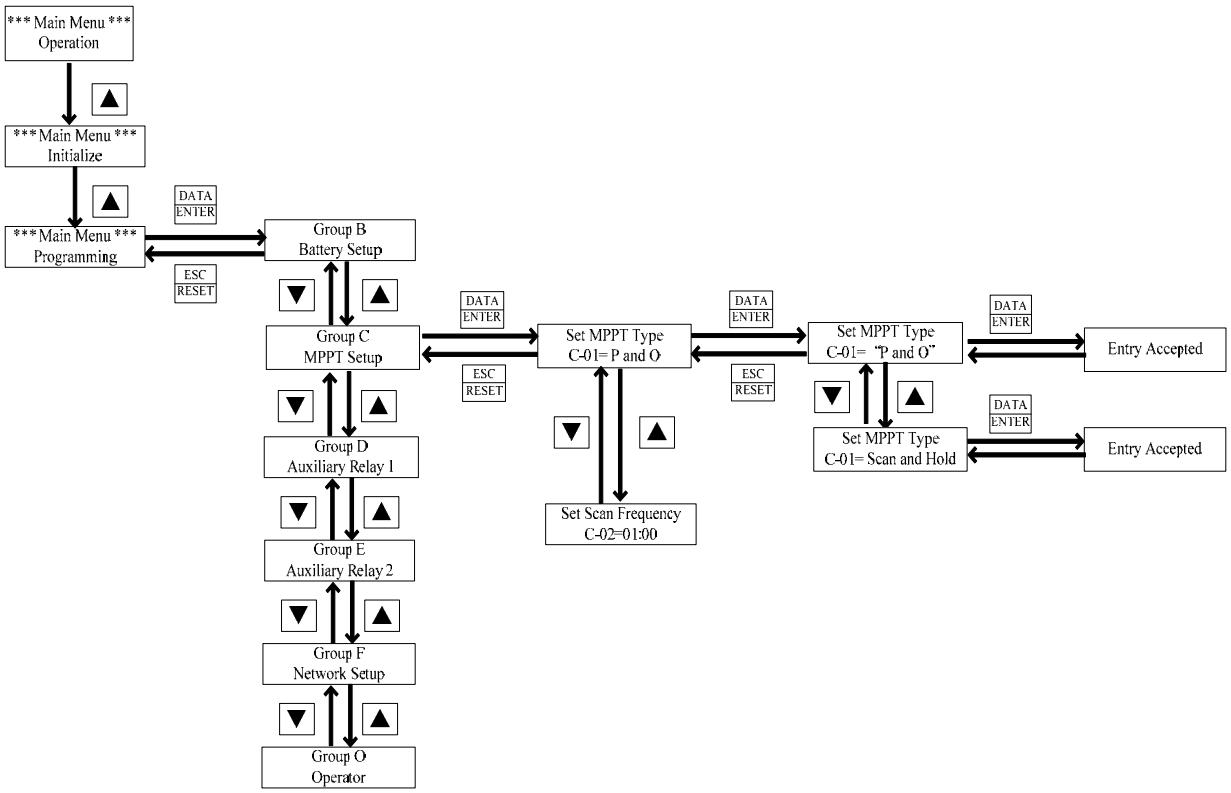
Main Menu-Programming Group B

Menu Group Constants Constants Edit Data Enter



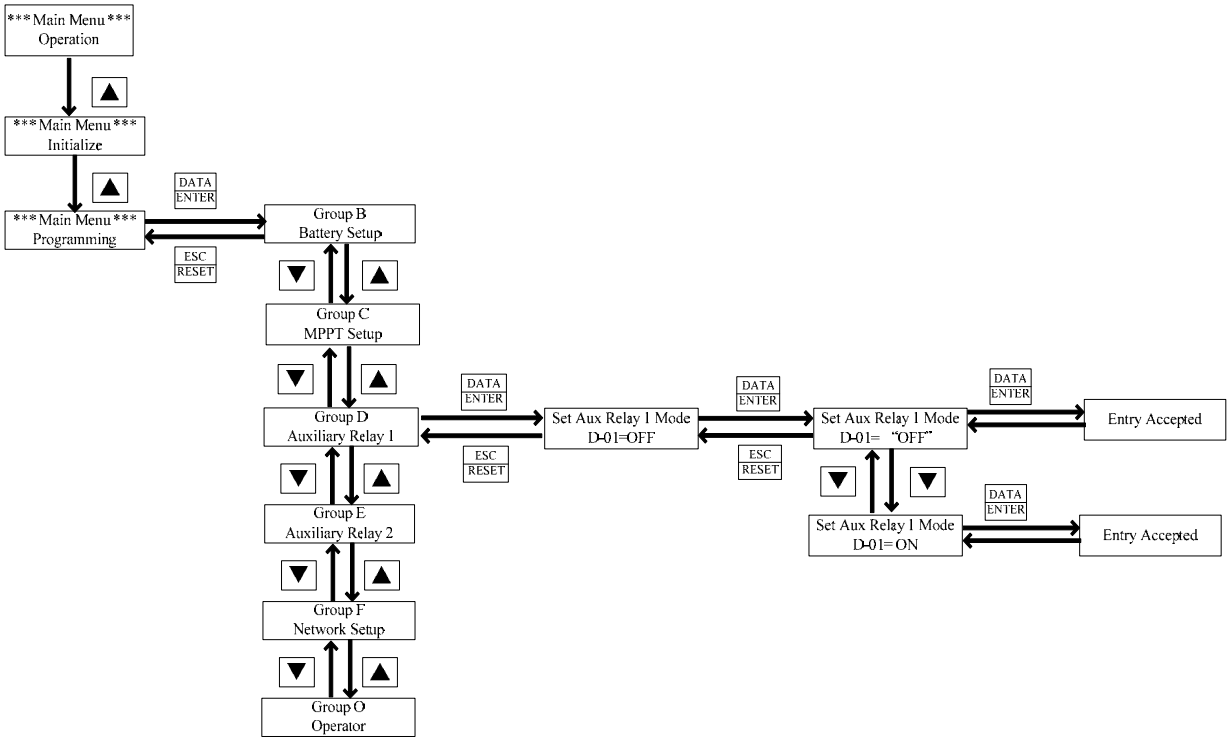
Main Menu-Programming Group C

Menu Group Constants Constants Edit Data Enter



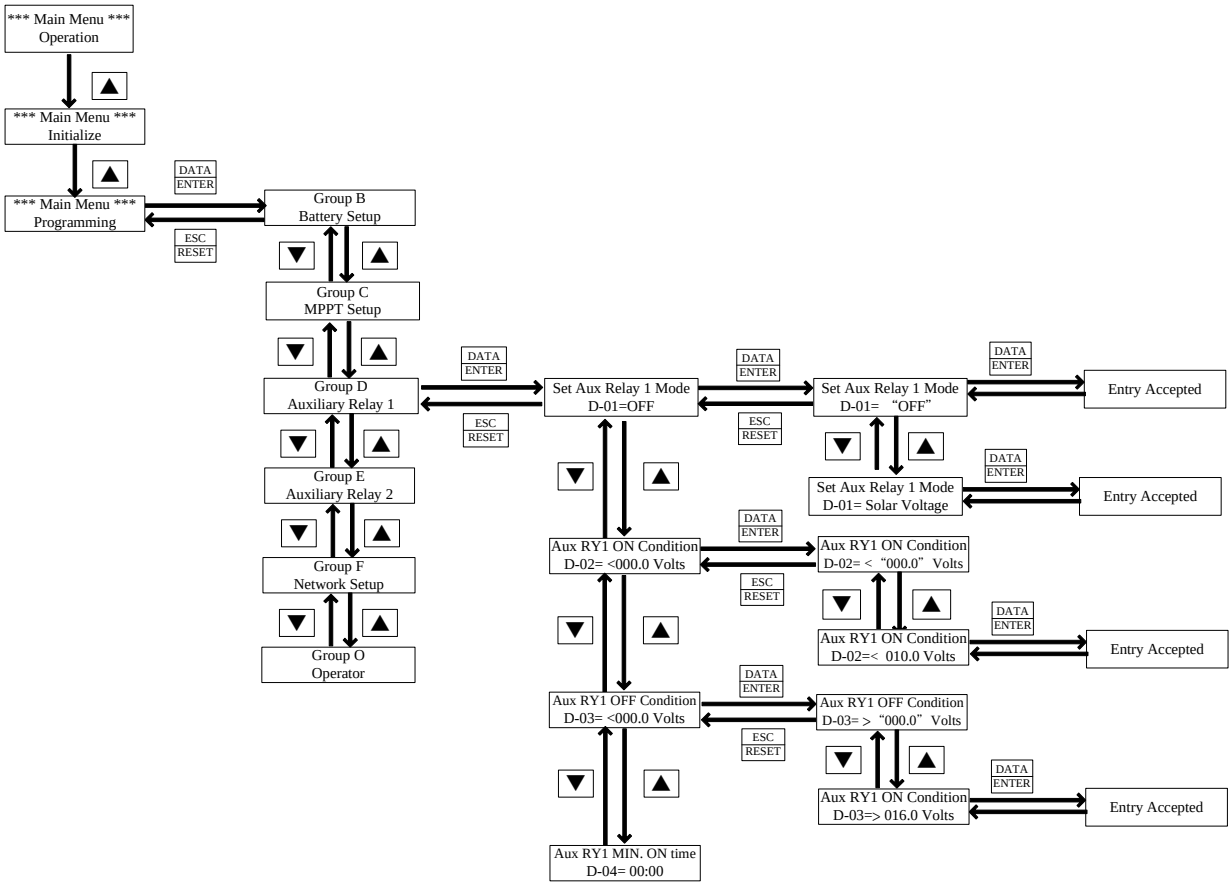
Main Menu-Programming Group D, D-01= ON or OFF

Menu Group Constants Constants Edit Data Enter



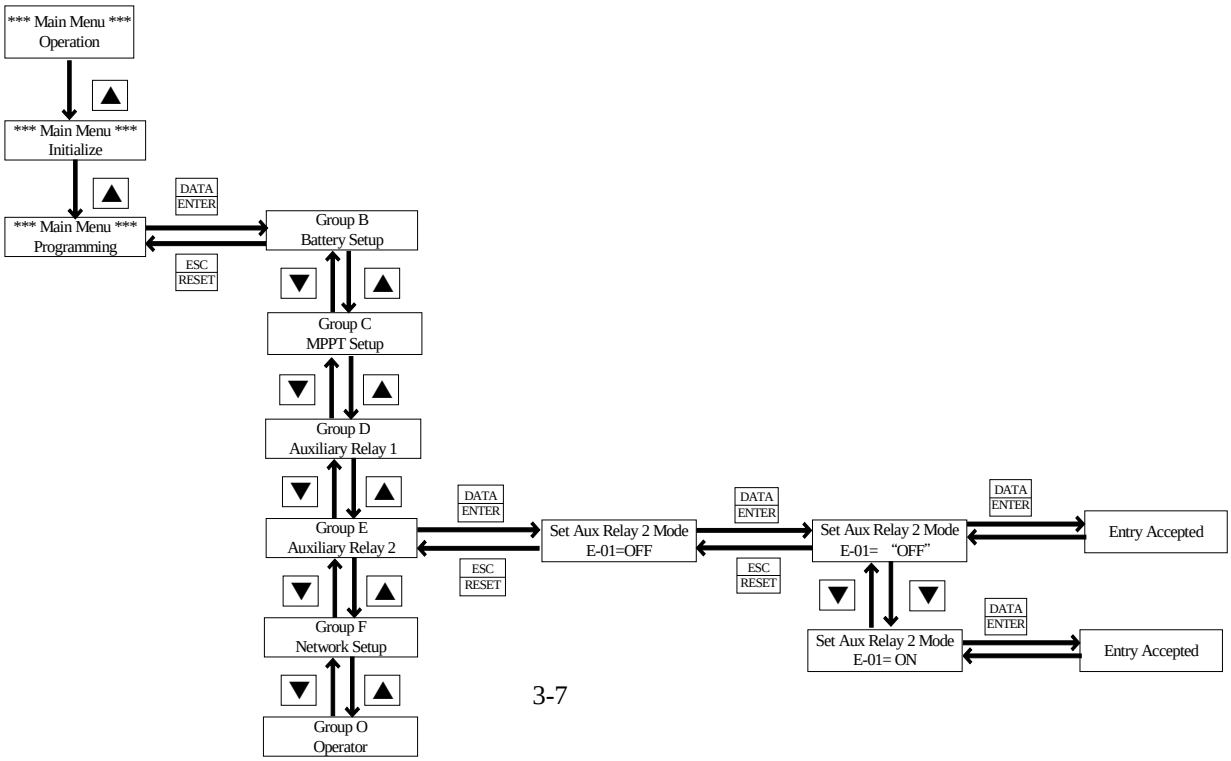
Main Menu-Programming Group D, Auxiliary 1 ON/OFF Condition Setting

Menu Group Constants Constants Edit Data Enter



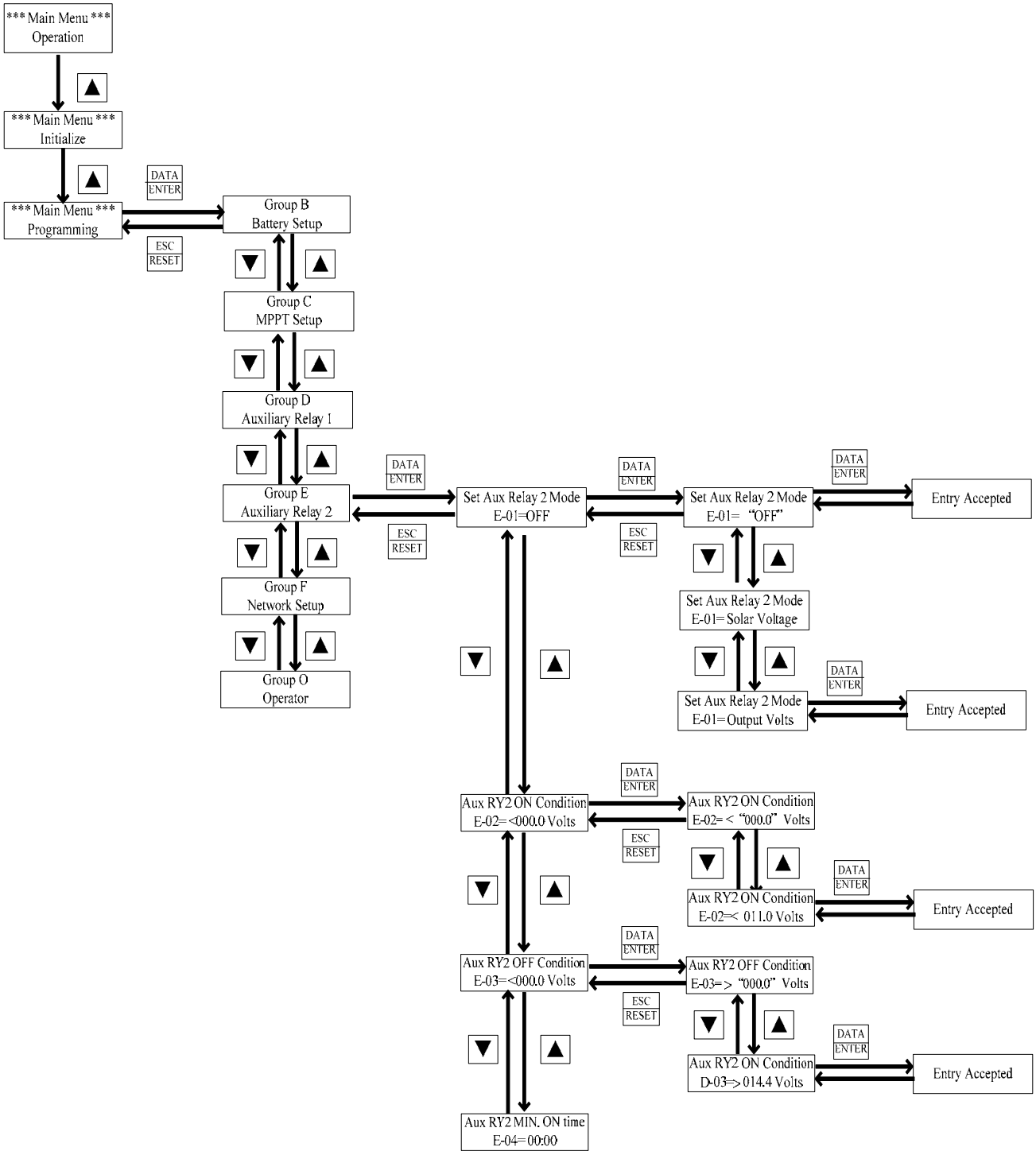
Main Menu-Programming Group E, E-01= ON or OFF

Menu Group Constants Constants Edit Data Enter

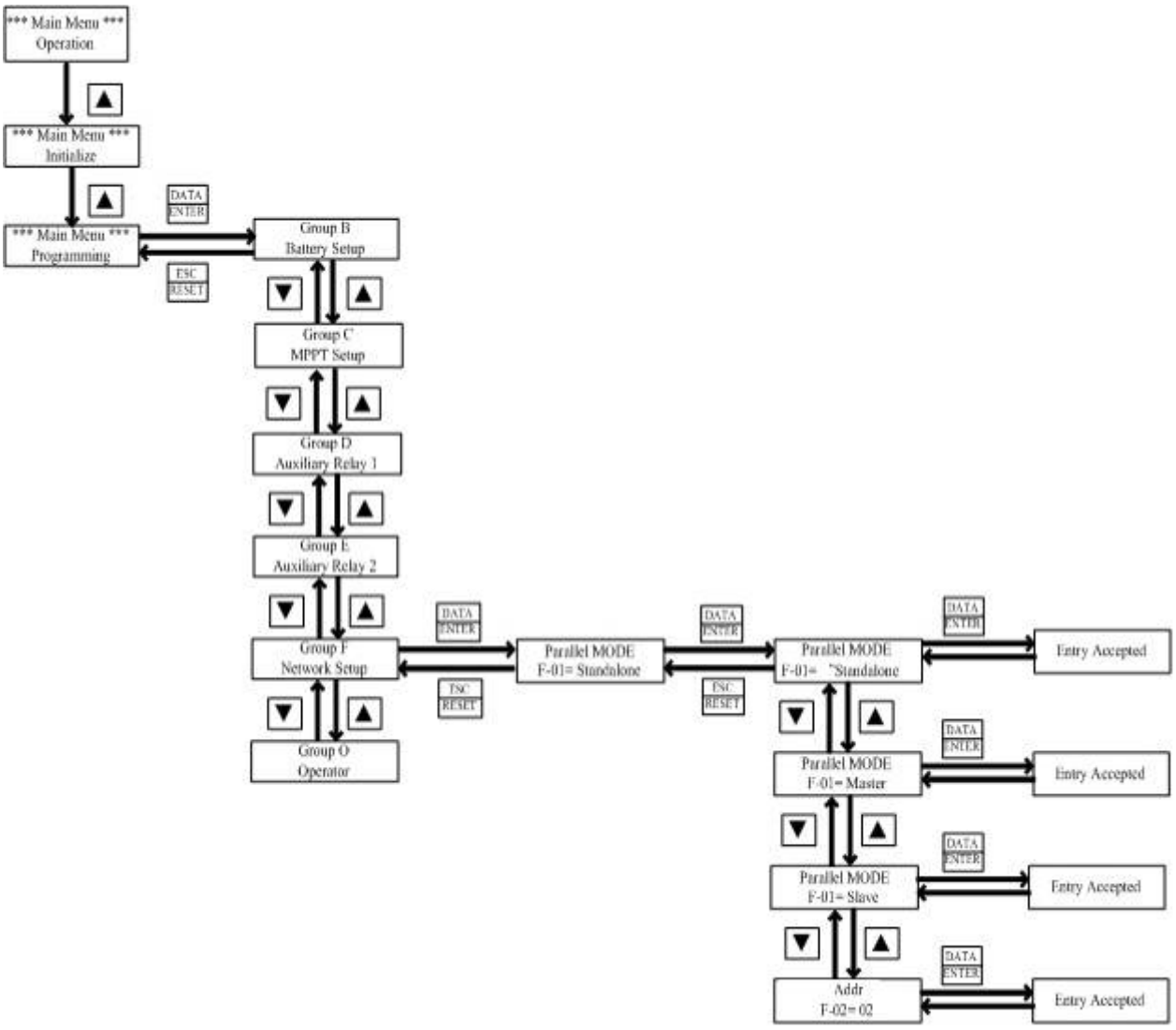


Main Menu-Programming Group E, Auxiliary 2 ON/OFF Condition Setting

Menu Group Constants Constants Edit Data Enter

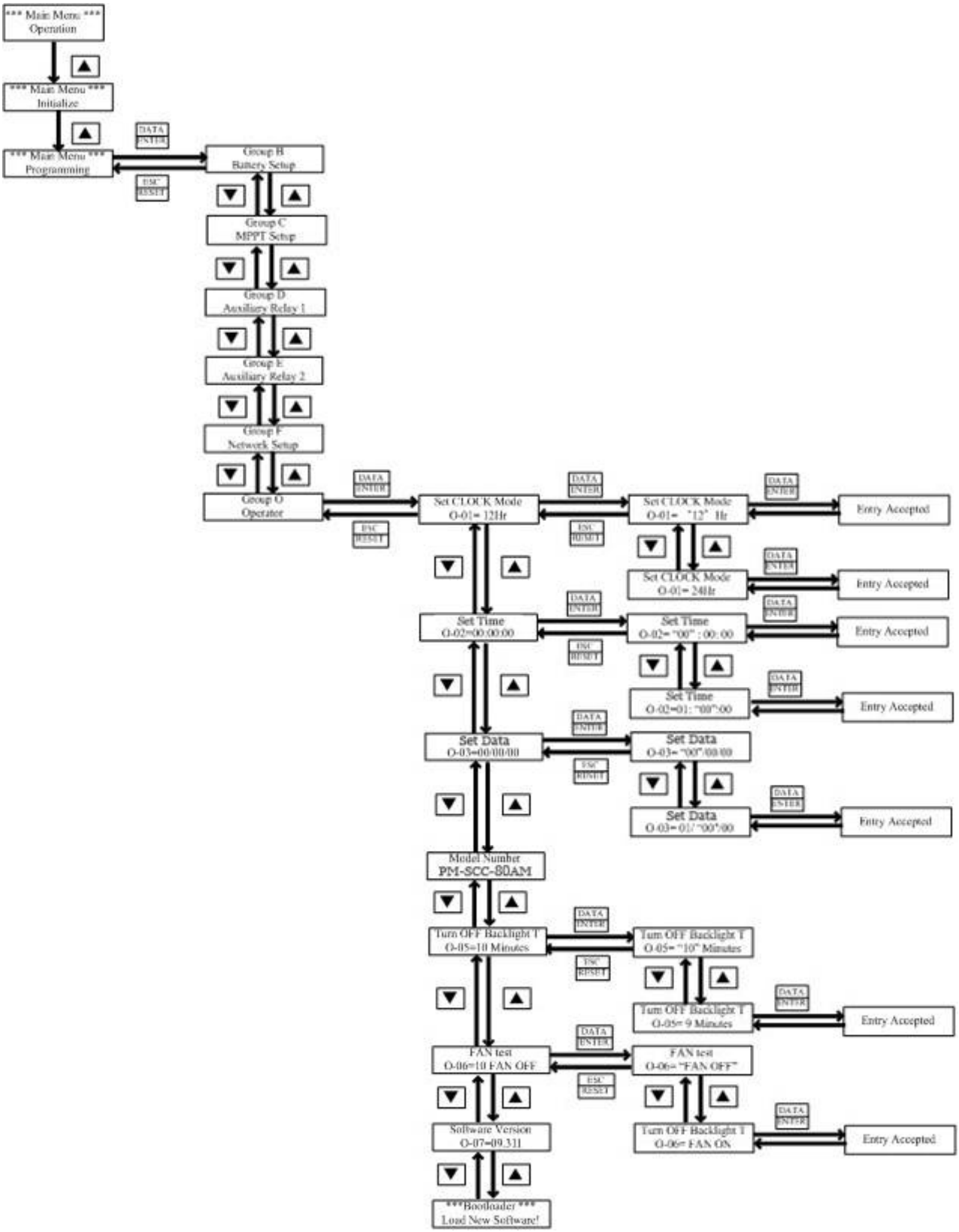


Main Menu-Programming Group F				
Menu	Group	Constants	Constants Edit	Data Enter



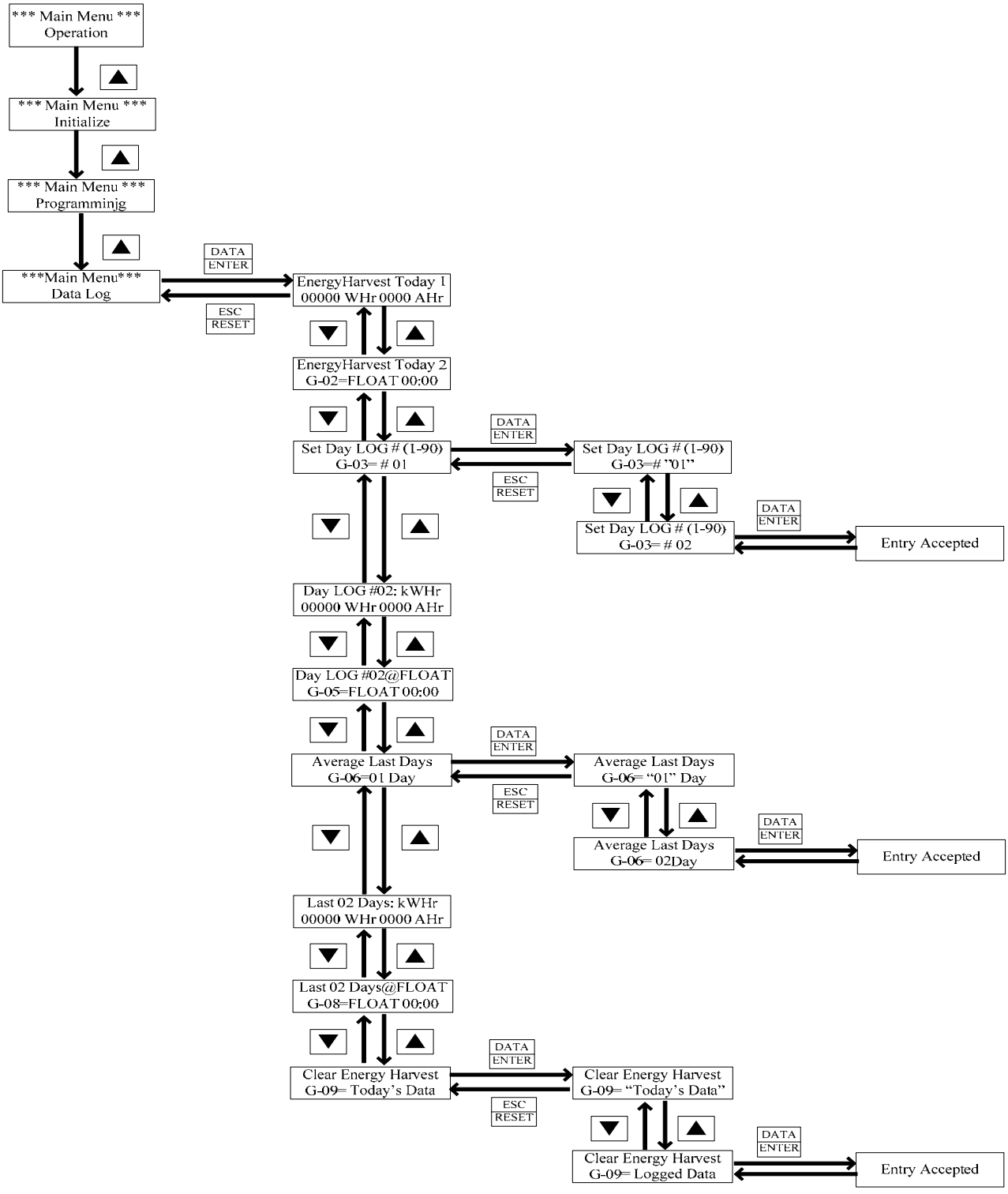
Main Menu-Programming Group O

Menu Group Constants Constants Edit Data Enter



Main Menu-Data Log

Menu | Constants | Constants Edit | Data Enter



Chapter 4 Constant List

Main Menu	Group	Constant	LCD Display	Range	Unit	Factory Setting	Remark	Page
Operation	U	U-00	IN =xxx.xV xxx.xAmps OUT =xxx.xV xxx.xAmps	—	0.1V 0.1A	—		5-1
		U-01	Input Voltage	—	0.1V	—		5-1
		U-02	Input Current	—	0.1A	—		5-1
		U-03	Output Voltage	—	0.1V	—		5-1
		U-04	Output Current	—	0.1A	—		5-1
		U-05	EnergyHarvestToday 1	—	1kWHr 1AHr	—		5-1
		U-07	EnergyHarvestToday 2	—	Hr:Min	—		5-2
		U-08	Stage of Charger	—	—	—		5-2
		U-09	Premium Date	MM/DD/YY	—	—		5-2
		U-10	Premium Time	Hr: Min: Sec	—	—		5-2
		U-11	Premium Temperature	—	1℃	—		5-2
		U-12	Battery SOC	1~100%	1%	—	NOTE 1	5-2
		U-13	Battery Current	—	0.1A	—	NOTE 1	5-2
		U-14	Battery Amp Hours	—	1AHr	—	NOTE 1	5-3
		U-15	Battery Temperature	—	1℃	—	NOTE 1	5-3
		U-16	Parallel COMM Status	—	—	—	NOTE 5	5-3
		U-17	Serial Number	—	—	—		5-3
Initialize	A	A-01	Access Level	Constant Set Operation Only	—	Constant Set		5-4
		A-02	Init Parameters	Preset Setting No Initialize	—	No Initialize		5-4
		A-03	Password 1	0~9999	1	0	NOTE 2	5-4
		A-04	Password 2	0~9999	1	0	NOTE 2	5-4
Programming	B	Battery Setup						
		B-01	Set Battery Voltage	12/24/36/48	—	12		5-5
		B-02	Set Battery Type	GEL, FLOODED AGM	—	GEL		5-5
		B-04	Set Battery Capacity	0~9990	10Ahr	—	NOTE 6	5-6

Main Menu	Group	Constant	LCD Display		Range	Unit	Factory Setting	Remark	Page
Programming	B	B-05	BAT. MAX Charge Amps		0~80/0~160	1A	—	NOTE 6	5-6
		B-06	Set Absorption Volts	FLOOD-ED	13.9~15.2	0.1V	14.6		5-6
				AGM	13.7~15.1	0.1V	14.1		5-6
				GEL	13.6~15.1	0.1V	14.1		5-6
		B-07	Set Absorption Time		0~ 99 Hr 59 Min	1 Min	2 Hr		5-7
		B-08	Set Float Voltage	FLOOD-ED	12.9~14.2	0.1V	13.8		5-7
				AGM	12.8~14.2	0.1V	13.2		5-7
				GEL	12.8~14.1	0.1V	13.5		5-7
		B-09	Set Equalize Voltage		12V:14.7~16.4 24V:29.4~32.8 36V:44.1~49.2 48V:58.8~65.6	0.1V	12V:15.6 24V:31.2 36V:46.8 48V:62.4	NOTE 3	5-7
		B-10	Set MAX EQU. Time		0~ 99 Hr 59 Min	1 Min	2 Hr	NOTE 3	5-7
		B-11	Set Days Between EQU		0~999	1 Day	OFF	NOTE 3	5-7
		B-12	Manual Equalize		YES/NO	—	NO	NOTE 3	5-8
	C	MPPT Setup							
		C-01	Set MPPT Type		P and O Scan and Hold Percentage Hold Input V	—	P and O		5-8
		C-02	Set Scan Frequency		1~4Hr	1 Min	1 Hr	NOTE 4	5-8
		C-03	Set Percentage VOC		0~100	1%	80	NOTE 4	5-9
		C-04	Percentage EveryTime		1~4Hr	1 Min	1 Hr	NOTE 4	5-9
		C-05	Set Hold Input Volts		0~140/0~240	0.1V	—	NOTE 4 NOTE 6	5-9

Main Menu	Group	Constant	LCD Display	Range	Unit	Factory Setting	Remark	Page
Programming	D	Auxiliary Relay 1						
		D-01	Set Aux Relay 1 Mode	OFF, ON, Solar Voltage, Output Volts, Battery Volts, OUT Current, BATT Current, Premium Temp. Battery Temp. Premium Time Battery SOC, Output Volts	—	OFF		5-9
		D-02	Aux RY1 ON Condition	See Below	See Below	See Below		5-10
			When D-01= Solar Voltage	0~150/0~250	0.1V	0		5-10
			When D-01=Output Volts	0~64	0.1V	0		5-10
			When D-01=Battery Volts	0~64	0.1V	0		5-10
			When D-01=OUT Current	0~80/0~160	1A	0		5-10
			When D-01=BATT Current	-500~500	1A	0		5-10
			When D-01=Premium Temp.	-20~100	1℃	0		5-10
			When D-01=Battery Temp.	-20~100	1℃	0		5-10
			When D-01=Premium Time	00~23 Hr 00~59 Min	1 Min	0		5-10
			When D-01=Battery SOC	0~100	1%	0		5-10
		D-03	AuxRY1 OFF Condition	See Below	See Below	See Below		5-11
			When D-01= Solar Voltage	0~150/0~250	0.1V	0		5-11
			When D-01=Output Volts	0~64	0.1V	0		5-11
			When D-01=Battery Volts	0~64	0.1V	0		5-11
			When D-01=OUT Current	0~80/0~160	1A	0		5-11
			When D-01=BATT Current	-500~500	1A	0		5-11

			When D-01=Premium Temp.	-20~100	1℃	0		5-11
			When D-01=Battery Temp.	-20~100	1℃	0		5-11

Main Menu	Group	Constant	LCD Display	Range	Unit	Factory Setting	Remark	Page
Programming	D	D-03	When D-01=Premium Time	00~23 Hr 00~59 Min	1 Min	0		5-11
			When D-01=Battery SOC	0~100	1%	0		5-11
		D-04	Aux RY1 MIN. ON time	0~23 Hr, 0~59Min	1 Min	0		5-11
	E	Auxiliary Relay 2						
		E-01	Set Aux Relay 2 Mode	OFF, ON, Solar Voltage, Output Volts, Battery Volts, OUT Current, BATT Current, Premium Temp. Battery Temp. Premium Time, Battery SOC, Output Volts	—	OFF		5-12
		E-02	Aux RY2 ON Condition	See Below	See Below	See Below		5-12
			When E-01= Solar Voltage	0~150/0~250	0.1V	0		5-12
			When E-01=Output Volts	0~64	0.1V	0		5-12
			When E-01=Battery Volts	0~64	0.1V	0		5-12
			When E-01=OUT Current	0~80/0~160	1A	0		5-12
			When E-01=BATT Current	-500~500	1A	0		5-12
			When E-01=Premium Temp.	-20~100	1℃	0		5-12
			When E-01=Battery Temp.	-20~100	1℃	0		5-12
			When E-01=Premium Time	00~23 Hr 00~59 Min	1 Min	0		5-12
			When E-01=Battery SOC	0~100	1%	0		5-12
		E-03	AuxRY2 OFF Condition	See Below	See Below	See Below		5-12

			When E-01= Solar Voltage	0~150/0~250	0.1V	0		5-12
			When E-01=Output Volts	0~64	0.1V	0		5-12
			When E-01=Battery Volts	0~64	0.1V	0		5-12

Main Menu	Group	Constant	LCD Display	Range	Unit	Factory Setting	Remark	Page
Programming	E	E-03	When E-01=OUT Current	0~80/0~160	1A	0		5-12
			When E-01=BATT Current	-500~500	1A	0		5-12
			When E-01=Premium Temp.	-20~100	1℃	0		5-12
			When E-01=Battery Temp.	-20~100	1℃	0		5-12
			When E-01=Premium Time	00~23 Hr 00~59 Min	1 Min	0		5-12
			When E-01=Battery SOC	0~100	1%	0		5-12
		E-04	Aux RY2 MIN. ON time	00~23 Hr 00~59 Min	1 Min	0		5-12
	F	Parallel Setup						
		F-01	Premium Parallel MODE	Standalone, Master, Slave	—	Stand-alone		5-12
		F-02	Premium Parallel Addr	2~16	—	2	NOTE 5	5-12
	O	Operator						
		O-01	Set CLOCK Mode	12/24 Hr	—	12		5-13
		O-02	Set Premium Time	Hr: Min: Sec	—	—		5-13
		O-03	Set Premium Date	MM/DD/YY	—	—		5-13
		O-04	Model Number	—	—	SS-xx C MPPT	NOTE 6	5-13
		O-05	Turn OFF Backlight T	0~10	1 Min	10		5-13
		O-06	FAN Test	ON/OFF	—	OFF		5-14
		O-07	Software Version	—	—	9.31I		5-14
		O-08	***Bootloader***	—	—	—		5-14
Data Log	G	G-01	EnergyHarvestToday 1	—	kWHr AHr	—		5-14
		G-02	EnergyHarvestToday 2	—	Hr:Min	—		5-14
		G-03	Set Day LOG # (1-90)	1~90	1 Day	—		5-14
		G-04	Day LOG # : kWHr	—	kWHr AHr	—		5-15
		G-05	Day LOG # @ FLOAT	—	Hr:Min	—		5-15
		G-06	Average Last Days	1~90	1 Day	—		5-15
		G-07	Last Days: kWHr	—	kWHr AHr	—		5-15

		G-08	Last Days @ FLOAT	—	Hr:Min	—		5-15

Data Log	G	G-09	Clear Energy Harvest	Today's Data Logged Data	—	Today's Data		5-16

NOTE 1 (U-12, U-13, U-14, U-15)
Battery SOC, Battery Current and Battery Amp Hours will only be visible when terminal BVS (Battery Voltage Sensing) is connected to the battery and will only be active when using an optional 50mv/500amp external shunt.
Battery Temperature will only be visible when terminal BVS (Battery Voltage Sensing) is connected to the battery and will only be active when using a Battery Temperature Sensor (BTS-3).
※ These four constants will only be displayed when the terminal BVS (Battery Voltage Sensing) is wired to the battery. To show the precise values, an optional 50mv/500amp external shunt is needed for U-12, U-13, U-14 and a Battery Temperature Sensor is needed for U-15.

NOTE 2 (A-03, A-04)
These two constants are reserved for the authorized distributor or technician to lock the constants operation.

Lock the constants setting

1. Finish setting all the programmable constants to the desired values.
2. Change A-01=Operation Only, factory setting is A-01=Constants Set.
3. Use UP key to go to A-03 to enter the password 1 (max. 4 digits)
4. Go to any display of A-xx and press DOWN key and hold it, then press ESC key at the same time till A-04 constant occurs.
5. Enter the desired password 2 (max. 4 digits) into A-04. Make sure the password 1 in A-03 must be different from the password 2 in A-04. Finally, press ENTER key to finish "lock" setting.
   Above procedure completes locking the constants setting and no more programming selection would appear. A-01 would only display Operation only and would not display Constants Set.

Unlock the constants setting

1. Enter the password in A-03 to be exactly the same as the one earlier set in A-04
2. When the password in A-03 matches the one earlier set in A-04, the unlocking is completed. A-01=Constants Set would appear again for programming.

NOTE 3 (B-09, B-10, B-11, B-12)
These constants are only displayed if Flooded is selected as battery type (B-02).

NOTE 4 (C-02, C-03, C-04, C-05)
C-02 is only displayed if P and O or Scan and Hold is selected as MPPT Type (C-01).
C-03 and C-04 are only displayed if Percentage is selected as MPPT Type (C-01).
C-05 is only displayed if Hold Input V is selected as MPPT Type (C-01).

NOTE 5 (U-16, F-02)
U-16 and F-02 are only displayed if Slave is selected as Premium Network MODE (F-01).

NOTE 6 (B-04, B-05, C-05, O-04)
The factory settings of the listed constants are dependent on the different model numbers.

Constant	LCD Display	PM-SCC-80AM Factory Setting	PM-SCC-160AMW Factory Setting
B-04	Set Battery Capacity	1600 Ahr	3200Ahr
B-05	Bat. MAX Charge Amps	80A	160A
C-05	Set Hold Input Volts	140Vdc	240Vdc
O-04	Model Number	PM-SCC-80AM	PM-SCC-160AMW

Chapter 5 Programming Constants

*** Main Menu***
Operation

U-00: IN=xxx.xV xxx.xAmps
OUT=xxx.xV xxx.xAmps

- Use Constant U-00 to monitor the power coming in from the PV array in Volts and Amps. The second line displays the power going out of the PREMIUM MPPT, it also displays in Volts and Amps.

- In most installations there will be a difference between incoming volts and outgoing volts. This reflects the flexibility of the PREMIUM MPPT with respect to PV array input voltage vs. battery voltage. Incoming and outgoing amps will also differ because they are the result of dividing watts (a constant) by volts.

U-01: Input Voltage

- This screen displays the input voltage value coming from the PV array in Volts.

U-02: Input Current

- This screen displays the input current value coming from the PV array in Amps.

U-03:Output Voltage

- This screen displays the power going out of the Premium MPPT in Volts.

U-04: Output Current

- This screen displays the power going out of the PREMIUM MPPT in Amps.

U-05: EnergyHarvest Today 1

- This screen displays how much the solar energy was harvested “Today” in kWHr and AHr.

U-07: EnergyHarvest Today 2

- This screen displays how much time the charger was in Float mode “Today” in Hour:Minute.

U-08: Stage of Charger

- This screen displays the charging stage of PREMIUM MPPT. The possible values are Charger Off, Charger Start, BULK Stage, ABSORP Stage, FLOAT Stage, Charger MPPT, Charger Stop, EQUALZ Stage.

U-09: Premium MPPT Date

- This screen displays the date according to the setting of initialization stage. The display format is MM/DD/YY.

U-10: Premium MPPT Time

- This screen displays the time according to the setting of initialization stage.

U-11: Premium MPPT Temperature

- This screen displays the temperature detected in Premium MPPT Battery Charger.

U-12: Battery SOC

- This screen displays the stage of charge (SOC) as a percentage of fully charged. SOC will only be visible when terminal BVS (Battery Voltage Sensing) is connected to the battery and will only be active when using an optional 50mv/500amp external shunt.

※ U-12 will only be displayed when the terminal BVS (Battery Voltage Sensing) is wired to the battery. To show the precise values, an optional 50mv/500amp external shunt is needed.

U-13: Battery Current

- This screen displays the battery current in Amps. Battery Current will only be

visible when terminal BVS (Battery Voltage Sensing) is connected to the battery and will only be active when using an optional 50mv/500amp external shunt.

※ U-13 will only be displayed when the terminal BVS (Battery Voltage Sensing) is wired to the battery. To show the precise values, an optional 50mv/500amp external shunt is needed.

U-14: Battery Amp Hours

- This screen displays the battery capacity in AHr (Amp Hours). Battery Amp Hours will only be visible when terminal BVS (Battery Voltage Sensing) is connected to the battery and will only be active when using an optional 50mv/500amp external shunt.

※ U-14 will only be displayed when the terminal BVS (Battery Voltage Sensing) is wired to the battery. To show the precise values, an optional 50mv/500amp external shunt is needed.

U-15: Battery Temperature

- This screen displays the battery temperature in ℃. Battery Temperature will only be visible when Battery Voltage Sensor is connected and will only be active when using a Battery Temperature Sensor (BTS-3).

※ U-15 will only be displayed when the terminal BVS (Battery Voltage Sensing) is wired to the battery. To show the precise values, a Battery Temperature Sensor (BTS-3) is needed to be wired to terminal BTS.

U-16: Parallel COMM Status

- This screen displays the communication status between Master unit and Slave units. U-16 is only displayed when Slave is selected as Premium MPPT Network MODE (F-01).
- When the communication is successful, the screen displays SLAVE UNIT. When the communication fails, then screen displays NETWORK ERROR.

U-17: Serial Number

- This screen displays the unit serial number. It is useful when contacting Power Master Support.

*** Main Menu***
Initialize

A-01: Access Level

- Use Constant A-01 to select the user constant access level.
  This level determines which user constants can be changed and displayed.

Settings:

A-01=Constant Set (Factory Setting)

This setting allows all user constants to be changed and displayed.

A-01=Operation Only

This setting allows the “Operation” and “Initialize” to be changed or displayed.

A-02: Init Parameters

- Use Constant A-02 to initialize the user constants.
- When initialized, the user constants will return to their factory preset values. You should normally record the setting of any constants that are changed from factory presets.

Settings:

A-02=Preset Setting

This setting allows to initialize the user constants to factory settings.

A-02=No Initialize (Factory Setting)

This setting does not initialize any user constants.

A-03: Password 1
A-04: Password 2

- These two constants are reserved for the factory to test and set the functions.
- Users are not allowed to set these two constants.

Lock the constants setting

1. Finish setting all the programmable constants to the desired values.
2. Change A-01=Operation Only, factory setting is A-01=Constants Set.

3. Use UP key to go to A-03 to enter the password 1 (max. 4 digits)
4. Go to any display of A-xx and press DOWN key and hold it, then press ESC key at the same time till A-04 constant occurs.
5. Enter the desired password 2 (max. 4 digits) into A-04. Make sure the password 1 in A-03 must be different from the password 2 in A-04. Finally, press ENTER key to finish "lock" setting.
   Above procedure completes locking the constants setting and no more programming selection would appear. A-01 would only display Operation only and would not display Constants Set.

Unlock the constants setting

1. Enter the password in A-03 to be exactly the same as the one earlier set in A-04
2. When the password in A-03 matches the one earlier set in A-04, the unlocking is completed. A-01=Constants Set would appear again for programming.

*** Main Menu***
Programming

Group B
Battery Setup

B-01: Set Battery Voltage

- During initialization of PREMIUM MPPT, it will detect and ask the installer to confirm the battery voltage found is correct. In almost all circumstance the PREMIUM MPPT will correctly detect battery voltage.
- Use Constant B-01 to change the battery voltage if the battery voltage displayed by the PREMIUM MPPT is different from the installed batteries. The selection range of the battery voltage is 12V (Factory Setting), 24V, 36V and 48V.

B-02: Set Battery Type

- Use UP or DOWN keys to allow the installer to change what type of batteries it is connected to (Flooded, Gel, AGM) PREMIUM MPPT. The default "BATTERY TYPE" is GEL
- Please be sure to select the type which matches the system's batteries. This setting controls battery charging voltages in B-06 and B-08.

B-04: Set Battery Capacity

- This setting controls battery charging amperages and other settings. The factory setting for CAPACITY is 1600 amp hours for PM-SCC-80AM and 3200 amp hours for PM-SCC-160AMW.
- At full output capacity a PM-SCC-80AM can deliver 80 amps to a battery, this amount of amperage (current) is equal to the C/10 (capacity divided by ten) rate of a 1600 amp hour battery and, as such meets most manufacturers recommendations for minimum PV charging capacity.
- In applications with battery banks under 1600 amp hours it is recommended to lower the Maximum Charge Rate setting from the default 80 amps to the C10 rate of the battery bank.

B-05: BAT. MAX Charge Amps

- Use Constant B-05 to allow the installer to limit the maximum charge amps allowed to the batteries. The factory setting is 80 amps (PM-SCC-80AM) and 160 amps (PM-SCC-160AMW).

B-06: Set Absorption Volts

- Use Constant B-06 to adjust the Absorption voltages. The default values are based on the battery type and capacity selected. It is not advisable to change default settings unless advised by the battery manufacturer or supplier.

Battery Type	Absorption Volts Range	Factory Setting
FLOODED	13.9V~15.2V	14.6V
AGM	13.7V~15.1V	14.1V
GEL	13.6V~15.1V	14.1V

※ The above values are based on 12V system. The values x 2 are for 24V system; the values x 3 are for 36V system and the values x 4 are for 48V system.

- PREMIUM MPPT series will charge at the Absorption voltage and at the length of time before switching to float mode.

B-07: Set Absorption Time

- Use Constant B-07 to adjust the length of Absorption time. The factory setting is 2 hours (displayed as 02:00).

B-08: Set Float Voltage

- Use Constant B-08 to adjust the Float voltages. The default set values are based on the battery type and capacity selected. It is not advisable to change default settings unless advised by the battery manufacturer or supplier.

Battery Type	Float Volts Range	Factory Setting
FLOODED	12.9V~14.2V	13.8V
AGM	12.8V~14.2V	13.2V
GEL	12.8V~14.1V	13.5V

※ The above values are based on 12V system. The values x 2 are for 24V system; the values x 3 are for 36V system and the values x 4 are for 48V system.

B-09: Set Equalize Voltage

- This constant is only displayed if Flooded is selected as battery type (B-02). Use Constant B-09 to select the Equalize voltages. The default values are based on the battery voltage and capacity selected. It is not recommended to change default settings unless advised so by the battery manufacturer or supplier.

Battery Type	Battery Voltage	Equalization Volts Range	Factory Setting
FLOODED	12V	14.7V~16.4V	15.6V
	24V	29.4V~32.8 V	31.2V
	36V	44.1V~49.2V	46.8V
	48V	58.8V~65.6V	62.4V

B-10: Set MAX EQU. Time

- This constant is only displayed if Flooded is selected as battery type (B-02). Use Constant B-10 to select the time of equalization time. The factory setting is 2

hours (displayed as 02:00).

B-11: Set Days Between EQU

- This constant is only displayed if Flooded is selected as battery type (B-02). Use Constant B-11 to select the number of days between equalization charges. The factory setting is OFF.

B-12: Manual Equalize

- This constant is only displayed if Flooded is selected as battery type (B-02). Use Constant B-12 to choose between manual and automatic equalization settings.
- Press ENTER key to select Yes for manual equalization and then it will display the Equalize voltage set in B-09 and the Max. EQU time set in B-10. Press ENTER key again to start the manual equalization.

※ During equalization, only ESC key is active to leave the equalization process screen.

After the manual equalization starts, BAT displays Battery voltage. Battery temperature and Equalizing blinks in return. CHARGE displays charging current. Finally, the remaining time for equalization charge is counted down.

WARNING: Before the manual equalization is selected, Premium MPPT should be connected to Battery Temperature Sensor (BTS-3). If it is not connected to BTS-3, “Warning, Bat. Sr Not Connected” is displayed.

- Press ESC key to select No to return to the display of Group B.

Group C
MPPT Setup

C-01: Set MPPT Type

- Use Constant C-01 to set up the MPPT type: P and O, Scan and Hold, Percentage, Hold Input V. The factory setting is P and O.
-

C-02: Set Scan Frequency

- This constant is only displayed if P and O or Scan and Hold is selected as MPPT Type (C-01).
- The scan frequency is settable from 1 minute to 4 hours and the factory setting is 1 hour. Press the UP and DOWN key to increase or decrease the length of time.
- P and O (Perturb and Observe) will run a full scan at the set time interval (frequency) and then do P and O scans at shorter intervals in between.
- Scan and Hold will run a full scan at the set time interval (frequency) and then hold the resultant MP until the next interval. This is also settable from 1 minute to 4 hours; factory is 1 hour.

C-03: Set Percentage VOC

- This constant is only displayed if Percentage is selected as MPPT Type (C-01).
- Percentage measures the VOC at the set time interval and calculates the operating Vmp based on the percentage set. The percentage set point can be from 0 – 100% and factory setting is 80%.

C-04: Set Percentage EveryTime

- This constant is only displayed if Percentage is selected as MPPT Type (C-01).
- When Percentage measure the VOC, the time interval can be set and time is 1 minute to 4 hours. Factory setting is 1 hour.

C-05: Set Hold Input Volts

- This constant is only displayed if Hold Input V is selected as MPPT Type (C-01).
- Hold Input Voltage will regulate based on the input voltage set (0-140V) for PM-SCC-80AM and (0-240V) for PM-SCC-160AMW, based on the panel type. The output current will be based on that voltage.

Group D
Auxiliary Relay 1

D-01: Set Aux Relay 1 Mode

- The Auxiliary Relays are useful for functions such as turning a generator on or off at low battery voltage or load change, turning on an external fan when battery

temperature increases, or shedding certain loads at specific times. Additional functions will be added in the future.

- Use Constant D-01 to select the Auxiliary Relay 1 mode and what it is based on.
- Auxiliary Relay 1 Mode includes OFF, ON, Solar Voltage, Output Voltage, Battery Voltage (only displayed and active when terminal BVS is connected to the battery), Output Current, Battery Current (only active when terminal BCS is connected with a Shunt 50mV, 500Amp), Premium MPPT Temperature, Battery Temperature (only active when terminal BTS is connected with a Battery Temperature Sensor, BTS-3), Premium MPPT Time and Battery State of Charge(only displayed when terminal BCS is connected with Shunt 500Amp, 50mV). The factory setting is OFF.
- D-02, D-03 and D-04 will not be displayed, when D-01 is set to be ON or OFF.

D-02: Aux RY1 ON Condition

- According to 9 selectable modes in D-01, use Constant D-02 to set the condition to activate the Auxiliary Relay 1 to be ON.
- The displayed setting range of D-02 will change to less than or greater than (< or >) depending on if D-02 or D-03 is higher or lower value. This allows setting on either a rising or falling voltage.
- Once entering the D-02, use UP and DOWN keys to increment and decrement the values.

Aux RY1 ON Condition	Setting Range of D-02	Setting Unit
When D-01= Solar Voltage	< or > 0~150V/0~250V	0.1V
When D-01=Output Volts	< or > 0~64V	0.1V
When D-01=Battery Volts	< or > 0~64V	0.1V
※ Battery Voltage is only displayed and active when terminal BVS is connected to the battery.		
When D-01=OUT Current	< or > 0~80A/0~160A	1A
When D-01=BATT Current	< or > -500~500A	1A
※ Battery Current is only active when terminal BCS is connected with a Shunt 50mV, 500Amp. ※ The values may be positive or negative as this input reads load current as well as charge current.		
When D-01=Premium MPPT Temp.	< or > -20~100℃	1℃
When D-01=Battery Temp.	< or > -20~100℃	1℃

※ Battery Temperature is only active when terminal BTS is connected with a Battery Temperature Sensor (BTS-3).		
When D-01=Premium MPPT Time	< or > 00~23 Hr 00~59 Min	1 Min
When D-01=Battery SOC	< or > 0~100%	1%
※ Battery SOC is only active when terminal BCS is connected with a Shunt 50mV, 500Amp.		

D-03: Aux RY1 OFF Condition

- According to 9 selectable modes in D-01, use Constant D-03 to set the condition to activate the Auxiliary Relay 1 to be OFF.
- The displayed setting range of D-03 will change to less than or greater than (< or >) depending on if D-02 or D-03 is higher or lower value. This allows setting on either a rising or falling voltage.
- Once entering the D-03, use UP and DOWN keys to increment and decrement the values.

Aux RY1 OFF Condition	Setting Range of D-03	Setting Unit
When D-01= Solar Voltage	< or > 0~150V/0~250V	0.1V
When D-01=Output Volts	< or > 0~64V	0.1V
When D-01=Battery Volts	< or > 0~64V	0.1V
※ Battery Voltage is only displayed and active when terminal BVS is connected to the battery.		
When D-01=OUT Current	< or > 0~80A	1A
When D-01=BATT Current	< or > -500~500A	1A
※ Battery Current is only active when terminal BCS is connected with a Shunt 50mV, 500Amp. ※ The values may be positive or negative as this input reads load current as well as charge current.		
When D-01=Premium MPPT Temp.	< or > -20~100℃	1℃
When D-01=Battery Temp.	< or > -20~100℃	1℃
※ Battery Temperature is only active when terminal BTS is connected with a Battery Temperature Sensor (BTS-3).		
When D-01=Premium MPPT Time	< or > 00~23 Hr 00~59 Min	1 Min

When D-01=Battery SOC	< or > 0~100%	1%
※ Battery SOC is only active when terminal BCS is connected with a Shunt 50mV, 500Amp.		

D-04: Aux RY1 MIN. ON time

- Use Constant D-04 is to set the minimum time that the relay can remain active.
- The minimum time is set to avoid the difference of the values set in D-02 and D-03 is so small to cause the damage on the relay due to the high frequency of relay action between ON and OFF.

Group E
Auxiliary Relay 2

E-01: Set Aux Relay 2 Mode
E-02: Aux RY2 ON Condition
E-03: Aux RY2 OFF Condition
E-04: Aux RY2 MIN. ON time

※ The functions and the settings of Auxiliary Relay 2 are exactly the same as those of Auxiliary Relay 1 so please refer to above Group D, Auxiliary Relay 1 description.

Group F
Parallel Setup

F-01: Premium MPPT Parallel MODE

- Use Constant F-01 to set up PREMIUM MPPT Network. Each PREMIUM MPPT in parallel requires a mode and address entry.
- The Mode choices are:

Setting	Usage
Standalone	Used when there is only one PREMIUM MPPT with a Remote Display connected.
Master	Used to assign the network master (this is the PREMIUM MPPT that connects to the shunt).
Slave	Assigns up to 15 additional PREMIUM MPPT slave units. The first PREMIUM MPPT is assigned as master and the rest

	of units in network are slaves. The network address will be assigned to each slave unit in F-02.

F-02: Premium MPPT Parallel Addr

- A PREMIUM MPPT assigned as Master or Standalone is always addressed 01 automatically so the address assignment in F-02 is only available for the slave units.
- The maximum slave address number is 16 and the factory setting is 2.

Group O
Operator

O-01: Set CLOCK Mode

- This is the same display as in the initialization setup of battery.
- Use Constant O-01 to change and select the hour format displayed between 12 Hour and 24 Hour. Factory setting is 12 Hour Format.
- When 12 Hour is selected, AM and PM indication will be shown in O-02.

O-02: Set Premium MPPT Time

- This is the same display as in the initialization setup of battery.
- When 12 Hour format is selected in O-01, AM and PM indication will be shown.
- Press ENTER to start to edit the Hour:Minute: Second number and press UP and DOWN key to increment or decrement the values.

O-03: Set Premium MPPT Date

- This is the same display as in the initialization setup of battery.
- Press ENTER key to start to edit the MM/DD/YY and press UP and DOWN key to increment or decrement the values.

O-04: Model Number

- The model number of the unit is displayed.

O-05: Turn OFF Backlight T

- Use Constant O-05 to set the operation of the LCD backlight. Since the backlight consumes a fair amount of quiescent current, it is recommended that the on time be as short as possible.
- Press ENTER key to enter the setting and press UP and DOWN key to turn off from NEVER (always on) or 1 to 10 minutes in 1 minute increments.

Note: When the backlight turns off, pressing any key will turn it back to U-00 display screen.

O-06: Fan Test

- Use Constant O-06 to test if the fan can be forced to be ON or OFF.
- When FAN ON is selected, the fan test is conducted as the O-06 screen remains. Once the screen leaves O-06, it will stop the test running.

O-07: Software Version

- The software version displayed is important and useful when contacting Power Master Support.

O-08: ***Bootloader***

- This is the Bootloader initiation display. It is only used to update the firmware.

*** Main Menu***
Data Log

G-01: EnergyHarvest Today 1

- This screen displays how much the solar energy was harvested “Today” in kWHr and AHr unit.

G-02: EnergyHarvest Today 2

- This screen displays how much time the charger was in Float mode “Today”.
- It is valuable to know that the charger enters Float mode because this is a clear

indication that the batteries have been fully recharged. If the value displayed in "G-02=FLOAT " is consistently 00.00 Hr, it means that the PV array is not sufficiently sized to keep up with the load. Use a generator for additional battery charging, reduce loads, or expand the PV array to ensure that batteries are fully recharged. For maximum service life batteries should be fully recharged at least once every five to ten days.

G-03: Set Day LOG# (1-90)

- Use G-03 to set the Day Log number to display the energy harvested from PV array (shown in G-04 and G-05) by PREMIUM MPPT MPPT over a period of time.

- If it is selected as #2 displays past power production since the last power cycle (or up to 90 days previous) along with the date of day before the current date. Use UP and DOWN keys to select the date by one and the energy harvested on the date shown is displayed in G-04.

G-04: Day LOG# :kWHr

- This screen displays how much the solar energy was harvested in kWHr and AHr according to the selected day shown in G-03.

G-05: Day LOG# @FLOAT

- This screen displays how much time the charger was in Float mode according to the selected day shown in G-03.

G-06: Average Last Days

- Use Constant G-06 to set the cumulative days for the average calculations of solar energy produced.

G-07: Last Days: kWHr

- This screen shows the average power produced over the past days (how many days are set in G-06) as both in kWHr and AHr.

G-08: Last Days@ FLOAT

- This screen displays how much average time the charger was in Float mode according to the selected cumulative days shown in G-06.

G-09: Clear Energy Harvest

- Use Constant G-09 to clear Today's Data or all the Logged Data.
- Press ENTER key and use UP and DOWN keys to select between Today's Data and Logged Data and then press ENTER key again to clear the selected data.

Chapter 6 Trouble Shooting

- Proceed as follows for a quick detection of common faults.
- Consult your dealer if the fault cannot be resolved.

Problem or Error message	Cause	Solution
ERROR!!! High Input Voltage	When the PV array voltage is higher than 140VDC for PM-SCC-80AM or higher than 240VDC for PM-SCC-160AMW, the battery charging stops.	Make sure the PV array voltage is within the rated voltage range.
ERROR!!! Premium MPPT Over-Temp.	The ambient temperature is too high and it causes the over temperature of heatsink.	Place the Premium MPPT unit in a cool and well-ventilated room.
ERROR!!! Battery Over-Temp.	The battery temperature is detected too high by the Battery Temperature Sensor (BTS-3).	Check the battery condition and place the battery bank in an well-ventilated room.
ERROR!!! Parallel COM Failed Dropped ERROR!!! Premium MPPT Over-Temp.	The communication failure between Master and Slave units or between Slave and Slave units has occurred.	Check the connecting cables between Master and Slave units or the cables among Slaves.