



samlexpower®

**Remote Control for
Evolution™ Series
Inverter/ Charger**

Model: EVO-RC-PLUS

**Owner's
Manual**

Please read this
manual **BEFORE**
operating.

NOTE: REMOTE CONTROL MODEL NO. EVO-RC-PLUS IS OPTIONAL AND IS REQUIRED TO BE ORDERED SEPARATELY.

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SECTION 1 | Introduction and Layout

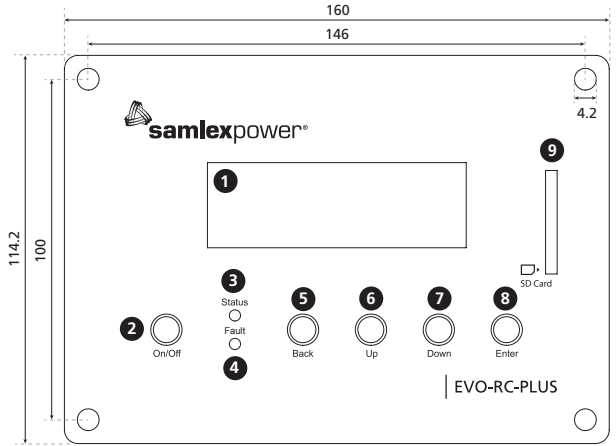
1.0 INTRODUCTION

The EVO-RC-PLUS Remote Control allows you to monitor and customize the operating parameters of Samlex EVO™ Inverter/Chargers Models EVO-1212F / 1212F-HW, 1224F / 1224F-HW, 2212, 2224, 3012 and 4024. Layout is shown in Fig 1 below.

It has its own internal Real Time Clock and Super Capacitor Type of Battery for clock operation.

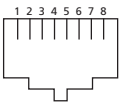
1.1 LAYOUT AND DIMENSIONS

1. LCD Screen:
 - 4 rows of 20 characters each
 - Blue screen with white characters
2. ON/OFF Key
3. Blue LED "Status"
4. Red LED "Alarm"
5. Navigation Key "Back"
6. Navigation Key "Up"
7. Navigation Key "Down"
8. Navigation Key "Enter"
9. SD Card Slot – FAT16/32 format, up to 16 GB



10. RJ-45 Jack

Pin #	Signal
1	12V
2	12V
3	ON/OFF
4	D+
5	D-
6	NC
7	GND
8	GND



11. RJ-12 Jack

Pin #	Signal
1	NC
2	GND
3	D-
4	D+
5	12
6	ON/OFF



View - Looking into the Jack)

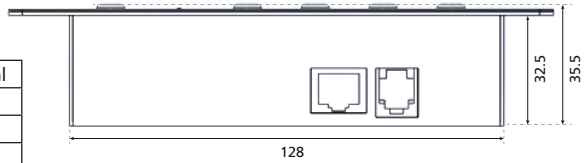


Fig 1.1 Layout and dimensions of Remote Control Model EVO-RC PLUS

1.2 CONNECTING CABLE

Details of connecting cable provided with the Remote Control are as follows:

- Length: 10m / 33ft
- No of conductors: 8
- Modular Plug: 8P8C, RJ-45
- Plug interconnection: Straight (See Pinout at Fig 1.2)

SECTION 1 | Introduction and Layout

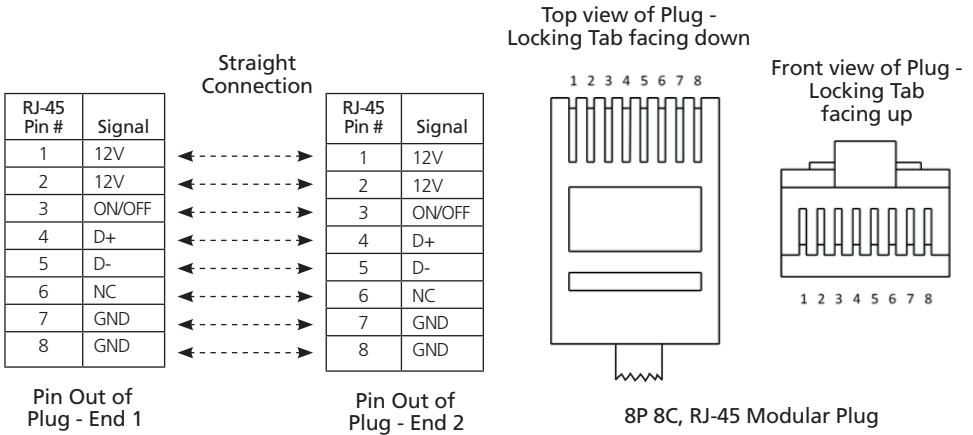


Fig 1.2 Pin Out of Plugs for 8P8C, RJ-45 Connecting Cable

1.3 PINOUT DIAGRAMS & INTERNAL INTERCONNECTION OF RJ-45 & RJ-12 JACKS

RJ-45 Jack (10, Fig 1.1) and RJ-12 Jack (11, Fig 1.1) are internally connected as pinout at Fig 1.3.

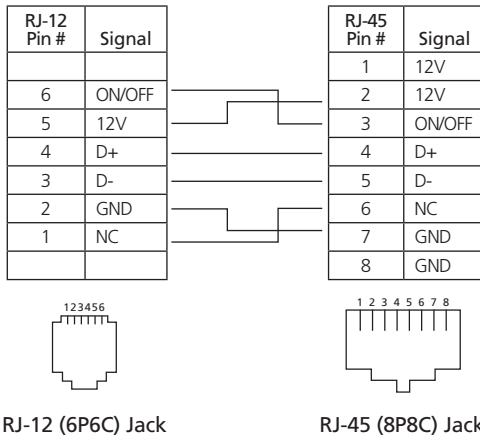


Fig 1.3 Pinout and internal interconnections of RJ-45 and RJ-12 (6P6C) Jacks on EVO-RC-PLUS

SECTION 1 | Introduction and Layout

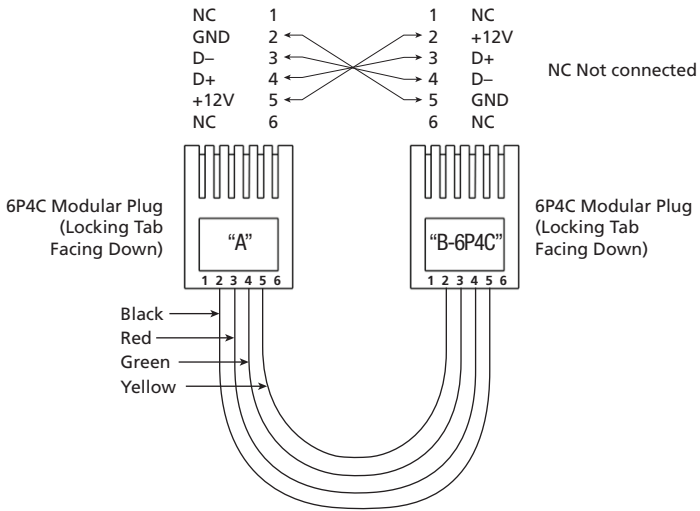


Fig 1.4 RJ-11 (6P4C) cross connected cable

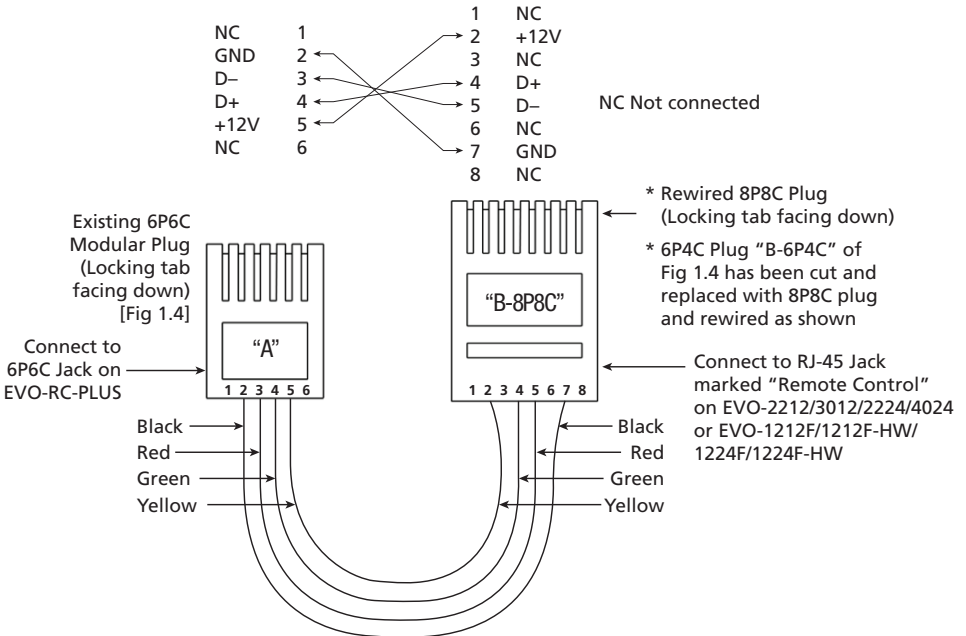


Fig 1.5 RJ-11 (6P4C) cable [Fig 1.4] rewired on one end with RJ-45 (8P8C) Modular Plug

SECTION 2 | Installation

2.0 INSTALLATION GUIDELINES

EVO-RC-PLUS is provided with 10M/33ft, RJ-45 data cable (straight wired). Check the proposed routing distance of the wire and use longer wire, if necessary.

- Flush mounting of the Remote requires appropriate cut-out in the wall/panel - See Fig 2.1.
Full scale installation Template for panel cut-out and pilot holes for mounting screws is also provided along with the unit. Take necessary precautions to ensure any wiring/plumbing running behind the wall/panel is not damaged.
- Route the wire to ensure there are no kinks.
- Use appropriate grommets when the wire is passed through holes in studs/partitions to prevent damage to insulation.

2.1 TOOLS REQUIRED

Following tools are recommended:

- Phillips head screwdriver
- Level
- Hand Drill
- Knife/Saw
- Pencil
- Drill Bit (2mm / 5/64")

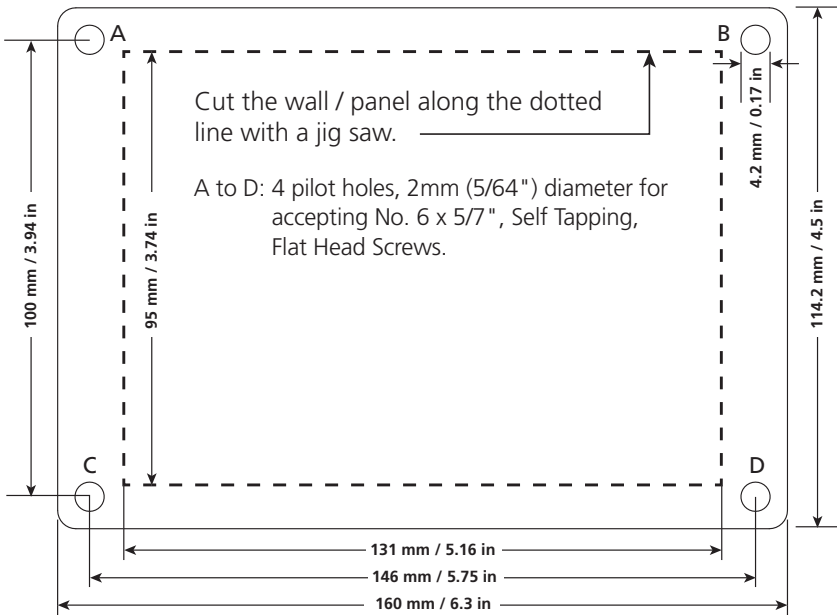


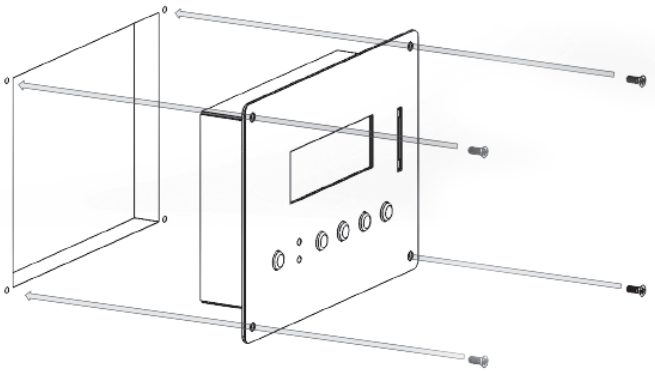
Fig 2.1 EVO-RC-PLUS Remote installation details

2.2 FLUSH MOUNT INSTALLATION

To flush mount, the wall opening must have at least 2" (5 cm) depth to make room for the remote and cable. Also, the thickness of wall/panel board at the place of mounting should not be more than 13 mm to ensure that the RJ-45 / RJ-12 Jack openings are not obstructed (see Fig. 2.3).

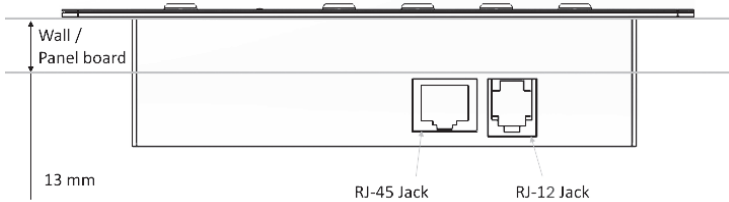
SECTION 2 | Installation

1. Cut an opening in the wall using the supplied Installation Template (based on Fig 2.1).
2. Drill four pilot holes (use 2mm / 5/64" diameter drill bit) for 4 screw (Self Taping, Flat Head No. 6 x 5/8" long) that will attach the remote to the wall (refer to Fig. 2.1 for hole locations and dimensions).
3. Route one end of the cable through wall opening to the EVO™ Inverter/Charger, and then plug it into the RJ-45 Remote Control Jack port on the EVO™ Inverter/Charger
4. Take the other end of the remote cable and plug it into the RJ-45 / RJ-12 Jack at the back of the EVO-RC-PLUS (Fig. 2.3).
5. Check the remote display to ensure the Power-up Self Test initiates.
6. If the self test is successful, secure the EVO-RC-PLUS to the wall using the four screws (Fig. 2.2).



Flush mounting the EVO-RC-PLUS on the wall with 4 screws:
No. 6 x 5/8", Self Tapping, Flat Head.

Fig 2.2 EVO-RC-PLUS Flush Mounting



The thickness of the wall/panel board at the place of mounting should not be more than 13 mm to ensure that the RJ-45 / RJ-12 jack openings are not obstructed.

Fig 2.3 Wall/Panel Thickness

SECTION 3 | Operation

3.0 GENERAL INFORMATION

EVO-RC-PLUS Remote Control provides the user with the ability to monitor the operation and also to modify EVO™ Inverter/Charger's operating parameters. The default settings in EVO™ Inverter/Charger are adequate for some installations but may have to be modified for others. This Section provides details on the remote functions, status and menu maps and displays, fault messages and parameter settings.

3.1 NAVIGATING THE REMOTE

Please refer to the layout at Fig. 1.1.

- **LCD Display (1)** – The 4-line (20 characters each) LCD display shows status and information for the EVO™ Inverter/Charger. All Setup Menus and faults also appear on the LCD display.
- **ON/OFF Key (2)** – The On/Off Key is used for switching on/ switching off the EVO™ Inverter/Charger and also to enter/exit Standby Mode.
- **Navigation Keys (5, 6, 7, 8)** – These four keys allow simple access to Menu Item that assists configuring, monitoring, and troubleshooting the EVO™ Inverter/Charger.
 - **Navigation Key Functions:**
 - **Back** – Return to previous selection
 - **Up** – Move from lower to upper Menu Screen in various Menu Maps e.g. Fig 3.1 (a)
 - **Down** – Move from upper to lower Menu Screen in various Menu Maps e.g. Fig 3.1(a)
 - **Enter** – Select/write a particular value or option.
- **Status** – Blue LED indicator for indicating operating status (see details at Section 6, Table 6.1).
- **Fault** – Red LED indicator for indicating fault conditions (see details at Section 6, Table 6.1).
- **SD Card slot** – This slot supports SD memory card (up to 16GB, FAT16/32). The SD Card is used for data logging of EVO™ Inverter/Charger's operational statistics and events and saving and uploading of programmed parameters. See Section 5: SD Card.

SECTION 3 | Operation

3.2 POWER ON / POWER OFF

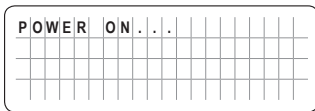


INFO

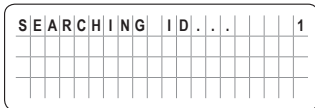
- a) Minimum battery voltage required for initiating *manual* switching ON of the unit is as follows:
- 12V units ----- Higher than 9V
 - 24V units ----- Higher than 18V
- b) Please note that this unit is designed to POWER ON AUTOMATICALLY if (i) AC voltage of $70V \pm 5$ VAC is available at the AC Input Terminals and (ii) DC input voltage is $> 12V$ for 12V versions of EVO™ and $>24V$ for 24V versions of EVO™. If the AC input voltage and frequency are within the programmed limits, the unit will automatically operate in "Charging Mode". If the AC input voltage and frequency are not within the programmed limits, the unit will operate in "Inverting" Mode. Further, as long as AC input voltage $> 70 \pm 5$ VAC is present, the unit CANNOT BE POWERED OFF using the ON / OFF Button on the front panel of the unit or on the Remote Control EVO-RC-PLUS. Switch OFF the AC input first if the unit is required to be powered off. However, if the unit is in "Fault Mode", it will be possible to power OFF the unit with the help of the ON/OFF Push Button.
- c) Before proceeding, confirm that the unit is NOT in "Standby" Mode. If it is in "Standby Mode", the "Status" LED (3, Fig 1.1) will flash once every 5 sec and the LED screen will display one of the "Standby Mode" Screens show in Figs 3.1(a) / 3.1(b). Press the On/Off Push Button (2, Fig 1.1) on the EVO-RC-PLUS to exit the "Standby Mode" to the current operating mode. Refer to Section 3.4 for more details on "Standby Mode".

3.2.1 Power ON - AC INPUT IS NOT PRESENT

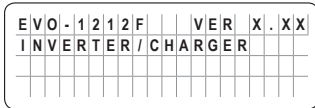
The sequence given below is applicable when there is no AC input and the unit is switched ON. Press On/Off Key and hold for 2 second to turn the EVO™ Inverter/Charger ON.



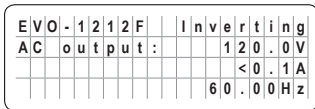
Screen (a)



Screen (b)



Screen (c)



Screen (d)

When the EVO™ Inverter/Charger is OFF and the On/Off Key is pressed and held, the LCD screen shows "POWER ON..." [Screen (a)] and the Status LED flashes 3 times. On/Off key may be released now. After 2 seconds, EVO-RC-PLUS starts to search for the communication ID of the EVO™ Inverter/Charger it is attached to. The LCD screen shows "SEARCHING ID ..." [Screen (b)] and the ID number which is found is shown at the end of the line. When the default ID of "1" is found, the display will then show the EVO™ Inverter/Charger Model No. and firmware version (3 digit number X.XX) [Screen (c)]. The screen will then change to the Inverting Mode Screen [Screen (d)].

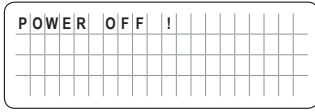
NOTE: If the EVO™ Inverter/Charger has AC input voltage over 70 ± 5 VAC available at the Grid/Generator inputs, the Power OFF function is disabled and the unit will remain in the ON condition if the power off sequence is attempted. The AC input must be removed before the unit can be powered OFF.

SECTION 3 | Operation

3.2.2 Power OFF - AC INPUT IS NOT PRESENT

The sequence given below is applicable when no AC input is present and the unit is powered OFF.

Press On/Off Key and hold for 5 seconds to turn OFF the EVO™ Inverter/Charger.



When EVO™ Inverter Charger is ON and the On/Off key is pressed and held for minimum of 5 seconds, the LCD screen will show "POWER OFF !" and both the Status and Alarm LEDs will turn ON. Now release the On/Off key (**please note that Power Off sequence will be completed and display "POWER OFF !" will disappear only when the On/Off key is released**).

NOTE: If the EVO™ Inverter/Charger has AC input voltage over 70 ± 5 VAC available at the Grid/Generator inputs, the Power OFF function is disabled and the unit will remain in the ON condition if the power off sequence is attempted. The AC input must be removed before the unit can be powered OFF.

3.3 DATE AND TIME SETUP

Set date and time as per procedure given at Section 4.9: "Group 6 Parameter Setup: Time Setting".

3.4 STANDBY MODE

When the EVO™ is in Standby Mode, inverting or charging / AC pass through will be suspended.



INFO

Standby Mode may be used to temporary halt normal operation of the Inverter/Charger without switching OFF the unit completely.

For the Standby Mode to be switched ON, the EVO™ should be in ON condition and should be operating in one of the 4 Operating Modes – "Inverting" or "Charging", "Power Saving" or "Online" (See Fig 3.1). When Standby Mode is switched ON, the EVO™ will exit its Operating Mode i.e. inverting or charging / AC pass through will be suspended.

Standby Mode is toggled between ON and OFF conditions as follows:

- By momentary pressing (0.1 sec) of ON/OFF Push Key (2, Fig 1.1), OR
- By momentary pressing (0.1 sec) of ON/OFF Push Button on the front panel of the unit (11, Fig 2.1 in the Owner's Manual for Evolution™ Series Inverter/Charger Models).

When the EVO™ is in "Standby Mode", operational status will be displayed as follows:

- **On the Remote Control EVO-RC-PLUS:**
 - Blue LED marked "Status" (3, Fig 1.1) will blink once every 5 sec. Red LED marked "FAULT" (4, Fig 1.1) will be off
 - The LCD will display "Standby" Mode screens as follows:
 - (i) For EVO-1212F/1212F-HW/1214F/1224F-HW: As per "Standby" Mode Menu Map at Fig 3.2(a).
 - (ii) For EVO-2212/3012/2224/4024: As per "Standby" Mode Menu Map at Fig 3.2(b).
 - No buzzer

SECTION 3 | Operation

- **On the front panel of EVO™:**

- No LED display. LED marked "ON" and Red LED marked "FAULT" will both be OFF.
- No buzzer
- LED marked "ON" (12, Fig 2.1 in the Owner's Manual for Evolution™ Series Inverter/Charger) will blink once every 5 sec.
- Red LED marked "FAULT" (13, Fig 2.1) in the Owner's Manual for Evolution™ Series Inverter/Charger) will be OFF.
- No buzzer

3.5. FAULT CLEARING

If any fault occurs, the LCD screen will display the Fault Message and the Red LED "Fault" will be lighted. Remove cause of the fault. The unit will remain in Fault Mode unless it is cleared. A short press (0.1 seconds) of the On/Off key will clear the Fault Message and the EVO™ Inverter/Charger will return to the operational status (if the fault condition no longer exists). Refer to section 7 on "Fault Messages".

3.6 OPERATING MODES AND ASSOCIATED LCD DISPLAY SCREENS

3.6.1 General Information

When the unit is operating normally, the LCD Screen will display the name of the Operating Mode and values of various associated operating parameters. As all the operating parameters associated with a particular Operating Mode cannot be displayed in one screen, multiple screens are available that can be accessed using the Up and Down Keys. For ease of navigating through the various screens, all the screens covering a particular Operating Mode are shown and arranged in a Menu Map – for example, see Menu Map for Inverting Mode at Figs 3.2(a) and 3.2(b). Table 3.1 shows the names of the Operating Modes and the Fig Nos. of the associated Menu Maps.

Typical Operating Mode Display Screen is shown in Fig 3.0 [Copy of Screen 1 of Inverting Mode Menu Map at Fig 3.2(a)]. There are 4 lines of display (up to 20 characters per line). The 1st line shows the Model No on the left side and the Operating Mode on the right side. The 2nd, 3rd and the 4th lines display various operating parameters and their values.

E	V	O	-	1	2	1	2	F		I	n	v	e	r	t	i	n	g		
A	C								:				1	2	0	.	0	V		
																<	0	.	1	A
													6	0	.	0	0	H	z	

**Fig 3.0 Typical Operating Mode Display Screen
[Screen No. 1 of Inverting Mode Menu Map at Fig 3.2(a)]**

SECTION 3 | Operation

Table 3.1 Operating Modes and Associated LCD Display Screens

Operating Mode Display	Description	Operating Mode Screen Menu Map	
		Models EVO-1212F / 1212F HW / 1224F / 1224F-HW	Models EVO-2212 / 3012 / 2224 / 4024
Standby	Standby Mode: No output, No AC bypass, No Charging	Fig 3.1(a), Section 3.6.2.1	Fig 3.1 (b), Section 3.6.2.2
Inverting	Unit is operating as an inverter	Fig 3.2(a), Section 3.6.3.1	Fig 3.2(b), Section 3.6.3.2
Charging	Unit is operating as a battery charger and passing through the AC input to the loads	Fig 3.3(a), Section 3.6.4.1	Fig 3.3(b), Section 3.6.4.2
PowerSave	Unit is in Power Saving Mode	Fig 3.4(a), Section 3.6.5.1	Fig 3.4(a), Section 3.6.5.2
Online	Unit is in On Line Mode	Fig 3.5, Section 3.6.6	
Chrg Only	Under "ONLINE MODE" only (Option 2=Charger Only). Provides charging and pass through when the AC input is available. No inverting when the AC input is not available.	Fig 3.6(a), Section 3.6.7.1	Fig 3.6(b), Section 3.6.7.2
Charger Off by BMS	Applicable when BATTERY TYPE Option 1=Lithium is selected. This mode is activated when the Lithium Battery Management System (BMS) sends command to EVO™ (contact closure signal) to stop charging to prevent battery over voltage or over temperature.	Fig 3.7, Section 3.6.8	
Inverter stop by BMS	Applicable when BATTERY TYPE Option 1=Lithium is selected. This mode is activated when the Lithium Battery Management System (BMS) sends command to EVO™ (contact closure signal) to stop inverting to prevent deep discharge of the battery.	Fig 3.8, Section 3.6.9	

SECTION 3 | Operation

3.6.2 Menu Map for Standby Mode Screens

Menu Maps for the Operating Mode Screens for the Standby Mode are shown as follows:

- Section 3.6.2.1: Fig 3.1(a) for Models EVO-1212F / 1212F-HW / 1224F / 1224F-HW (Model No. shown in the screens is EVO-1212F)
- Section 3.6.2.2: Fig 3.1(b) for Models EVO-2212 / 3012 / 2224 / 4024 (Model No. shown in the screens is EVO-3012)

3.6.2.1 Menu Map for Standby Mode Screens for EVO-1212F / 1212F-HW / 1224F / 1224F-HW

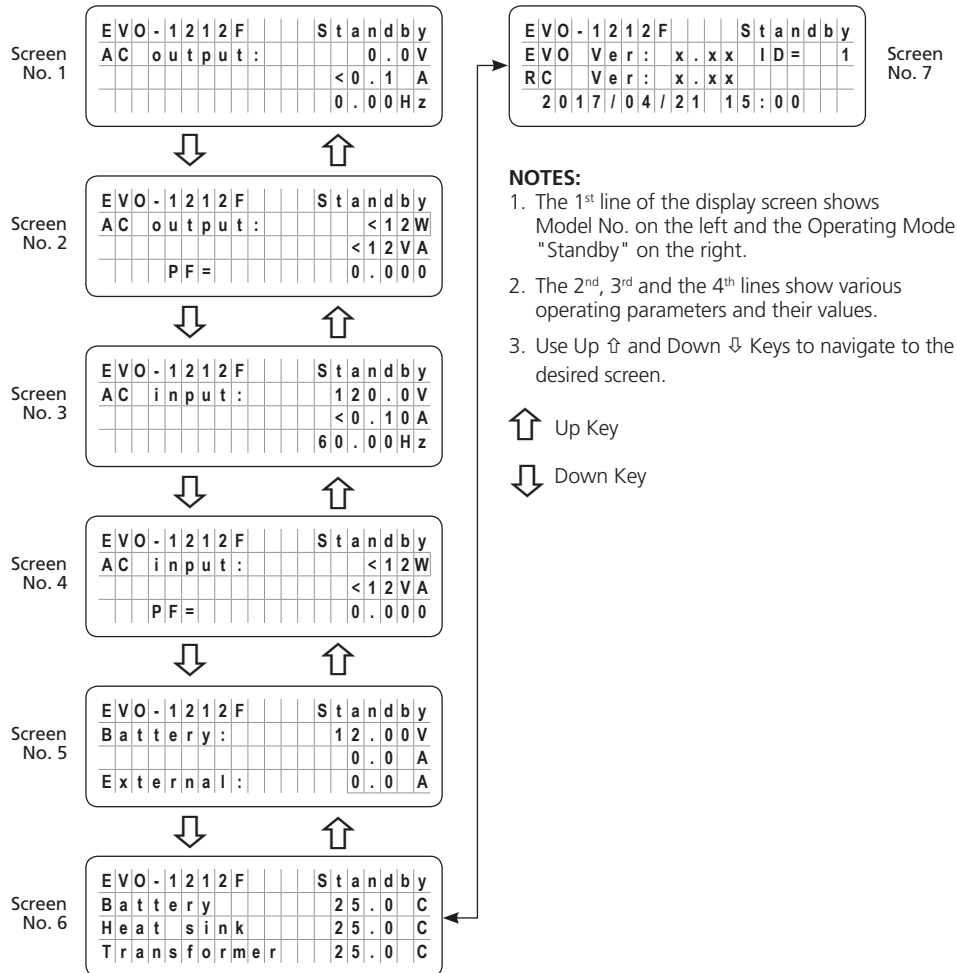


Fig 3.1(a) Menu Map for Standby Mode Screens for Models EVO-1212F / EVO-1212F-HW / 1224F / 1224F-HW (Model No. shown is EVO-1212F)

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3.6.2.2 Menu Map for Standby Mode Screens for EVO-2212 / 3012 / 2224 / 4024

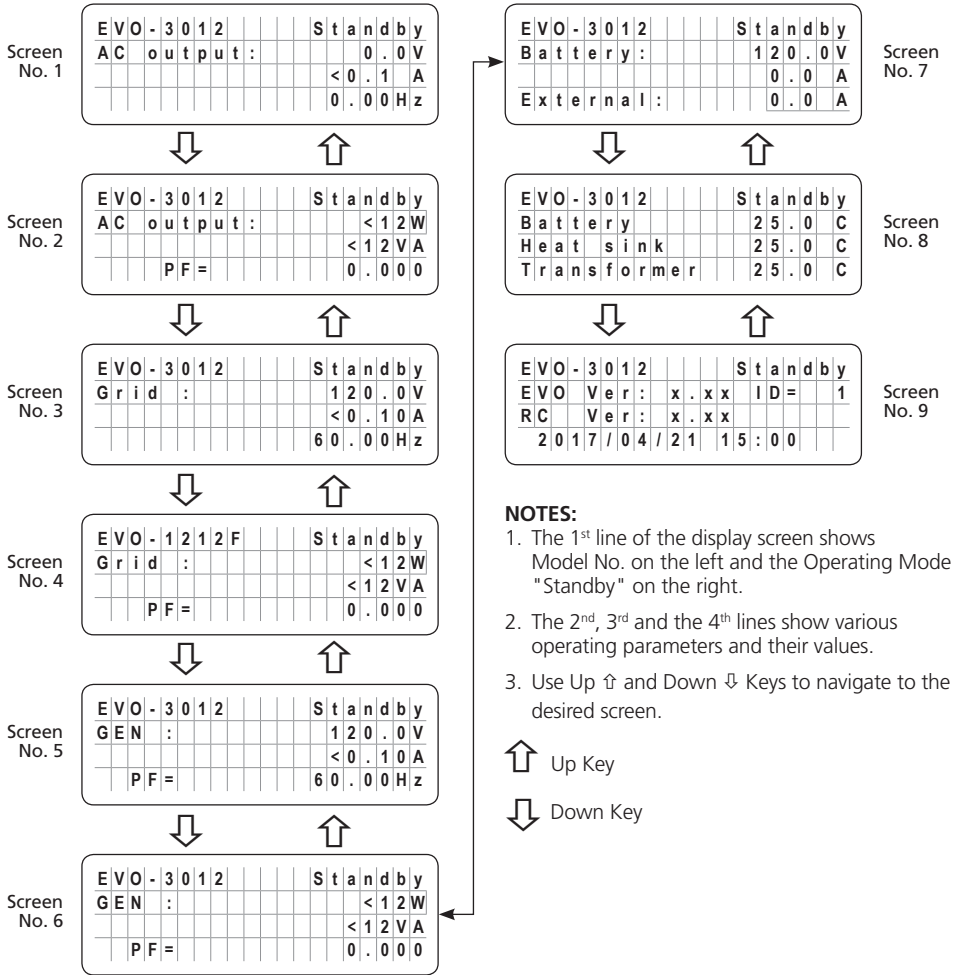


Fig 3.1(b) Menu Map for Standby Mode Screens for Models EVO-2212 / 3012 / 2224 / 4024

SECTION 3 | Operation

3.6.3 Menu Map for Inverting Mode Screens

Menu Maps for the Operating Mode Screens for the "Inverting" Mode are shown as follows:

- Section 3.6.3.1; Fig 3.2(a) for Models EVO-1212F / 1212F-HW / 1224F / 1224F-HW (Model No. shown in the screens is EVO-1212F).
- Section 3.6.3.2; Fig 3.2(b) for Models EVO-2212 / 3012 / 2224 / 4024 (Model No. shown in the screens is EVO-3012).

3.6.3.1 Menu Map for Inverting Mode Screens for Models EVO-1212F / 1212F-HW / 1224F / 1224F-HW

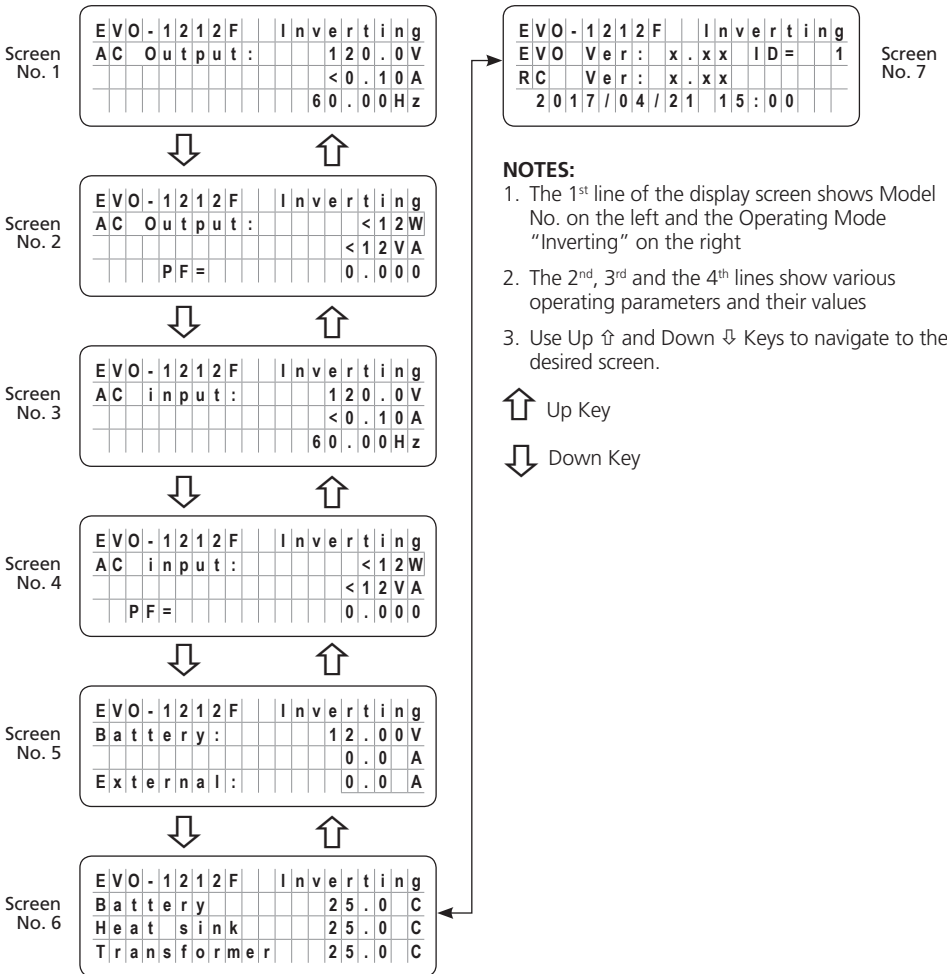


Fig 3.2(a) Menu Map for Inverting Mode Screens for Models EVO-1212F / 1212F-H / 1224F / 1224F-HW (Model No. Shown is EVO-1212F)

SECTION 3 | Operation

3.6.3.2 Menu Map for Inverting Mode Screens for Models EVO-2212 / 3012 / 2224 / 4024

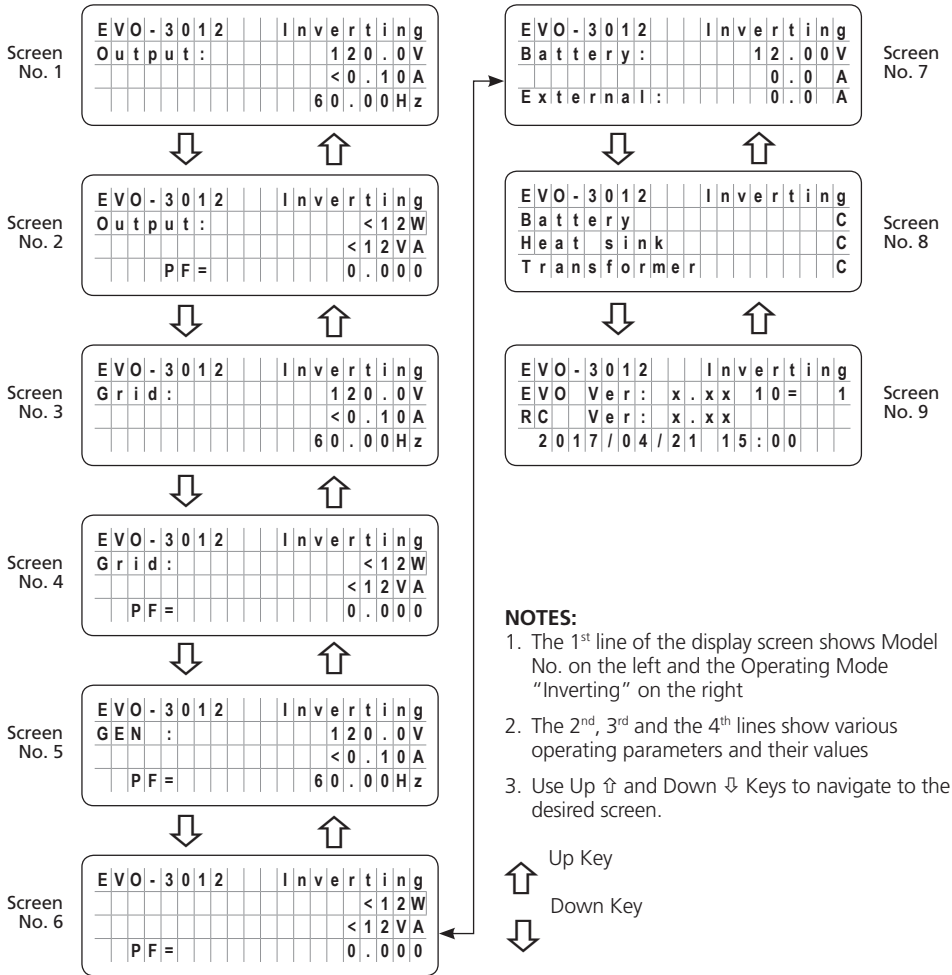


Fig 3.2(b) Menu Map for Inverting Mode Screens for Models EVO-2212 / 3012 / 2224 / 4024 (Model No. shown is EVO-3012)

SECTION 3 | Operation

3.6.4 Menu Map for Charging Mode Screens

Menu Map for the Operating Mode Screens for the "Charging" Mode are shown as follows:

- [Section 3.6.4.1](#): Fig 3.3(a) for Models EVO-1212F / 1212F-HW / 1224F / 1224F-HW (Model No. shown in the screens is EVO-1212F).
- [Section 3.6.4.2](#): Fig 3.3(b) for Models EVO-2212 / 3012 / 2224 / 4024 (Model No. shown in the screens is EVO-3012).

3.6.4.1 Menu Map for Charging Mode Screens for Models EVO-1212F / 1212F-HW / 1224F / 1224F-HW

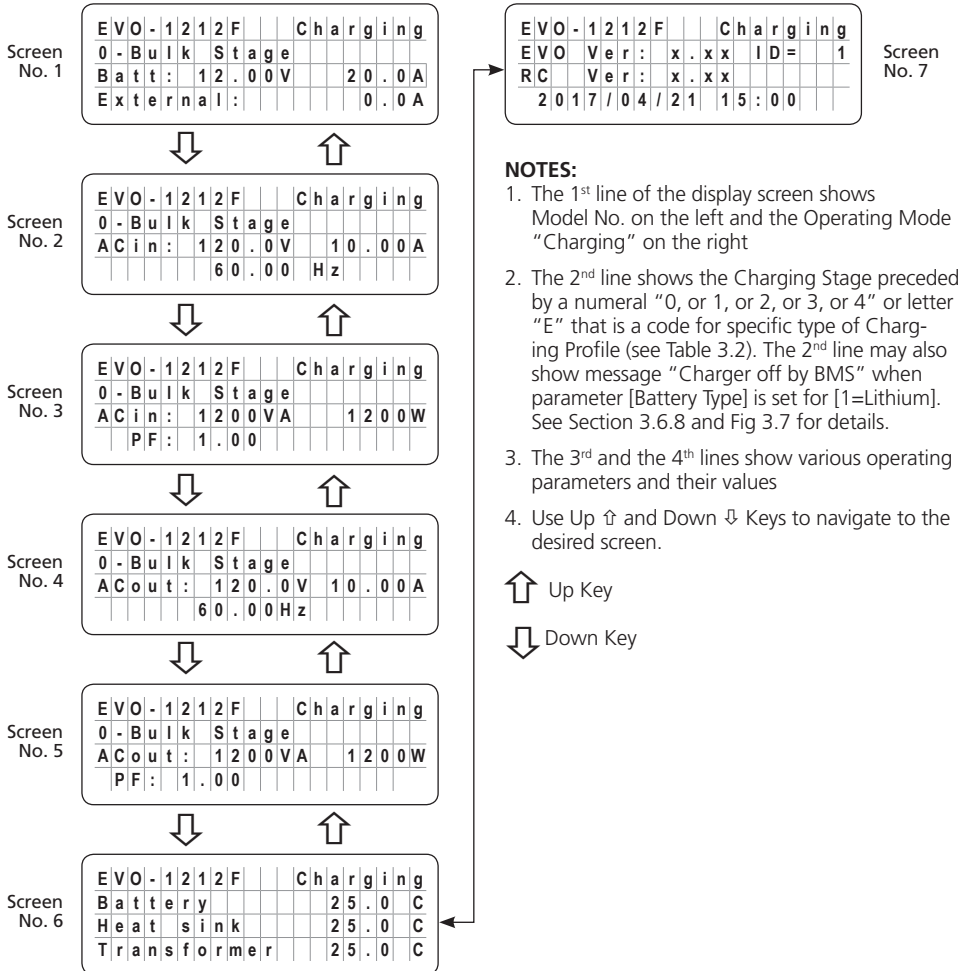


Fig 3.3(a) Menu Map for Charging Mode Screens for Models EVO-1212F / 1212F-HW / 1224F / 1224F-HW (Model No. shown is EVO-1212F)

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3.6.4.2 Menu Map for Charging Mode Screens for Models EVO-2212 / 3012 / 2224 / 4024

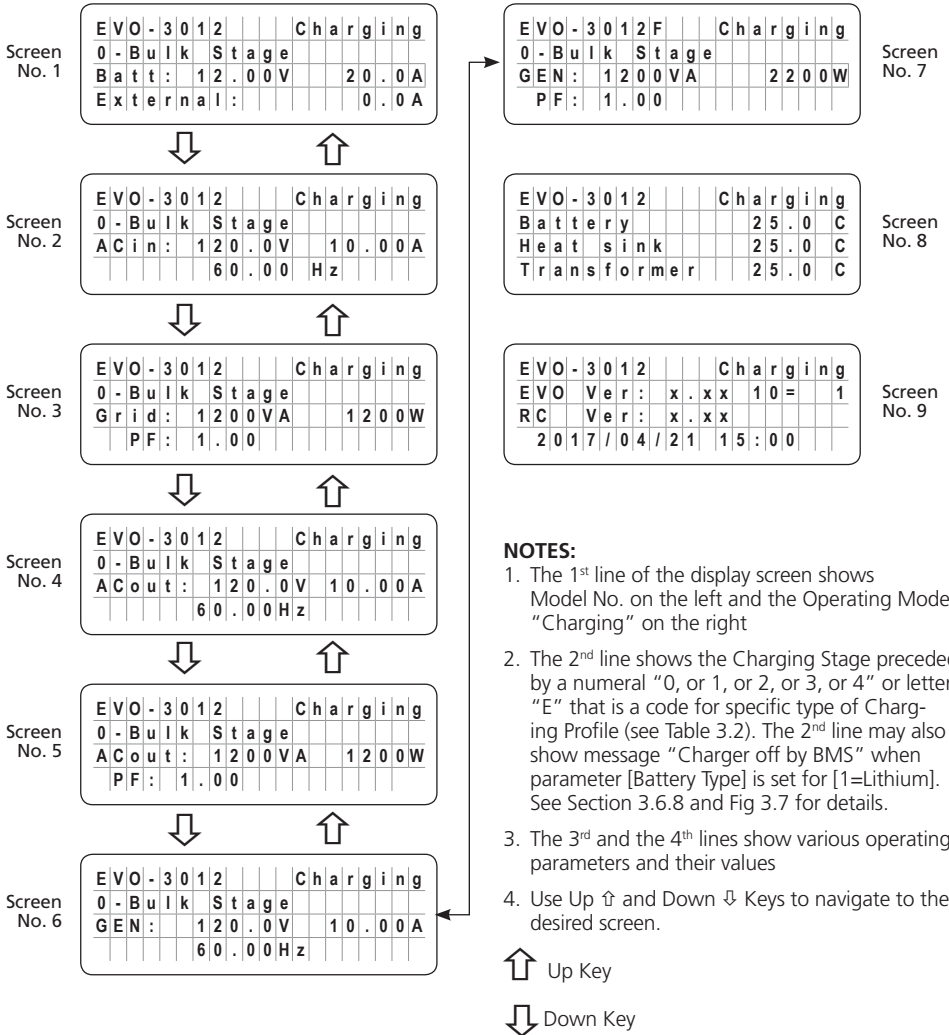


Fig 3.3(b) Menu Map for Charging Mode Screens for Models EVO-2212 / 3012 / 2224 / 4024 (Model No. shown is EVO-3012)

SECTION 3 | Operation

3.6.4.3 Details of Charging Profiles in Charging Mode Screens

Refer to the 2nd Line of the following Charging Mode Screens:

- Fig 3.3(a) under Section 3.6.4.1 for Models EVO-1212F / 1212F-HW / 1224F / 1224F-HW
- Fig 3.3(b) under Section 3.6.4.2 for Models EVO-2212 / 3012 / 2224 / 4024

Details of information related to this line on the screen are shown in Table 3.2.

Table 3.2 Details of Charging Profiles indicated in 2nd line of Charging Mode Screens	
2nd Line of Screens in Fig 3.3(a) & 3.3(b)	Description
0- Bulk Stage	Constant Current, Bulk Stage, Charging Profile=0 (3-Stage Adaptive)
1- Bulk Stage	Constant Current, Bulk Stage, Charging Profile=1 (3-Stage Type 1)
2- Bulk Stage	Constant Current, Bulk Stage, Charging Profile=2 (3-Stage Type 2)
3- Bulk Stage	Constant Current, Bulk Stage, Charging Profile=3 (2-Stage Type 1)
4- Bulk Stage	Constant Current, Bulk Stage, Charging Profile=4 (2-Stage Type 2)
E- Bulk Stage	Constant Current, Bulk Stage, Equalize - 4Stages (1=Yes)
0- Absorption Stage	Constant Voltage, Absorption Stage, Charging Profile=0 (3-Stage Adaptive)
1- Absorption Stage	Constant Voltage, Absorption Stage, Charging Profile=1 (3-Stage Type 1)
2- Absorption Stage	Constant Voltage, Absorption Stage, Charging Profile=2 (3-Stage Type 2)
3- Absorption Stage	Constant Voltage, Absorption Stage, Charging Profile=3 (2-Stage Type 1)
4- Absorption Stage	Constant Voltage, Absorption Stage, Charging Profile=4 (2-Stage Type 2)
E- Absorption Stage	Constant Voltage, Absorption Stage, Equalize - 4Stages (1=Yes)
E- Equalization Stage	Constant Voltage, Equalization Stage, Equalize - 4Stages (1=Yes)
0-Float Stage	Float Stage, Charging Profile=0 (3-Stage Adaptive)
1- Float Stage	Float Stage, Charging Profile=1 (3-Stage Type 1)
2- Float Stage	Float Stage, Charging Profile=2 (3-Stage Type 2)
3- Charger Off	Charger Off, AC Bypass, Charging Profile=3 (2-Stage Type 1)
Charger Off by BMS	Charger Off by BMS (Battery Type=Lithium)
Inverter Stop by BMS	Inverter Stop by BMS (Battery Type: 1=Lithium)
Inverter Off	Charger only, Inverter Off (Online Mode=2, Charger only)

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3.6.5 Menu Maps for Power Save Mode Screens

Menu Maps for the Operating Mode Screens for the Power Save Mode are shown as follows:

- Section 3.6.5.1: Fig 3.4(a) for Models EVO-1212F / 1212F-HW / 1224F / 1224F-HW (Model No. shown in the screens is EVO-1212F).
- Section 3.6.5.2: Fig 3.4(b) for Models EVO-2212 / 3012 / 2224 / 4024 (Model No. shown in the screens is EVO-3012).

3.6.5.1 Menu Maps for Power Save Mode Screens for EVO-1212F / 1212F-HW / 1224F / 1224F-HW

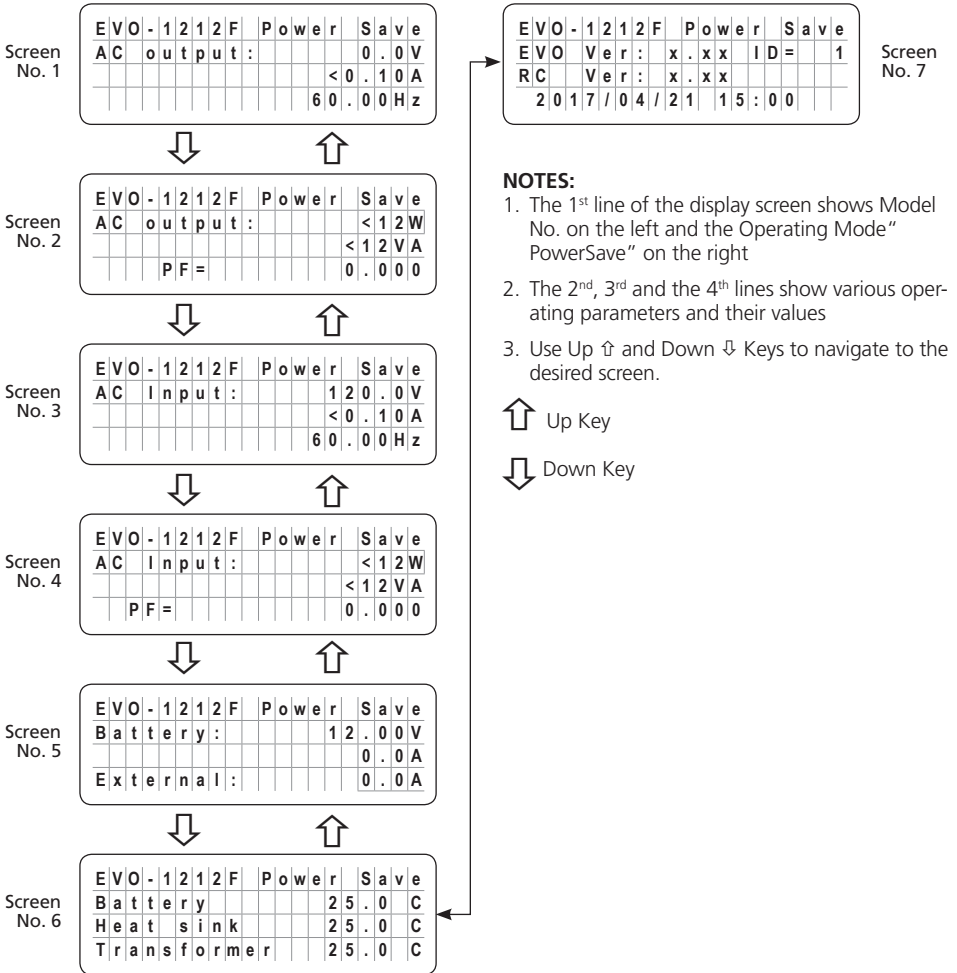


Fig 3.4(a) Menu Map for Power Save Mode Screens for EVO-1212F / 1212F-HW / 1224F / 1224F-HW (Model No. shown is EVO-1212F)

SECTION 3 | Operation

3.6.5.2 Menu Maps for Power Save Mode Screens for EVO-2212 / 3012 / 2224 / 4024

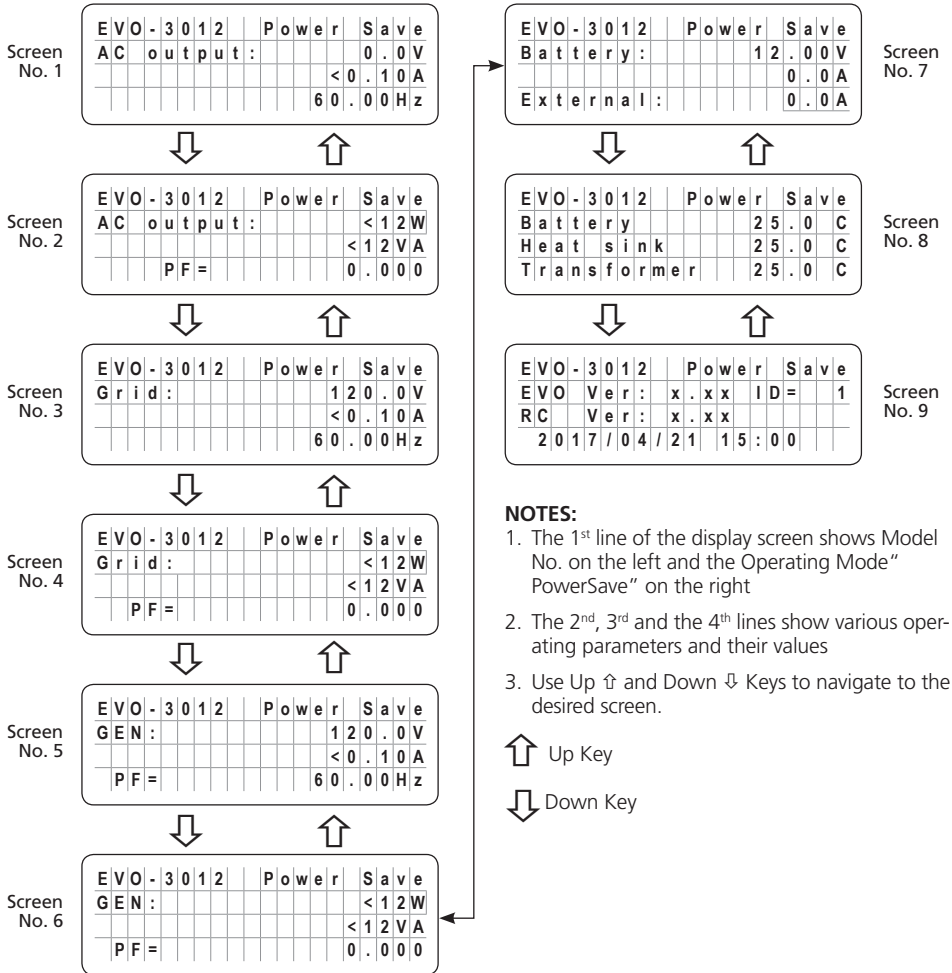


Fig 3.4(b) Menu Map for Power Save Mode Screens for EVO-2212 / 3012 / 2224 / 4024 (Model No. shown is EVO-3012)

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3.6.6 Menu Maps for On-Line Mode Screens

Menu Maps for the On-Line Mode Screens will be similar to the following Menu Map Screens for the default Off-Line Mode except for some changes explained below:

Mode	Menu Map Screens for Models EVO-1212F / 1212F-HW / 1224F / 1224F-HW	Menu Map Screens for Models EVO-2212 / 3012 / 2224 / 4024
Standby Mode	Fig 3.1(a), Section 3.6.2.1	Fig 3.1(b), Section 3.6.2.2
Inverting Mode	Fig 3.2(a), Section 3.6.3.1	Fig 3.2(b), Section 3.6.3.2
Charging Mode	Fig 3.3(a), Section 3.6.4.1	Fig 3.3(b), Section 3.6.4.2
Power Save Mode	Fig 3.4(a), Section 3.6.5.1	Fig 3.4(b), Section 3.6.5.2

In the On-Line Mode Screens, the top right of the 1st line displaying the "Operating Mode" will switch every 2 sec between the "Operating Mode" and "Online" as shown in Fig 3.5(a) to (d) below:

EVO-1212F	Standby
AC output:	0.0V
	<0.10A
	00.00Hz

These 2 screens will switch every 2 sec

EVO-1212F	Online
AC output:	0.0V
	<0.10A
	00.00Hz

Fig 3.5(a) Example of Screen No. 1 of Online / Standby Mode Menu Map Screens

EVO-1212F	Inverting
AC output:	120.0V
	<0.10A
	60.00Hz

These 2 screens will switch every 2 sec

EVO-1212F	Online
AC output:	120.0V
	<0.10A
	60.00Hz

Fig 3.5(b) Example of Screen No. 1 of Online / Inverting Mode Menu Map Screens

EVO-1212F	Charging
0-Bulk Stage	
Batt: 12.00V	0.0 A
External:	0.0 A

These 2 screens will switch every 2 sec

EVO-1212F	Online
0-Bulk Stage	
Batt: 12.00V	0.0 A
External:	0.0 A

Fig 3.5(c) Example of Screen No. 1 of Online / Charging Mode Menu Map Screens

EVO-1212F	Power Save
AC output:	120.0V
	<0.10A
	60.00Hz

These 2 screens will switch every 2 sec

EVO-1212F	Online
AC output:	120.0V
	<0.10A
	60.00Hz

Fig 3.5(d) Example of Screen No. 1 of Online / Power Save Mode Menu Map Screens

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3.6.7 Menu Maps for "Chgr Only" (Charger Only) Mode Screens

Menu Maps for the Operating Mode Screens for the "Chgr Only" Mode are shown as follows:

- Fig 3.6(a) for Models EVO-1212F / 1212F-HW / 1224F / 1224F-HW (Model No. shown in the screens is EVO-1212F).
- Fig 3.6(b) for Models EVO-2212 / 3012 / 2224 / 4024 (Model No. shown in the screens is EVO-3012).

3.6.7.1 Menu Map for "Chgr Only" (Charger Only) Mode Screens for EVO-1212F / 1212F-HW / 1224F / 1224-HW

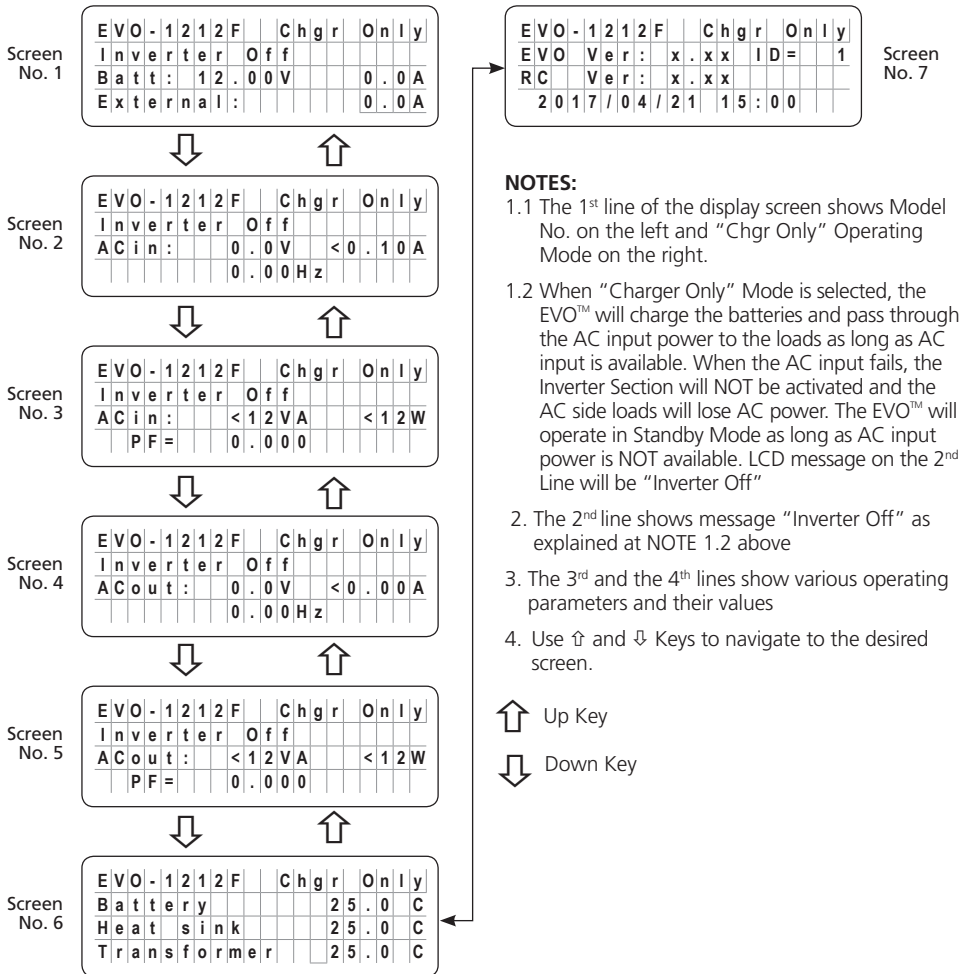


Fig 3.6(a) Menu Map for "Charger Only" Mode Screens for Models EVO-1212F / 1212F-HW / 1224F / 1224F-HW (Model No. shown is EVO-1212F)

SECTION 3 | Operation

3.6.7.2 Menu Map for "Chgr Only" (Charger Only) Mode Screens for EVO-2212 / 3012 / 2224 / 4024

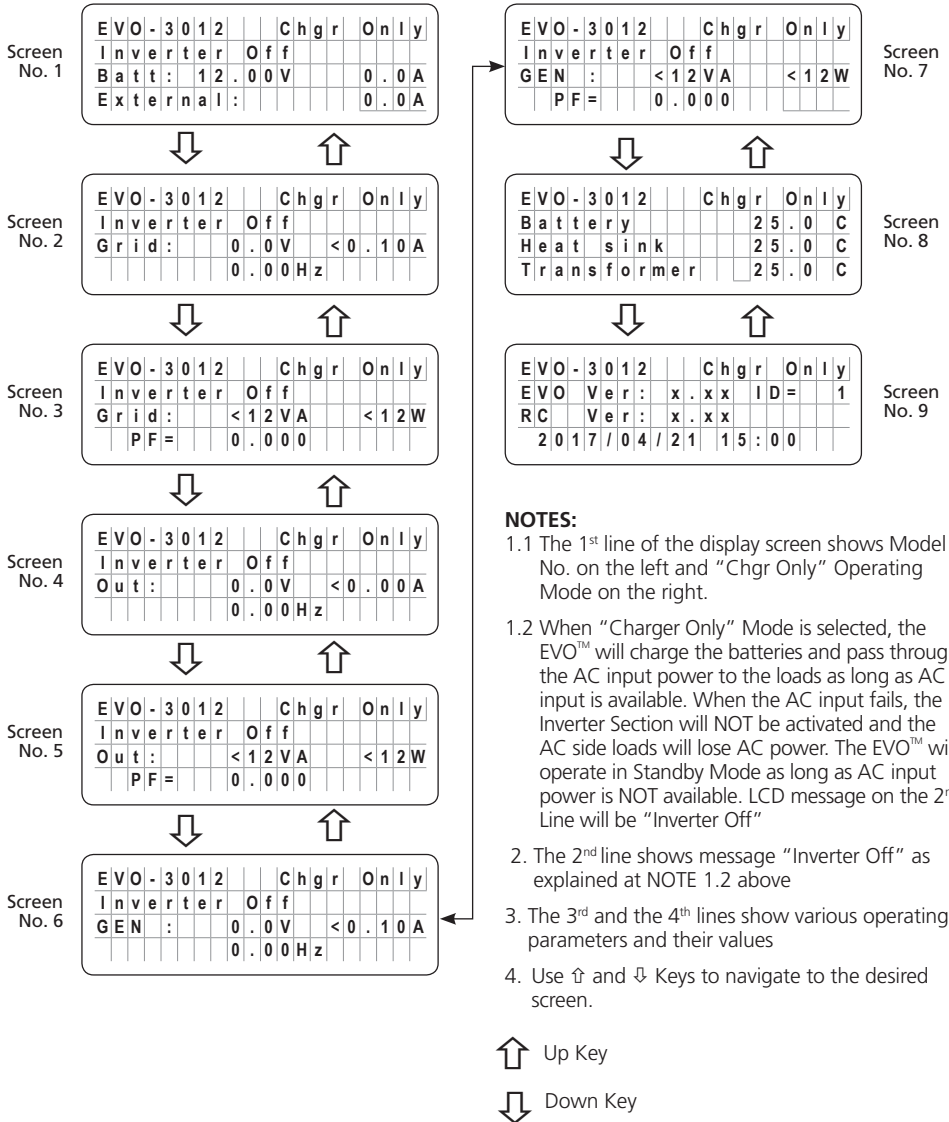


Fig 3.6(b) Menu Map for "Charger Only" Mode Screens for EVO-2212 / 3012 / 2224 / 4024 (Model No. shown is EVO-3012)

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3.6.8 Menu Map for "Charger Off by BMS" Mode Screens

This mode is applicable when option BATTERY TYPE 1 = Lithium is selected (see Screen No. 22 at Table 4.3 for Group 1 Parameter Setup-CHARGE CURVE). This mode is activated when the Battery Management System (BMS) of the Lithium Battery sends a command (contact closure) to pins 4 and 5 of the RJ-45 Temperature Sensor Jack on the EVO™ Inverter/Charger (Temperature Sensor is not required for Lithium Battery) to stop inverting to protect the Lithium Battery from deep discharging condition. Please see details at Section 5.12.2 of Owner's Manual for EVO-1212F / 1212F-HW / 1224F / 1224F-HW.

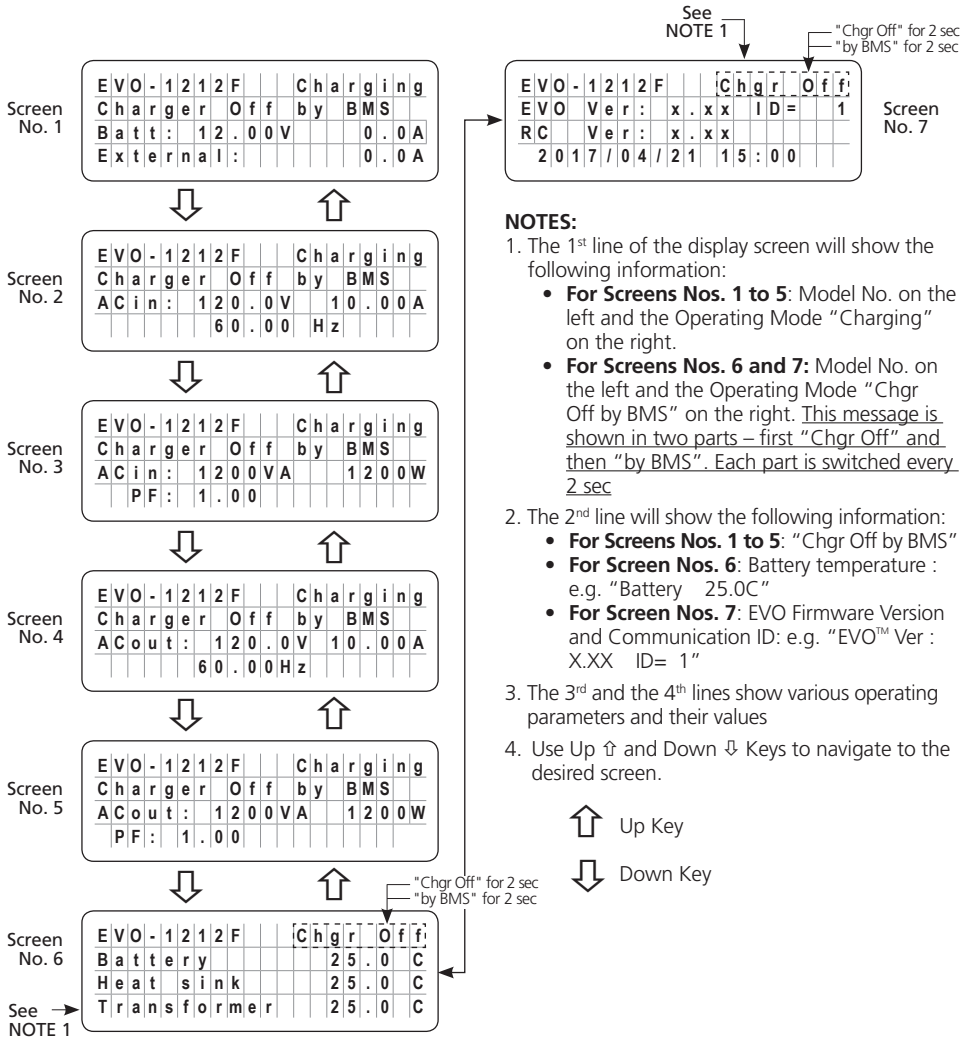


Fig 3.7 Menu Map for "Charger Off by BMS" Mode Screens for Models EVO-1212F / 1212F-HW / 1224F / 1224F-HW (Model No. shown is EVO-1212F)

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3.6.9 Menu Map for "Inverter stop by BMS" Mode Screens for Models EVO-1212F / 1212F-HW / 1224F / 1224F-HW

Menu Map for Operating Mode Screens for "Inverter stop by BMS" Mode is shown in Fig 3.8 below. This mode is applicable when option BATTERY TYPE 1 = Lithium is selected (see Screen No. 22 at Table 4.3 for Group 1 Parameter Setup-CHARGE CURVE). This mode is activated when the Battery Management System (BMS) of Lithium Battery sends a command (contact closure) to pins 4 and 5 of the RJ-45 Temperature Sensor Jack on the EVO™ Inverter/Charger (Temperature Sensor is not required for Lithium Battery) to stop inverting to protect the Lithium Battery from deep discharging condition. Please see details at Section 5.12.2 of Owner's Manual for EVO-1212F / 1212F-HW / 1224F / 1224F-HW.

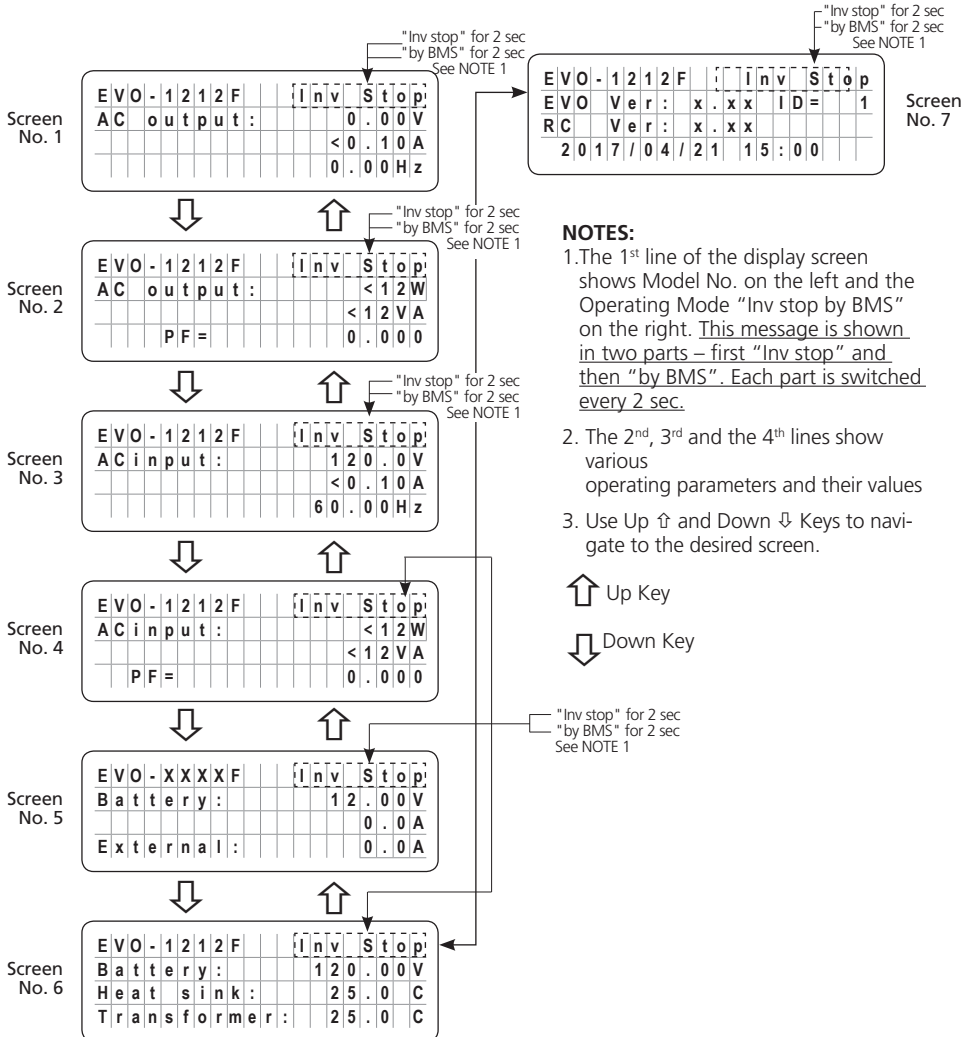


Fig 3.8 Menu Map for "Inverter stop by BMS" Mode Screens for Models EVO-1212F / 1212F-HW / 1224F / 1224F-HW (Model No. shown is EVO-1212F)

SECTION 4 | Parameter Setup

4.0 "SELECT GROUP" AND "SELECT PARAMETER" MENU MAPS

4.1.1 General Information

Up to 58 operating parameters can be programmed to suit the desired operating conditions. The programmable parameters have been arranged under 7 Parameter Groups as per details at Table 4.1 below. "Select Group" Menu Map for accessing the 7 Parameter Groups is shown at Fig 4.1.

Parameter Group No.	Parameter Group Name	Description	"Select Group" Menu Map
1	CHARGE CURVE	Parameters for battery charging/battery protection	Fig 4.1
2	INPUT SETTING	Parameters for Grid/Generator input current level, frequency range	
3	INPUT LOW LIMIT	Parameters for Grid/Generator input low voltage level	
4	INPUT HIGH LIMIT	Parameters for Grid/Generator input high voltage level	
5	OTHER FUNCTION	Power Saving/Buzzer/Remote Switch/Multi-function Relay/etc.	
6	TIME SETTING	Real Time Clock setting	
7	STOP SD CARD	Shown only when SD Card is inserted. To stop SD Card accessed and to remove the SD Card.	

The 1st screen for Group 1 - CHARGE CURVE will be accessed when Enter key is pressed momentarily from any of the Operating Mode Display Screens detailed at Table 3.1.

Fig 4.1 shows "Select Group" Menu Map for 7 Parameter Groups. Use the Up and Down keys to navigate to the desired Parameter Group or the Back key to go back to the Operating Mode Screen. Press Enter to access Parameters in the selected Parameter Group.

For explanation of the format of the "Select Group Screens" shown in Fig 4.1, consider Group 1 Screen - CHARGE CURVE. The 1st line shows the action i.e. "Select Group". The 2nd line shows the name of the "Select Group" - CHARGE CURVE with an asterisk sign * against it. The asterisk sign * indicates that this Group will be selected when Enter key is pressed.

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4.1.2 "Select Group" Menu Map

Menu Map for "Select Group" is shown at Fig 4.1 below:

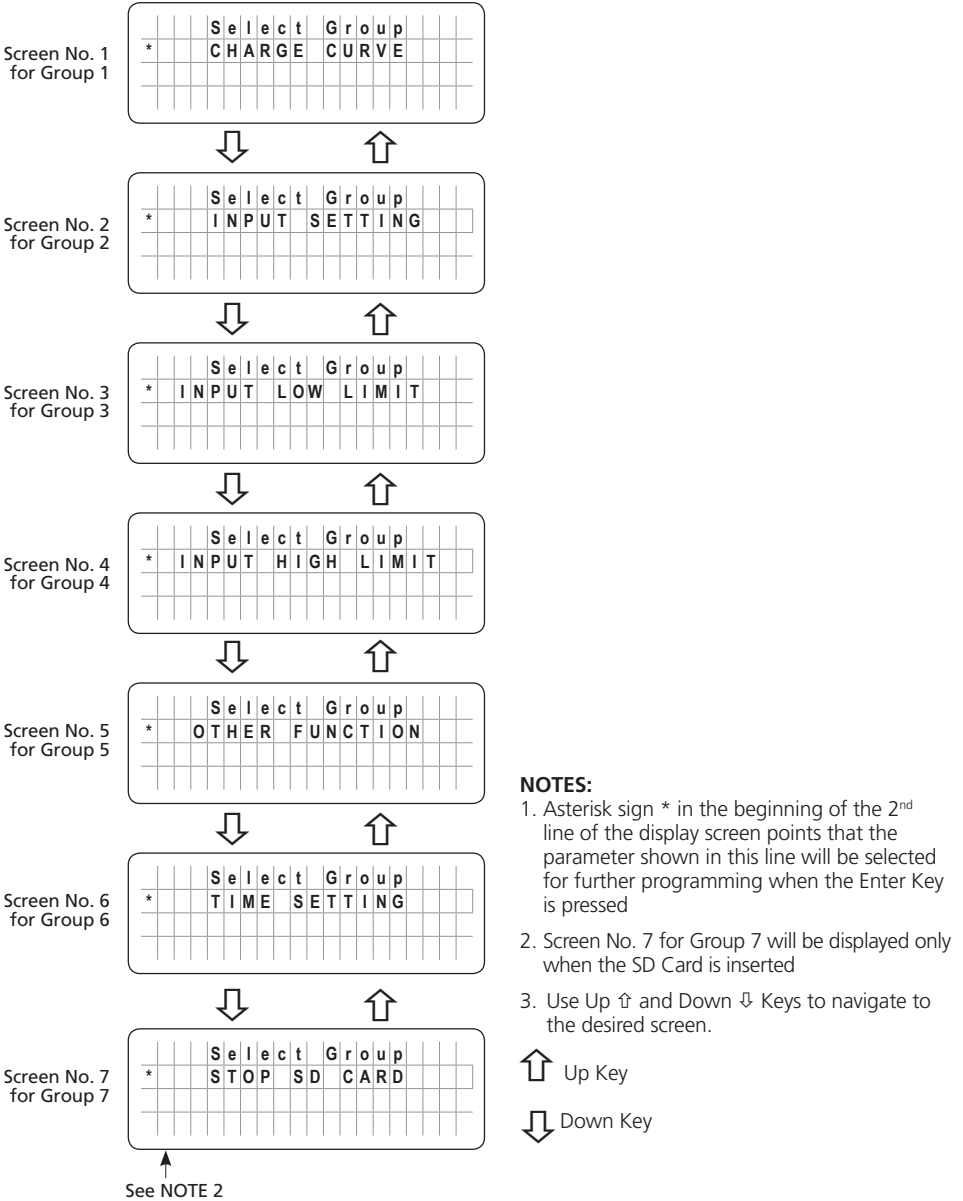


Fig 4.1 "Select Group" Menu Map

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4.1.3 "Select Parameter" Menu Map

When any of the 7 Parameter Groups from the "Select Group" Menu Map (Fig 4.1) is selected, access is available to the "Select Parameter" Menu Map pertaining to that Group. Location of "Select Parameter" Menu Maps are given in Table 4.2.

"Select Group" Menu Map (Fig 4.1) Column (1)	Location of "Select Parameter" Menu Map Column (2)	Location of TABLES for Parameter details Column (3)
Group 1 - CHARGE CURVE	Fig 4.2	Table 4.3 (Section 4.4)
Group 2 - INPUT SETTING	Fig 4.3	Table 4.4 (Section 4.5)
Group 3 - INPUT LOW LIMIT	Fig 4.3	Table 4.5 (Section 4.6)
Group 4 - INPUT HIGH LIMIT	Fig 4.3	Table 4.6 (Section 4.7)
Group 5 - OTHER FUNCTION	Fig 4.4	Table 4.7 (Section 4.8)
Group 6 - TIME SETTING	Fig 4.5	Section 4.9
Group 7 - STOP SD CARD	Fig 4.5	Section 4.10

NOTE: Figs 4.2 to 4.4 show the default/factory preset parameters for EVO-1212F / 1212F-HW. For parameters for other Models, refer to Tables shown under Column (3) of Table 4.2.

For explanation of the format of the "Select Parameter" screen, refer to Fig 4.2, Screen No. 1 - "Select Parameter" - BULK CURRENT (extract given below):

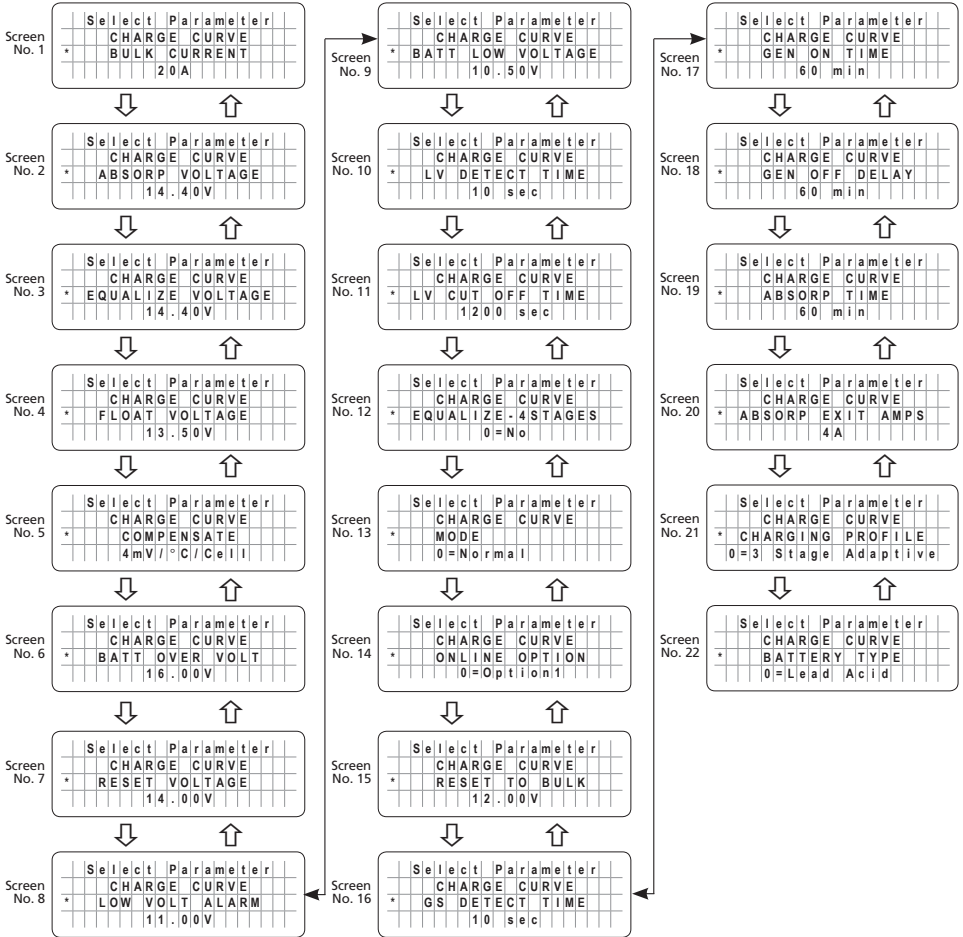
Screen No. 1	S e l e c t P a r a m e t e r									
		C H A R G E				C U R V E				
	*	B U L K				C U R R E N T				
			2 0 A							

NOTE: The information in this screen pertains to Model No. EVO-1212F

- The 2nd line shows the Parameter Group - CHARGE CURVE in this case
- The 3rd line - "BULK CURRENT" in this case shows that this parameter is earmarked for programming. The asterisk * against this line shows that this parameter will be accessed for programming when Enter key is pressed.
- The 4th line shows the default/factory preset value for BULK CURRENT (20A for EVO-1212F / 1212F-HW).
- Refer to Tables shown in Column 3 of TABLE 4.2 above for parameter details for various models.

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4.1.3.1 "Select Parameter" Menu Map for Parameter Group 1: CHARGE CURVE



NOTES:

- Value shown in the 4th line of the display screen is the default / factory pre-set values (EVO-1212F / 1212F-HW in this case). Refer to Table 4.3 (Section 4.4.1) for the default / factory pre-set values and additional programming details for the other Models
- Asterisk sign * in the beginning of the 3rd line of the display screen points that the parameter shown in this line will be selected for further programming when the Enter Key is pressed
- Use Up ↑ and Down ↓ Keys to navigate to the desired screen.

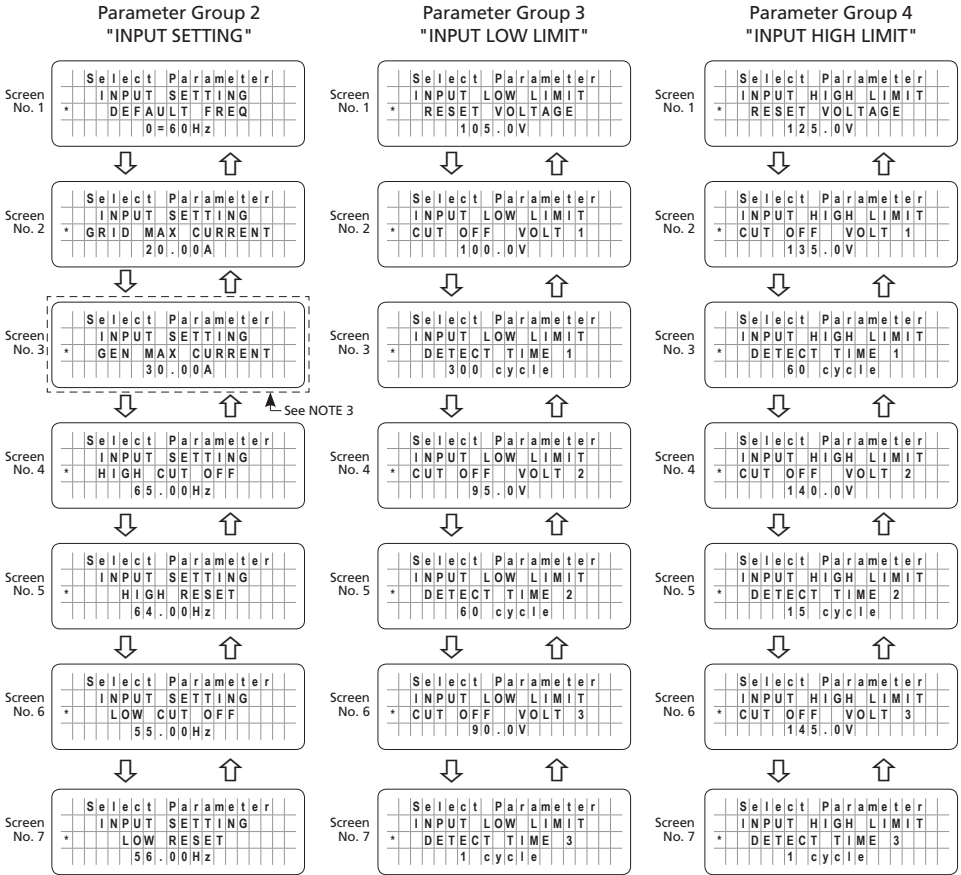
↑ Up Key

↓ Down Key

Fig 4.2 "Select Parameter" Menu Map for Parameter Group 1 - CHARGE CURVE

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4.1.3.2 "Select Parameter" Menu Maps for (i) Parameter Group 2: INPUT SETTING, (ii) Parameter Group 3: INPUT LOW LIMIT and (iii) Parameter Group 4: INPUT HIGH LIMIT.



NOTES:

- Value shown in the 4th line of the display screen is the default / factory pre-set values (EVO-1212F / 1212F-HW in this case). For the default / factory pre-set values and additional programming details for the other Models, refer to (i) Table 4.5 (Section 4.5) for "INPUT SETTING", (ii) Table 4.6 (Section 4.6) for "INPUT LOW LIMIT" and (iii) Table 4.7 (Section 4.7) for "INPUT HIGH LIMIT".
- Asterisk sign * in the beginning of the 3rd line of the display screen points that the parameter shown in this line will be selected for further programming when the Enter Key is pressed
- Screen No. 3 is displayed only in Model Nos. that have Generator input terminals (EVO-2212 / 3012 / 2224 / 4024). These screens are NOT displayed in EVO-1212F / 1212F-HW and EVO-1224F / 1224F-HW
- Use Up ↑ and Down ↓ Keys to navigate to the desired screen.

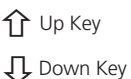


Fig 4.3 "Select Parameter" Menu Maps for (i) Parameter Group 2: INPUT SETTING, (ii) Parameter Group 3: INPUT LOW LIMIT and (iii) Parameter Group 4: INPUT HIGH LIMIT.

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4.1.3.3 "Select Parameter" Menu Map for Parameter Group 5: OTHER FUNCTION

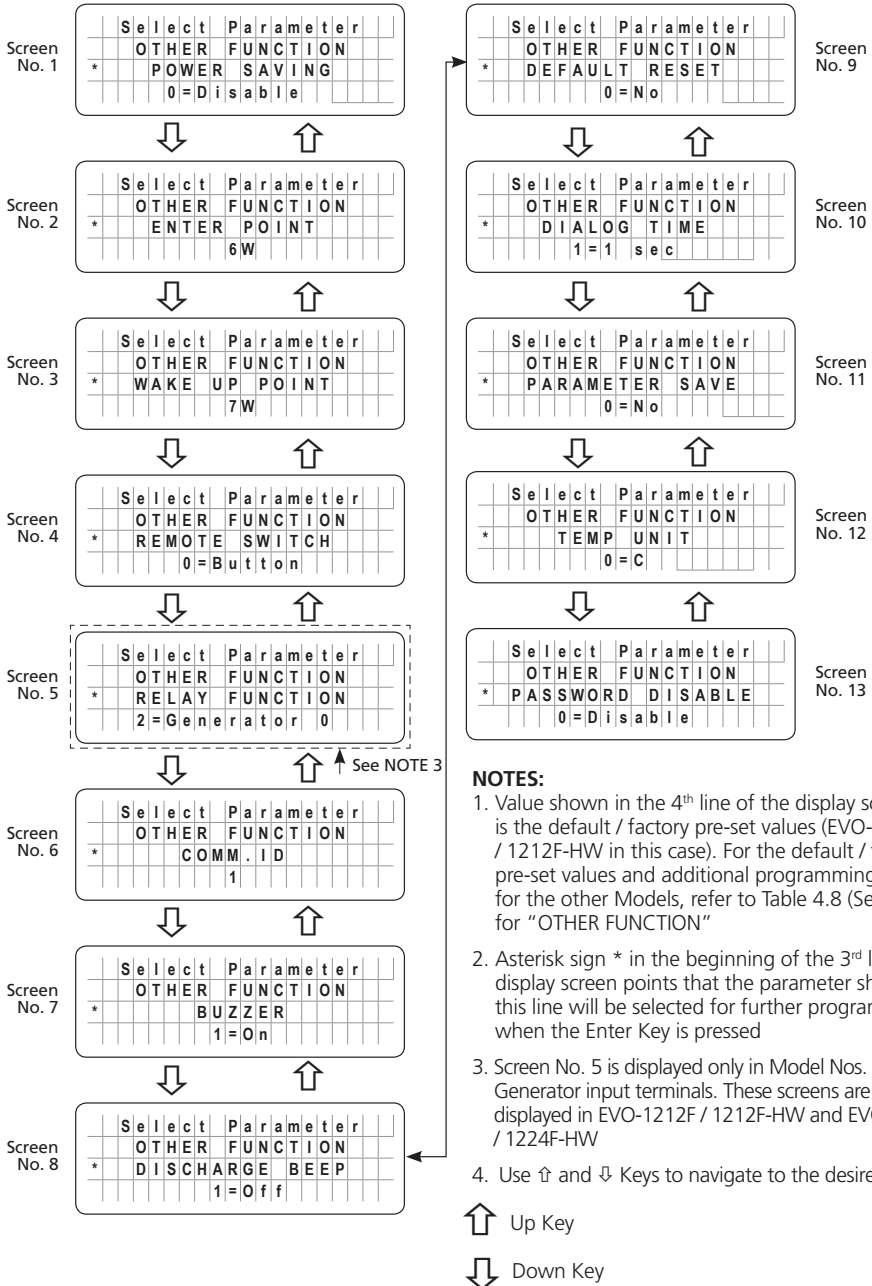


Fig 4.4 "Select Parameter" Menu Map for Parameter Group 5: OTHER FUNCTION

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4.1.3.4 "Select Parameter" Menu Maps for (i) Parameter Group 6: TIME SETTING and (ii) Parameter Group 7: STOP SD CARD

Group 6 "TIME SETTING"												Group 7 "STOP SD CARD"											
Select						Parameter						Select						Parameter					
TIME						SETTING						STOP						SD CARD					
* Enter the time												0 = No											
2000			/01			/01			00:00														

NOTE:

Value shown in the 4th line of the display screen is the default / factory pre-set value. For additional programming details, refer to (i) Section 4.9 for "TIME SETTING" and (ii) Section 4.10 for STOP SD CARD"

Fig 4.5 "Select Parameter" Menu Map for (i) Parameter Group 6: TIME SETTING and (ii) Parameter Group 7: STOP SD CARD.

4.2 PARAMETER SETUP PROCEDURE

4.2.1 General Information - Parameter Setup Procedure

Please refer to Fig 4.6.

The **Enter** key is used to enter "Select Group" Menu Map from any Operating Mode Screen shown in Figs 3.1 to 3.5.

Example in Fig 4.6 starts with Inverting Mode Screen [(Screen 1 in Figs 3.2(a) and 3.2(b)]. After the **Enter** key is pressed, the **Up/Down** keys are used to navigate to one of the 7 "Select Group" Screens (Fig 4.1). When the Group for the desired setting is displayed on the LCD, the **Enter** Key is used again to select this Group. The **Up** and **Down** Keys are used to move to the individual screens within the Group.

Pressing the **Back** Key will exit to the previous level.



INFO

There is a 30 second timeout for setting parameters; after 30 seconds the Setting Mode will be cancelled and the display will revert to the Operating Mode Screen associated with current operation.

It is highly recommended to set the EVO™ Date and Time (Parameter Group 6, Screen No. 6 in Fig 4.1)) as this value is used to record data logging files. (Refer to Section 4.9 for Date and Time set up).

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➡ Press Enter Key

⏴ Press Down Key

⏪ Press Back Key

⏵ Press Up Key

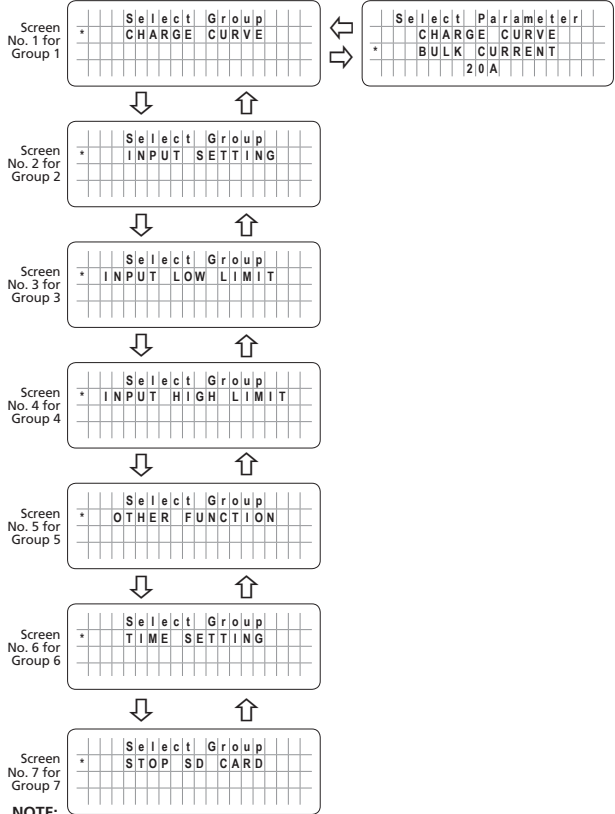
Any Operating Mode
Screen from Fig 3.1 to 3.5

EVO-1212F	Inverting
AC output:	120.0V
	<0.10A
	60.00Hz

[Above screen is Screen 1 of Fig 3.2(a)]

"Select Group"
Menu Map (Fig 4.1)

"Select Parameter" Screen
(Figs 4.2 to 4.5)
(eg. BULK CURRENT:
Screen No. 1, Fig 4.2)



NOTE:
Will be displayed only
when SD Card is inserted.

Fig 4.6 Example - Navigating from Operating Mode Screen to "Select Parameter" Screen for Parameter "BULK CURRENT"

4.2.2 Changing / Entering Parameter Values

Each parameter has a programmable range of values specific to the model number of the EVO™. Please refer to Tables 4.3 and 4.5 to 4.8 and Sections 4.9 and 4.10 for details. **During parameter programming**, the displayed numerical value of the parameter consists of multiple digits that are necessary to display the highest numerical value within the programmable range. For example, the programmable range for the parameter BULK CURRENT for EVO-1212F / 1212F-HW is 0-60A (Table 4.3). The highest numerical value is "60" and consists of

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2 digits. Hence, for EVO-1212F / 1212F-HW, the numerical value of BULK CURRENT will be displayed /entered as 2 digits. For example, 1A will be displayed / entered as "1A"; 20A will be displayed / entered as "20A" and so on. The overall numerical value of the parameter is changed digit by digit starting from the 1st digit on the left. On entering the desired "Select Parameter" Screen (Figs 4.2 to 4.5), a cursor will appear under the 1st digit and the cursor and the digit will be blinking. Scroll to the desired numerical value for the 1st digit using Up and Down Keys. Press the Enter Key **momentarily** to write the desired numerical value for the 1st digit. The cursor will automatically move to the 2nd digit on the right. The 2nd digit and the cursor and the digit will be blinking. Scroll to the desired numerical value for the 2nd digit with the help of Up and Down Keys. Then, press the Enter Key **momentarily** to write the desired numerical value for the 2nd digit. The overall numerical value of the parameter will be selected after scrolling to the desired numerical value for the **last digit**. Now, press the Enter Key, **HOLD for 3 to 4 sec and then release**. Process for writing the overall numerical value of the parameter into the memory will be initiated – the screen will display message "Writing..." followed by message "Write Success!".

Please read Section 4.3.1 for example of programming a typical parameter – BULK CURRENT



INFO

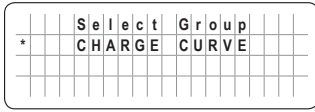
1. When the numerical value for any individual digit is changed that makes the overall numerical value of the parameter outside the programmable range, an Exclamation Sign "!" will appear on the left of the display screen warning you to correct the overall numerical value of the parameter to within the programmable range before writing the new overall numerical value of the parameter to memory. See Tables 4.3 and 4.5 to 4.8 and Sections 4.9 and 4.10 for programmable ranges.
2. If, after scrolling to the desired numerical value for the last digit, the overall numerical value of the parameter is out of the programmable range, the Exclamation Sign "!" will continue to appear on the left of the display screen. If an attempt is made to write this "out of range overall numerical value" into the memory (by pressing and holding the Enter Key when the cursor is at the last digit), message "Out of range!" will be displayed and the screen will go back to display the originally stored value of the parameter. **Parameter set up procedure will have to be re-started.**
3. If there is some problem in writing to the memory, message "Write failure!" will be displayed. **Parameter set up procedure will have to be re-started.**

4.3 PASSWORD PROTECTION FOR PARAMETER CHANGE

In the factory preset (Default) condition, all parameters except Time and Date are protected with a Password. This has been done to prevent accidental / unintentional changes of parameter values. When the required "Select Parameter" Screen is reached and is displayed and **Enter** Key is pressed to modify the parameter value, the system will request a 4-digit Password. **The Password is 8052.** Once you **Enter** the Password correctly, you don't need to enter the Password again until any Key is not pressed for over 60 seconds. An example of Parameter setting is shown at Section 4.3.1. **NOTE: Password protection may be disabled, if required – See Section 4.3.2.**

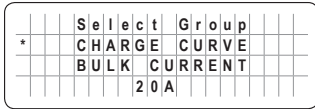
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4.3.1 Example of Password Activation and Changing Bulk Current Setting for EVO-1212F / 1212F-HW from Default Value of 20A to 50A



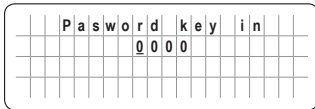
Starting from any of the 5 Operating Mode Screens (shown at Figs 3.1 to 3.8), press **Enter** Key. Screen "Select Group, CHARGE CURVE" as shown on the left will be displayed (Parameter Group 1 of "Select Group" Menu Map, Fig 4.1)

Press **Enter** key to access 22 Parameter Screens under "Select Parameter" Menu Map for Parameter Group 1 "Charge Curve" (Fig 4.2) [Parameters are detailed at Table 4.3 under Section 4.4.1].

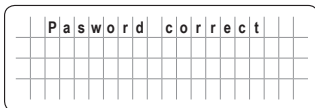


Screen "BULK CURRENT, 20A" as shown on the left will be displayed (Screen No.1 of "Select Parameter" Menu Map for Parameter Group 1: CHARGE CURVE at Fig 4.2). Default current setting of 20A or previously set value will be displayed.

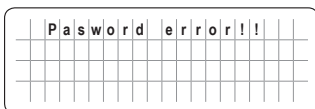
Press **Enter** Key to change Bulk Current parameter setting. A Password will be requested. Password will not be requested if disabled - see Section 4.3.2).



Password consisting of 4 digits "0000" will be requested as shown on the left. The first digit will have a blinking cursor "_". Use **Up /Down** Keys to scroll to number 8 for the first digit "8" of the password. **Momentarily** press **Enter Key (Short press)**. Digit 8 will be entered as the first digit of the Password and the blinking cursor will automatically move to the 2nd digit (0) to the right. As the next digit in the Password "8052" is already "0", momentarily press **Enter Key (Short press)** to enter "0" in the second digit. The blinking cursor will automatically move to the 3rd digit (0). Use **Up /Down Keys** to scroll to number 5 for the 3rd digit "5" of the password "8052" and **momentarily** press **Enter Key (Short press)**. The blinking cursor will automatically move to the 4th digit (0). Use **Up /Down Keys** to scroll to number 2 for the 4th digit "2" of the password "8052". Now keep the **Enter Key pressed continuously for longer time** (3 to 4 sec) to write the full password of 4 digits i.e. "8052".



Flashes twice when Password is correct. (8052)



Flashes twice when Password is not correct.

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S	e	t	u	p	P	a	r	a	m	e	t	e	r		
	C	H	A	R	G	E	C	U	R	V	E				
	B	U	L	K	C	U	R	R	E	N	T				
					2	0	A								

Screen No.1 of the "Select Parameter - CHARGE CURVE" for BULK CURRENT setting appears as shown on the left.. The Default Value of 20A will be displayed as "20" using 2 digits. There will be a blinking cursor under the 1st digit ("2"). The 1st digit ("2") will also blink. To change the setting to the new value of 50A, the 2 digits will have to be changed from "20" to "50" one by one as follows:

- Press the Up Key to scroll the 1st digit to "5". Press the Enter Key **MOMENTARILY** to select "5" for the 1st digit. The blinking cursor will automatically move to the 2nd digit "0". The 2nd digit "0" will be blinking.
- As the 2nd digit of the new setting "50" is already "0", there is no need to change this value. Now, the overall numerical value will be "50". The cursor and "0" at the 2nd digit will be blinking.
- Press the Enter Key, **HOLD for 3 to 4 sec and then release** to write the new value of 50A into the memory.

	W	r	i	t	e	s	u	c	c	e	s	s	!		

Flashes twice when writing is successful.

	S	e	t	u	p	P	a	r	a	m	e	t	e	r	
	C	H	A	R	G	E	C	U	R	V	E				
*	B	U	L	K	C	U	R	R	E	N	T				
					2	0	A								

End of setting.

Press **Back** Key to go back to the previous level "Select Group - CHARGE CURVE" or **Up/Down** Key to the other parameter(s) within the Select "Parameter - CHARGE CURVE".

	S	e	t	u	p	P	a	r	a	m	e	t	e	r	
	C	H	A	R	G	E	C	U	R	V	E				
*	B	U	L	K	C	U	R	R	E	N	T				
!					9	0	A								

An exclamation sign '!' is shown when the parameter is out of the specified programming range. For example, if 90A was entered for EVO-1212F / 1212F-HW (EVO-1212F / 1212F-HW (programmable range is 0-60A), it will be out of range and an exclamation sign '!' will be displayed.

	W	r	i	t	e	f	a	i	l	u	r	e	!		

Flashes twice when there is a write failure.

	O	u	t	o	f	r	a	n	g	e	!				

Flashes twice when the set value is out of range. (90 A is out of range for EVO-1212F).

Details of all the programmable parameters, their programmable ranges and default values are detailed in Section 4.4 to 4.10.

SECTION 4 | Parameter Setup

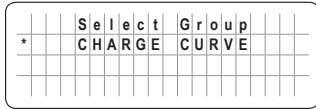
4.3.2 Disabling Password Protection

In the default / factory preset condition, Password Protection is enabled.

Password Protection may be disabled, if required.

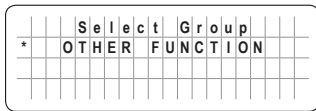
Procedure is given below:

1. Press ENTER Key momentarily from any Operating Mode Screen (see details at Table 3.1)



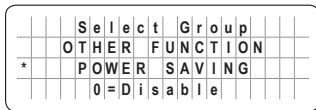
- Screen No. 1 of "Select Group * CHARGE CURVE" (Fig 4.1) will appear as shown on the left.

2. Press "Down Key" 4 times to scroll to "*OTHER FUNCTION" screen.



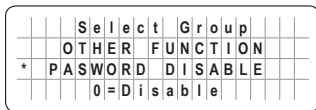
- Screen No. 5 of "Select Group * OTHER FUNCTION" (Fig 4.1) will appear as shown on the left.

3. Press ENTER Key momentarily



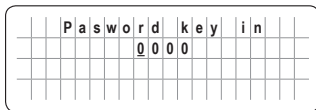
- Screen No. 1 of "Select Parameter, OTHER FUNCTION, *POWER SAVING, 0=Disable" (Fig 4.4) will appear as in the left.

4. Press DOWN Key momentarily, (i) 11 times for EVO-1212F / 1212F-HW / 1224F / 1224F-HW or (ii) 12 times for EVO-2212 / 3012 / 2224 / 4024



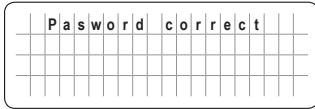
- Screen "Select Parameter, OTHER FUNCTION, * PASSWORD DISABLE, 0=Disable" (Fig 4.4) will appear as on the left.
NOTE: Default value is 0=Disable i.e. Disable the command "DISABLE PASSWORD" which means enable password protection.

5. Press ENTER Key momentarily

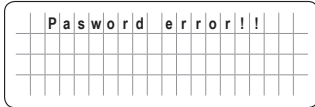


- Password consisting of 4 digits "0000" will be requested as shown on the left. The first digit will have a blinking cursor "_". Use **Up /Down** Keys to scroll to number 8 for the first digit "8" of the password. **Momentarily** press **Enter Key** (**Short** press). Digit 8 will be entered as the first digit of the Password and the blinking cursor will automatically move to the 2nd digit (0) to the right. As the next digit in the Password "8052" is already "0", momentarily press **Enter Key** (**Short** press) to enter "0" in the 2nd digit. The blinking cursor will automatically move to the 3rd digit (0). Use **Up /Down Keys** to scroll to number 5 for the 3rd digit "5" of the password "8052" and **momentarily** press **Enter Key** (**Short** press). The blinking cursor will automatically move to the 4th digit (0). Use Up /Down Keys to scroll to number 2 for the 4th digit "2" of the password "8052". Now keep the **Enter Key** **pressed continuously for longer time** (3 to 4 sec) to write the full password of 4 digits i.e. "8052".

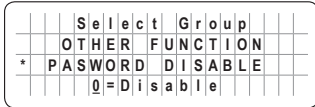
SECTION 4 | Parameter Setup



- Flashes twice when Password is correct. (8052)

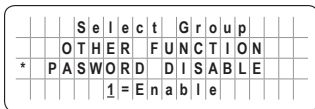


- Flashes twice when Password is not correct.



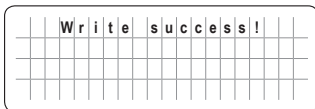
- Screen as on the left will appear with a blinking cursor "_" under "0".

6. Use Up ↑ Key to change 0 to 1.

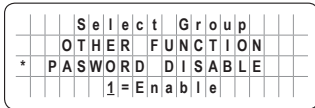


- Screen as on the left will appear. Command will change to 1=Enable with a blinking cursor "_" under "1".

7. Press Enter Key for **longer time** (3 to 4 sec) to write the new selection "1=Enable"



- New selection will be written with the message "Write success!" as shown on the left.



- Screen as on left will appear confirming that the password has been disabled.

8. Press "Back Key" two times to go back to the Operating Mode Screen.

SECTION 4 | Parameter Setup

4.4 GROUP 1 PARAMETER SETUP: CHARGE CURVE

4.4.1 Programming Ranges and Default / Factory Preset Values or Parameters Under - Group 1 - CHARGE CURVE

Table 4.3 below gives details of programming ranges and default values of parameters under Group 1 - "CHARGE CURVE". Refer to Fig 4.2 under Section 4.1.3.1 for the Menu Map for navigating through various parameters under this Group.

NOTE: Value shown within brackets "()" indicate the "Default Setting".

Table 4.3 Group 1 Parameter Set Up: CHARGE CURVE (Refer to Menu Map at Fig 4.2, Section 4.1.3.1)							
Screen No.	Parameter	EVO-1212F EVO-1212F-HW	EVO-2212	EVO-3012	EVO-1224F EVO-1224F-HW	EVO-2224	EVO-4024
1	"BULK CURRENT" (Bulk Charge Current "Io")	0 – 60A (20A)	0 – 100A (40A)	0 – 130A (40A)	0 – 40A (15A)	0 – 70A (40A)	0 – 110A (40A)
2	"ABSORP VOLTAGE" (Absorption Voltage)	13.50 – 16.00V (14.40V)			27.00 – 32.00V (28.80V)		
3	"EQUALIZE VOLTAGE" (Equalization Voltage)	14.00 – 16.00V (14.40V)			28.00 – 32.00V (28.80V)		
4	"FLOAT VOLTAGE" (Float Voltage)	13.00 – 15.00V (13.50V)			26.00 – 30.00V (27.00V)		
5	"COMPENSATE" (Temperature Compensation)	-3mV to -5mV/°C/Cell (-4mV/°C/Cell)					
6	"BATT OVER VOLT" (Battery Over Voltage Shut Down)	14.00 – 17.00V (16.00V)			28.00 – 35.00V (32.00V)		
7	"RESET VOLTAGE" (Battery Low Voltage Reset)	12.00 – 17.00V (14.00V)			24.00 – 35.00V (28.00V)		
8	"LOW VOLT ALARM" (Battery Low Voltage Alarm)	9.50 – 12.50V (11.00V)			19.00 – 25.00V (22.00V)		
9	"BATT LOW VOLTAGE" (Battery Low Voltage Shut Down)	>9.00 – 12.00V (10.50V)			>18.00 – 24.00V (21.00V)		
10	"LV DETECT TIME" (Detected Time to Qualify as Battery Low Voltage Shut Down Condition)	0 – 600 sec (10 sec)					
11	"LV CUT OFF TIME" (Time in Low Voltage Shut Down Condition before Shut Down is Activated)	0 – 7200 sec (1200 sec)					

SECTION 4 | Parameter Setup

Table 4.3 Group 1 Parameter Set Up: CHARGE CURVE (Continued)							
Screen No.	Parameter	EVO-1212F EVO-1212F-HW	EVO-2212	EVO-3012	EVO-1224F EVO-1224F-HW	EVO-2224	EVO-4024
12	"EQUALIZE-4STAGES" (4 Stage Charging On/Off)	0=No (3-stage) ; 1=Yes (4-stage) (0=No)					
13	"MODE"	0 = Normal (Default).....Grid / Generator priority Also called Off-Line Mode 1 = On-Line.....Inverter priority Also called On-Line Mode 2 = Charger Only.....Charging and AC bypass only No inverting					
14	"ONLINE OPTION"	0 = Option 1 (Default) 1 = Option 2					
15	"RESET TO BULK" (Voltage to exit Float Stage to re-charge from Bulk Stage)	10.00 – 13.00V (12.00V)			20.00 – 26.00V (24.00V)		
16	"GS DETECT TIME"	0 – 600 sec (10 sec)					
17	"GEN ON TIME"	0 – 240 minute (60 minute)					
18	"GEN OFF DELAY"	0 – 240 minute (60 minute)					
19	"ABSORP TIME"	0 – 600 min (60 min)					
20	"ABSORP EXIT AMPS"	0 – 20 A (4 A)					
21	"CHARGING PROFILE"	0 = 3 Stage Adaptive (default) 1 = 3 Stage Type 1 2 = 3 Stage Type 2 3 = 2 Stage Type 1 4 = 2 Stage Type 2					
22	"BATTERY TYPE"	0 = Lead Acid (default) 1 = Lithium					

4.4.2 Description of Parameters under Group 1 - CHARGE CURVE

4.4.2.1 BULK CURRENT (Table 4.3, Screen No. 1)

This sets the maximum charging current during the Bulk Charging Stage. The default value is 20A for EVO-1212F / 1212F-HW, 15A for EVO-1224F / 1224F-HW and 40A for EVO-2212 / EVO-3012 / EVO-2224 / EVO-4024.

Normally, Lead Acid batteries should not be charged at very high Bulk Charging Current as this will damage the batteries due to overheating and cell degradation. Normal Bulk Charging

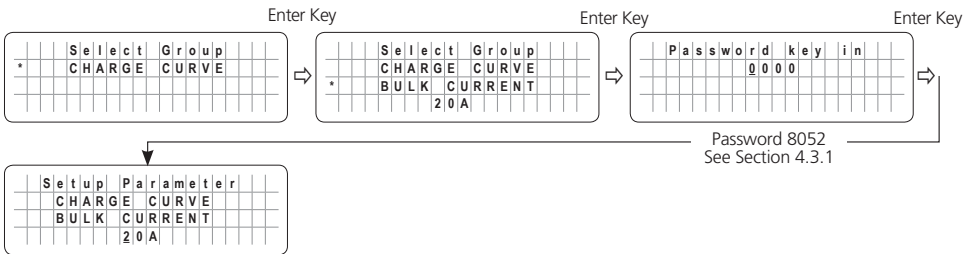
SECTION 4 | Parameter Setup

Current is in the range of 10% to 20% of the Ah capacity of the battery bank at C/20 Discharge Rate. Check with the battery manufacturer regarding recommended Bulk Charging Current for your battery bank. This value of “Bulk Charging Current” should be programmed as “BULK CURRENT”.

Please refer to Section 5.4 in the Owner’s Manual for EVO™ Inverter/Charger. In case External Solar Charge Controller is also charging the batteries through DC input terminals marked “EXT Charger” (3,4 in Fig 2.1 in Owner’s Manual for Evolution™ Series Inverter/Charger), the amount of Bulk Charging Current produced by the internal Battery Charging Section is adjusted in real time to satisfy the following condition:

- Internal Bulk Charging Current = Programmed Value of “BULK CURRENT” – External Charging Current

For example, if the “BULK CURRENT” in the EVO-1212F is programmed at say the default value of 20A and the external Solar Charge Controller is generating 15A, the internal Battery Charging Section of EVO-1212F will reduce its current from 20A to 5A so that the net charging current is equal to the programmed “BULK CURRENT” value of 20A



See Table 4.3, Screen No. 1 for programmable range



INFO

In order to protect against over temperature shut down when operating in higher ambient temperatures, the set value of “BULK CURRENT” is automatically reduced as follows based on temperature sensed at the Power Transformer and at the Heat Sink for the Power Mosfets:

1. Models: EVO-2212, EVO-3012, EVO-2224 and EVO-4024

- **Power Transformer Temperature > 130°C:** (i) EVO-2212: Reduce by 4A every 10 sec, (ii) EVO-3012: Reduce by 20A every 10 sec, (iii) EVO-2224: Reduce by 1A every 10 sec, (iv) EVO-4024: Reduce by 5A every 10 sec.
- **Heat Sink Temperature is > 65 °C: (i) EVO-2212:** Reduce by 4A every 10 sec, (ii) EVO-3012: Reduce by 20A every 10 sec, (iii) EVO-2224: Reduce by 1A every 10 sec, (iv) EVO-4024: Reduce by 5A every 10 sec.

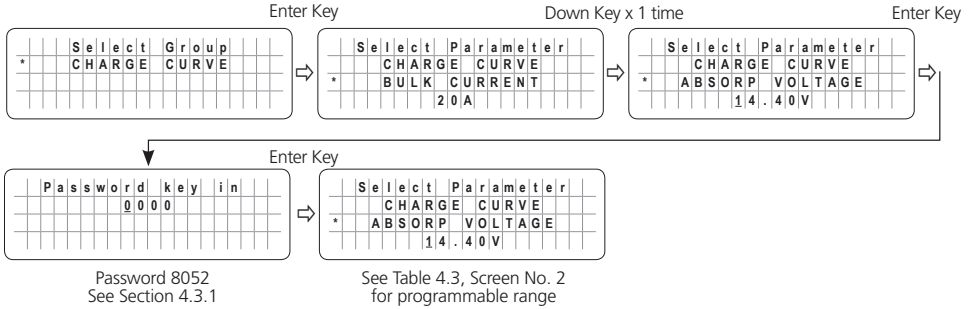
2. Models EVO-1212F, EVO-1212F-HW, EVO-1224F and EVO-1224F-HW

- **Power Transformer Temperature > 130°C:** Reduce by 0.2% every 20 sec
- **Heat Sink Temperature is > 90 °C:** Reduce by 0.2% every 20 sec

SECTION 4 | Parameter Setup

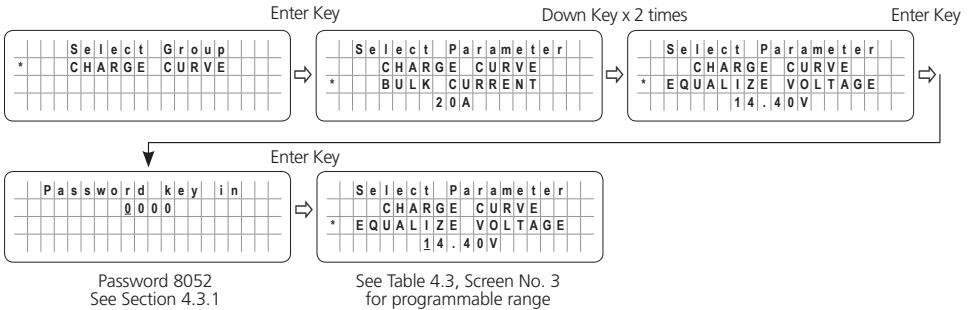
4.4.2.2 ABSORP VOLTAGE (Table 4.3 , Screen No. 2)

This sets the charging voltage in the Constant Voltage Absorption Stage.



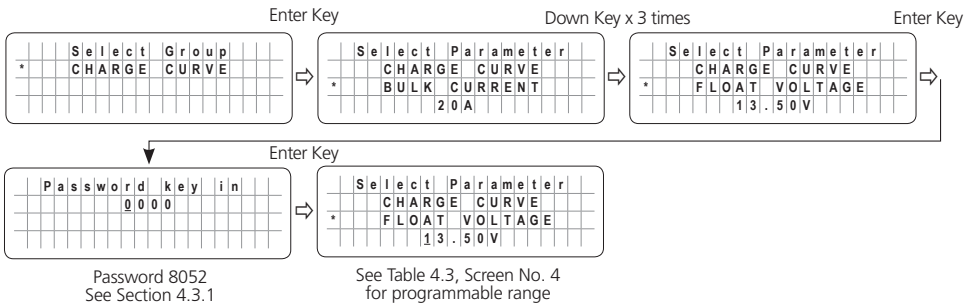
4.4.2.3 EQUALIZE VOLTAGE (Table 4.3, Screen No. 3)

This sets the charging voltage in the Constant Voltage Stage in the 4-stage Equalization Charging Stage.



4.4.2.4 FLOAT VOLTAGE (Table 4.3, Screen No. 4)

This sets the charging voltage in the Constant Voltage Float Stage.

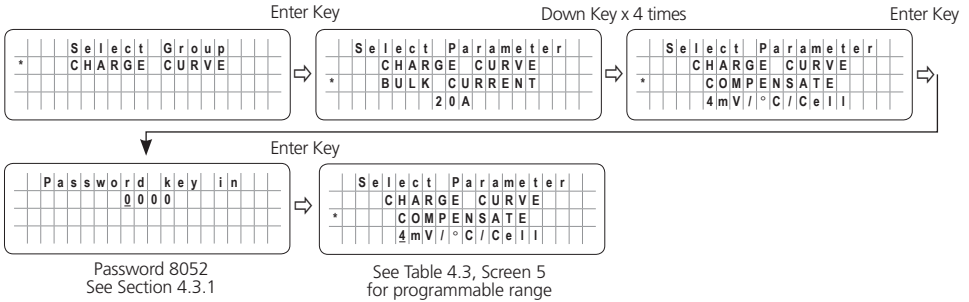


SECTION 4 | Parameter Setup

4.4.2.5 COMPENSATE (Table 4.3, Screen No. 5)

This parameter sets the temperature compensation for the battery. The operational range of the EVO™ Inverter/Charger is -20°C to 60°C.

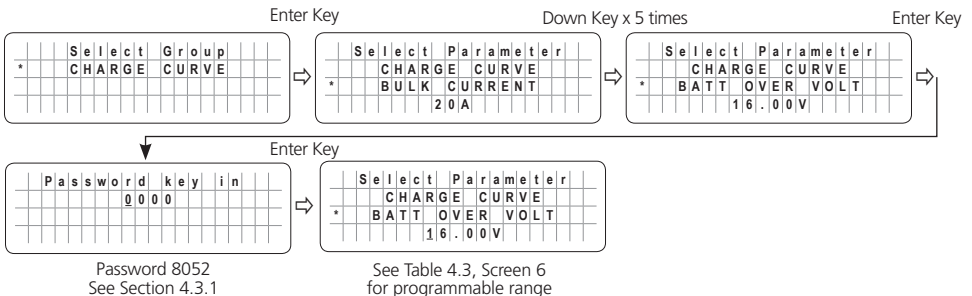
This compensation voltage will affect the Absorption Voltage/Equalize Voltage/Floating Voltage/Batt Over Volt/Restart Voltage/Low Volt Alarm/Batt Low Voltage when the Temperature Sensor is installed on the battery (see Fig 2.5 in the Owner's Manual for Evolution™ Series Inverter/Charger).



4.4.2.6 BATT OVER VOLT (Table 4.3, Screen No. 6)

This parameter sets the upper battery voltage threshold at which inverting / charging operations are switched OFF to protect the unit against damage due to battery overvoltage:

- AC input is not available and EVO™ Inverter/Charger is operating in Inverting Mode:** When the battery voltage rises to the set upper threshold of "BATT OVER VOLT", the Inverter Section will be shut down and fault message "Battery over voltage!" will be displayed on the LCD screen. The Blue LED marked "Status" will switch OFF and the Red LED marked "Fault" will remain ON steady. The buzzer on EVO™ Inverter/Charger will beep steady. The fault will be cleared automatically when the battery voltage drops to 0.5V below the set upper threshold of "BATT OVER VOLT".
- AC input is available and EVO™ Inverter/Charger is operating in Charging Mode:** When the battery voltage rises to the set upper threshold of "BATT OVER VOLT", the Transfer Relay will be de-energized, charging and pass through will be stopped and PWM drive to the Inverter Section will be switched OFF. Fault message "Battery over voltage!" will be displayed on the LCD screen. The Blue LED marked "Status" will switch OFF and the Red LED marked "Fault" will remain ON steady. The Buzzer on EVO™ Inverter/Charger will beep steady. The fault will be cleared automatically when the battery voltage drops to 0.5V below to the set upper threshold of "BATT OVER VOLT". The unit will start in Inverting Mode, synchronize with the AC input and then, the Transfer Relay will be energized to transfer to AC input at zero crossing. The unit will, thus, resume operation in "Charging Mode".

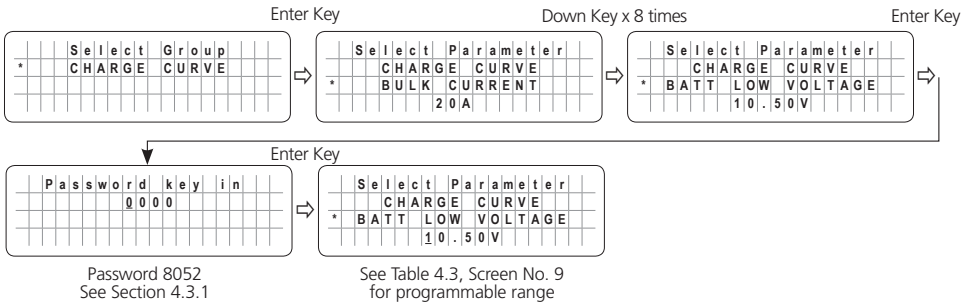


SECTION 4 | Parameter Setup

4.4.2.9 BATT LOW VOLTAGE (Table 4.3, Screen No. 9)

This parameter sets the battery low voltage threshold at which the Inverter Section / the complete EVO™ Inverter/Charger will be shut down to protect the battery from deep discharge:

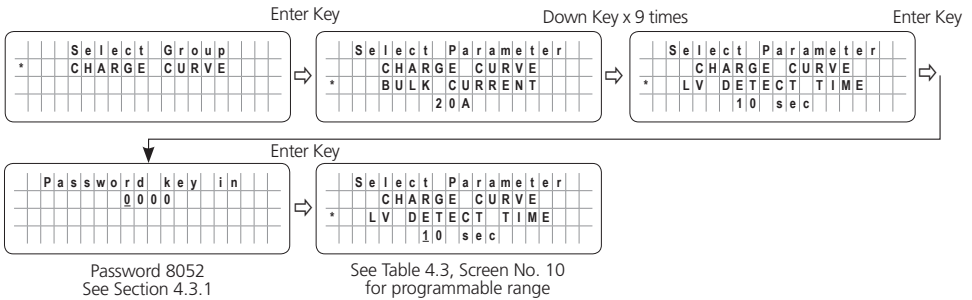
- When the battery voltage drops to the set threshold of "BATT LOW VOLTAGE", the Red LED marked "Fault" will flash once per second. The buzzer in EVO™ Inverter/Charger will beep once per second. The Inverter Section will continue to operate normally and the Blue LED marked "Status" will continue to be ON steady.
- If the battery voltage stays at or below the above threshold for duration equal to the "LV DETECT TIME" (Section 4.4.2.10), only the Inverter Section will be switched OFF and fault message "Battery low voltage!" will be displayed. The Blue LED marked "Status" will be switched OFF and the Red LED marked "Fault" will remain ON steady. The buzzer in EVO™ Inverter/Charger will beep steady.
- If the "Battery low voltage!" fault condition is not reset within the "LV CUTOFF TIME" (Section 4.4.2.11), the EVO™ Inverter/Charger will be shut down completely after "LV CUTOFF TIME" has elapsed (LCD Display / LED / Buzzer will be OFF).
- If the batteries are charged by external Solar Charge Controller connected directly to the batteries or through the External Charger Input (3, 4 in Fig 2.1 in the Owner's Manual for Evolution™ Series Inverter/Chargers) and the battery voltage recovers to the set "RESET VOLTAGE" (Section 4.4.2.7) before the expiry of "LV CUT OFF TIME" (Section 4.4.2.11), while in "Battery low voltage!" fault condition, the Inverter Section will restart and the "Battery low voltage!" fault condition will be cleared.
- While in "Battery low voltage!" fault condition, if AC input is made available before the expiry of "LV CUT OFF TIME" (Section 4.4.2.11), the "Battery low voltage!" fault condition will be cleared. The EVO™ Inverter/Charger will restart in Inverter Mode, synchronize with the AC input and then, transfer to the AC input at zero crossing. It will now operate in Charging Mode.



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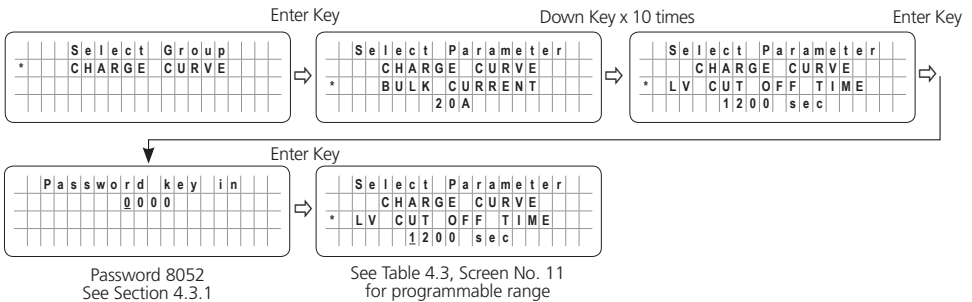
4.4.2.10 LV DETECT TIME (Table 4.3, Screen No. 10)

To prevent "Battery low voltage!" fault and shut down of the inverter due to momentary dips in battery voltage as a result of high power, short duration AC loading (e.g. motor starting, inrush current etc.), a timer is used to qualify "BATT LOW VOLTAGE" (Section 4.4.2.9) condition only if the battery voltage drops to or below the set "BATT LOW VOLTAGE" threshold for the set "LV DETECT TIME" (Section 4.4.2.10). The timer starts as soon as the battery voltage drops to the set threshold of "BATT LOW VOLTAGE" described at Section 4.4.2.9.



4.4.2.11 LV CUT OFF TIME (Table 4.3, Screen No. 11)

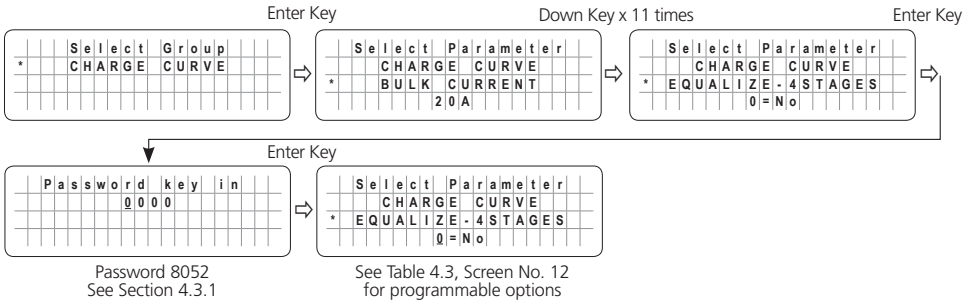
Even when the Inverter Section is shut down due to "Battery low voltage!" fault condition as described above, there will still be some power drawn from the battery to keep the other circuitry in the EVO™ Inverter/Charger alive so that the inverter can be switched on when the fault gets cleared automatically after the battery has been recharged to the "RESET VOLTAGE" (Section 4.4.2.7) or when AC input voltage is available. However, if the fault is not cleared over a long period of time, the battery may get completely discharged. Hence, a timer is used to record the duration of "Battery low voltage!" condition. The EVO™ Inverter/Charger will be completely shut down (LCD Display / LED / Buzzer will be OFF) when the duration of the "Battery low voltage!" fault condition as described above is equal to the "LV CUT OFF TIME".



SECTION 4 | Parameter Setup

4.4.2.12 EQUALIZE – 4 STAGES (Table 4.3, Screen No. 12)

Parameter "CHARGING PROFILE" (Section 4.4.2.21) allows option to select from 3 versions of 3-Stage and 2 versions of 2-Stage charging Profiles. Default option is "0=3-Stage Adaptive". The charging profile can be changed AT ANY TIME to 4-Stage Equalize profile through programmable parameter "EQUALIZE-4STAGES" set to "1=Yes". The Default Setting is "0=No" i.e. charging will be carried out as per 3 or 2-Stage profile set by parameter "CHARGING PROFILE" (Section 4.4.2.21). After "Equalization Mode" is completed (the charger enters Float Stage after completing Equalization Stage), the option automatically resets to "0=No" and the charging profile reverts to the profile programmed through parameter "CHARGING PROFILE" (Section 4.4.2.21).



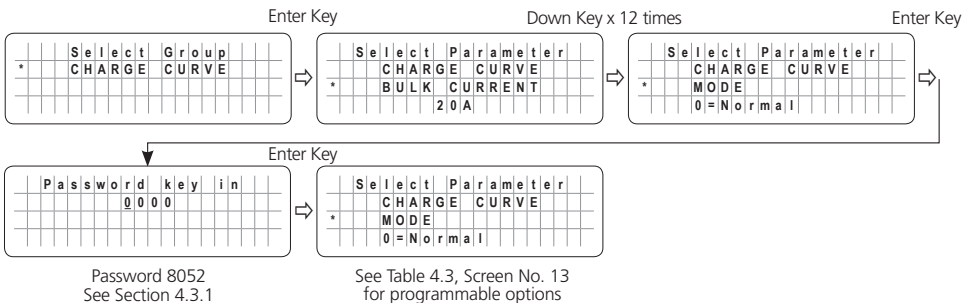
4.4.2.13 MODE (Table 4.3, Screen No. 13)

Under the "MODE" Menu, 3 options can be programmed: 0= Normal (Offline) [Default], 1= Online and 2= "Charger Only".

For more information on the applications of these 3 modes, please refer to the following sections:

- Section 4.6.5 of Owners Manual for Models EVO-1212F / 1212F-HW / 1224F / 1224F-HW
- Section 4.8.5 of Owners Manual for Models EVO-2212 / 3012 / 2224 / 4024

The default factory setting for this unit is Normal (Offline) Mode (MODE, 0 = Normal). Programming steps are shown below to change from the default setting of Normal (Offline) Mode (MODE, 0 = Normal) to (i) Online Mode (MODE, 1 = On-line) or (ii) Charger only (explained further at Section 4.4.2.13.1)



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4.4.2.13.1 Charger Only Mode (Table 4.3, Screen No. 13)

Under the MODE Menu (Section 4.4.2.13), 3 options can be programmed: 0=Normal (Offline Mode) or 1=Online or 2=Charger Only.

When "Charger Only" Mode is selected (2=Charger Only), the EVO™ will charge the batteries and pass through the AC input power to the loads as long as AC input is available.

- Operating Mode Screens for Charging Mode will be displayed (See Operating Mode Screens in the Charging Mode Menu Map at Fig 3.3(a) for EVO-1212F / 1212F-HW / 1224F / 1212F-HW and at Fig 3.3(b) for EVO-2212 / 3012 / 2224 / 4024). Extract of Screen No.1 for EVO-1212F is shown below as an example.

EVO-1212F					Charging
0-Bulk Stage					
Batt:	12.00V	100.0A			
External:				0.0A	

When the AC input fails, the Inverter Section will NOT be activated and the AC side loads will lose AC power. The EVO™ will operate in Standby Mode as long as AC input power is NOT available.

- Operating Mode Screens for Standby Mode will be displayed (See Operating Mode Screens in the Standby Mode Menu Map at Fig 3.1(a) for EVO-1212F / 1212F-HW / 1224F / 1212F-HW and at Fig 3.1(b) for EVO-2212 / 3012 / 2224 / 4024). Extract of screen for EVO-1212F is shown below as an example.

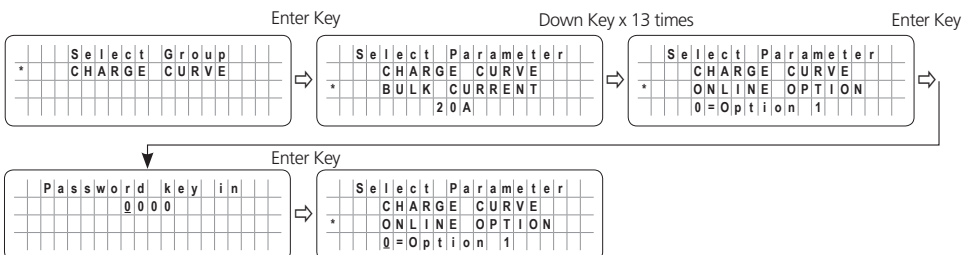
EVO-1212F					Standby
Output:				0.00V	
				< 0.10A	
				60.00Hz	

- If attempt is made to exit Standby Mode by momentarily pressing the On/Off Key, the following message will be seen for some time and the screen will revert back to Standby Mode Screen

					Charger Only
					Inverter Off

4.4.2.14 ONLINE OPTION (Table 4.3, Screen No. 14)

This setting is effective only when (MODE: "1=On-Line", Section 4.4.2.13). The default setting is: 0=Option 1. Programming steps are given below:



Password 8052
See Section 4.3.1

See Table 4.3, Screen No. 14
for programmable options

SECTION 4 | Parameter Setup

Details of the two options are given below:

0= Option 1 (Default):

- The Transfer Relay will be switched ON (energized) if the battery voltage drops to "LOW VOLT ALARM" (Section 4.4.2.8) or lower for sustained period = "GS DETECT TIME" (Section 4. 4.2.16). The EVO™ will change over to "Charging Mode" and qualified AC input from the Grid will be passed through to the AC Output and at the same time, the Internal AC Charger will start charging the battery. If an external Solar Charge Controller is also connected to the External Charging Terminals (3 and 4, Fig 2.1 in Owner's Manual for Evolution™ Series Inverter/Charger), the internal AC Charger will limit the charging current to a value = (Programmed Value of "BULK CURRENT" – Value of Current fed from the external Solar Charge Controller).
- Charging will take place as per the charging profile set through the programmable parameter "CHARGING PROFILE" (Section 4.4.2.21).
- Transfer Relay will be switched OFF (de-energized) on entering "Float Stage" on completion of "Absorption Stage" and the unit will change over to "Inverting Mode" (NOTE: The battery will be charged to 100% State of Charge after the Transfer Relay has de-energized on entering Float Stage)

1= Option 2:

- The Transfer Relay will be switched ON (energized) if the battery voltage drops to "LOW VOLT ALARM" (Section 4.4.2.8), or lower for sustained period = "GS DETECT TIME" (Section 4.4.2.16). The EVO™ will change over to "Charging Mode" and qualified AC input from the Grid will be passed through to the AC Output and at the same time, the Internal AC Charger will start charging the battery. If an external Solar Charge Controller is also connected to the External Charging Terminals (3 and 4, Fig 2.1 in Owner's Manual for Evolution™ Series Inverter/Charger), the internal AC Charger will limit the charging current to a value = (Programmed Value of "BULK CURRENT" – Value of Current fed from the external Solar Charge Controller).
- Charging will proceed as per the charging profile set through the programmable parameter "CHARGING PROFILE" (Section 4.4.2.21).
- The Transfer Relay will be switched OFF (de-energized) after the programmed value of "GEN OFF DELAY" (Section 4.4.2.18) counted from the time the battery voltage rises to the programmed value of "RESET VOLTAGE" (Section 4.4.2.7). The unit will exit "Charging Mode" and revert to "Inverting" Mode.

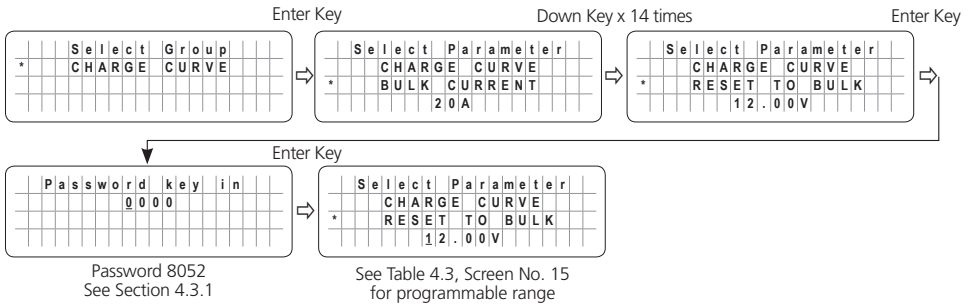
NOTE: There is a possibility that the following situations may occur:

- (i) The battery voltage may rise higher than the programmed value of "RESET VOLTAGE" up to the programmed value of "ABSORP VOLTAGE" (If the programmed value of "ABSORP VOLTAGE" is > the "RESET VOLTAGE") due to continuation of charging for the programmed value of "GEN OFF DELAY" after the voltage has reached the programmed value of "RESET VOLTAGE"
- (ii) The battery may not be charged fully after the Transfer Relay has de-energized because the programmed values of "RESET VOLTAGE" and "GEN OFF DELAY" may not match the desired Absorption Voltage / Absorption Time of the battery being used.

SECTION 4 | Parameter Setup

4.4.2.15 RESET TO BULK (Table 4.3, Screen No. 15)

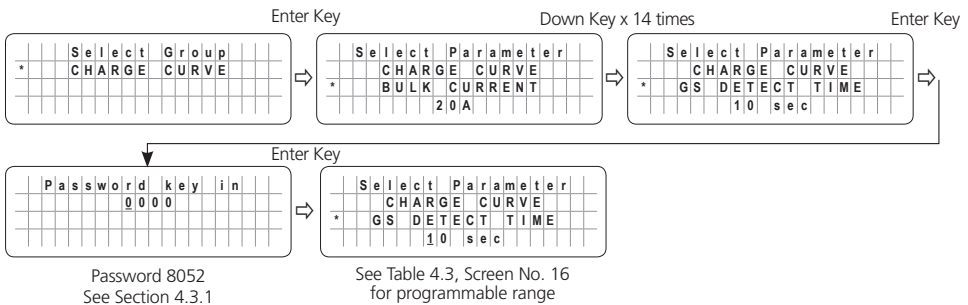
Please refer to Sections 5.7.4 and 5.9.1 of the Owner's Manual for Evolution™ Series Inverter/Chargers EVO-1212F / 1212F-HW / 1224F / 1224F-HW regarding automatic resetting of charging profiles. When charging is in Float Stage and the battery discharges to the programmed discharged voltage level "RESET TO BULK", the Charging Cycle is reset to the Bulk Stage of the charging profile programmed through parameter "CHARGING PROFILE" (Section 4.4.2.21). The programmable range of this voltage level is 10 to 13V for 12V battery and 20 to 26V for 24V battery and the Default Setting is 12V for 12V battery and 24V for 24V battery.



4.4.2.16 GS DETECT TIME (Table 4.3, Screen No. 16)

This parameter is a Programmable Timer (0-600 sec; Default: 10 sec). The Timer sets the duration the battery voltage has to remain at threshold of "LOW VOLT ALARM" condition (Section 4.4.2.8), or lower before the following actions are initiated:

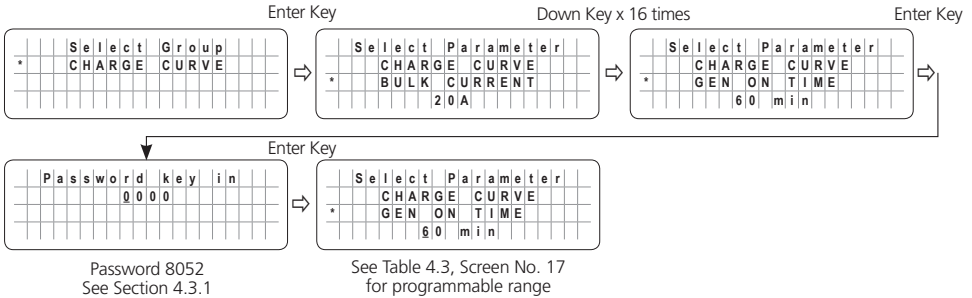
- **Automatic Starting and Stopping of Generator:** Switching ON (energizing) the Status Relay to initiate Generator starting [see Sections 4.8.2.5.2(a) to (c)].
- **On-Line Mode:** Switching ON of the Transfer Relay to transfer from "Inverting" Mode to "Charging" Mode (see Section 4.4.2.14).



SECTION 4 | Parameter Setup

4.4.2.17 GEN ON TIME (Table 4.3, Screen No. 17)

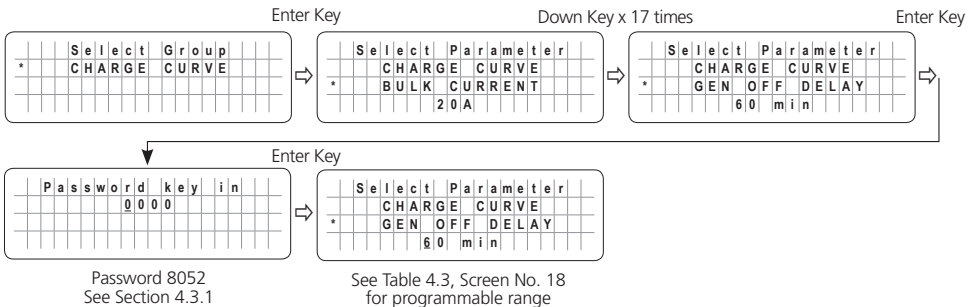
This parameter is a Programmable Timer (0-240 min; Default: 60 min) that is used for programming Automatic Starting and Stopping of Generator [Section 4.8.2.5.2(c)]. The Timer sets the duration the Generator will remain ON from the time the Status Relay has been switched ON (energized). The Status Relay will switch ON (energize) and start the Generator if the battery voltage remains at threshold of "LOW VOLT ALARM" (Section 4.4.2.8) or lower for continuous period = "GS DETECT TIME" (Section 4.4.2.16).



4.4.2.18 GEN OFF DELAY (Table 4.3, Screen No. 18)

This parameter is a Programmable Timer (0-240 min; Default: 60 min) that is used for the following:

- **Programming Automatic Starting and Stopping of Generator [Section 4.8.2.5.2(b)]:** The Timer sets the time period the batteries are required to remain charged at the desired programmed level of voltage = "RESET VOLTAGE" (Section 4.4.2.7) or higher before the Status Relay is switched OFF (de-energized) to stop the Generator.
- **Programming Option "1=Option2" in "ONLINE OPTION" (Section 4.4.2.14)** The Timer sets the time period the batteries are required to remain charged at the desired programmed level of voltage = "RESET VOLTAGE" (Section 4.4.2.7) or higher before the Transfer Relay is switched OFF (de-energized) to exit "Charging" Mode and revert to "Inverting" Mode.



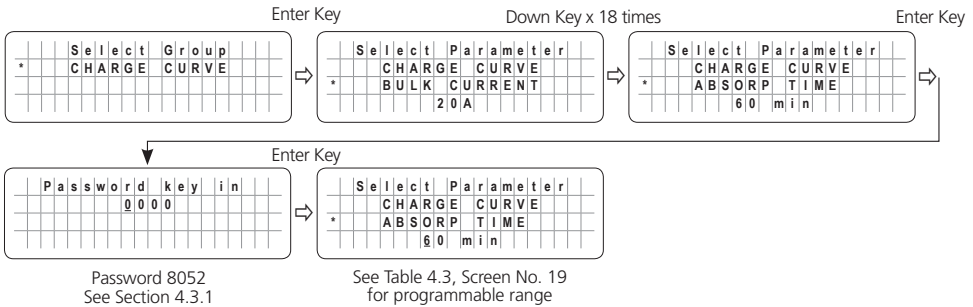
SECTION 4 | Parameter Setup

4.4.2.19 ABSORP TIME (Table 4.3 , Screen No. 19)

Parameter "ABSORP TIME" is used to set the time the charger will remain in Absorption Stage when the following "CHARGING PROFILE" options are selected:

- 1=3 Stage Type 1
 - 3=2 Stage Type 1
- (Refer to Section 4.4.2.21)

Programmable range is 0 – 600 min. Default value is 60 min.

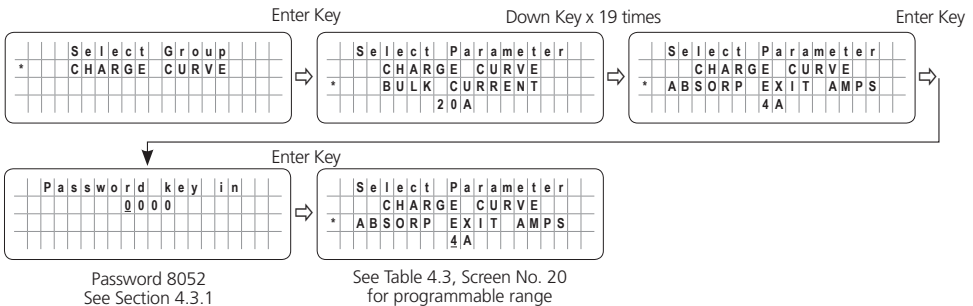


4.4.2.20 ABSORP EXIT AMPS (Table 4.3, Screen No. 20)

Parameter "ABSORP EXIT AMPS" is used to set the value of the charging current at which the charger will exit the Absorption Stage and transition to Float Stage when the following "CHARGING PROFILE" option is selected.

- 2=3 Stage Type 2

Programmable range is 0 – 20A. Default value is 4A. (Refer to Section 4.4.2.21)



4.4.2.21 CHARGING PROFILE (Table 4.3, Screen No. 21)

Parameter "CHARGING PROFILE" is used to select one of 6 available options for the charging profile that are designed to cover various charging requirements for Lead Acid and Lithium Batteries. (See **NOTE** on the next page)

- 0 = 3 Stage Adaptive (Default)
- 1 = 3 Stage Type 1
- 2 = 3 Stage Type 2
- 3 = 2 Stage Type 1
- 4 = 2 Stage Type 2

3 Stage Adaptive Charging Profile setting "0=3 Stage Adaptive" is the default charging profile applicable for Lead Acid Batteries

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Details of the 5 programmable charging profiles are given in Table 5.2.

NOTE: 4-Stage Equalize Charging Profile is also available and can be activated anytime during charging taking place under one of the 5 Charging Profile options given above. Procedure to activate Equalize Charging Profile is described under programmable Parameter "EQUALIZE-4STAGES" at Section 4.4.2.12.



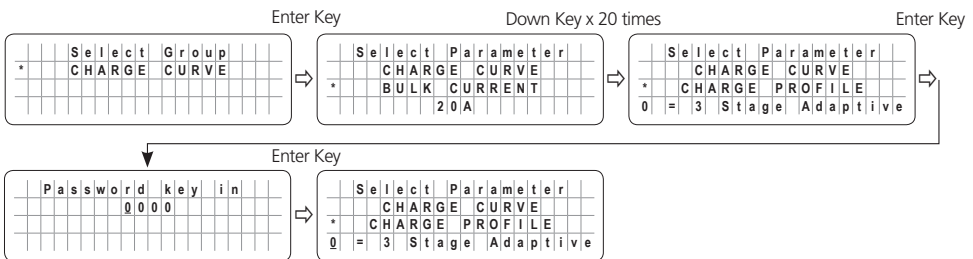
CAUTION!

The Battery Management System (BMS) that comes with the type of Lithium Battery being used will need to have control over charging and discharging of the battery. For this, Pins 4 and 5 of the temperature Sensor Jack (6, Fig 4.1) may be used to feed potential free contact closing signal from the BMS to "Stop Charging" or "Stop Inverting" Refer to Section 5.12 of the EVO 1212F / 1212F-HW / 1224 / 1224-HW Owner's Manual for details.

Options for Parameter "CHARGING PROFILE"	Charging Stages	Battery Type and Battery Loading Condition
0=3 Stage Adaptive (Default)	<ol style="list-style-type: none"> Bulk Stage: Charge at constant current equal to programmable parameter "BULK CURRENT" <ul style="list-style-type: none"> Transition to Absorption Stage when voltage rises to programmable parameter "ABSORP VOLTAGE". Absorption Stage: Charge at constant voltage at programmable parameter "ABSORP VOLTAGE". <ul style="list-style-type: none"> Adaptive Time Algorithm: Time in Absorption Stage is computed automatically based on time in Bulk Stage. Transition to Float Stage thereafter. Float Stage: Charge at constant voltage equal to programmable parameter "FLOAT VOLTAGE" <ul style="list-style-type: none"> Reset to Bulk Stage under the following conditions: <ul style="list-style-type: none"> After 10 days in Float Stage, or Voltage drops to programmable voltage parameter "RESET TO BULK" 	<ul style="list-style-type: none"> Lead Acid: Flooded and sealed – AGM/ Gel Cell ENSURE that there are no other DC load(s) on the batteries. Load(s) on the battery may drain full or part of the charging current and will upset the "Adaptive Algorithm" for Absorption Stage time
1 = 3 Stage Type 1	<ol style="list-style-type: none"> Bulk Stage: Charge at constant current equal to programmable parameter "BULK CURRENT" <ul style="list-style-type: none"> Transition to Absorption Stage when voltage rises to programmable parameter "ABSORP VOLTAGE". Absorption Stage: Charge at constant voltage at programmable parameter "ABSORP VOLTAGE". <ul style="list-style-type: none"> Time in Absorption Stage is programmable through parameter "ABSORP TIME". Transition to Float Stage thereafter Float Stage: Charge at constant voltage equal to programmable parameter "FLOAT VOLTAGE" <ul style="list-style-type: none"> Reset to Bulk Stage under the following conditions: <ul style="list-style-type: none"> After 10 days in Float Stage, or Voltage drops to programmable voltage parameter "RESET TO BULK" 	<ul style="list-style-type: none"> Lead Acid: Flooded and sealed – AGM/ Gel Cell Lithium (See Section 5.12 and Table 5.2(a) of the Owner's Manual for EVO-1212F, EVO-1212F-HW, EVO-1224F, EVO-1224F-HW for details on charging Lithium Batteries)

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Options for Parameter "CHARGING PROFILE"	Charging Stages	Battery Type and Battery Loading Condition
2 = 3 Stage Type 2	<ol style="list-style-type: none"> Bulk Stage: Charge at constant current equal to programmable parameter "BULK CURRENT" <ul style="list-style-type: none"> Transition to Absorption Stage when voltage rises to programmable parameter "ABSORP VOLTAGE". Absorption Stage: Charge at constant voltage at programmable parameter "ABSORP VOLTAGE". <ul style="list-style-type: none"> Transition from Absorption to Float when current drops to programmable parameter "ABSORP EXIT AMPS" Float Stage: Charge at constant voltage equal to programmable parameter "FLOAT VOLTAGE" <ul style="list-style-type: none"> Reset to Bulk Stage under the following conditions: <ul style="list-style-type: none"> After 10 days in Float Stage, or Voltage drops to programmable voltage parameter "RESET TO BULK" 	<ul style="list-style-type: none"> Lead Acid: Flooded and Sealed – AGM/ Gel Cell Lithium (See Section 5.12 and Table 5.2(a) of the Owner's Manual for EVO-1212F, EVO-1212F-HW, EVO-1224F, EVO-1224F-HW for details on charging Lithium Batteries)
3 = 2 Stage Type 1	<ol style="list-style-type: none"> Bulk Stage: Charge at constant current equal to programmable parameter "BULK CURRENT" <ul style="list-style-type: none"> Transition to Absorption Stage when voltage rises to programmable parameter "ABSORP VOLTAGE". Absorption Stage: Charge at constant voltage at programmable parameter "ABSORP VOLTAGE". <ul style="list-style-type: none"> Remain in Absorption Stage for programmable parameter "ABSORP TIME" Switch OFF charging thereafter Reset to Bulk Stage under the following conditions: <ul style="list-style-type: none"> After 10 days in Float Stage, or Voltage drops to programmable voltage parameter "RESET TO BULK" 	<ul style="list-style-type: none"> Lithium (See Section 5.12 and Table 5.2(a) of the Owner's Manual for EVO-1212F, EVO-1212F-HW, EVO-1224F, EVO-1224F-HW for details on charging Lithium Batteries)
4 = 2 Stage Type 2	<ol style="list-style-type: none"> Bulk Stage: Charge at constant current equal to programmable parameter "BULK CURRENT" <ul style="list-style-type: none"> Transition to Absorption Stage when voltage rises to programmable parameter "ABSORP VOLTAGE". Absorption Stage: Charge at constant voltage at programmable parameter "ABSORP VOLTAGE". 	<ul style="list-style-type: none"> Lithium (See Section 5.12 and Table 5.2(a) of the Owner's Manual for EVO-1212F, EVO-1212F-HW, EVO-1224F, EVO-1224F-HW for details on charging Lithium Batteries)



Password 8052
See Section 4.3.1

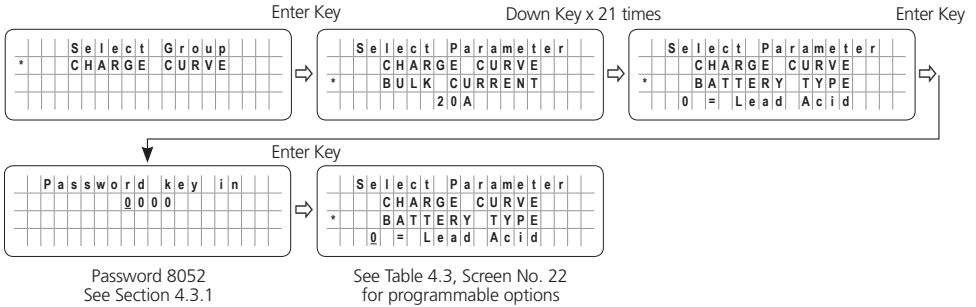
See Table 4.3, Screen No. 21
for programmable options

SECTION 4 | Parameter Setup

- EVO™ in Inverting Mode:** Inverting will stop. EVO™ will go to Standby Mode. The right half of the 1st Line of the Standby Mode Screens shown in the Menu Map for Standby Mode Screens [Fig 3.1(a) and 3.1(b)] will show “Inv stop by BMS” in 2 consecutive displays - first “Inv stop” and then “by BMS” as shown in example below:

EVO-1212F	Inv stop
Output:	0.00V
	< 0.10A

EVO-1212F	by BMS
Output:	0.00V
	< 0.10A



4.5 GROUP 2 PARAMETER SET UP: INPUT SETTING

4.5.1 Programming Ranges and Default / Factory Preset Values of Parameters under Group 2 - INPUT SETTING

Table 4.5 below gives details of programming ranges and default values of parameters under Group 2 - "Select Group - INPUT SETTING". Refer to Fig 4.3 under Section 4.1.3.2 for the Menu Map for navigating through the various parameters under this Group.

Screen No.	Parameter	Setting range					
		EVO-1212F EVO-1212F-HW	EVO-2212	EVO-3012	EVO-1224F EVO-1224F-HW	EVO-2224	EVO-4024
1	DEFAULT FREQ	See NOTE 0=60Hz (60Hz)	0=60Hz, 1=50Hz (60Hz)		See NOTE 0=60Hz (60Hz)	0=60Hz, 1=50Hz (60Hz)	
2	GRID MAX CURRENT	5 - 20A (20A)	5 - 40A (30A)	5 - 70A (30A)	5 - 20A (20A)	5 - 40A (30A)	5 - 70A (30A)
3	GEN MAX CURRENT		5 - 40A (30A)	5 - 70A (30A)		5 - 40A (30A)	5 - 70A (30A)
4	HIGH CUT OFF	50 - 70Hz (65Hz)					
5	HIGH RESET	50 - 70Hz (64Hz)					
6	LOW CUT OFF	40 - 60Hz (55Hz)					
7	LOW RESET	40 - 60Hz (56Hz)					

SECTION 4 | Parameter Setup

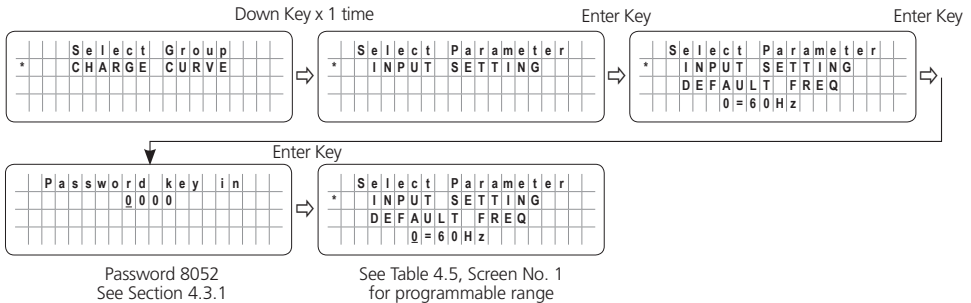
NOTES for Table 4.5:

1. Values within brackets "()" show the Default Setting.
2. DEFAULT FREQ parameter is fixed at 60Hz for EVO-1212F / 1212F-HW and EVO-1224F / 1224F-HW (Option 0=60Hz). If option 1 is entered, the screen line will show " ! 1=xxHz" meaning that Option 1 is invalid.
3. Parameter "GEN MAX CURRENT" is not available for EVO-1212F / 1212F-HW and EVO-1224F / 1224F-HW as separate Generator input is not available in these models.

4.5.2 Description of Parameters under Group 2 - INPUT SETTING

4.5.2.1 DEFAULT FREQ (Table 4.5, Screen No. 1)

Default frequency sets the Inverter frequency, which is also the standard frequency for AC input.



NOTE: DEFAULT FREQ parameter is fixed at 60Hz for EVO-1212F / 1212F-HW and EVO-1224F / 1224F-HW (Option 0=60Hz). If option 1 is entered for these models, the screen line will show " ! 1=xxHz" meaning that Option 1 is invalid.

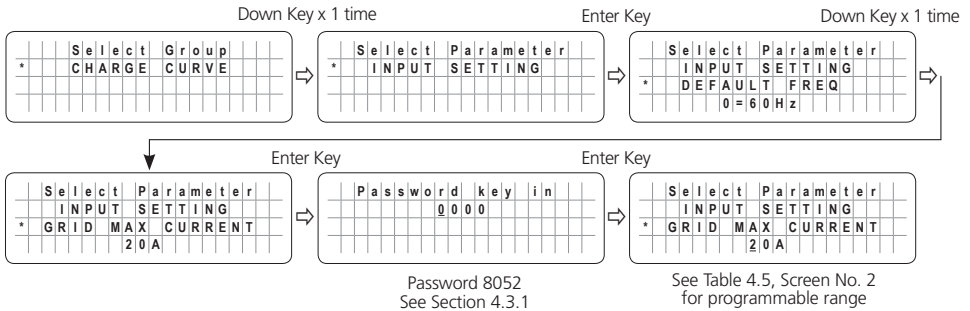
4.5.2.2 GRID MAX CURRENT / GEN MAX CURRENT (Table 4.5, Screen Nos. 2 & 3)

In Charging Mode, the net AC input current from the Grid/Generator is the sum of the AC side charging current and the pass through load current. Based on the rated capacity of the Grid Branch Circuit/Generator, the net AC input current will be required to be limited to prevent overloading of the Grid Branch Circuit/Generator.

EVO™ Series has a very powerful battery charger that will require a proportionate higher AC input current from the Grid/Generator. The Grid Branch Circuit/Generator will also be required to provide current to the AC loads. The desired maximum value of input current from Grid/Generator can be programmed (Default setting is 20A for Models EVO-1212F / 1212F-HW / 1224F / 1224F-HW and 30A for Models EVO-2212 / 3012 / 2224 / 4024). The EVO™ will automatically reduce charging current to support the AC loads on priority and use whatever is extra for charging. This will prevent overloading of the Grid Branch Circuit/Generator. If the AC input current is over the setting value by 1A for 5 seconds, the EVO™ Inverter/Charger will stop outputting and display an error message "Input over current!" on LCD screen. For more details, please refer to Section 5.2.1 of the Owner's Manual for Evolution™ Series Inverter/Charger.

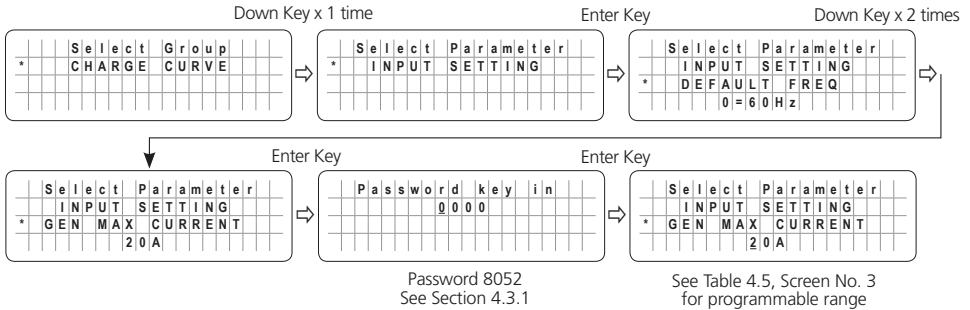
SECTION 4 | Parameter Setup

4.5.2.2.1 GRID MAX CURRENT (Table 4.5, Screen No. 2)



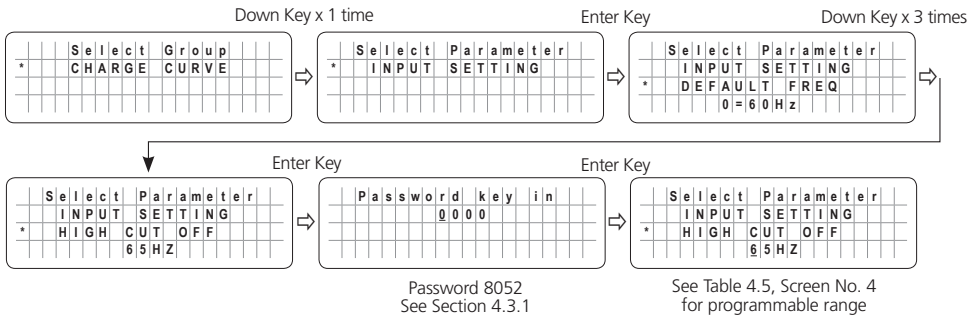
4.5.2.3 GEN MAX CURRENT (Table 4.5, Screen No. 3)

NOTE: This parameter setting is NOT available for EVO-1212F / 1212F-HW and EVO-1224F / 1224F-HW.



4.5.2.4 HIGH CUT OFF (Table 4.5, Screen No. 4)

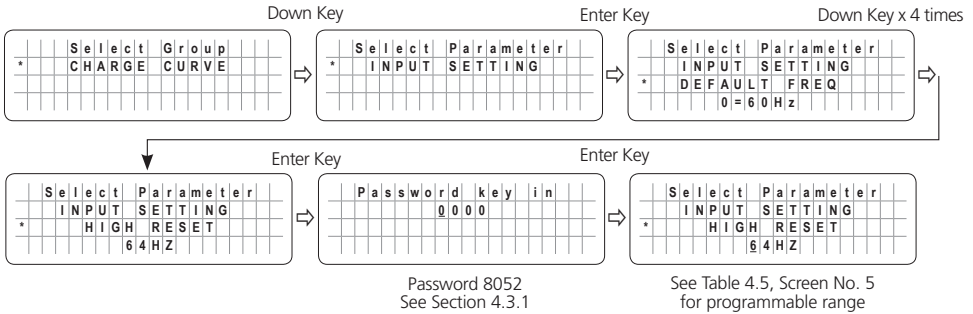
If the AC input frequency is over the value of "HIGH CUT OFF" when in "Charging Mode", the EVO™ Inverter/Charger will transfer to Inverting Mode.



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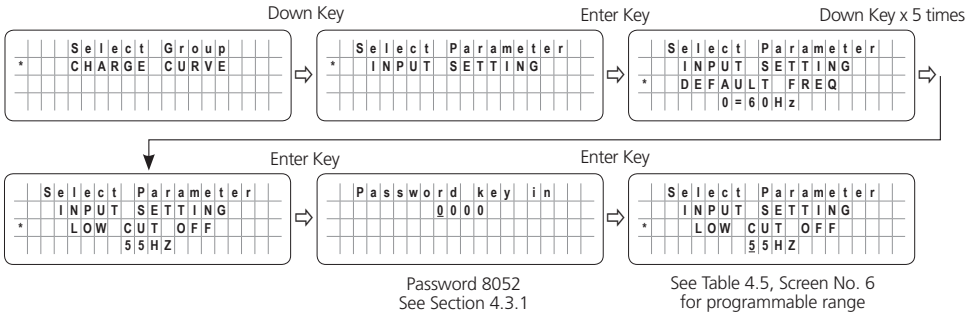
4.5.2.5 HIGH RESET (Table 4.5, Screen No. 5)

This is the reset frequency at which the unit will revert to "Charging Mode" after it has switched over to "Inverter Mode" due to input frequency rising above "HIGH CUT OFF".



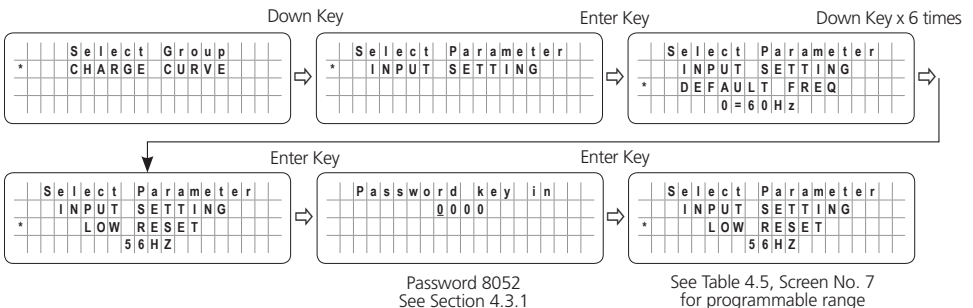
4.5.2.6 LOW CUT OFF (Table 4.5, Screen No. 6)

If the AC input frequency is below "LOW CUT OFF" value when in "Charging Mode", the EVO™ Inverter/Charger will transfer to Inverting Mode.



4.5.2.7 LOW RESET (Table 4.5, Screen No. 7)

This is the reset frequency at which the unit will revert to "Charging Mode" after it has switched over to "Inverting Mode" due to input frequency falling below "LOW CUT OFF".



SECTION 4 | Parameter Setup

4.6 GROUP 3 PARAMETER SET UP: INPUT LOW LIMIT

4.6.1 Programming Ranges and Default / Factory Preset Values of Parameters under Group 3 - INPUT LOW LIMIT

Table 4.6 below gives details of programming ranges and default values of parameters under Group 3 - INPUT LOW LIMIT. Refer to Fig 4.3 under Section 4.1.3.2 for Menu Map for navigating through the various parameters under this Group.

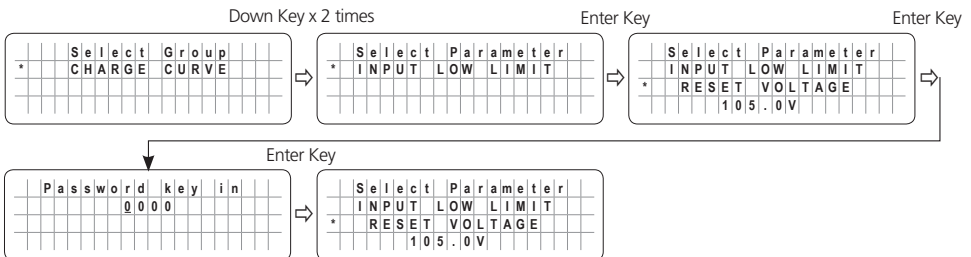
Screen No.	Parameter	Setting range					
		EVO-1212F EVO-1212F-HW	EVO-2212	EVO-3012	EVO-1224F EVO-1224F-HW	EVO-2224	EVO-4024
1	RESET VOLTAGE	60.00 - 120.0V (105.0V)					
2	CUT OFF VOLT 1	60.00 - 120.0V (100.0V)					
3	DETECT TIME 1	0 - 2000 cycles (300 cycles)					
4	CUT OFF VOLT 2	60.00 - 120.0V (95.0V)					
5	DETECT TIME 2	0 - 2000 cycles (60 cycles)					
6	CUT OFF VOLT 3	60.00 - 120.0V (90.0V)					
7	DETECT TIME 3	0 - 2000 cycles (1 cycle)					

NOTE for Table 4.6: Values within brackets "()" show the Default Setting.

4.6.2 Description of Parameters under Group 3 - INPUT LOW LIMIT

4.6.2.1 RESET VOLTAGE (Table 4.6, Screen No. 1)

This is the reset voltage at which the unit will revert to "Charging Mode" after it has switched over to "Inverting Mode" due to input voltage falling to "CUT-OFF VOLT 1/CUT-OFF VOLT 2/CUT-OFF VOLT 3".



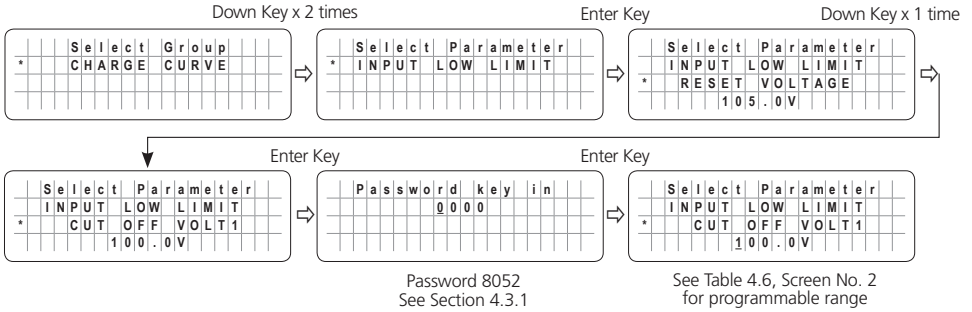
Password 8052
See Section 4.3.1

See Table 4.6, Screen No. 1
for programmable range

SECTION 4 | Parameter Setup

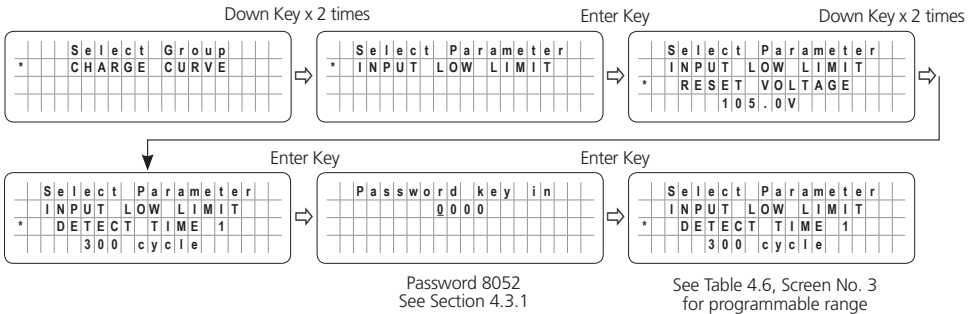
4.6.2.2 CUT OFF VOLT 1 (Table 4.6, Screen No. 2)

If during "Charging Mode", the AC input voltage falls below "CUT-OFF VOLT 1" for period > "DETECT TIME 1", the EVO™ Inverter/Charger will transfer to Inverting Mode from "Charging Mode".



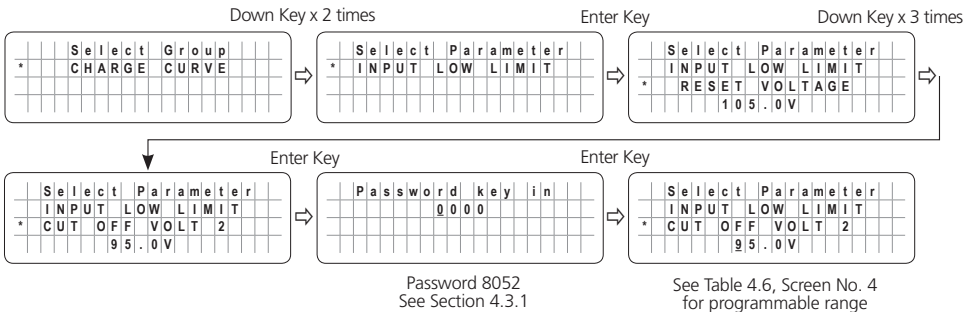
4.6.2.3 DETECT TIME 1 (Table 4.6, Screen No. 3)

This is the time limit in cycles up to which low AC input voltage "CUT-OFF VOLT 1" is allowed.



4.6.2.4 CUT OFF VOLT 2 (Table 4.6, Screen No. 4)

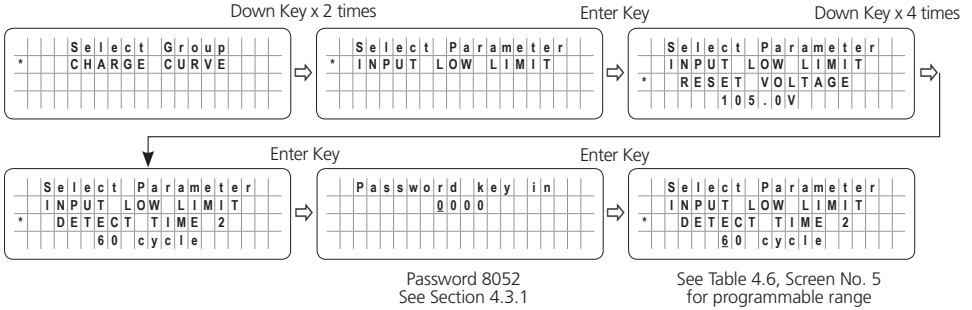
If during "Charging Mode", the AC input voltage falls below "CUT-OFF VOLT 2" for period > "DETECT TIME 2", the EVO™ Inverter/Charger will transfer to "Inverting Mode".



SECTION 4 | Parameter Setup

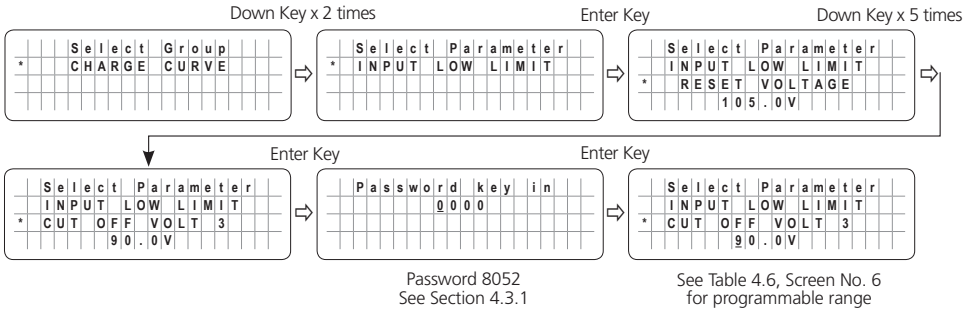
4.6.2.5 DETECT TIME 2 (Table 4.6, Screen No. 5)

This is the time limit in cycles up to which low AC input voltage "CUT-OFF 2" is allowed.



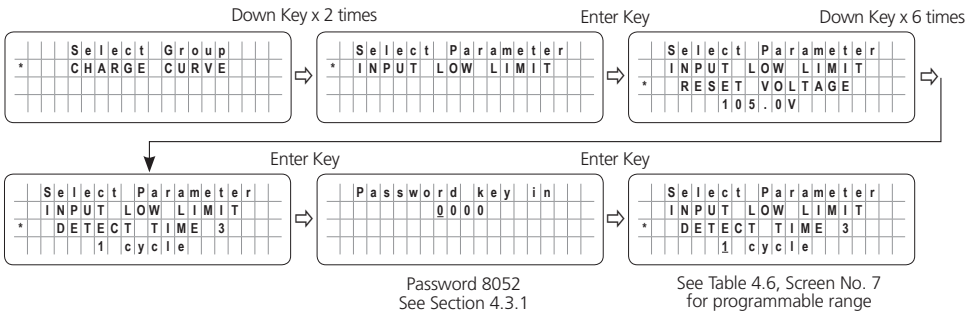
4.6.2.6 CUT OFF VOLT 3 (Table 4.6, Screen No. 6)

If during "Charging Mode", the AC input voltage falls below "CUT-OFF VOLT 3" for period > "DETECT TIME 3", the EVO™ Inverter/Charger will transfer to "Inverting Mode".



4.6.2.7 DETECT TIME 3 (Table 4.6, Screen No. 7)

This is the time limit in cycles up to which the low AC input voltage "CUT-OFF 3" is allowed.



SECTION 4 | Parameter Setup

4.7 GROUP 4 PARAMETER SET UP: INPUT HIGH LIMIT

4.7.1 Programming Ranges and Default / Factory Preset Values of Parameters under Group 4 - INPUT HIGH LIMIT

TABLE 4.7 below gives details of programming ranges and default values of parameters under Group 4 - INPUT HIGH LIMIT. Refer to Fig 4.3 under Section 4.1.3.2 for Menu Map for navigating through the various parameters under this Group.

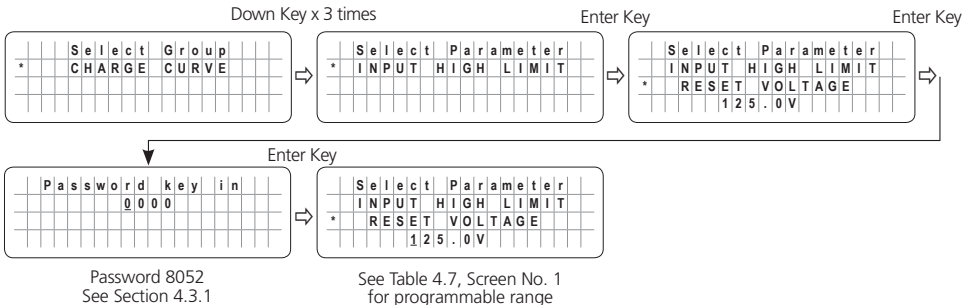
Screen No.	Parameter	Setting range					
		EVO-1212F EVO-1212F-HW	EVO-2212	EVO-3012	EVO-1224F EVO-1224F-HW	EVO-2224	EVO-4024
1	RESET VOLTAGE	120.0 - 150.0V (125.0V)					
2	CUT OFF VOLT 1	120.0 - 150.0V (135.0V)					
3	DETECT TIME 1	0 - 2000 cycles (60 cycles)					
4	CUT OFF VOLT 2	120.00 - 150.0V (140.0V)					
5	DETECT TIME 2	0 - 2000 cycles (15 cycles)					
6	CUT OFF VOLT 3	120.0 150V (145.0V)					
7	DETECT TIME 3	0 - 2000 cycles (1 cycle)					

NOTE for Table 4.6: Values within brackets "()" show the Default Setting.

4.7.2 Description of Parameters under Group 4 - INPUT HIGH LIMIT

4.7.2.1 RESET VOLTAGE (Table 4.7, Screen No. 1)

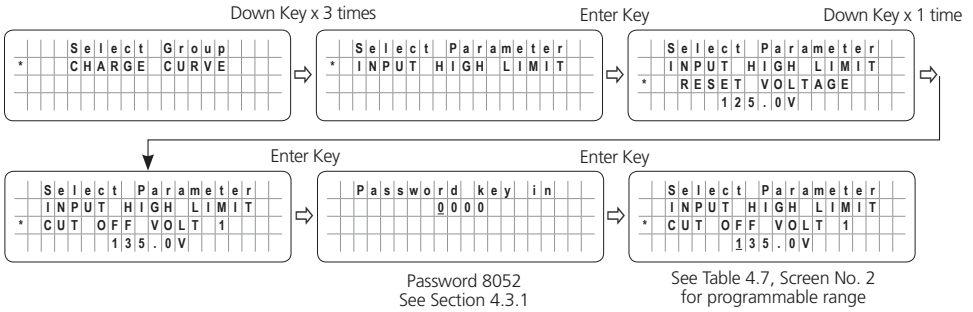
This is the reset voltage at which the unit will revert to "Charging Mode" after it has switched over to "Inverting Mode" due to input AC voltage rising to "CUT-OFF VOLT 1/CUT-OFF VOLT 2/CUT-OFF VOLT 3.



SECTION 4 | Parameter Setup

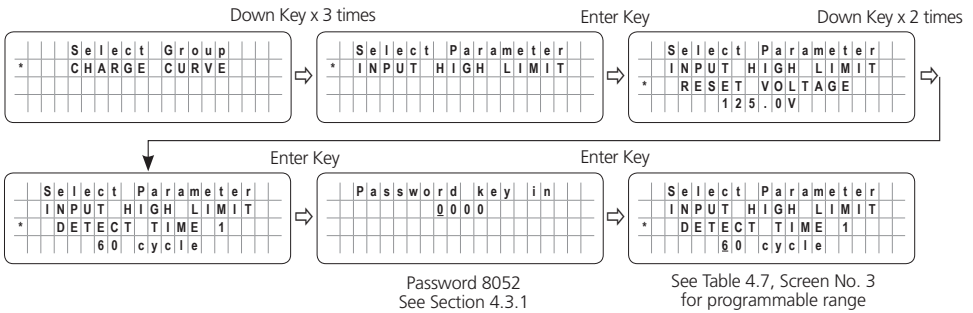
4.7.2.2 CUT OFF VOLT 1 (Table 4.7, Screen No. 2)

If during "Charging Mode", the AC input voltage rises above "CUT-OFF VOLT 1" for period > "DETECT TIME 1", the EVO™ Inverter/Charger will transfer to "Inverting Mode".



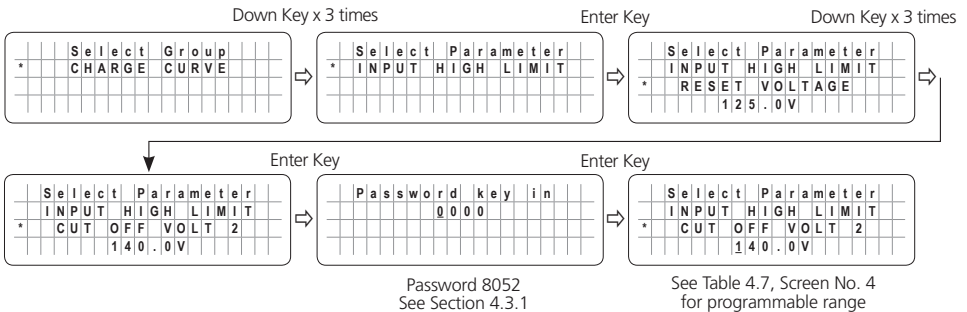
4.7.2.3 DETECT TIME 1 (Table 4.7, Screen No. 3)

This is the time limit in cycles up to which high AC input voltage "CUT-OFF VOLT 1" is allowed.



4.7.2.4 CUT OFF VOLT 2 (Table 4.7, Screen No. 4)

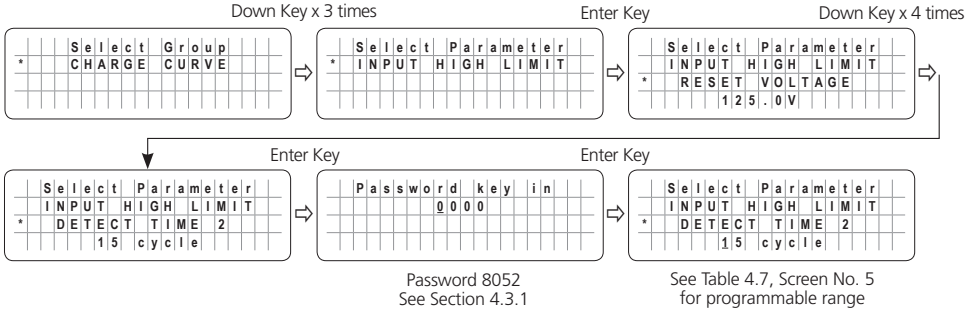
If during "Charging Mode", the AC input voltage rises above "CUT-OFF VOLT 2" for period > "DETECT TIME 2", the EVO™ Inverter/Charger will transfer to "Inverting Mode".



SECTION 4 | Parameter Setup

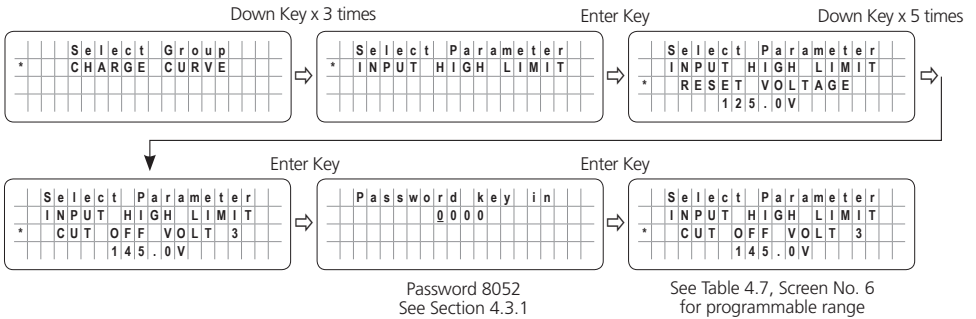
4.7.2.5 DETECT TIME 2 (Table 4.7, Screen No. 5)

This is the time limit in cycles up to which high AC input voltage "CUT-OFF VOLT 2" is allowed.



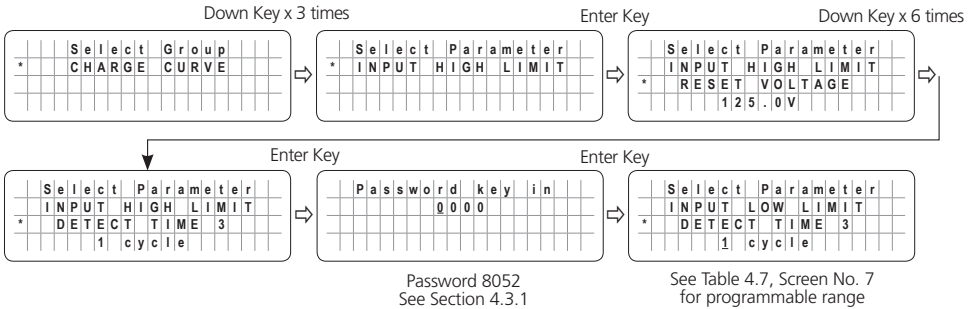
4.7.2.6 CUT OFF VOLT 3 (Table 4.7, Screen No. 6)

If during "Charging Mode", the AC input voltage rises above "CUT-OFF VOLT 3" for period > "DETECT TIME 3", the EVO™ Inverter/Charger will transfer to "Inverting Mode".



4.7.2.7 DETECT TIME 3 (Table 4.7, Screen No. 7)

This is the time limit in cycles up to which high AC input voltage "CUT-OFF VOLT 3" is allowed.



SECTION 4 | Parameter Setup

4.8 GROUP 5 PARAMETER SET UP: OTHER FUNCTIONS

Please refer to Parameters under Group 5 at Fig 4.2. Details of Parameter set up are given below:

4.8.1 Programming Ranges and Default / Factory Preset Values of Parameters under Group 5 - OTHER FUNCTION

Table 4.8 below gives details of programming ranges and default values of parameters under Group 5 - OTHER FUNCTION. Refer to Fig 4.4 under Section 4.1.3.3 for Menu Map for navigating through the various parameters under this Group.

Table 4.8 Group 5 Parameter Set Up: INPUT LOW LIMIT (Refer to Menu Map at Fig 4.4, Section 4.1.3.3)							
Screen No.	Parameter	Setting range					
		EVO-1212F EVO-1212F-HW	EVO-2212	EVO-3012	EVO-1224F EVO-1224F-HW	EVO-2224	EVO-4024
1	POWER SAVING	0 = Disable , 1 = Enable (0 = Disable)					
2	ENTER POINT	4 - 50W (6W)	4 - 50W (6W)	4 - 50W (8W)	4 - 50W (6W)	4 - 50W (6W)	4 - 50W (8W)
3	WAKE UP POINT	4 - 50W (7W)	4 - 50W (7W)	4 - 50W (10W)	4 - 50W (7W)	4 - 50W (7W)	4 - 50W (10W)
4	REMOTE SWITCH	0 = Button Type , 1 = Switch Type (0 = Button Type)					
5	RELAY FUNCTION		0 = Charger / Other 1 = Normal / Fault 2 = Generator 0 3 = Generator 1			0 = Charger / Other 1 = Normal / Fault 2 = Generator 0 3 = Generator 1	
6	COMM ID	1 - 255 (1)					
7	BUZZER	0 = OFF , 1 = ON (1 = ON)					
8	DISCHARGE BEEP	0 = OFF , 1 = ON (0 = ON)					
9	DEFAULT RESET	0 = No , 1 = Yes (0 = No)					
10	DATALOG TIME	0 = Disable, 1 = 1 sec, 2 = 10 sec, 3 = 30 sec, 4 = 1 min, 5 = 5 min, 6 = 10 min (1 = 1 sec)					
11	PARAMETER SAVE	0 = No , 1 = Yes (0 = No)					
12	TEMP UNIT	0 = °C ; 1 = °F (0 = °C)					
13	PASSWORD DISABLE	0 = No , 1 = Yes (0 = No)					

NOTES for Table 4.8:

1. Values with brackets "()" show the Default Setting.

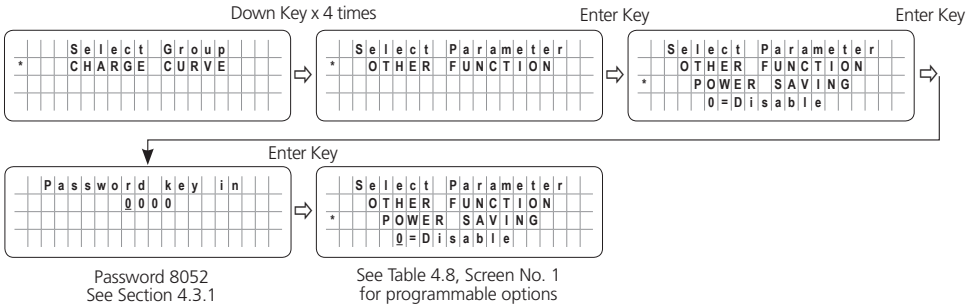
2. RELAY FUNCTION is not available for EVO-1212F / 1212F-HW / 1224F / 1224F-HW

SECTION 4 | Parameter Setup

4.8.2 Description of Parameters under Group 5 - OTHER FUNCTION

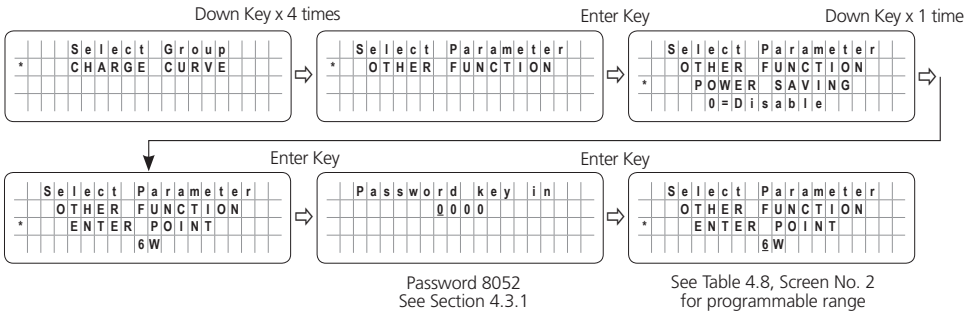
4.8.2.1 POWER SAVING (Table 4.8, Screen No. 1)

Enable or disable Power Saving Mode when in "Inverting Mode".



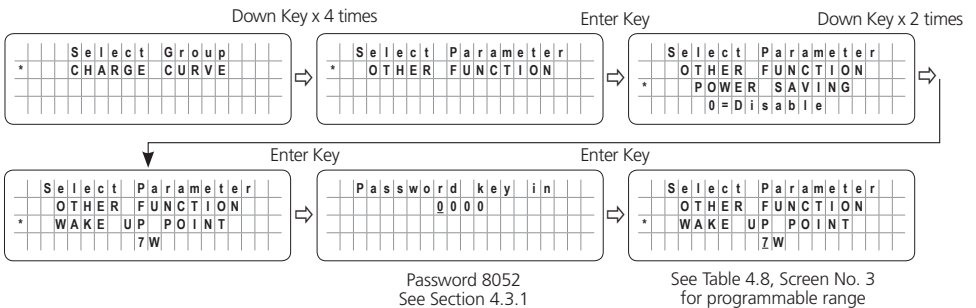
4.8.2.2 ENTER POINT (Table 4.8, Screen No. 2)

If the value of power drawn by AC load falls to the "ENTER POINT" value for 5 sec, the unit will enter "Power Save Mode".



4.8.2.3 WAKE UP POINT (Table 4.8, Screen No. 3)

If the unit is in "Power Save Mode" and the value of the AC power of the load rises to "WAKE UP POINT", the unit will quit "Power Save Mode" and will start operating in full voltage "Inverting Mode".



SECTION 4 | Parameter Setup

4.8.2.4 REMOTE SWITCH (Table 4.8, Screen No. 4)

This selection is used when ON/OFF control of EVO™ Inverter/Charger is desired through external 12 VDC signal fed to Remote ON/OFF terminals on the Front Panel of EVO™ Inverter/Charger [(i) 15, Fig 2.1 in EVO™ Inverter/Charger Owner's Manual for EVO-2212/3012/2224/4024 and (ii) 16, Fig 2.1 for EVO-1212F/1212F-HW and EVO-1224F/1224-HW] On/Off Logic Diagram is shown in Fig 4.8 below:

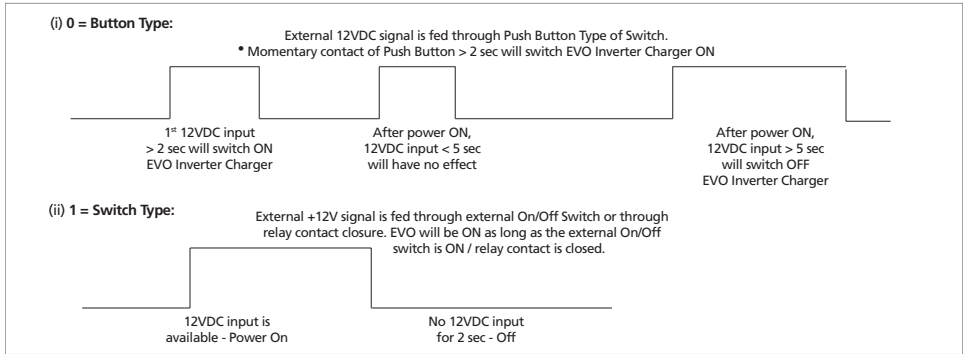


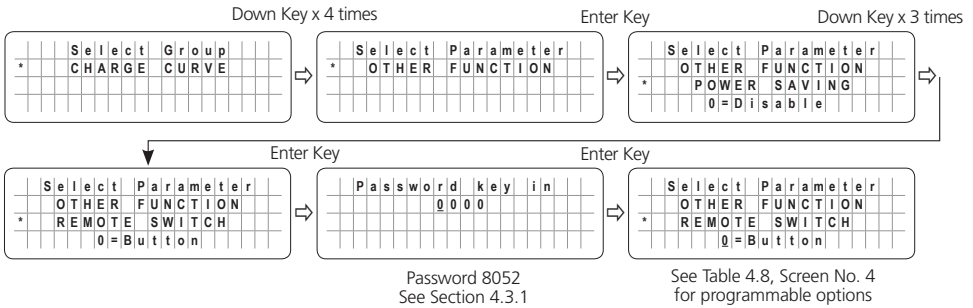
Fig 4.8. On/Off Logic Diagram for Remote Switch Options



CAUTION!

1. On/Off Logic shown in Fig 4.8 also controls the operation of the On/Off Button on the front panel of EVO™ Inverter/Charger (11, Fig 2.1 in EVO™ Inverter/Charger Owner's Manual). The Default Setting is "0 = Button".
2. If the On/Off control is changed to external "Remote Switch", it will not be possible to switch On/Off the EVO™ Inverter/Charger from the front panel On/Off Push Button because it will work with Switch Type Logic at Fig 4.8: it will be ON only as long as the Push Button is kept pressed and will switch off when released.

SECTION 4 | Parameter Setup



4.8.2.5 RELAY FUNCTION (Table 4.8, Screen No. 5)



INFO

Menu "RELAY FUNCTION" will be displayed only for Models EVO-2212 / 3012 / 2224 / 4024 that have Generator Input Terminals. It will not be displayed for Models EVO-1212F / 1212F-HW / 1224F / 1224F-HW.

A Single Pole Double Throw (SPDT) Status Relay with 3 contacts (Contact Rating: 3A ; 125 VAC / 30 VDC) has been provided in the Evolution™ Series (EVO™) Inverter/Chargers EVO-2212 / 3012 / 2224 / 4024 that can be used for (i) signaling of operational status (Options 0 and 1) and (ii) providing contact closure / opening for automatic starting and stopping of generator through appropriate optional Generator Auto Start / Stop Control Module (Options 2, 3 and 4). The 3 contacts of the Status Relay are connected to 3 terminals of Terminal Block (14, Fig 2.1 in Owner's Manual for Evolution™ Series Models EVO-2212 / 3012 / 2224 / 4024) on the front panel. The contacts are marked "NO" (Normally Open), "Common" and "NC" (Normally Closed). When the Status Relay is OFF (de-energized), contacts marked "Common" and "NO" will be in open condition and contacts marked "Common" and "NC" will be in closed condition. When the Status Relay is ON (energized), contacts marked "Common" and "NO" will close and contacts marked "Common" and "NC" will open.

Diagram showing steps for programming the RELAY FUNCTION parameter and details of 5 different associated Options 0 to 4 are provided in the succeeding paragraphs.

4.8.2.5.1 (a) Signaling of Operational States (Options 0 and 1)

NOTE: Applicable for Models EVO-2212 / 3012 / 2224 / 4024 ONLY.

Option 0 = Charger/Other: When the EVO™ Inverter/Charger Model EVO-2212 / 3012 / 2224 / 4024 is in "Charging" Mode, the Status Relay will be OFF (de-energized) [(i) "Common" and "NO" contacts will be in open condition and (ii) "Common" and "NC" contacts will be in closed condition]. In "Other" operating modes i.e. in "Inverting", "Power Save" or in "Standby" Modes, the Status Relay will be ON (energized)
[(i) Common and "NO" contacts will close and (ii) "Common" and "NC" contacts will open].

Option 1 = Normal/Fault: When in "Normal" operational state i.e. when not in Fault Mode, the Status Relay will be OFF (de-energized) [(i) "Common" and "NO" contacts will be in open condition and (ii) "Common" and "NC" contacts will be in closed condition]. When the EVO™ Inverter/Charger is in "Fault" mode, the Status Relay will be ON (energized) [(i) Common and "NO" contacts will close and (ii) "Common" and "NC" contacts will open].

SECTION 4 | Parameter Setup

4.8.2.5.1 (b) Automatic Starting and Stopping of Generator (Options 2, 3 and 4)

NOTE: Applicable for Models EVO-2212 / 3012 / 2224 / 4024 ONLY.



INFO

The following programmable parameters have been referred to in the description below. Links to detailed information on these parameters are given below:

- “LOW VOLT ALARM”: Please refer to Section 4.4.2.8
- “GS DETECT TIME”: Please refer to Section 4.4.2.16
- “EQUALIZE-4STAGES”: Please refer to Section 4.4.2.12
- “GEN ON TIME”: Please refer to Section 4.4.2.17
- “GEN OFF TIME”: Please refer to Section 4.4.2.18
- “RESET VOLTAGE”: Please refer to Section 4.4.2.7

The Normally Open “NO” and “Common” contacts of Status Relay (14, Fig 2.1 in the Owner's Manual for Evolution™ Series Inverter/Charger Models EVO-2212 / 3012 / 2224 / 4024) can be used to also automatically start and stop generator through appropriate external Generator Auto Start / Stop Module. 3 options (Options 2, 3 and 4) explained below are available for carrying out this function depending upon user requirements. The “Common” and “NO” terminals are wired to the optional Generator Auto Start / Stop Control Module which, in turn, is wired to the Remote Start / Stop connections on the Generator. The AC output terminals of the Generator are wired to the Generator Input Terminals on the EVO™ (7, 8, 9 in Fig 2.3 in Owner's Manual for EVO™ Series Inverter/Charger Models EVO-2212 / 3012 / 2224 / 4024). For installation details, please refer to Section 3.15 / Fig 3.13 and Section 3.16 / Fig 3.14 in the Owner's Manual for EVO™ Series Inverter/Charger Models EVO-2212 / 3012 / 2224 / 4024.

Based on the Generator Start Logic contained in of one of the selected Options 2, 3 or 4 explained below, the Status Relay will be switched ON (energized), its “Common” and “NO” contacts will close and the external Generator Start / Stop Control Module will initiate automatic starting of the Generator. Once the Generator has started and starts feeding AC output to EVO™ (within the programmed limits of voltage and frequency), the EVO™ will be synchronized with the Generator and once synchronization is completed, the load will be transferred instantly (within 1 ms) to the Generator at Zero Crossing of the voltage waveform for seamless transfer and for better protection of Transfer Relay contacts. The EVO™ will now operate in “Charging Mode” with the AC power from the Generator charging the batteries as well as providing power to the AC load(s).

Based on the Generator Stop Logic contained in one of the selected Options 2, 3 or 4 explained below, the Status Relay will be switched OFF (de-energized), its “Common” and “NO” contacts will open and the external Generator Auto Start Control Control Module will initiate automatic stopping of the Generator. When AC output of the generator is shut down, the EVO™ will automatically transfer the AC load(s) to the “Inverter Section” within 16 ms.

SECTION 4 | Parameter Setup

Relay Options 2, 3 and 4 related to automatic starting and stopping of generator are explained below:

4.8.2.5.2(a) Option 2 = Generator 0 (This is the Default Option):

This Option will start the Generator at "LOW VOLT ALARM" and stop the Generator when the batteries are fully charged till completion of 3-Stage Charging Cycle.

- If the battery voltage drops to "LOW VOLT ALARM" [(i) for 12V: 9.5V – 12.5V / Default 11.0V (ii) for 24V: 19.0V – 25.0V / Default 22.0V] or lower for continuous period = "GS DETECT TIME" (0-600 sec; Default 10 sec), the Status Relay will be energized. "Common" and "NO" contacts of the Status Relay will close to initiate automatic starting of the Generator.
- Once the generator has started and starts feeding AC output (within the programmed limits of voltage and frequency), the EVO™ will change over from "Inverting Mode" to "Charging Mode". Battery charging will be initiated as per full and complete 3-Stage Charging Algorithm ("EQUALIZE-4STAGES", Option 0 = No).
- On entering "Float Stage" on completion of "Absorption Stage", the Status Relay will be switched OFF (de-energized). "Common" and "NO" contacts of the Status Relay will open to initiate automatic stopping of the Generator. When AC output from the Generator switches OFF, EVO™ will change over to "Inverting Mode" (**NOTE:** The battery will be charged to 100% State of Charge after the Transfer Relay has de-energized on entering Float Stage).

4.8.2.5.2 (b) Option 3 = Generator 1

This Option will start the Generator at "LOW VOLT ALARM" and stop the Generator when the batteries are charged to the desired programmed level of voltage ("RESET VOLTAGE") and stay at this desired level of voltage or higher for the desired programmed time period = "GEN OFF DELAY".

- If the battery voltage drops to "LOW VOLT ALARM" [(i) for 12V: 9.5V – 12.5V / Default 11.0V (ii) for 24V: 19.0V – 25.0V / Default 22.0V] or lower for continuous period = "GS DETECT TIME" (0-600 sec; Default 10 sec), the Status Relay will be switched ON (energized). "Common" and "NO" contacts of the Status Relay will close to initiate automatic starting of the Generator.
- Once the generator has started and starts feeding AC output (within the programmed limits of voltage and frequency), the EVO™ will change over from "Inverting Mode" to "Charging Mode". Battery charging will be initiated as per full and complete 3-Stage Charging Algorithm ("EQUALIZE-4STAGES", Option 0 = No).
- When the batteries are charged to the desired programmed level of voltage = "RESET VOLTAGE" [(i) for 12V: 12.0V – 17.0V / Default 14.0V (ii) for 24V: 24.0V – 35.0V / Default 28.0V] and stay at this desired level of voltage, or higher for the desired programmed time period = "GEN OFF DELAY" (0-240 min; Default 60 min), the Status Relay will be switched OFF (de-energized). "Common" and "NO" contacts of the Status Relay will open to initiate automatic stopping of the Generator. When AC output from the Generator switches OFF, EVO™ will change over to "Inverting Mode" (**NOTE:** The State of Charge of the battery after the Status Relay has been switched OFF (de-energized) and Generator is stopped will be indeterminate.)

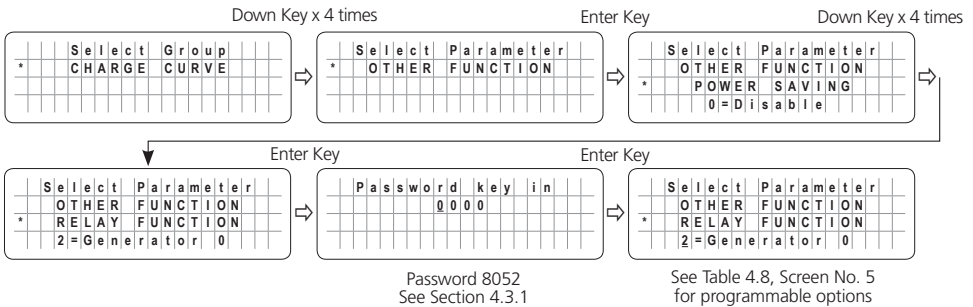
4.8.2.5.2 (c) Option 4 = Generator 2

This Option will start the Generator at "LOW VOLT ALARM" and stop the Generator after the desired programmed value of run time of the Generator = "GEN ON TIME" (0-240 min; Default = 60 min) counted from the time the Status Relay is switched ON (energized).

SECTION 4 | Parameter Setup

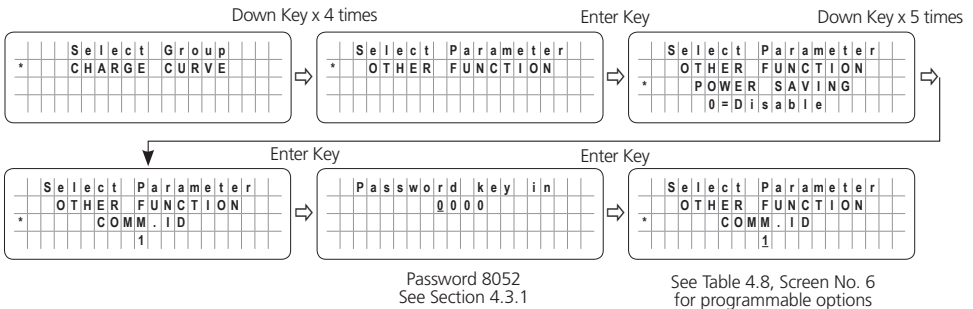
- If the battery voltage drops to “LOW VOLT ALARM” [(i) for 12V: 9.5V – 12.5V / Default 11.0V (ii) for 24V: 19.0V – 25.0V / Default 22.0V] or lower for continuous period = “GS DETECT TIME” (0-600 sec; Default 10 sec), the Status Relay will be switched ON (energized). “Common” and “NO” contacts of the Status Relay will close to initiate automatic starting of the Generator.
- Once the generator has started and starts feeding AC output (within the programmed limits of voltage and frequency), the EVO™ will change over from “Inverting Mode” to “Charging Mode”. Battery charging will be initiated as per full and complete 3-Stage Charging Algorithm (“EQUALIZE-4STAGES”, Option 0 = No).
- The Status Relay will be switched OFF (de-energized) after expiry of the desired programmed Generator run time = “GEN ON TIME” (0-240 min; Default = 60 min) counted from the time the Status Relay is switched ON (energized). “Common” and “NO” contacts of the Status Relay will open to initiate automatic stopping of the Generator. When AC output from the Generator switches OFF, EVO™ will change over to “Inverting Mode” (**NOTE: The State of Charge of the battery after the Status Relay has been switched OFF (de-energized) and Generator is stopped will be indeterminate**).

Diagram showing steps for programming the above RELAY FUNCTION is given below:



4.8.2.6 COMM ID (Table 4.8, Screen No. 6)

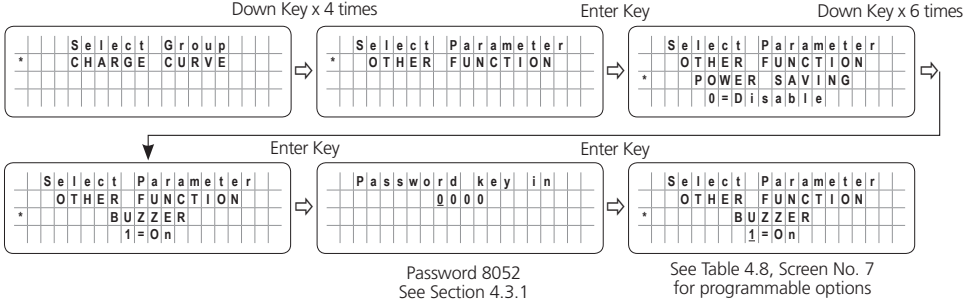
Communication ID- This sets the ID number for the COMM Port and EVO-RC Remote Control.



SECTION 4 | Parameter Setup

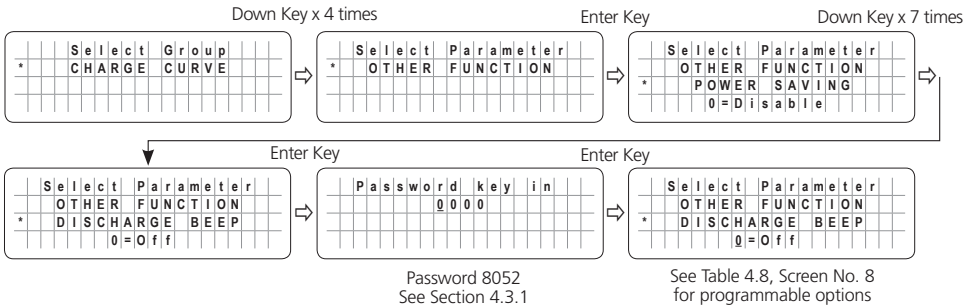
4.8.2.7 BUZZER (Table 4.8, Screen No. 7)

Set the buzzer ON/OFF.



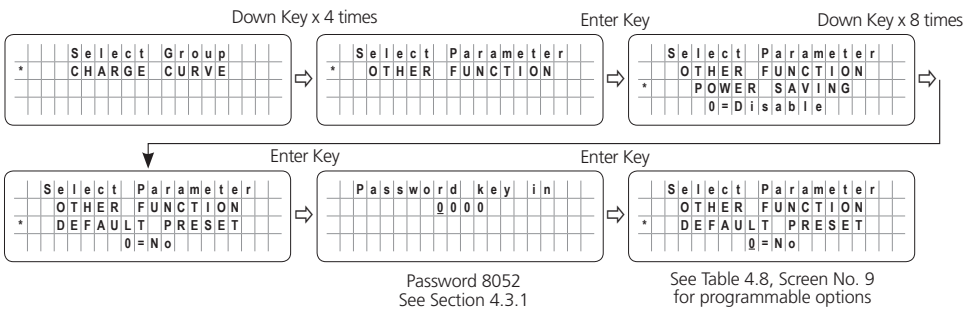
4.8.2.8 DISCHARGE BEEP (Table 4.8, Screen No. 8)

To select the buzzer ON/OFF while in "Inverting Mode".



4.8.2.9 DEFAULT RESET (Table 4.8, Screen No. 9)

This is to reset all of the parameters to the Default Values.



4.8.2.10 DATALOG TIME AND DATALOG DISABLE (Table 4.8, Screen No. 10)

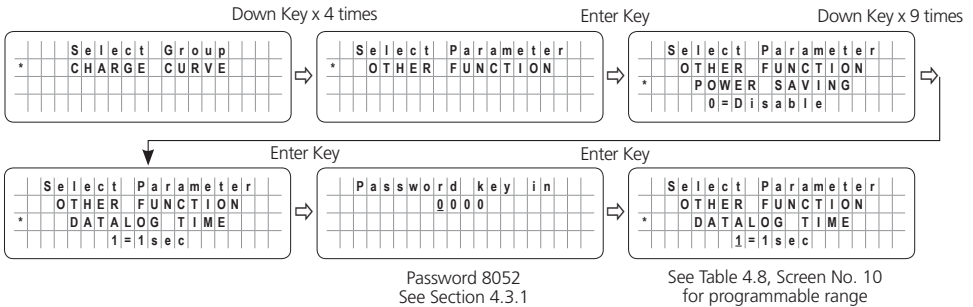
Refer to Sections 5.2 to 5.3 on Data Logging. There are 25 Data Fields in Model Nos. EVO-1212F / 1212F-HW / 1224F / 1224F-HW and 28 Data Fields in Model Nos. EVO-2212 / 3012 / 2224 / 4024 that can be logged in external SD Card (Refer to Section 5.2.2 and 5.2.3 for details of the Data Fields). A Real Time Clock inside the EVO-RC-PLUS Remote Control records

SECTION 4 | Parameter Setup

timing. Time interval between recordings (called "DATALOG TIME") is programmable. "Events" and "Errors" are recorded as soon as they are sensed. In the default setting, Data Logging is enabled. Data Logging can be disabled by setting programming option "0=Disable".

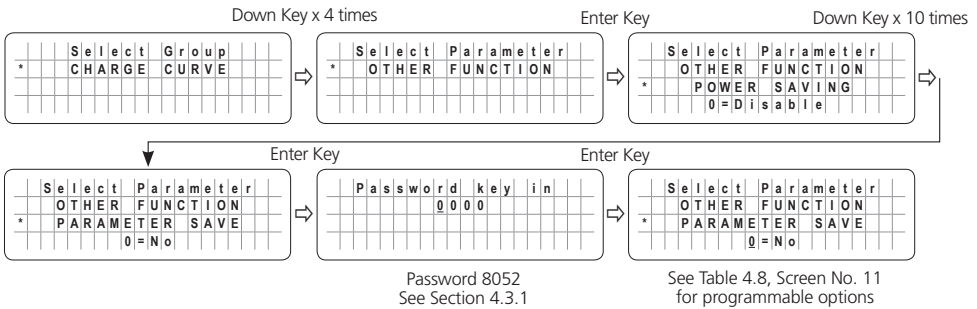
Programming options and procedure are shown below:

Programming Options (i) 0=Disable, (ii) 1=1 sec (Default), (iii) 2=10 sec, (iv) 3=30 sec, (v) 4=60 sec, (vi) 5=5 min, (vii) 6=10 min



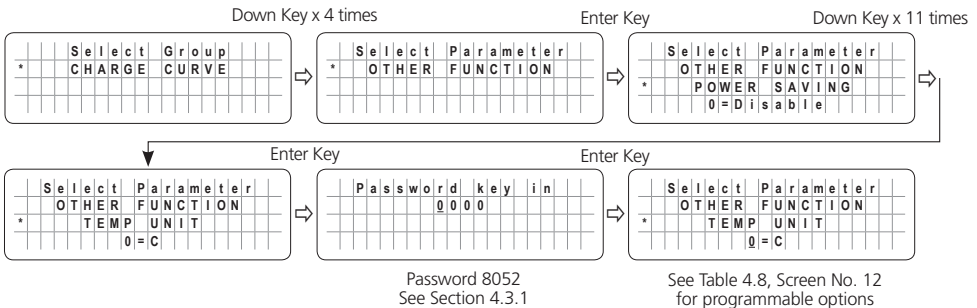
4.8.2.11 PARAMETER SAVE (Table 4.8, Screen No. 11)

Save all parameters to SD Card. (see Details at Section 5.4)



4.8.2.12 TEMP UNIT (Table 4.8, Screen No. 12)

Temperature display can be selected in °C or °F. Default is in °C.

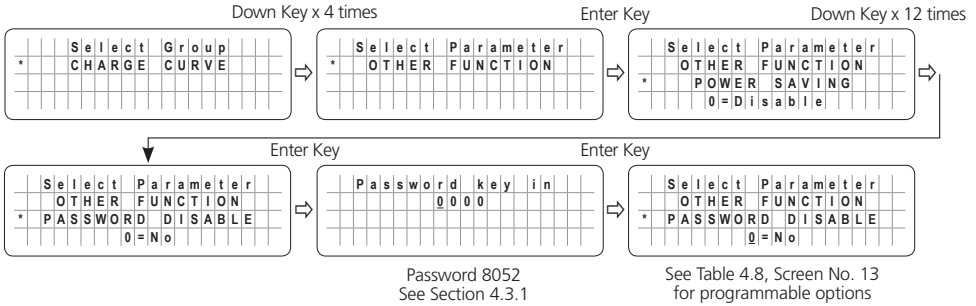


SECTION 4 | Parameter Setup

4.8.2.13 PASSWORD DISABLE (Table 4.8, Screen No. 13)

In default condition, Password (8052) is required to change the value of programmable parameter. Use of Password prevents accidental change of parameter setting.

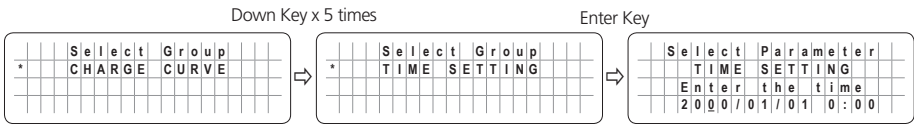
Password may be disabled, if required.



4.9 GROUP 6 PARAMETER SETUP: TIME SETTING

Please refer to Parameter "TIME SETTING" under Screen No. 6 for Group 6 at Fig 4.1. Set up details are given below. The Date and Time Format is Year/Month/Day Hour:Minute (24 hour clock):

NOTE: Password is not required for setting this parameter.



INFO

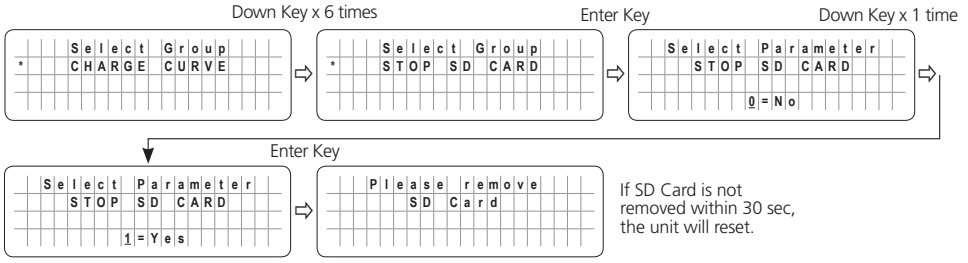
- Time can be programmed from Year 2000 to 2099 only.
- Month can be programmed from 01 to 12 only.
- Day can be programmed from 01 to 31 only.
- Hour can be programmed from 00 to 24 only.
- Minute can be programmed from 00 to 60 only.
- **If the numbers Entered for Month, Day, Hour and Minute are not within the above ranges, message "OUT OF RANGE!" will be displayed and the display screen will go back to the previously set time. Setting procedure will have to be re-started.**

4.10 GROUP 7 PARAMETER SETUP: STOP SD CARD

Please refer to Parameter "STOP SD CARD" under Group 7 at Fig 4.2. Please note that this set up is displayed / accessible only when SD Card is inserted in the SD Card Slot (9, Fig 1.1a). Set up details are given below:

Once SD Card is being used, it should be removed/ejected only after the operation of the Card has been stopped as shown below and message "Please remove SD Card" appears. If the SD card is not removed within 30 sec, it will reset. After the card is removed, it reverts to the original operating screen.

SECTION 4 | Parameter Setup

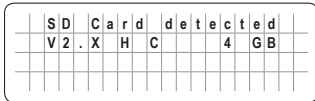


SECTION 5 | SD Card

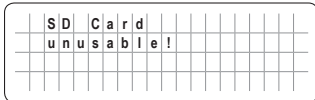
5.1 SD CARD GENERAL INFORMATION

SD Card slot has been provided for using an SD card for (i) data logging and (ii) saving programmed parameters. SD card supports FAT16/FAT32 format up to 16GB in size.

When the SD card is inserted, the LCD screen will display the following.



SD card is detected and shows the Version and capacity. "xx" is the capacity.



Not supported card.



CAUTION!

Do not remove SD Card when data logging has been enabled (may corrupt files). Follow "STOP SD CARD" procedure (Section 4.10) before removing the SD Card.

SECTION 5 | SD Card

5.2 DATA LOGGING

As mentioned at Section 5.1 above, external SD Card may be used to log operating information.

- When the SD Card is inserted in the SD Card Slot, data logging is activated automatically (it will be disabled only if programmable setting has been changed to "0=Disable")

A Real Time Clock inside the EVO-RC Remote Control records timing. Time interval between recordings (called "DATALOG TIME") is programmable. Refer to Section 4.8.2.10 for programming details. Available options for "DATALOG TIME" are:

- 0=Disable ; 1=1 sec (Default); 2=10 sec; 3=30 sec; 4=60 sec; 5=5 min; 6=10 min
- "Events" and "Error Codes" are recorded as soon as they are sensed.

5.2.2 DATA LOGGING Fields for Models EVO-1212F / 1212F-HW / 1224F / 1224F-HW

The following 25 Data Fields consisting of various electrical parameters, events and error codes are recorded for Models EVO-1212F/1212F-HW/1224F/1224F-HW:

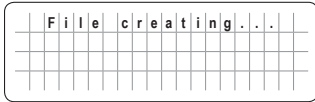
Date	Time	Grid status	Grid freq	Grid volt	Input current	Input VA	Inputt watt	Output freq	Output Volt	Output current
								←		↓
Output VA	Output watt	Battery volt	Battery current	External current	Battery temperature (C)	Transformer temperature (C)				
↓		→								
Hear sink temperature 1 (C)		Hear sink temperature 2 (C)		Fan speed	Mode	Error code	Charge stage	Event		

5.2.3 DATA LOGGING Fields for Models EVO-2212 / 3012 / 2224 / 4024

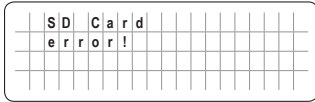
The following 28 Data Fields consisting of various electrical parameters, events and error codes are recorded for Models EVO-2212 / 3012 / 2224 / 4024:

Date	Time	Gen status	Gen freq	Gen volt	Grid status	Grid freq	Grid volt	Input current	Input VA	Inputt watt
								←		↓
Output freq	Output Volt	Output current	Output VA	Output watt	Battery volt	Battery current	External current	Battery temperature		
↓		→								
Transformer temperature	Busbar temperature	Heat sink temperature	Fan speed	Mode	Error Code	Charge stage	Event			

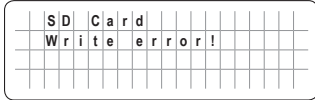
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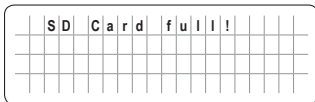
Data log function has been initiated and new file is being created. Do not remove the SD card when file creating is displayed.



Read error, the data log function/update/upload will stop.



Write error. The Data logging function will stop.



















1. Card full. Data logging function has stopped.
2. There is not enough space to create Data Log File Folder or to save file with saved programmed parameters.

NOTE: Once there is enough space to create a Data Log File Folder and subsequently, it runs out of capacity due to recording newer data, it will start to overwrite on older files.

5.3 DATA LOG FILES AND VIEWING DATA LOG FILES USING MICROSOFT EXCEL

The Data Log Files are written as Text Files (.txt) in the DATALOG Folder on the SD Card's Root Directory. Table 5.1 is an image of the DATALOG Folder showing example of the Data Log Files. The File Name Format is month/day/hour/minute.txt (MMDDhhmm.txt). Each file has 512 rows of records (Each row has multiple data fields as described at Section 5.2.2 and 5.2.3). Each file size is 128KB.

Table 5.1 Example of Data Log Folder in SD Card's Root Directory

 10141103.TXT	2014/10/14 AM 11:03	Text Document	128 KB
 10141228.TXT	2014/10/14 PM 12:28	Text Document	128 KB
 10141353.TXT	2014/10/14 PM 01:53	Text Document	128 KB
 10141518.TXT	2014/10/14 PM 03:18	Text Document	128 KB
 10141643.TXT	2014/10/14 PM 04:43	Text Document	128 KB
 10141808.TXT	2014/10/14 PM 06:08	Text Document	128 KB
 10141933.TXT	2014/10/14 PM 07:33	Text Document	128 KB
 10142058.TXT	2014/10/14 PM 08:58	Text Document	128 KB
 10142223.TXT	2014/10/14 PM 10:23	Text Document	128 KB
 10142348.TXT	2014/10/14 PM 11:48	Text Document	128 KB
 10150113.TXT	2014/10/15 AM 01:13	Text Document	128 KB
 10150238.TXT	2014/10/15 AM 02:38	Text Document	128 KB
 10150403.TXT	2014/10/15 AM 04:03	Text Document	128 KB
 10150528.TXT	2014/10/15 AM 05:28	Text Document	128 KB
 10150653.TXT	2014/10/15 AM 06:53	Text Document	128 KB
 10150818.TXT	2014/10/15 AM 08:18	Text Document	128 KB

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Table 5.2 shows an example of one of the File's contents opened with a general purpose Text Reader. The 1st Row shows the Model No. of the EVO™. The 2nd Row shows Data fields separated by semicolon i.e. ";" (see details of the Data fields at Section 5.2.2 and 5.2.3). The 3rd Row onwards shows the status of the Data Fields at time interval equal to the programmed value of DATALOG TIME (See Section 4.8.2.10).

NOTE: Event / Error Code will be logged as soon as they occur.

TABLE 5.2 Contents of Data Log File

```

EVO-2224
Date:Time:Gen status:Gen freq:Gen volt:Grid status:Grid freq:Grid volt:Input current:Input VA:Input watt:Output freq:Output volt:Output current:Output VA:Output watt:Battery ve
2014/10/14:12:28:32:33340:000.00:000.62:33341:000.00:000.42:<00.10;<0012;<0012:060.00:000.42;<00.10;<0012;<0012:25.002:0000.0:0000.0:0025.0:0026.7:0027.1:0:0:00000:0:
2014/10/14:12:28:42:33340:000.00:000.62:33341:000.00:000.42:<00.10;<0012;<0012:060.00:000.43;<00.10;<0012;<0012:25.002:0000.0:0000.0:0025.0:0026.7:0027.1:0:0:00000:0:
2014/10/14:12:29:02:33340:000.00:000.62:33341:000.00:000.41:<00.10;<0012;<0012:060.00:000.42;<00.10;<0012;<0012:25.002:0000.0:0000.0:0025.0:0026.7:0027.1:0:0:00000:0:
2014/10/14:12:29:02:33340:000.00:000.62:33341:000.00:000.42;<00.10;<0012;<0012:060.00:000.43;<00.10;<0012;<0012:25.002:0000.0:0000.0:0025.0:0026.7:0027.1:0:0:00000:0:
2014/10/14:12:29:12:33340:000.00:000.62:33341:000.00:000.42;<00.10;<0012;<0012:060.00:000.43;<00.10;<0012;<0012:25.002:0000.0:0000.0:0025.0:0026.7:0027.1:0:0:00000:0:
2014/10/14:12:29:22:33340:000.00:000.62:33341:000.00:000.41:<00.10;<0012;<0012:060.00:000.42;<00.10;<0012;<0012:25.002:0000.0:0000.0:0025.0:0026.7:0027.1:0:0:00000:0:

```

Follow procedure given below to open Data Log Files in Microsoft Office Excel:

- Start Microsoft Office Excel.
- Click File Microsoft Office Button on the top left hand corner.
- Click "Open" from the Drop Down Menu.
- Navigate to the Directory where the Log Files downloaded from the SD Card are located.
- Click on "File Types" selection button at the bottom right corner (shows "All Excel Files" as default) and **select Text files from the Drop Down Menu.**
- All Text Files (.txt) will be displayed. The screen will look like Fig 5.1.

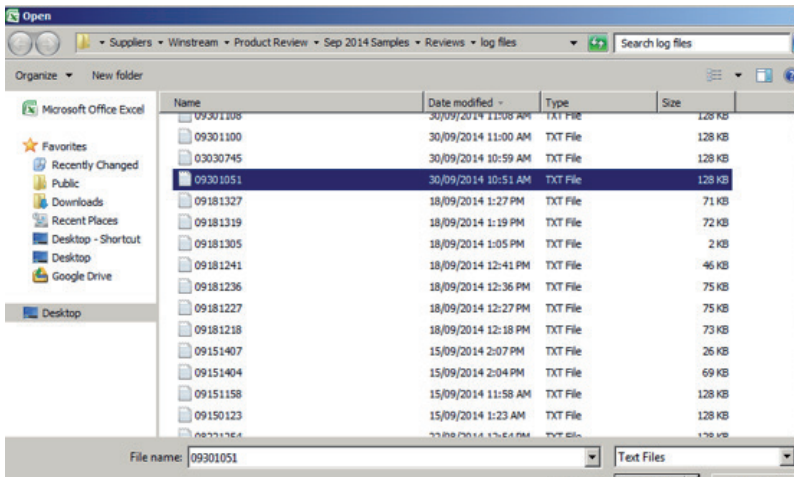


Fig 5.1 Screen Showing .txt Files

- Click "Open" Button (Bottom right corner of Fig 5.1).
- Text Import Wizard – Step 1 will be shown (Fig 5.2). Choose "Delimited" File Type".

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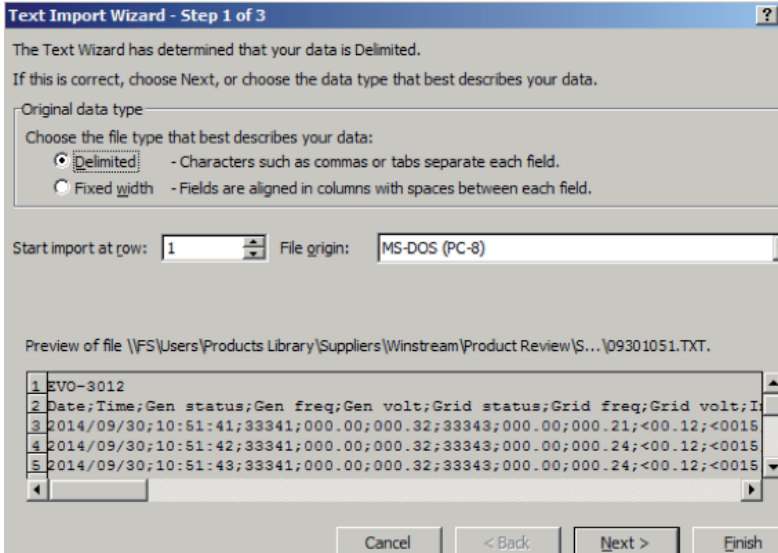


Fig 5.2 Screen Shot of Step 1 of "Text Import Wizard" in Excel

- Text Import Wizard – Step 2 will appear (see Fig 5.3). Choose "Semicolon" and click 'Finish' button.

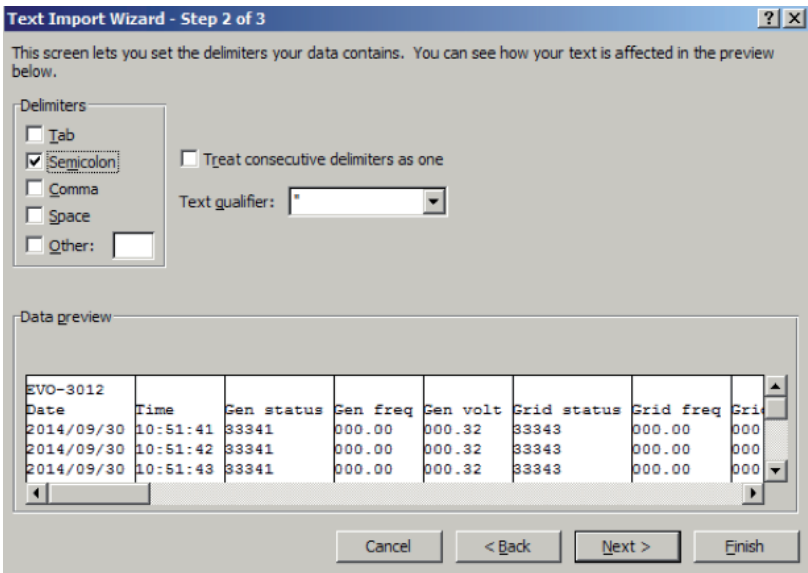


Fig 5.3 Screen Shot of Step 2 of "Text Import Wizard" in Excel

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- Data as in Fig 5.4 will be displayed on your Worksheet, with the Log Data stored in Columns and Rows.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1	12/01/2014	1229-02	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.7	27.1	0	0
2	12/01/2014	1229-02	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.7	27.1	0	0
3	12/01/2014	1229-02	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.7	27.1	0	0
4	12/01/2014	1229-02	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.7	27.1	0	0
5	12/01/2014	1229-02	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.7	27.1	0	0
6	12/01/2014	1229-02	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.7	27.1	0	0
7	12/01/2014	1229-02	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.7	27.1	0	0
8	12/01/2014	1229-02	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.7	27.1	0	0
9	12/01/2014	1229-02	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.7	27.1	0	0
10	12/01/2014	1229-03	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.8	27.2	0	0
11	12/01/2014	1229-03	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.8	27.2	0	0
12	12/01/2014	1229-03	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.8	27.2	0	0
13	12/01/2014	1229-03	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.8	27.2	0	0
14	12/01/2014	1229-03	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.8	27.2	0	0
15	12/01/2014	1229-03	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.8	27.2	0	0
16	12/01/2014	1229-03	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.8	27.2	0	0
17	12/01/2014	1230-03	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.8	27.1	0	0
18	12/01/2014	1230-03	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.8	27.1	0	0
19	12/01/2014	1231-03	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.8	27.1	0	0
20	12/01/2014	1231-03	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.8	27.1	0	0
21	12/01/2014	1231-03	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.8	27.1	0	0
22	12/01/2014	1231-43	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.8	27.1	0	0
23	12/01/2014	1231-53	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.8	27.1	0	0
24	12/01/2014	1232-03	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.9	27.2	0	0
25	12/01/2014	1232-13	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.9	27.2	0	0
26	12/01/2014	1232-23	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.9	27.3	0	0
27	12/01/2014	1232-33	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.9	27.2	0	0
28	12/01/2014	1232-43	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.9	27.2	0	0
29	12/01/2014	1232-53	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.9	27.1	0	0
30	12/01/2014	1233-03	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.9	27.1	0	0
31	12/01/2014	1233-13	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.9	27.1	0	0
32	12/01/2014	1233-23	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.9	27.1	0	0
33	12/01/2014	1233-33	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.9	27.1	0	0
34	12/01/2014	1233-43	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.9	27.1	0	0
35	12/01/2014	1234-03	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.9	27.1	0	0
36	12/01/2014	1234-03	33340	0	0.62	33341	0	0.42	-0.010	-0.012	-0.012	60	0.42	-0.010	-0.012	-0.012	25.002	0	0	25	26	26.9	27.1	0	0

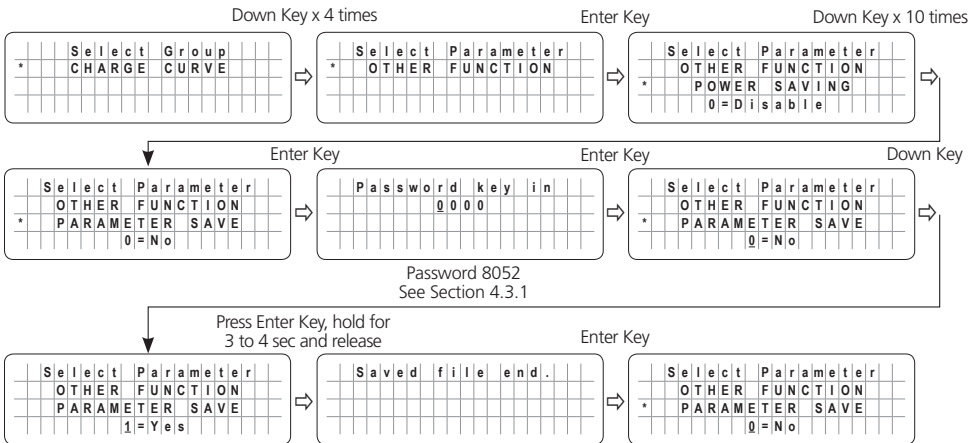
Fig 5.4 Screen Shot and Data Log Work Sheet

5.4 SAVING / UPLOADING PROGRAMMED PARAMETERS

5.4.1 Saving Programmed Parameters

All the programmed parameters can be saved on an SD Card (FAT 16 / FAT 32 Format, up to 16 GB capacity). The parameters will be saved in File named "xxxx_yyy.cfg", where the first group of 4 digits xxx is the Model No. e.g. 1212F or 1224F or 2212 or 2224 or 3012 or 4024 and the second group of 3 digits YYY is the Revision No. for that Model e.g. 074.

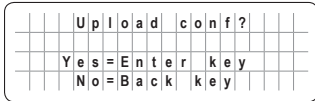
- For saving, first insert the SD Card in the SD Card Slot.
- Then, go to "Parameter Save" Screen (See Table 4.8 and Section 4.8.2.11) – under heading "PARAMETER SAVE"). Steps are given below:



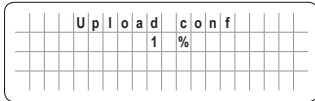
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5.4.2 Uploading Saved Parameters

If there is a "xxx_yyy.cfg" file in the SD card with stored programmed parameters, then on inserting the card, the Remote Control will ask to upload the Config File. Press Enter Button to confirm or Back Key to cancel.



- Asks to confirm or cancel uploading of saved parameters.
- Choose Yes by pressing Enter Key.



Configuration uploading.

SECTION 6 | Monitoring of Operation Using LED and Buzzer

TABLE 6.1 LED & BUZZER INDICATIONS FOR OPERATION MONITORING

Status	Blue LED "Status"	Red LED "Fault"	Buzzer (See Note 1)
Seen during Power-On Sequence Indicates completion of Power-On Sequence after Power ON/OFF Button is pressed for 2 sec	Blink 3 times	OFF	OFF
Seen during Power-Off Sequence Indicates completion of Power-Off Sequence after Power ON/OFF Button is pressed for 5 sec	ON	ON	OFF
Normal charging	Blink once per sec	OFF	OFF
Equalization charging	Blink twice per sec	OFF	OFF
Inverting	ON	OFF	Beep per 3 second (Default OFF)
Low battery alarm	ON	Blink once per sec	Beep per second
Power saving	Blink once per 3 sec	OFF	OFF
Standby	Blink once per 5 sec	OFF	OFF
Fault	OFF	ON	ON

NOTE: Buzzer is available only in EVO™ Inverter/Charger. There is no buzzer in Remote Control EVO-RC-PLUS.

SECTION 7 | Fault Messages and Troubleshooting Guide

TABLE 7.1 FAULT MESSAGES AND TROUBLESHOOTING GUIDE

NOTES: 1. Please see Table 6.1 for LED indications in EVO-RC and buzzer indications in EVO™ Inverter/Charger
2. Buzzer is available only in EVO™ Inverter/Charger. There is no buzzer in Remote Control EVO-RC

Fault Message	Symptoms and Trouble Shooting
Battery low voltage!	<ul style="list-style-type: none"> • EVO™ Inverter/Charger is in FAULT MODE because the battery voltage has dropped to the set lower threshold of “BATT LOW VOLTAGE” • When the battery voltage drops to the set lower threshold of “BATT LOW VOLTAGE”, activation of this fault protection is initiated. The Red LED marked “Fault” will flash once per second and the buzzer in EVO™ Inverter/Charger will beep once per second. The Inverter Section will continue to operate normally and the Blue LED marked “Status” will continue to be ON steady (NOTE: Fault message “Battery low voltage!” will not be displayed during this time) • If the battery voltage stays at or below the above threshold for duration equal to the set “LV DETECT TIME”, only the Inverter Section will be switched OFF and fault message “Battery low voltage!” will be displayed. The Red LED marked “Fault” will now change to steady ON, the Blue LED marked “Status” will switch OFF and the buzzer in EVO™ Inverter/Charger will now beep steady. If the “Battery low voltage!” fault condition is not reset within the “LV CUT OFF TIME”, EVO™ Inverter/Charger will be shut down completely after the expiry of “LV CUT OFF TIME” (LCD Display / LED / Buzzer will be OFF). • If the batteries are charged by external charger connected directly to the batteries or through the External Charger Input (3, 4 in Fig 2.1 in EVO™ Inverter/Charger Manual) and the battery voltage recovers to the set “RESET VOLTAGE” before the expiry of “LV CUT OFF TIME” while in “Battery low voltage!” fault condition, the Inverter Section will restart and “Battery low voltage!” fault condition will be cleared. • While in “Battery low voltage!” fault condition, if AC input is made available before the expiry of “LV CUT OFF TIME”, the “Battery low voltage!” fault condition will be cleared. The EVO™ Inverter/Charger will restart in Inverter Mode, synchronize with the AC input and then, transfer to the AC input at zero crossing. It will now operate in Charging Mode
Battery ultra low voltage!	<ul style="list-style-type: none"> • EVO™ Inverter/Charger is in FAULT MODE because the battery voltage has dropped to 9V or lower for the 12VDC input Models EVO-1212F / 1212F-HW / 2212 / 3012 or to 18 V or lower for the 24 VDC input Models EVO-1224F / 1224F-HW / 2224 / 4024. • When the battery voltage drops to 9V or lower for the 12 VDC version of EVO™ Inverter/Charger or 18V or lower for the 24 VDC version, only the Inverter Section will be switched OFF and message “Battery ultra low voltage!” will be displayed. Red LED marked “Fault” will be steady ON, the Blue LED marked “Status” will be switched OFF and the buzzer in EVO™ Inverter/Charger will beep steady. • When the duration in “Battery ultra low voltage!” fault condition is equal to the set duration of “LV DETECT TIME”, the message will change to “Battery low voltage!” If “Battery low voltage!” fault condition is not reset within the “LV CUT OFF TIME”, EVO™ Inverter/Charger will be shut down completely after the expiry of “LV CUT OFF TIME” (LCD Display / LED / Buzzer will be OFF). • If the batteries are charged by external charger connected directly to the batteries or through the External Charger Input (3, 4 in Fig 2.1 in EVO™ Inverter/Charger Manual) and the battery voltage recovers to the set “RESET VOLTAGE” before the expiry of “LV CUT OFF TIME” while in “Battery low voltage!” fault condition, the Inverter Section will restart and “Battery low voltage!” fault condition will be cleared. • While in “Battery low voltage!” fault condition, if AC input is made available before the expiry of “LV CUT OFF TIME”, the “Battery low voltage!” fault condition will be cleared. The EVO™ Inverter/Charger will restart in Inverter Mode, synchronize with the AC input and then, transfer to the AC input at zero crossing. It will now operate in Charging Mode

SECTION 7 | Fault Messages and Troubleshooting Guide

<p>Battery over voltage!</p>	<p>EVO™ Inverter/Charger is in FAULT MODE because the battery voltage has risen to the set upper threshold of "BATT OVER VOLTAGE"</p> <p>(a) AC input is not available and EVO™ Inverter/Charger is operating in Inverting Mode:</p> <ul style="list-style-type: none"> • There will be no AC output because the Inverter Section will be switched OFF. The Blue LED marked "Status" will be switched OFF and the Red LED marked "Fault" will be steady ON. The buzzer in EVO™ Inverter/Charger will beep steady • The fault will be cleared automatically when the battery voltage drops to 0.5V below the set upper threshold of "BATT OVER VOLT" <p>(b) AC input is available and EVO™ Inverter/Charger is operating in Charging Mode:</p> <ul style="list-style-type: none"> • There will be no AC output or charging because the Transfer Relay will be de-energized and PWM drive to the Inverter Section will be switched OFF. • The fault will be cleared automatically when the battery voltage drops to 0.5V below to the set upper threshold of "BATT OVER VOLT". The EVO™ Inverter/Charger will restart in Inverting Mode, synchronize with the AC input and then, the Transfer Relay will be energized to transfer to AC input at zero crossing. The unit will, thus, resume operation in "Charging Mode"
<p>Input over current!</p>	<p>EVO™ Inverter/Charger is in FAULT MODE because the input current being drawn from the AC input source (Input current = Charging Current + Pass Through Current to the load) is 1A more than the set threshold of "GRID MAX CURRENT" / "GEN MAX CURRENT" for 5 seconds (current is sampled every 33.3 μs).</p> <ul style="list-style-type: none"> • There will be no AC output because the Transfer Relay will be de-energized, charging will be stopped and PWM drive to the Inverter Section will be switched OFF. The Blue LED marked "Status" will be switched OFF and the Red LED marked "Fault" will be steady ON. The buzzer in EVO™ Inverter/Charger will beep steady • EVO™ Inverter/Charger will be latched in OFF condition and will require manual reset by powering OFF, waiting for 1 minute and then powering ON again • The set threshold of "GRID MAX CURRENT" / "GEN MAX CURRENT" (Section 4.5.2.2) should match the breaker capacity of the AC input source / AC input Branch Circuit. If AC input current capacity cannot be increased, reduce the AC load / "BULK CURRENT" (Section 4.4.2.1) accordingly.
<p>Output over current!</p>	<p>EVO™ Inverter/Charger is in FAULT MODE because the instantaneous output current being drawn by the AC load in Inverting Mode is 330% of the rated value of the EVO™ Inverter/Charger for 2 samples (current is sampled every 33.3 μs).</p> <ul style="list-style-type: none"> • There will be no AC output because the Inverter Section will be switched OFF. The Blue LED marked "Status" will be switched OFF and the Red LED marked "Fault" will be steady ON. The buzzer in EVO™ Inverter/Charger will beep steady • EVO™ Inverter/Charger will be latched in OFF condition and will require manual reset by powering OFF, waiting for 1 minute and then powering ON again • Ensure that the maximum instantaneous surge current of the load is not more than 300% of the rated current of the EVO™ Inverter/Charger for 1 millisecond
<p>Output over load! Output over load 1! Output over load 2! Output over load 3! Output over load 4!</p>	<p>EVO™ Inverter/Charger is in FAULT MODE because of overload conditions in Inverting Mode:</p> <ul style="list-style-type: none"> • There will be no AC output because the Inverter Section will be switched OFF. The Blue LED marked "Status" will be switched OFF and the Red LED marked "Fault" will be steady ON. The buzzer in EVO™ Inverter/Charger will beep steady • EVO™ Inverter/Charger will be latched in OFF condition and will require manual reset by powering OFF, waiting for 1 minute and then powering ON again • Ensure that overloading is limited to the specified limit <p>Output voltage is less than 96Vrms for 300 cycles (5 seconds at 60Hz)</p> <p>Output power is over the Power Boost Rating: 110% for 30 min</p> <p>Output power is over the Power Boost Rating:</p> <ul style="list-style-type: none"> • 120% for 10 min for EVO-1212F / 1212F / 1224F / 1224F-HW • 120% for 5 min for EVO-2212 / 3012 / 2224 / 4024 <p>Output power is over the Power Boost Rating:</p> <ul style="list-style-type: none"> • 140% for 1 min for EVO-1212F / 1212F / 1224F / 1224F-HW • 140% for 30 sec for EVO-2212 / 3012 / 2224 / 4024 <p>Output power is over the Power Boost Rating:</p> <ul style="list-style-type: none"> • 150% for 30 sec for EVO-1212F / 1212F / 1224F / 1224F-HW • 150% for 5 sec for EVO-2212 / 3012 / 2224 / 4024

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Fault Message	Symptoms and Trouble Shooting
<p>Output short circuit!</p>	<p>EVO™ Inverter/Charger is in FAULT MODE because there is a short circuit on the output side in Inverter Mode. Short circuit protection is activated when: (i) EVO-1212F/1212F-HW/1224F/1224F-HW: Output voltage is < 15Vrms for 6 cycles and output current is > the rated output current of 10.00Arms, (ii) EVO-2212/2224: Output voltage is < 15Vrms for 6 cycles and output current is > the rated output current of 18.33Arms (iii) EVO-3012: Output voltage is < 15Vrms for 6 cycles and output current is > the rated output current of 25.00Arms and (iv) EVO-4024: Output voltage is < 15Vrms for 6 cycles and output current is > the rated output current of 33.33Arms</p> <ul style="list-style-type: none"> • There is no AC output because the Inverter Section has been switched OFF. The Blue LED marked “Status” will be switched OFF and the Red LED marked “Fault” will be steady ON. The buzzer in EVO™ Inverter/Charger will beep steady • EVO™ Inverter/Charger will be latched in OFF condition and will require manual reset by powering OFF, waiting for 1 minute and then powering ON again <p>NOTE: If there is short circuit condition in Charging Mode i.e. when AC input is available, short circuit condition on the output side will trip the AC input breaker. The load will be transferred to the Inverter Section and the Inverter Section will then see short circuit condition and will shut down as described above</p>
<p>Output failure!</p>	<p>EVO™ Inverter/Charger is in FAULT MODE because AC input from Grid / Generator has been connected to the AC Output terminals by mistake. 10VAC or above seen at the AC Output Terminals at the time of boot up of EVO™ Inverter/Charger will activate this protection</p> <ul style="list-style-type: none"> • The Blue LED marked “Status” will be switched OFF and the Red LED marked “Fault” will be steady ON. The buzzer in EVO™ Inverter/Charger will beep steady • EVO™ Inverter/Charger will be latched in OFF condition and will require manual reset by powering OFF, waiting for 1 minute and then powering ON again <p>Check the connection. If there is 10V over at the output terminal, remove the connection and connect to the input terminals.</p>
<p>Transformer over heat!</p>	<p>EVO™ Inverter/Charger is in FAULT MODE because the main Bidirectional Transformer in the EVO™ Inverter/Charger has overheated to 150°C</p> <ul style="list-style-type: none"> • The Blue LED marked “Status” will be switched OFF and the Red LED marked “Fault” will be steady ON. The buzzer in EVO™ Inverter/Charger will beep steady • If in Inverting Mode, Inverter Section will be switched OFF. If in Charging Mode, the Transfer Relay will be de-energized and the Inverter Section will be switched OFF. • Check that the fans are working properly, there is no blockage of air suction and discharge vents, adequate cool replacement air is available and the ambient temperature is within the limits. Reduce the load / “BULK CURRENT” (Section 4.4.2.1) • The fault will be cleared when the transformer has cooled down to 80°C
<p>Heat sink over heat!</p>	<p>EVO™ Inverter/Charger is in FAULT MODE because the internal heat sink in the EVO™ Inverter/Charger has overheated to 70°C</p> <ul style="list-style-type: none"> • The Blue LED marked “Status” will be switched OFF and the Red LED marked “Fault” will be steady ON. The buzzer in EVO™ Inverter/Charger will beep steady • If in Inverting Mode, Inverter Section will be switched OFF. If in Charging Mode, the Transfer Relay will be de-energized and the Inverter Section will be switched OFF. • Check that the fans are working properly, there is no blockage of air suction and discharge vents, adequate cool replacement air is available and the ambient temperature is within the limits. Reduce the load and “BULK CURRENT” (Section 4.4.2.1) • The fault will be cleared when the heat sink has cooled down to 40°C

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Fault Message	Symptoms and Trouble Shooting
SD card unusable!	<ul style="list-style-type: none"> Data logging will not start. Check that the format is FAT16/FAT32. Check that the capacity is less than 16 GB. Re-format the card.
SD card read error!	<ul style="list-style-type: none"> Data logging stops. Remove and re-insert the card.
SD card write error!	<ul style="list-style-type: none"> Data logging stops. Remove and re-insert the card.
SD card full!	<ul style="list-style-type: none"> Data logging stops. Move or delete files or re-format the card.
WRITE FAILURE!	<ul style="list-style-type: none"> The entered value of programmable parameter could not be written. Call Technical Support.
OUT OF RANGE!	<ul style="list-style-type: none"> The entered value of programmable parameter is out of the programmable range. Change parameter value to within the specified range.

SECTION 8 | Specifications

8.1 SPECIFICATIONS – EVO-RC-PLUS

ITEM	DESCRIPTION / SPECIFICATIONS	
Compatible Inverter/Chargers	EVO™ Series Inverter/Charger	
Display	LCD Display	4 Rows, 20 Character each, Alpha-Numeric LCD Display
	LED Indicators	Blue (Status); Red (Fault)
Input/Output Jacks	RJ-45	Modular Jack, 8P8C
	RJ-12	Modular Jack, 6P6C
Cable Set Provided	RJ-45 Data Cable (Straight Wired); 10 Meters / 33 ft	
Environment	Operating Temperature Range	-20°C to 60°C
Dimensions	(W X H X D), mm	160 x 114.2 x 35.5
	(W X H X D), inches	6.3 x 4.5 x 1.4
Weight	Weight without cable	0.3 kg / 0.6 lb
	Weight with cable	0.4 kg / 1.0 lb