About OutBack Power Technologies

OutBack Power Technologies is a leader in advanced energy conversion technology. OutBack products include true sine wave inverter/chargers, maximum power point tracking charge controllers, and system communication components, as well as circuit breakers, batteries, accessories, and assembled systems.

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Date and Revision

March 2017, Revision A

Part Number

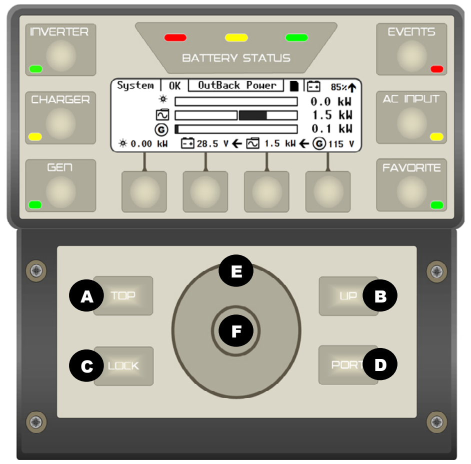
900-0125-12-01 Rev A

MATE3s System Display and Controller

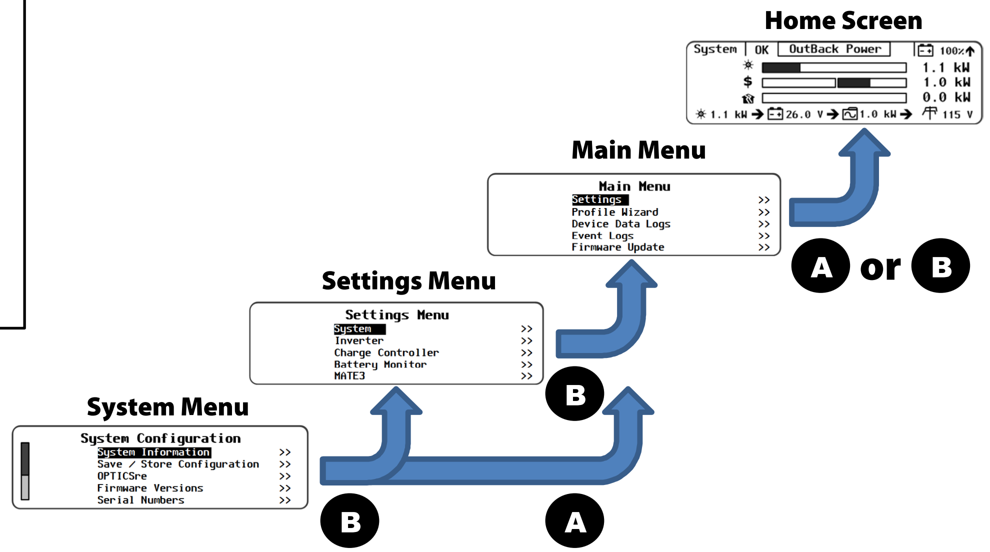
Contents:

Features

A: TOP Navigation Key
B: UP Navigation Key
C: LOCK Navigation Key
D: PORT Navigation Key
E: Control Wheel
F: Center Button



NOTE: This document assumes knowledge of features, functions, and operation of other OutBack products. Consult appropriate literature as necessary.



Navigation Keys (buttons)

Four navigation keys are located on the lower half of the MATE3s. They are protected by the front cover when it is in place. The navigation keys allow the user to move around within the menu structure. They also provide access to the ***Main Menu*** programming and the various components connected to the HUB.

- The TOP navigation key (**A**) returns the operator to the top of the ***Main Menu*** for the selected device. From the ***Main Menu***, the TOP or LOCK keys return the operator to the Home screen.
- The UP navigation key (**B**) returns to the menu item on the previous screen that was used to access the current screen. It moves up, or back, one screen in the menu map for the selected device. See the *MATE3s Menu Map*.
- The LOCK navigation key (**C**) locks the access to prevent unauthorized changes to the system settings. It also provides access to the ***Enter Password*** screen. (See page 2.)
- The PORT navigation key (**D**) cycles through each device connected to a port on the HUB Communications Manager. See page 6 for OPTICS RE monitoring with this key.

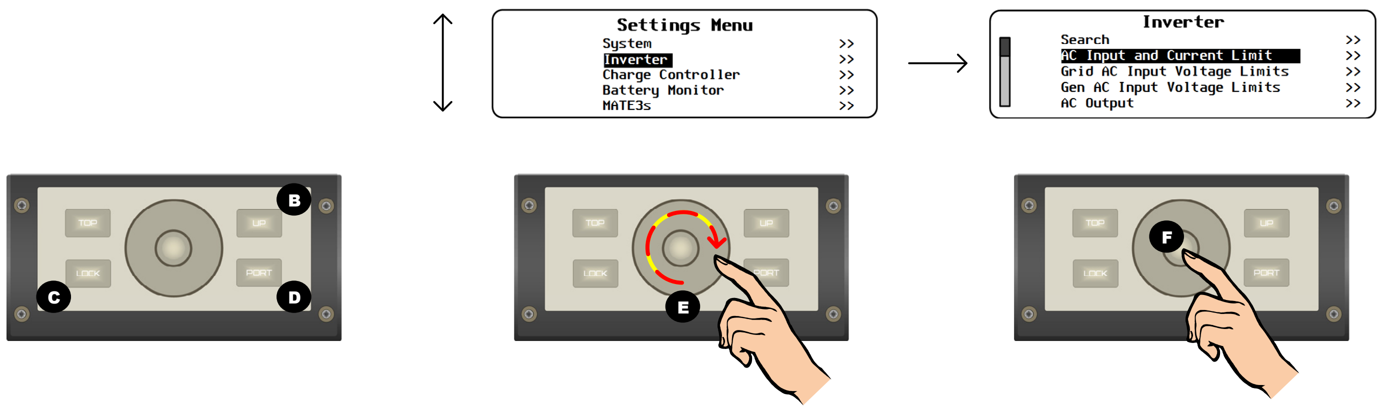
Menu Navigation

Control Wheel

The control wheel is a touch-sensitive navigation control with a center button. It is used to navigate through the advanced menu structure. It is also used to change set points once selected.

To navigate:

1. Use the control wheel **E** to scroll forward or backward (up or down) in the menu map. Tracing a clockwise circle scrolls down. A counterclockwise circle scrolls up. The present selection is highlighted black when scrolling.
2. When the desired menu item is highlighted, press the center button **F** to move forward into that screen. The screens below show an example of scrolling through the ***Settings*** menu. See the *MATE3s Menu Map.*

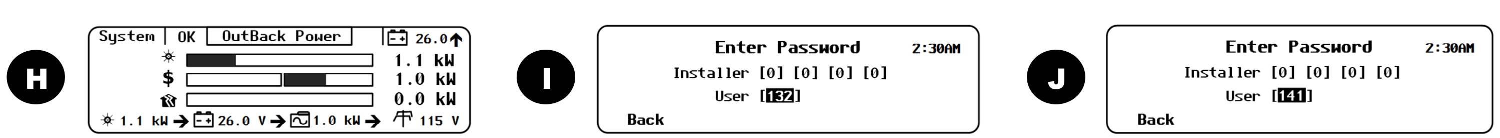


Access to the Main Menu

Programming the system is done in the ***Main Menu***. A password is required to access the ***Main Menu*** screen. This password is **141**. It is preprogrammed and cannot be changed.

To access the *Main Menu*, enter the password as follows:

1. From the home screen **H**, press the LOCK key **C**. This brings up the ***Enter Password*** screen **I**. The default entry is **132**.
2. Trace a clockwise circle on the control wheel **E** until the display shows **141** as shown in **J**.
3. Press the center button **F** to accept the password.
   - Access to menus can been restricted by an installer or OEM by setting an installer password. The installer password can be entered from **I** to allow full access.
   - Press the UP key **B** to enter the installer password. The default installer password is **1732**. This password can be changed. See page 9.



Set Points

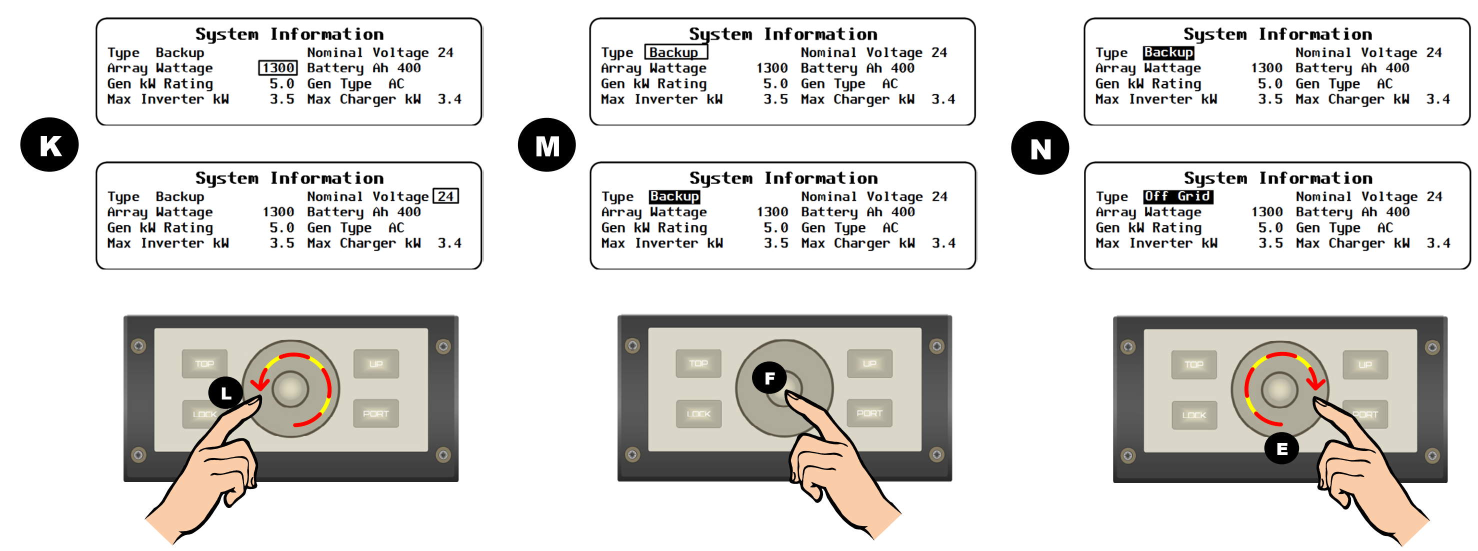
A set point is a condition, measurement, or baseline that a user establishes in order for something else to happen (such as when to start or stop a generator). The MATE3 allows a user to view, monitor, and establish all the settings and values that occur while the system is running. Occasionally components may be added or upgraded, electrical loads increase, or patterns of usage may change. These settings and values can be adjusted to match.

On screens with set points, the control wheel **E** serves two functions: navigation and set point adjustment.

- Set points are adjustable settings for each specific menu item.
- Set points will vary depending on the system configuration.
- When a screen with set points is available, the present selection is identifiable by a black line around the item. To change the setting, follow the instructions below.

To change set points:

1. The black line around an item shows it is in ***Field Select*** mode. In this mode, the control wheel **E** can switch between all selectable fields or items on the screen. A clockwise movement on the control wheel scrolls to the next field. A counterclockwise movement (**L**) scrolls to the previous field as shown in **K**.
2. When the desired item is selected, press the center button **F**. The box around the field should become solid black as shown in **M**. This shows it is in ***Adjust Set Point*** mode. The selectable field becomes an adjustable set point.
3. Use the control wheel **E** to change the set point value as shown in **N**.
4. When the set point is correct, press the center button **F** again to return to ***Field Select*** mode.
5. Repeat Steps 1-4 for each set point to be adjusted. The screens below show an example of scrolling through the ***System Information*** menu and selecting a different ***System Type***.



Ports

If a screen shows a port number in the upper right corner, those settings only apply to that particular device. Other devices can be individually selected by using the PORT key **D**. Screens with no port designation, such as those shown on this page, are for system-wide changes.

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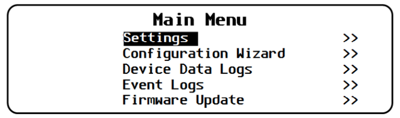
Main Menu



All programming is accessed from the ***Main Menu***, which includes the following:

- ***Settings*** (System, Inverter, Charge Controller, Battery Monitor, MATE3s) (see below)
- ***Profile Wizard*** (**W**) (see page 40)
- ***Device Data Logs*** (**D**) (see page 45)
- ***Event Logs*** (**E**) (see page 47)
- ***Firmware Updates*** (see page 48 and the *MATE3s Overview Guide*)

Each menu has a set of menu options. Each menu option has a set of menu items.

Recommended Programming Order

It is recommended that programming proceed in the following order.

1) Establish Profile Wizard settings (**W-4**).

2) Save the Profile (as applicable in either **W-1**, **W-2**, or **W-3**).

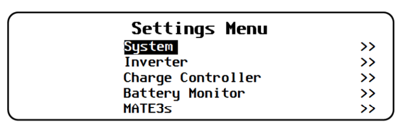
3) Program the Profile (as applicable in either **W-1**, **W-2**, or **W-3**).

4) Program any other custom settings.

5) Save the System Configuration (**S-2**).

6) When restoring settings in the future, restore the System Configuration instead of the Profile Wizard. (See the Profile Wizard on page 40 for more information.)

Settings Menus



This menu accesses additional menus with settings for the system and for individual devices.

- System ***Settings*** (**S**) apply to overall system functions (date and time, communication options, etc.). See the ***System Settings*** section.
- Device ***Settings*** are used to program the system components (inverter, charge controller, battery monitor, MATE3s).
  - Inverter ***Settings*** (**I**) are described beginning on page 10. See the inverter literature for details about inverter functions.

IMPORTANT:
If multiple inverters are used in the installation, make certain to change settings as appropriate for each inverter on its assigned port. Changing settings for a single inverter in a multiple-inverter system may result in conflicts in operation.

  - Charge controller ***Settings*** (**C**) are described beginning on page 18. For details about a FLEXmax or FLEXmax Extreme charge controller, see the controller literature. The MATE3s can monitor, but not program, an MX60 controller.
  - Battery monitor ***Settings*** (**B**) for the FLEXnet DC are described beginning on page 22. For details about the FLEXnet DC, see the product literature.
  - MATE3s function ***Settings*** (**M**) are for device functions with control logic based in the MATE3s (AGS, HBX, etc.) These are described beginning on page 24.

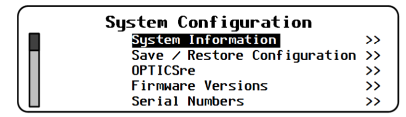
NOTE: Once the settings have been changed to match the configuration, they are stored in the static memory of the MATE3s. Once the configuration is established, save the data to an SD card. That way the configuration can be restored without having to repeat each setting individually. (See **S-2**.)

NOTE: The letter codes for each branch of the ***Settings*** menu are continued on subsequent pages under the appropriate sections.

For example, charge controller setting menu items are labeled **C-1**, **C-2**, **C-3**, and so on.

System Settings (S)

The ***Main Menu*** selection for this screen is ***Settings***, but the actual screen name is ***System Configuration***.



S-1. ***System Information***

S-2. ***Save/Restore Configuration***

S-3. ***OPTICSre***

S-4. ***Firmware Versions***

S-5. ***Serial Numbers***

S-6. ***Date and Time***

S-7. ***LCD Display***

S-8. ***Sound***

S-9. ***Ethernet Addresses***

S-10. ***Ethernet Ports***

S-11. ***Data Stream***

S-12. ***Battery Voltage Min/Max Reset***

S-13. ***Clear Internal Data Log***

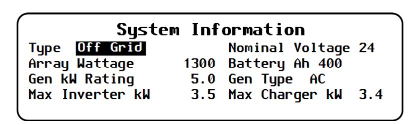
S-14. ***System Name***

S-15. ***Installer Information***

S-16. ***Installer Settings***

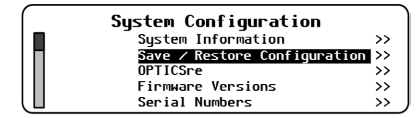
S-1. System Information

This screen contains a basic outline of the system. Many of these settings inform other system functions.

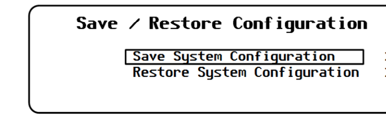


- ***Type**** — either ***Off Grid***, ***Grid Tied***, or ***Backup***
- ***Array Wattage**** — Allows for a PV array(s) with total wattage rating of ***0*** to ***50*** kW
- ***Generator kW Rating**** — Allows for a generator with a rating of ***0*** to ***250*** kW
- ***Max Inverter kW**** — Allows for an inverter system with total wattage rating of ***0*** to ***72*** kW
- ***Nominal Voltage*** — Allows for a battery bank with a voltage of ***12***, ***24***, ***36***, ***48***, or ***60*** Vdc.
- ***Battery Ah*** — Allows for a bank with a total amp-hour rating of ***25*** to ***10,000*** Ah
- ***Generator Type*** — Allows for an ***AC*** or ***DC*** generator, or ***None***
- ***Max Charger kW**** — Allows for a system with a total charger rating of ***0*** to ***60*** kW

*These items are used to format the Home screen layout or meter bars. See the *MATE3s Overview Guide* for more information on Home screens.



S-2. Save/Restore Configuration



A configuration is the sum of all MATE3s settings for all devices. This menu allows for saving a configuration to an SD card after programming is complete.
It can restore a lost or erased configuration from the SD card to the MATE3s. It can also copy a configuration from an SD card to an identical system.

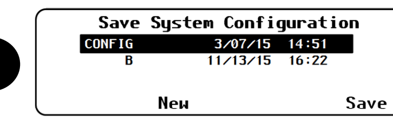
To save or update, select ***Save Configuration*** and follow the **A** steps. To restore from an SD card, select ***Restore Configuration*** and follow the **B** steps.

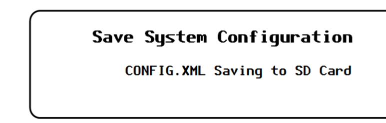
NOTE: The Profile Wizard (see section **W** on page 40) has similar functions. However, it does not affect the entire system configuration and is not interchangeable with this function. See Recommended Programming Order.

A. To save a configuration to an SD card:

If other configurations have been saved on the SD card, a list will be displayed. Choose Option 1 or 2.
NOTE: If the SD card is empty, pressing the <**Save**> soft key will automatically default to Option 2.

1

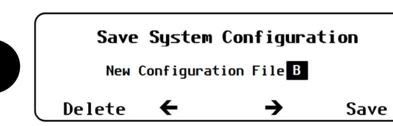


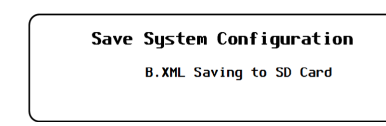


1. Select a name on the list with the control wheel. Press <**Save**> to save the new settings over the selected configurations. ***Saving to SD Card*** will be displayed. Proceed to 3.

OR

2



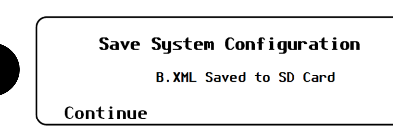


2. Press <**New**> to create a new configuration name. (8 characters maximum)
   - Use the control wheel to scroll through the available characters.
   - Use <➔> or <⬅> to move to the desired character location.
   - Use <**Delete**> to erase characters when highlighted.

   Press <**Save**> to save the new configuration name. ***Saving to SD Card*** will be displayed.

In either case:

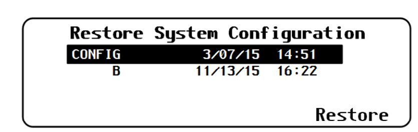
3



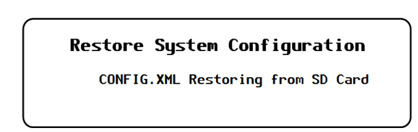
3. Wait for the confirmation screen to appear. After the screen appears, press <**Continue**> to return to the ***Main Menu***.

B. To restore a configuration from an SD card:

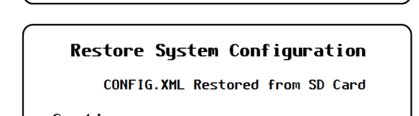
1



2



3



1. If other configurations have been saved on the SD card, a list will be displayed. Use the control wheel to select the name of the configuration that is to be restored.
2. Press <**Restore**> to start the process. Wait for the confirmation screen to appear.
3. After the screen appears, press <**Continue**> to return to the ***Main Menu***.

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```
System Configuration
  System Information              >>
  Save / Restore Configuration    >>
  OPTICSre                        >>
  Firmware Versions               >>
  Serial Numbers                  >>
```

S-3. OPTICSre

```
OPTICSre
OPTICSre   Enabled

SunSpec Interface Disabled
Modbus Port   502
```

OPTICS RE is the web-based remote monitoring and control application for OutBack devices.

- The ***OPTICSre*** menu item enables or disables the application.
- It is also possible to communicate with OutBack devices using the Modbus protocol and SunSpec client software as described in the *AXS Port Owner's Manual*. The ***SunSpec Interface*** menu item enables or disables this type of data stream from the MATE3s.
- The ***Modbus Port*** menu item is the Modbus TCP/IP port number. The default setting is the standard internet designation. The port number can be changed if necessary.
- The status of OPTICS RE can be monitored with the PORT key. This key opens a screen similar to ***Ethernet Addresses*** in **S-9**.

```
IP Address 192.168.000.064  OPTICSRE:
Netmask    255.255.255.000    Connected
Gateway    192.168.000.001
DNS-1      192.168.000.002  SunSpec:
DNS-2      192.168.000.003    Disabled
MAC        00:12:34:56:78:9A
```

S-4. Firmware Versions

```
Firmware Versions
    MATE3s              001.001.000
 1: VFXR2812A           001.006.011
 2: VFXR2812A           001.006.011
 3: FNDC                001.001.000
```

This screen shows the revision of firmware for every OutBack product on the system.

- The screen shows the model number for newer OutBack devices (VFXR2812A, GS8048A, etc.).
- For prior OutBack devices such as FX-class inverters, the screen still displays a simple identifier such as "FX".

S-5. Serial Numbers

```
Serial Numbers
    MATE3s     MA3507F18000215
 1: VFXR3648A  FXR1505F1600003
 2: VFXR3648A  FXR1505F1600010
```

The ***Serial Numbers*** screen displays the serial numbers for all products programmed with them.

- The number displayed here is the same as that shown on the external label.
- Currently the products with programmed serial numbers are limited to the MATE3s and the FXR inverter.
- The serial number is preloaded in the control PCBA (printed-circuit board assembly) of the FXR-class inverter. If the control PCBA is replaced during service, this menu will read the FXR serial number as "SPARE FXR". This is the designation programmed into all replacement control boards.

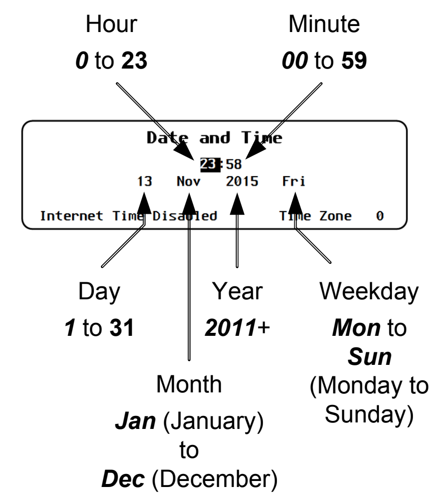
```
System Configuration
  Serial Numbers          >>
  Date and Time           >>
  LCD Display             >>
  Sound                   >>
  Ethernet Addresses      >>
```

S-6. Date and Time

The ***Date and Time*** screen allows the date and time to be set for the current date and current time.

IMPORTANT:

- Some features are dependent on time and date settings. Be sure to adjust these settings for the proper time and date for the location of the installation.
- The MATE3s clock does not automatically adjust for daylight savings time.
- The MATE3s ***does*** automatically adjust for leap year.



Internet Time and ***Time Zone*** are not active here. These items become active when OPTICS RE is implemented.

S-7. LCD Display

Ambient lighting and eyesight varies with each installation. The contrast, color, brightness, and backlighting of the LCD can be adjusted to provide the best visibility for a given location.

- ***Contrast*** — Range is from ***1*** to ***100***, from lowest contrast to highest contrast.
- ***Color*** — Range is from ***1*** to ***11*** discrete display colors.

```
LCD Display
Contrast  40
Color 10
Brightness 10
Backlight AUTO
Auto Timeout 120 Secs
```

- ***Brightness*** — Range is from ***1*** to ***10***, from dimmest to brightest.
- ***Backlight*** — ***ON***, ***OFF***, or ***AUTO*** (see ***Auto Timeout*** below).
- ***Auto Timeout*** — The amount of time that will elapse before the screen backlight turns off. Range is from ***1*** to ***300*** seconds.

S-8. Sound

The Sound menu item allows the user to enable, or disable, sounds when a button is pushed or the control wheel is used.

- ***Button Beep — Enabled*** or ***Disabled***.
- ***Wheel Click — Enabled*** or ***Disabled***.

```
Sound

Button Beep Enabled

Wheel Click Enabled
```

```
System Configuration
  Ethernet Addresses              >>
  Ethernet Ports                  >>
  Data Stream                     >>
  Battery Voltage Min/Max Reset   >>
  Clear Internal Data Log         >>
```

S-9. Ethernet Addresses

To connect the MATE3s to a personal computer or network, it may be necessary to manually set the IP address, netmask, gateway, DNS-1, and DNS-2 (optional) addresses to the host router.

IMPORTANT:

- Using this function requires advanced knowledge of network administration and internet protocols. Due to the variety of routers available, specific instructions will vary.
- The IP address must be unique. It cannot be the same as any other device on the network.
- See **S-3** for a related screen.

A

```
Ethernet Addresses
DHCP Enabled   IP Address 192.168.000.064
               Netmask    255.255.255.000
               Gateway    192.168.000.001
               DNS-1      192.168.000.002
               DNS-2      192.168.000.003
```

A (the default) is used when connecting to a router on an intranet.

- ***DHCP — Enabled*** (Dynamic Host Configuration Protocol enabled). This allows the MATE3s to be assigned the IP address, netmask, gateway, DNS-1 and DNS-2 numbers from a router.

B

```
Ethernet Addresses
DHCP Disabled  IP Address 192.168.000.064
               Netmask    255.255.255.000
               Gateway    192.168.000.001
               DNS-1      192.168.000.002
               DNS-2      192.168.000.003
```

B is used when connecting a computer directly to the MATE3s, connecting through a network switch, or connecting through the internet.

- ***DHCP — Disabled*** (Dynamic Host Configuration Protocol enabled). This allows the user to set the following parameters.
- ***IP Address — 192.168.xxx.xxx**** (Default IP address is 192.168.0.64)
- ***Netmask — 255.255.255.000**** *
- ***Gateway — 192.168.xxx.xx1**** *
- ***DNS-1 — 192.168.xxx.xx2**** *
- ***DNS-2 — 192.168.xxx.xx3**** *

(*this can vary by installation.)

S-10. Ethernet Ports

The MATE3s is preprogrammed to use the following ports for Ethernet communication. These ports are adjustable if required.

```
Ethernet Ports
HTTP     80
FTP      21
Telnet   23
```

- ***HTTP*** — Range ***1*** to ***65535*** (default ***80***)
- ***FTP*** — Range ***1*** to ***65535*** (default ***21***)
- ***Telnet*** — Range ***1*** to ***65535*** (default ***23***)

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```
System Configuration
  Data Stream                       >>
  Battery Voltage Min/Max Reset     >>
  Clear Internal Data Log           >>
  System Name                       >>
  Installer Information             >>
```

S-11. Data Stream

The ***Network Data Stream*** option can be enabled if the data is destined for a network server.

```
Data Stream
Network Data Stream      Disabled
  Destination IP         192.168.000.080
  Destination Port       57027
```

- ***Network Data Stream*** — ***Enabled*** or ***Disabled***
- ***Destination IP*** — The IP address of the host computer or server.
- ***Destination Port*** — The port number assigned to the MATE3s on the host computer or server.

S-12. Battery Voltage Min/Max Reset

This screen shows the time and date of the highest and lowest battery voltages that have been recorded. The ***Reset*** key resets these items to the values present at that moment.

Before

```
Battery Voltage Min/Max Reset
Min   0.0 V  Wed, Jan,  7, 2015, 19:18:13
Max  58.0 V  Fri, Nov, 13, 2015, 09:43:07
      Reset
```

After

```
Battery Voltage Min/Max Reset
Min  52.2 V  Fri, Nov, 13, 2015, 14:11:31
Max  52.2 V  Fri, Nov, 13, 2015, 14:11:31
      Reset
```

S-13. Clear Internal Data Log

This screen allows the option to clear the internal history of the MATE3s. The ***Yes*** key clears all graph data, Event logs, and similar items.

```
Clear Internal Data Log
Clear MATE3s Internal Data Log?
No                              Yes
```

```
System Configuration
  Battery Voltage Min/Max Reset     >>
  Clear Internal Data Log           >>
  System Name                       >>
  Installer Information             >>
  Installer Settings                >>
```

S-14. System Name

This screen allows the installer to give the installation a unique name and status title.

```
System Name
Name OutBack Power Technologies
Status Title OutBack Power
```

- ***Name*** — Any combination of characters up to 30 characters maximum. This information is displayed by the web site interface (if used).
- ***Status Title*** — (Optional) Any combination of characters up to 15 characters maximum. This name is displayed on the Home screen.

S-15. Installer Information

This screen allows a location to enter basic installer information.

```
Installer Information
Company [          ]
Name
Phone
Notes
```

- ***Company*** — Any combination of characters up to 28 characters maximum.
- ***Name*** — Any combination of characters up to 19 characters maximum.
- ***Phone*** — Any combination of characters up to 15 characters maximum.
- ***Notes*** — Any combination of characters up to 31 characters maximum.

```
System Configuration
  Battery Voltage Min/Max Reset     >>
  Clear Internal Data Log           >>
  System Name                       >>
  Installer Information             >>
  Installer Settings                >>
```

S-16. Installer Settings

This screen is a menu with options to set user access levels and the installer password.

```
Installer Settings
Set User Access Level             >>
Change Installer Password         >>
Challenge Installer Password      >>
```

- ***Set User Access Level*** (**A**) — This prevents unauthorized access to certain levels of menus when using the standard password **141**.
- ***Change Installer Password*** (**B**) — This sets an alternate password which allows access to the full menus. Often this is used by an installer if the user's access has been limited by **A**.
- ***Challenge Installer Password*** (**C**) — (Optional) Any combination of characters up to 15 characters maximum. This name is displayed on the Home screen.

Set User Access Level (A)

This menu allows one of four different user access levels (UAL) to set points for programming.

A

```
Set User Access Level
Access Level Full
```

- ***Full*** — Access Level 1 (UAL1). This allows full access to all available menus. This is the same access permitted by the installer password. It is the default setting.
- ***Advanced*** — Access Level 2 (UAL2). This allows access to many user menus. It also accesses the menus of UAL3 and UAL4.
- ***Basic*** — Access Level 3 (UAL3). This allows access to the designated basic user menus. It also accesses the menus of UAL4.
- ***Minimum*** — Access Level 4 (UAL4). This allows access to only a few designated user menus. The ability to program is minimal.

Change Installer Password (B)

This menu allows changes to the installer password. In conjunction with the UAL settings, this password will restrict full menu access to those who know the new password (OEM or installers).

B

```
Change Installer Password
[1][7][3][2]
```

- The installer password consists of four settable numerical digits from ***0*** to ***9***.
- The default password is **1732**.

IMPORTANT:
Changes to system settings should only be made by qualified personnel.

Challenge Installer Password (C)

If the installer password is lost or forgotten, this process is used to reset access to the device. The screen will generate a challenge code as shown in the image. Once the installer has the challenge code, it is necessary to contact OutBack Technical Support (*see inside front cover*) to obtain a temporary "challenge password" that corresponds with the MATE3s-generated challenge code. After entering a valid challenge password, the MATE3s will immediately display the ***Change Installer Password*** screen **B**. The installer should change the password according to preference. Make certain to record the new password.

C

```
Challenge Installer Password
[0][0][0][0]
Challenge Code 8941
```

- The challenge password consists of four settable numerical digits from ***0*** to ***9***.

IMPORTANT:
After changing the installer password, cycle the power to the MATE3s. Unplug the cable, wait 5 seconds, then plug it back in. This will ensure the new installer password is saved.

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Inverter Settings (I)

Many of the inverter settings in this section apply to all classes of inverters. However, some inverters use different screens. In cases where screens are different or product-specific, the title indicates the inverter class.

- ○ **I-1**. ***Search***
- ○ **I-2**. ***AC Input and Current Limit***
- ○ **I-3a**. ***Grid*** and ***Gen AC Input Mode and Limits (FXR/Radian-class)***
- ○ **I-3b**. ***Grid*** and ***Gen AC Input Voltage Limits (FX-class)***
- ○ **I-4**. ***AC Output***
- ○ **I-5**. ***Low Battery***
- ○ **I-6**. ***Battery Charger***
- ○ **I-7**. ***Battery Equalize***
- ○ **I-8**. ***Auxiliary Output / Relay***
- ○ **I-9**. ***Inverter Stacking***
- ○ **I-10**. ***Power Save Ranking***
- ○ **I-11**. ***Grid-Tie Sell***

I-1. Search

```
Search
                    Port 1
Sensitivity  6
Pulse Length    8 cycles
Pulse Spacing  60 cycles
```

This function can minimize inverter power draw when no loads are present.

- ***Name*** — Adjusts the ***Search*** mode sensitivity while searching for loads. Setting this item to zero will disable ***Search*** mode.
- ***Pulse Length*** — Adjusts the duration of search pulses (in single AC cycles). Longer pulses will detect loads more quickly. This consumes more power.
- ***Pulse Spacing*** — Adjusts the time between search pulses (in single AC cycles). Shorter spacing will detect loads more quickly. This consumes more power.

I-2. AC Input and Current Limit

This menu controls the input current that the inverter can draw. It has independent settings for two AC sources. It is common for one source to be the utility grid and the other is an AC generator. The settings are labeled accordingly. (It also has an independent setting for the inverter's charger.)

NOTE: FX-class, FXR-class, and Radian-class inverters interact differently with multiple AC sources. Note also that several items in this menu are also controlled in the <**Input Select**> soft key menu. See the *MATE3s Overview Guide*.

Adjust these settings to the size of the input circuit breaker or conductor. This is for protection. If combined charging and loads exceed this setting, the inverter automatically reduces its charge rate. (The loads receive priority.) If the loads exceed the limit on their own, the charge reduces to zero. This setting may be assisted by the Input Support function, if present.

Beyond this point, the input breaker may trip. This is accompanied by a MATE3s event and the warning ***Input Amps > Max***.

A

```
AC Input and Current Limit
                                 Port 1
Input Type Grid     Charger Control  ON
Grid Input AC Limit 60.0 A
Gen Input AC Limit  60.0 A
Charger AC Limit    15.0 A
```

B

```
AC Input and Current Limit
                                 Port 1
Input Priority Grid     Charger Control  ON
Grid Input AC Limit 28.0 A
Gen Input AC Limit  28.0 A
Charger AC Limit    12.0 A
```

C

```
AC Input and Current Limit
                                 Port 1
Input Type Grid        Input Support  N
Grid Input AC Limit 60.0 A
Gen Input AC Limit  60.0 A
Charger AC Limit    12.0 A
```

D

```
AC Input and Current Limit
                                 Port 1
Input Type Grid
Grid Input AC Limit 60.0 A
Gen Input AC Limit  60.0 A
Charger AC Limit    12.0 A
```

NOTE: If multiple parallel inverters are installed with a limited AC source, the combined amperage settings must be less than the AC input circuit. The MATE3s Profile Wizard can perform this calculation. (See page 40.)

- ***Input Type*** — (FX-class and FXR-class only; **A**, **C**, **D**) – The inverter has two choices for AC sources: ***Grid*** or ***Gen***. It cannot use both at once, but it can be switched between them using an external selector switch. The user can select between defined parameters for each source. (See **I-3**. See page 42 for the effects of the Profile Wizard on this setting.)
- In FX-class grid-interactive models, this sets the charging format and other parameters. ***Gen*** prevents the inverter from selling power.
- ***Input Priority*** — (Radian-class only; **B**) – The inverter can be wired to two AC sources: ***Grid*** or ***Gen***. It can accept either source but cannot use both at once. However, it will accept one input as a default selection if both sources are active at the same time.
- ***Grid*** and ***Gen Input AC Limit*** — Adjusts the inverter's draw to the size of the appropriate input circuit or source. (See page 42.)
- ***Charger AC Limit*** — Adjusts the draw of the inverter's charger. This setting can be limited to avoid accidentally overcharging the batteries. It should not exceed the maximum charge rate of the battery bank. (See page 42.)
- ***Charger Control*** — (FXR-class and Radian-class only; **A** and **B**) – Turns off the charger for an individual inverter and prevents it from responding to global charger commands.
- ***Input Support*** — (FX-class only; **C**) – Enables the Input Support function, if present. Not all FX-class inverters have this function (**D**).

  NOTE: ***Input Support*** is present in Radian- and FXR-class inverters, but is not selectable. It only works in ***Support*** mode. See **I-3a**.

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NOTE: See the inverter literature for more information on any setting.

```
Settings Menu
System               >>
Inverter             >>
Charge Controller    >>
Battery Monitor      >>
MATE3s               >>
```

- ○ **I-12**. ***Module Control***
- ○ **I-13**. ***Calibrate***
- ○ **I-14**. ***Grid Interface Protection***
- ○ **I-15**. ***Model Select***
- ○ **I-16**. ***Reset to Factory Defaults***

```
Inverter
Search                                >>
AC Input and Current Limit            >>
Grid AC Input Mode and Limits         >>
Gen AC Input Mode and Limits          >>
AC Output                             >>
```

NOTE: Items **1-3a** and **1-3b** use the same location in the ***Inverter*** menu, but are used in different models.

I-3a. Grid and Gen Input Mode and Limits (FXR-class and Radian-class)

```
Grid AC Input Mode and Limits
Input Mode Grid Zero                 Port 1
Voltage Limit Lower 108 VAC  Upper 132 VAC
Transfer Delay 1.00 Seconds
Connect Delay 0.2   Minutes
DoD Volts 24.0 VDC     DoD Amps  6.0 Aac
```

```
Gen AC Input Mode and Limits
Input Mode Mini Grid                 Port 1
Voltage Limit Lower 105 VAC  Upper 140 VAC
Transfer Delay 1.00 Seconds
Connect Delay 0.2   Minutes
Connect to Grid 23.8 VDC     Delay  10 Mins
```

The inverter will not connect to an AC source unless specific conditions are met. Each input selection has a menu to adjust the conditions. In the Radian, the ***Grid Input Mode and Limits*** menu applies to the input labeled **GRID**. ***Gen Input Mode and Limits*** affects the **GEN** input. In FXR inverters, either menu can apply depending on whether the single input is set to accept ***Grid*** or ***Gen***. See **I-2**.

When the conditions are met, the inverter will accept the source after the designated delay.

AC Input Modes

- ❑ ***Generator***
- ❑ ***Support***
- ❑ ***Grid Tied***
- ❑ ***UPS***
- ❑ ***Backup***
- ❑ ***Mini Grid***
- ❑ ***GridZero***

- ***Input Mode*** — Sets this input to one of seven AC input modes (see list). Each mode has specific advantages for a particular application. (See page 42 for the effects of the Profile Wizard on this setting.)
- ***Voltage Limit Lower*** and ***Upper*** — Set the acceptable AC voltage. If the source is within this range, the inverter accepts it. If it exceeds this range, the inverter disconnects itself. It will return to inverting if that function is active.
- ***Transfer Delay*** — Sets the duration that the input AC voltage or frequency may exceed limits before disconnection. This may be preceded by a warning and may be followed by a ***Last AC Disconnect*** message. (See the *MATE3s Overview Guide*.)
- ***Connect Delay*** — Sets the designated delay period before the inverter begins accepting power from the source. This is intended to give a generator time to stabilize its output. It is not the same as the AGS warmup period (see page 25).

GridZero Mode

- ***DoD Volts*** — Adjusts the lowest allowable battery discharge voltage. Loads will switch to grid power when this setting is reached.
- ***DoD Amps*** — Adjusts the maximum current (in AC amperes) at which ***GridZero*** mode draws power from the batteries.

Mini Grid Mode

- ***Connect to Grid*** — Adjusts the battery voltage setting that causes the inverter to reconnect to the utility grid in ***Mini Grid*** mode.
- (Connect) ***Delay*** — Adjusts the delay period after reaching ***Connect to Grid*** before the inverter reconnects to the grid.

I-3b. Grid and Gen Input Voltage Limits (FX-class only)

```
Grid AC Input Voltage Limits
                              Port 1
Lower Voltage Limit 108 VAC
Upper Voltage Limit 140 VAC
Transfer Delay   6 Cycles
```

```
Gen AC Input Voltage Limits
                              Port 1
Lower Voltage Limit 108 VAC
Upper Voltage Limit 140 VAC
Transfer Delay   6 Cycles
Connect Delay   0.5 minutes
```

The inverter will not connect to an AC source unless specific conditions are met. When ***Input Type*** is set to ***Grid*** or ***Gen*** in the ***AC Input and Current Limit*** screen (**I-2**), these menus adjust the limits on acceptable source voltage. Frequency is not adjustable.

- ***Lower*** and ***Upper Voltage Limit*** — Set the limits on the acceptable AC voltage. If the source is within the appropriate range, the inverter will accept it. If it exceeds this range, the inverter will disconnect itself. It will return to inverting if that function is active.
- ***Transfer Delay*** — Sets the duration that the input AC voltage or frequency may exceed limits before the inverter disconnects itself. This may be preceded by a warning and may be followed by a ***Last AC Disconnect*** message. (See the *MATE3s Overview Guide*.)
- ***Connect Delay*** — Sets the designated delay period before the inverter begins accepting power from the source. This is intended to give a generator time to stabilize its output. It is not the same as the AGS warmup period (see page 25).

```
Inverter
AC Output                 >>
Low Battery               >>
Battery Charger           >>
Battery Equalize          >>
Auxiliary Output          >>
```

I-4. AC Output

This menu adjusts the output voltage while the inverter is inverting. When using an AC input source, this setting does not affect the inverter's output, or the source acceptance parameters.

```
              AC Output
                                  Port 1
Output Voltage 120 VAC
```

- ***Output Voltage*** – Adjusts the voltage while inverting.

I-5. Low Battery

While inverting, the inverter stops functioning if the battery voltage decreases below ***Cut-Out Voltage*** for five minutes. This is Low Battery Cut-Out (LBCO). It is accompanied by a MATE3s event and the error ***Low Battery V***. See the *MATE3s Overview Guide*.

The inverter recovers from LBCO after rising (charging) to ***Cut-In Voltage*** for ten minutes. The error clears itself and the inverter automatically resumes functioning.

```
            Low Battery
                                  Port 1
Cut-Out voltage    21.0 VDC
Cut-In Voltage     25.0 VDC
```

- ***Cut-Out Voltage*** — Sets the voltage at which the inverter enters LBCO. (See page 43.)
- ***Cut-In Voltage*** — Sets the voltage at which the inverter recovers from LBCO.

```
Inverter
AC Output                 >>
Low Battery               >>
Battery Charger           >>
Battery Equalize          >>
Auxiliary Output          >>
```

I-6. Battery Charger

The inverter uses a "three-stage" battery charging cycle which utilizes multiple settings. This menu controls the voltages and timers for the charger.

IMPORTANT:
Charger settings must be correct for a given battery type. Follow all battery manufacturer recommendations. Incorrect settings may cause the batteries to be poorly charged.

```
              Battery Charger
                                      Port 1
Absorb Voltage       29.2 VDC     Time  1.0
Float Voltage        26.8 VDC     Time  1.0
Re-Float Voltage     25.0 VDC
Re-Bulk Voltage      24.0 VDC
```

- ***Absorb Voltage*** — Adjusts the target voltage of Bulk and Absorption stages.
- (Absorb) and (Float) ***Time*** — Adjust the duration of each stage. These may be set for a certain run time, or to disable a stage, or remain in that stage continuously.
- ***Float Voltage*** — Adjusts the target voltage of Float stage.
- ***Re-Float Voltage*** — Adjusts the point where Float stage is initiated.
- ***Re-Bulk Voltage*** — Adjusts the point where Bulk stage is initiated. (Radian-class and FXR-class only.)

I-7. Battery Equalize

This menu controls the settings for equalization. This process is used for battery maintenance.

CAUTION: Battery Damage
- Do not equalize sealed batteries unless approved by the manufacturer. Some batteries may suffer severe damage.
- Follow all battery manufacturer recommendations for equalization.

```
             Battery Equalize
                                      Port 1
Equalize Voltage     31.0 VDC     Time  1.0
```

- ***Equalize Voltage*** — Adjusts the voltage of the Equalization cycle.
- (Equalize) ***Time*** — Adjusts the duration of Equalization once the voltage is reached.

```
Inverter
Auxiliary Output          >>
Inverter Stacking         >>
Power Save Ranking        >>
Grid-Tie Sell             >>
Calibrate                 >>
```

```
Inverter
Auxiliary Output          >>
Auxiliary Relay           >>
Inverter Stacking         >>
Power Save Ranking        >>
Grid-Tie Sell             >>
```

I-8. Auxiliary Output and Auxiliary Relay

The ***Auxiliary Output*** menu controls any inverter's Auxiliary (AUX) output. The AUX terminals provide 12 Vdc to control loads.

Modes

1. *Remote*	**5**. *Cool Fan*	**9**. *DC Divert*
2. *Load Shed*	**6**. *Vent Fan*	**10**. *AC Divert*
3. *Gen Alert*	**7**. *AC Drop*	**11**. *Source Status*
4. *Fault*	**8**. *GT Limits*	

NOTE: This is a list of **all** modes. Modes are not necessarily in this order, or present in all inverters.

1. ***Remote*** (all models) — The AUX can be used with commands external to the inverter. To prevent software conflicts, select ***Remote*** when using AGS or similar external functions.

- Not depicted. This mode has no settable parameters.

2. ***Load Shed*** (all models) – This is load management based on battery voltage. The AUX activates when DC (battery) voltage passes a certain threshold (either low-voltage or high, depending on model). The AUX operates noncritical loads.

```
           Auxiliary Output
Status Auto Off                  Port 1
Aux Mode Load Shed
Enable Voltage 22.0 VDC

        Off         Auto         On
```

FXR- and Radian-class parameters:

- ***ON:Batt >*** (and ***Delay***) — High-voltage threshold and time before activation.
- ***OFF:Batt <*** (and ***Delay***) — Low-voltage threshold and time before deactivation.

FX-class parameters:

- ***Enable Voltage*** — Low-voltage threshold before activation. The AUX deactivates three minutes after the ***Enable*** condition clears.

Radian inverters have an additional ***Auxiliary Relay***. This is a switched contact with no 12 Vdc output. It has a second set of independent programming options identical to ***Auxiliary Output***. (See above.)

FXR-class AUX programming is identical to Radian-class except that FXR inverters have only ***Auxiliary Output***. FX-class programming options are slightly different from the others.

- ***Status*** – The AUX output status is controlled by the <**Off**>, <**Auto**>, and <**On**> soft keys.
- ***Aux Mode*** – Selects one of the available modes. (See the list to the left). If an ***Aux Mode*** has settable parameters, additional fields will appear. The modes and parameters are depicted below. The <**Off**>, <**Auto**>, and <**On**> soft keys are also depicted.
  - <**On**> activates the AUX output immediately. It displays ***Manual On*** and remains continuously active until <**Off**> is selected.
  - <**Auto**> activates the AUX output according to the ***Aux Mode*** automatic criteria. When activated, it displays ***Auto On***; otherwise it displays ***Auto Off***.
  - <**Off**> deactivates the AUX output. It displays ***Manual Off.*** Note that the AUX output may still activate from the settings of inverter or MATE3s functions such as AGS. (See page 25.) ***Remote*** mode should be used to prevent unwanted activations.

3. ***Gen Alert*** (all models) — This is a limited-functionality automated generator start. **NOTE**: It does not have the same functions as the Advanced Generator Start (AGS) function. (See page 25.)

```
           Auxiliary Output
Status Auto Off                  Port 1
Aux Mode Gen Alert
ON:  Voltage 22.0 VDC     Delay   4 Minutes
OFF: Voltage 28.0 VDC     Delay   9 Minutes
        Off               Auto       On
```

- ***ON:Batt <*** (and ***Delay***) — Low-voltage threshold and time before activation.
- ***OFF:Batt >*** (and ***Delay***) — High-voltage threshold and time before deactivation.

4. ***Fault*** (all models) — This activates the AUX output when the inverter shuts down due to an error condition. It can operate a failure alarm.

- Not depicted. This mode has no settable parameters.

5. ***Cool Fan*** (all models) — This activates the AUX output due to high inverter internal temperature. It deactivates due to cooler temperature. It can operate a small cooling fan.

- Not depicted. This mode has no settable parameters.

6. ***Vent Fan*** (all models) — This activates the AUX output in response to high DC (battery) voltage. It can operate a small fan.

```
           Auxiliary Output
Status Auto Off                  Port 1
Aux Mode Vent Fan
Enable Voltage 26.0 VDC
Off Period    5 Minutes
        Off         Auto         On
```

- ***ON:Batt >*** (Radian- and FXR-class) or ***Enable Voltage*** (FX-class) — High-voltage threshold for activation. The activation lasts one minute.
- ***OFF:Delay*** (Radian- and FXR-class) or ***Off Period*** (FX-class) — The delay before the AUX can activate again.

7. ***AC Drop*** (FX-class) — The AUX activates when the inverter disconnects from an AC source. It can operate a disconnect alarm.

- Not depicted. No settable parameters.

8. ***GT Limits*** (FXR-class and Radian-class) — The AUX activates as an alert that the grid does not meet grid-interactive parameters and the inverter has stopped selling. It can operate a disconnect alarm.

- Not depicted. No settable parameters.
- Sometimes called ***IEEE***.

9. ***DC Divert*** and
10. ***AC Divert*** (all models) — This diverts excess energy in response to high battery voltage. ***DC Divert*** allows current to flow to a dedicated DC load. ***AC Divert*** allows the inverter output to flow to a dedicated AC load.

```
           Auxiliary Output
Status Auto Off                  Port 1
Aux Mode  DC Divert
Enable Voltage 29.2 VDC
Off Delay  30 Minutes
        Off         Auto         On
```

```
           Auxiliary Output
Status Auto Off                  Port 1
Aux Mode  AC Divert
Enable Voltage 29.2 VDC
Off Delay  30 Minutes
        Off         Auto         On
```

FXR-class and Radian class parameters:

- ***ON:Batt >*** (and ***Delay***) — High-voltage threshold and time before activation.
- ***OFF:Batt <*** (and ***Delay***) — Low-voltage threshold and time before deactivation.

FX-class parameters:

- ***Enable Voltage*** — High-voltage threshold for the AUX to activate.
- ***OFF Delay*** — The delay before the AUX can activate again.

11. ***Source Status*** (FXR- and Radian-class) — The AUX activates when the inverter accepts an AC source. It can operate an indicator to show that the source is present.

- Not depicted. No settable parameters.

```
Inverter
Inverter Stacking            >>
Power Save Ranking           >>
Grid-Tie Sell                >>
Calibrate                    >>
Grid Interface Protection    >>
```

I-9. Inverter Stacking

This menu contains settings to coordinate, or "stack", multiple inverters. Stacking assigns an inverter to a particular phase or output. Any inverter connected to an OutBack HUB product must be designated as master or slave of some type. Stacking configurations and other details are discussed in the inverter literature.

The Change soft key enters a new series of screens. The inverter's output is disabled as shown below. This prevents phase shifting and other problems which can arise from inverters remaining active while their programming is changed.

```
Inverter Stacking
                               Port 2
Stack Mode Master

                         Change
```

```
Inverter Stacking
  Warning all inverters will be disabled
  while modifying Stack Mode. Disable
  AC output breakers before continuing.
Back                         Continue
```

```
Inverter Stacking
                               Port 2
Stack Mode Slave

                         Change
```

```
Inverter Stacking
  Inverters will now be enabled.  Test
  AC output voltages and phasing before
  enabling AC output breakers.
Back                         Continue
```

The output is activated when the selection is complete. Regardless, make certain to observe the caution below when programming.

CAUTION: Equipment Damage

Ensure the inverter outputs are turned off, or disconnected, before programming.
Failure to do so could result in damage to the equipment.

IMPORTANT:

- All inverters connected to ports on the HUB Communications Manager must be assigned valid designations for stacking and Power Save Levels. If this is not done, the system may give any number of error messages or other symptoms.
- All stacked inverters must have the same firmware revision. If inverters are stacked with different firmware revisions, any inverter with a revision different from the master will not invert and will not connect to an AC source. The MATE3s will register an event and will display the following message:

  An inverter firmware mismatch has been detected. Inverters X, Y, Z[1] are disabled. Visit www.outbackpower.com for current inverter firmware.
- Combining unstacked or incorrectly stacked inverters may cause similar problems.
- If more than one model series is stacked together, any inverter model belonging to a series different from the master will not invert and will not connect to an AC source. The MATE3s will register an event and will display the following message:

  A model mismatch has been detected. Inverters are incompatible. Inverters X, Y, Z[1] are disabled. Match all models before proceeding.
- Stack modes are inverter-dependent. The list to the right shows all possible modes. Some are not available with all OutBack inverters.

- ***Stack Mode*** — Assigns the inverter to a specific priority and output (phase). This assignment must be made for every inverter that is connected to a HUB port. In a multiple-inverter system, one inverter must be assigned as master. The others are assigned to other phases or as slaves.
  - ***Master*** **or** ***1-2phase Master*** — The primary inverter for single-inverter systems, single-phase stacked systems, or split-phase systems. In models where this selection reads ***Master***, it is also used for three-phase systems.
  - ***Slave*** — A secondary inverter in a stacked system.
  - ***Classic Slave*** — A secondary (L2) inverter, partly independent of the master.
  - ***OB Slave L1*** — A secondary (L1) inverter for single-phase (parallel) or split-phase multiple-inverter systems.
  - ***OB Slave L2*** — A secondary (L2) inverter for split-phase multiple-inverter systems.
  - ***L2 Phase Master*** — The subphase master inverter for the L2 output in a split-phase system.
  - ***B Phase*** (***C Phase***) Master — The subphase master inverters for the B or C outputs in a three-phase system.
  - ***3p Master*** or ***3phase Master*** — The primary inverter for three-phase systems that include the selection ***1-2ph Master*** as shown above. The ***3p Master*** is Phase A.
  - ***3phase Classic B (C)***, or ***3p OB Slave A (B/C)*** — A secondary inverter for three-phase systems. Used in models where the phases are manually assigned.
  - ***3phase Slave*** — A secondary inverter for three-phase systems. Used in older models for B and C phases where the phases are assigned based on the HUB port.

  See the inverter literature for more information on these stacking modes.

```
Inverter
Inverter Stacking            >>
Power Save Ranking           >>
Grid-Tie Sell                >>
Calibrate                    >>
Grid Interface Protection    >>
```

I-11. Grid-Tie Sell

```
Grid-Tie Sell
                          Port 1
Grid-Tie Enable Y
Sell Voltage 26.0 VDC
Grid-Tie Window IEEE
```

This menu sets basic limits for Offset operation, which includes the "grid-tie" (grid-interactive) function.

- ***Offset Enable*** (also called ***Grid-Tie Enable****) — Enables or disables the inverter's Offset function by selecting ***Y*** or ***N***. This controls grid interaction in applicable models. It also controls offset operation in the ***Support***, ***Mini Grid***, and ***GridZero*** modes in applicable models.

  NOTE: If ***Enable Auto Grid-Tie Control*** (see page 38) is set to ***Y*** (yes), ***Offset Enable*** may be turned on according to MATE3s and FLEXnet DC automatic criteria, even if it is manually turned off here. ***Offset Enable*** will switch to ***Y***.
- ***Sell Voltage*** — Sets the operating point for offset operation, including the grid-interactive function. When this point is exceeded (usually from renewable charging), the inverter sends the extra power to the loads. This offsets the use of the AC source. If the energy exceeds the loads, a grid-interactive inverter can sell the power to the utility.
- ***Grid-Tie Window**** — Sets the requirements for the utility grid before the grid-interactive function can work. If the voltage and frequency are within designated ranges, the inverter can sell power. Otherwise, this function will not operate. (A message will appear in the ***Sell Status*** screen.) Two selections are available, ***IEEE*** and ***user***. Specific settings for each set point are listed in the inverter literature.
  - The ***IEEE*** selection has narrower settings than the ***user*** setting.
  - ***IEEE*** is required by most utilities in the United States. (For American models, its voltage and frequency criteria are preset to the requirements of UL1741 and IEEE 1547.)

*Only used in GS8048 and grid-interactive FX-class inverters

I-10. Power Save Ranking

Each inverter uses power while it remains on, even if it is not inverting or charging. Power Save can put slave inverters into Silent mode. This mode minimizes the idle consumption. The inverters will come on again when the loads require power.

```
Power Save Ranking
                          Port 1
Stack Mode Master
Master Power Save Level 0
```

```
Power Save Ranking
                          Port 2
Stack Mode Slave
Slave Power Save Level 1
```

Selecting ***Power Save Ranking*** will bring up one of the menus below. This depends on whether the inverter on that port has been set as a master (including subphase masters) or a slave. The inverters are given a "rank" or level number. This controls the order in which slaves activate (or return to Silent mode).

- ***Master Power Save Level*** — Sets the rank of the master or subphase master. Any inverter ranked equal or less than the master will not enter Silent mode.
- ***Slave Power Save Level*** — Sets the ranking of slave inverters. This rank controls the order in which slaves activate (or return to Silent mode). Lower rank numbers activate when lesser loads are applied. Higher ranks only activate when the load increases to a high level.

IMPORTANT:

Inverters with higher-level settings will go into Silent mode sooner. The master must stay on and should have the lowest setting. The default is zero (0). Normally it should be left at zero (0).

See the inverter literature for more information on Power Save.

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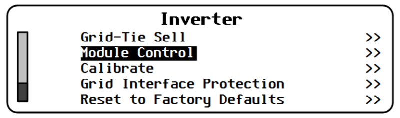
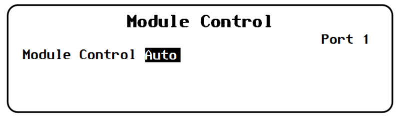


I-12. Module Control (Radian-class only)



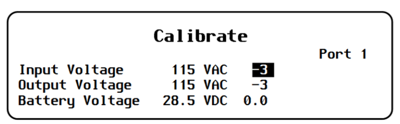
This item is used to disable either of a Radian-class inverter's internal power modules for testing. If one module fails or if troubleshooting is otherwise needed, the module selection can be performed manually.

The available options are ***Auto***, ***Left***, ***Right***, and ***Both***. The inverter can be directed to use a single, specified module (left or right), or it can turn on both modules simultaneously.

This procedure should be performed only if directed by OutBack Technical Support. It should not be performed on inverters that do not have two power modules.

I-13. Calibrate

This menu allows adjustment of the inverter's internal voltmeters. Calibration can improve system performance. Multiple inverters can achieve voltage targets at the same time.



This image shows the readings taken by the inverter in Vac and Vdc. To the right of each value is the calibration setting which adjusts the reading.

The settable range will vary with inverter model. See the inverter literature for specific ranges.

- ***Input Voltage*** — Calibrates the AC voltage measurement made at the inverter's AC input (from an incoming AC source).

NOTE: Radian-class inverters have two ***Input Voltage*** settings due to the dual inputs.

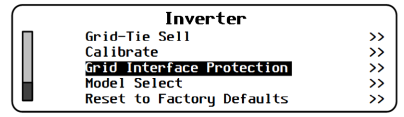
- ***Output Voltage*** — Calibrates the AC voltage measurement made at the inverter's AC output (from the inverter's own power, or from an incoming AC source).
- ***Battery Voltage*** — Calibrates the DC voltage measurement made at the inverter's DC terminals.

To calibrate the battery voltage reading:

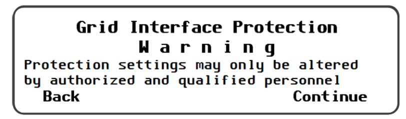
1. Place an accurate DC voltmeter at the battery terminals (not the inverter terminals).
2. Operate the inverter at about half power, then adjust the ***Battery Voltage*** setting until the inverter's battery voltage matches the reading on the DC voltmeter.

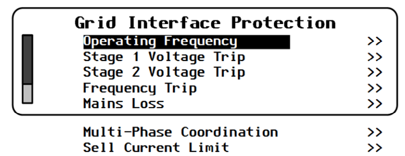
The AC readings are calibrated similarly at the AC terminals.

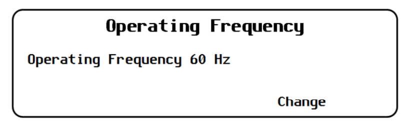
IMPORTANT:
Calibration does not change the actual output of the inverter, only the reading of that output.

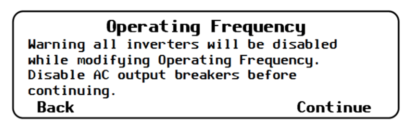


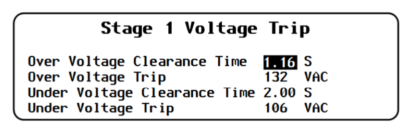
I-14. Grid Interface Protection

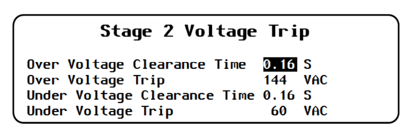


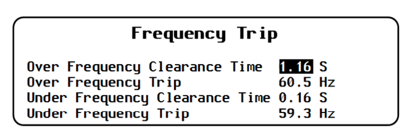


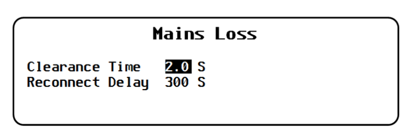


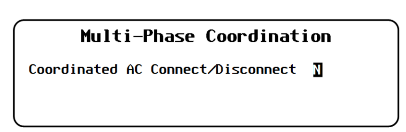


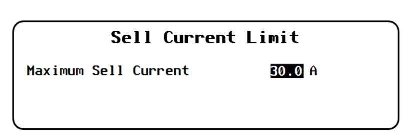












(FXR-class and Radian-class with the exception of GS8048)

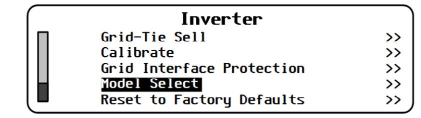
This menu contains sensitive inverter settings. Some settings relate to regional requirements or large system performance (***Operating Frequency***, ***Multi-Phase Coordination***). However, most settings are related specifically to grid-interactive applications.

All settings are protected as they can noticeably affect inverter operation. The installer password needs to be initially set before this menu is visible. (See page 9.) None of these settings should be changed unless required by the utility company or another authority.

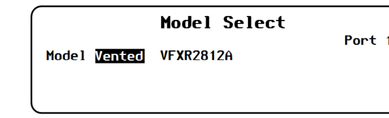
Each ***Grid Interface Protection*** item opens a separate screen with adjustable menu items.

- ***Operating Frequency*** — This screen has a single item which selects the operating nominal frequency of the inverter. The options are 60 Hz or 50 Hz. The default setting depends on the model of inverter. Pressing ***Change*** on this screen leads to a warning screen before this setting can be changed.
- ***Stage 1 Voltage Trip*** and ***Stage 2 Voltage Trip*** — Each of these screens has inverter disconnection settings. These are based on high and low AC voltage conditions (***Over*** and ***Under Voltage Trip***) and inverter response times for each condition (***Clearance Time***).
- ***Frequency Trip*** — This screen has inverter disconnection settings. These are based on high and low AC frequency conditions (***Over*** and ***Under Frequency Trip***) and inverter response times for each condition (***Clearance Time***).
- ***Mains Loss*** — This screen has a setting for inverter disconnection time (***Clearance Time***) following the loss of an AC source. It also has a ***Reconnect Delay*** setting after the source is introduced or restored.
- ***Multi-Phase Coordination*** (FXR-class only) — This screen allows activation of ***Coordinated AC Connect/Disconnect***. When this function is active, the AC source must deliver input (in the appropriate phase) to all inverters. If the master or subphase master inverters do not sense an acceptable AC source, the entire system will disconnect from the source.

  The default state for this function is inactive. If ***Coordinated AC Connect/Disconnect*** is not active, a stacked inverter system attempts to remain connected to the AC source as long as the master remains connected, even if other inverters are disconnected. Disconnected inverters display a ***Phase Loss*** warning. (Subphase master inverters that are disconnected will return to inverting mode. Slave inverters will not.)
- ***Sell Current Limit*** — This screen has a single item. It controls the maximum amount of power sold in grid-interactive operation.



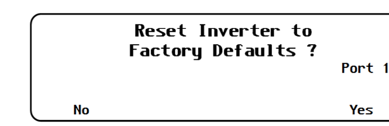
I-15. Model Select (FXR-class only)

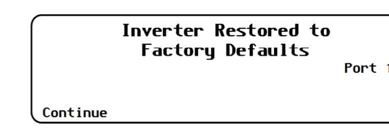


This item designates whether an inverter is a vented or sealed model. If replacing the control PCBA in a **sealed** FXR-class inverter, it must be re-programmed for that model. The default setting is for a vented model.

I-16. Reset to Factory Defaults

This screen allows the user to erase the settings from the selected inverter and start over with the values programmed at the factory.





Entering this screen brings up the query ***Reset Inverter to Factory Defaults?***

Use the soft keys to select ***No*** or ***Yes***.

- If **<No>** is selected, the screen returns to the ***Inverter*** menu. No changes will be made to any settings.
- If **<Yes>** is selected, the inverter's settings immediately change to the original factory values. The screen displays the message ***Inverter Restored to Factory Defaults***. A **<Continue>** soft key will appear. Pressing this key returns the screen to the ***Inverter*** menu.

NOTE: Some items are retained at the present setting even when the inverter is reset to factory defaults. The retained settings include the ***Output Voltage***, all items in the ***Calibrate*** menu, ***Model Select***, and all items in the ***Grid Interface Protection*** menu.

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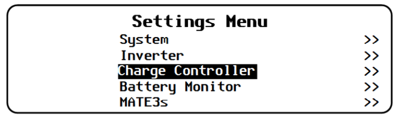
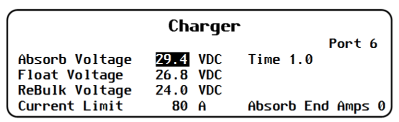
Charge Controller Settings (C)

- *Charger* (**C-1**)
- *MPPT* (**C-2**)
- *Temperature Compensation* (**C-3**)
- *Battery Equalize* (**C-4**)
- *Grid-Tie Mode* (**C-5**)
- *Auxiliary Output* (**C-6**)
- *Restart Mode* (**C-7**)
- *Calibrate* (**C-8**)
- *Reset Charge Controller to Factory Defaults* (**C-9**)



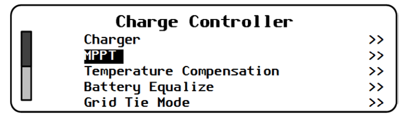
IMPORTANT
Battery charger settings need to be correct for a given battery type. Always follow battery manufacturer recommendations. Making incorrect settings, or leaving them at factory default settings, may cause the batteries to be undercharged or overcharged.

C-1. Charger

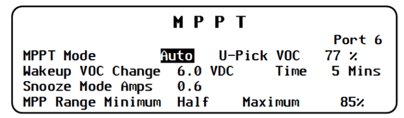


The charge controller uses a "three-stage" charging cycle with multiple settings. This menu controls the charging voltages and timers. See the charge controller literature for an explanation of the cycle.

- ***Absorb Voltage*** — Adjusts the voltage of Bulk and Absorption stages. (See page 42 for the effects of the Profile Wizard.)
- (Absorb) ***Time*** — Adjusts the duration of Absorption stage.
- ***Float Voltage*** — Adjusts the voltage of Float stage. (See page 42.)
- ***Rebulk Voltage*** — Adjusts the point of low battery voltage that triggers a new Bulk stage after 90 seconds.
- ***Current Limit*** — Adjusts the maximum charging amperage.
- ***Absorb End Amps*** — Adjusts the "trickle" charge that will override ***Absorb Time*** and proceed to the Float stage. This should be set to just above the lowest absorption current. **NOTE**: if more than one controller is present, this item should be left at zero.



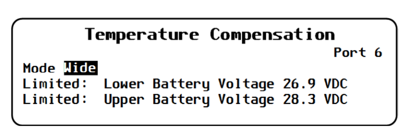
C-2. MPPT



The charge controller uses a maximum power point tracking (MPPT) algorithm which controls the PV array to harvest maximum wattage. Although MPPT is automatic, this menu allows adjustment for special applications. See the charge controller literature for more details.

- ***MPPT Mode*** — Selects between ***Auto*** (which allows automatic MPPT) and ***U-Pick*** (which limits the MPPT to a specified voltage).
- ***U-Pick VOC*** — Adjusts the MPPT limit as a percentage of the array's open-circuit voltage (V_{OC}).
- ***Wakeup VOC Change VDC*** — Adjusts the amount of V_{OC} increase for wakeup needed to leave Snooze mode and begin MPPT. (The charge controller manual uses the title "Wakeup Mode.")
- ***Wakeup VOC Change Time*** — Adjusts the minimum duration of the array V_{OC} and amperage before leaving Snooze mode. (The voltage must be at least 0.3 Vdc above battery voltage; the current is controlled by ***Snooze Mode Amps***.) (The charge controller manual uses the title "Wakeup Mode.")
- ***Snooze Mode Amps*** — Adjusts the controller's required current level during the wakeup time.
- ***MPP Range Minimum*** and ***Maximum*** — Adjust the lower and upper MPPT limit to narrow the focus of the process. ***Minimum*** options are half the array's V_{OC}, or the full V_{OC}. ***Maximum*** options are 80%, 85%, 90%, and 99% of the array's V_{OC}.(The *Owner's Manual* uses the title "Mpp Range Limit %.")

C-3. Temperature Compensation



When equipped with the Remote Temperature Sensor (RTS), the charge controller compensates for temperature changes by raising or lowering its charging voltages. However, the sensitivity of other DC devices could require limits on this compensation. This menu can adjust the upper and lower limits of temperature compensation. See the charge controller *Owner's Manual* for an explanation of temperature compensation.

- ***Mode*** — Selects between ***Wide***, which allows full compensation, and ***Limited***, which allows the manual limits controlled by the next two set points. (The charge controller *Owner's Manual* features this as an option under "RTS Compensation.")
- ***Limited: Lower*** and ***Upper Battery Voltage*** — Adjust the lowest and highest allowed compensated voltage. (The *Owner's Manual* features these as an option under "RTS Compensation.") See page 42 for the effects of the Profile Wizard on both settings.

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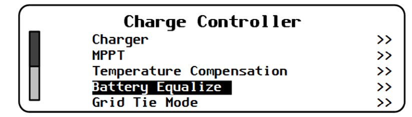
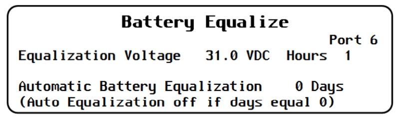


C-4. Battery Equalize

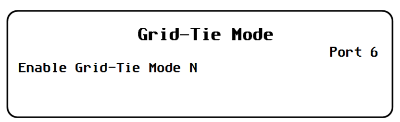


CAUTION: Battery Damage
Do not equalize any sealed battery types (VRLA, AGM, Gel, or other) unless approved by the manufacturer. Some batteries may suffer severe damage from equalization.
Contact the battery manufacturer for recommendations on equalization voltage, duration, schedule, and/or advisability. Always follow manufacturer recommendations for equalization.

This menu controls the settings for the equalization process, which is used for battery maintenance. See the charge controller *Owner's Manual* for an explanation of equalization.

- ***Equalization Voltage*** — Adjusts the voltage of the Equalization cycle.
- ***Hours*** — Adjusts the duration of the Equalization timer, once the voltage has been reached.
- ***Automatic Battery Equalization*** — Establishes a schedule which begins a new cycle after a certain number of days. Setting to 0 disables the automatic schedule.

C-5. Grid-Tie Mode



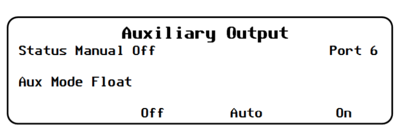
IMPORTANT
Grid-Tie Mode requires a grid-interactive inverter (also known as grid-tied or grid-tie enabled). Not all inverters are grid-interactive. If the MATE3s is connected to a non-grid-interactive inverter, Grid-Tie Mode will not function if selected.

This menu allows the charge controller to work more effectively with any grid-interactive inverters present on the HUB. When enabled, this setting automatically raises the charge controller's Float voltage to equal its Absorption voltage. Since the inverter sells power to maintain its own Float, Absorption, or other settings (all normally lower than the controller), this mode makes it easier for the inverter to sell power.

NOTE: The charge controller's Float voltage returns to normal any time the inverter enters ***PassThru*** or ***Silent*** modes. (See the *MATE3s Overview Guide* for a list of inverter modes.)

- ***N*** (No) disables ***Grid-Tie Mode***. ***Y*** (Yes) enables ***Grid-Tie Mode***. (See page 42 for the effects of the Profile Wizard on this setting.)

C-6. Auxiliary Output



This menu controls the output and functionality of the Auxiliary (AUX) output. These terminals provide a 12 Vdc output that can deliver up to 0.2 Adc to control external loads. Typical loads include signaling a generator to start, sending a fault alarm signal, or running a small fan to cool the inverter. See the charge controller *Owner's Manual* for more information.

- ***Status*** – The ***Auxiliary Output*** status is controlled by the **<Off>**, **<Auto>**, and **<On>** soft keys.
  - **<On >** activates the AUX immediately. It displays ***Manual On*** and remains continuously active until **<Off>** is selected.
  - **<Auto>** activates the AUX by automatic criteria according to the ***Aux Mode*** selected. (See the next page.) When activated, it displays the ***Auto On***; otherwise it displays ***Auto Off***.
  - **<Off>** deactivates the ***Auxiliary Output*** and prevents any of the charge controller's automatic AUX options from working. When <Off> is selected, it will display ***Manual Off.*** Note that even if the AUX output is set to ***Off***, it may still be activated by an external option not based in the charge controller, such as AGS. (See page 25.)
- ***Aux Mode*** **–**Selects one of nine functions. See the next page.

```
Charge Controller
Grid Tie Mode                    >>
Auxiliary Output                 >>
Restart Mode                     >>
Calibrate                        >>
Reset to Factory Defaults        >>
```

C-6 (Auxiliary Output, continued)

Aux Modes

- ***Aux Mode*** includes nine functions with automatic criteria. They do not necessarily appear in the order shown here. ***Vent Fan*** appears first if the controller is set at factory default values; otherwise, it displays the last option selected. (AUX modes are described in the charge controller *Owner's Manual*.)

- ***Vent Fan*** activates the AUX output in response to high DC (battery) voltage. It can operate a small fan. The output deactivates when the voltage drops below the set point.
  - ***Enable Voltage*** — The high-voltage setting for activation.

```
Auxiliary Output
Status Manual Off                Port 6
Aux Mode Vent Fan
Enable Voltage > 28.8 VDC
          Off        Auto        On
```

- ***PV Trigger*** activates the AUX output due to high the PV voltage. This can operate an alarm to indicate a dangerously high V_{OC}.
  - ***Enable Voltage*** — The high-voltage setting for activation (if ***Active High***).
  - ***Hold Time*** — The delay after reaching ***Enable Voltage*** before AUX deactivation.
  - ***Active: High*** or ***Low*** — ***Active High*** activates the output when conditions are met. ***Active Low*** deactivates the output when the same conditions are met but activates it the rest of the time.

```
Auxiliary Output
Status Manual Off                Port 6
Aux Mode PV Trigger         Active High
Enable Voltage > 140 VDC
Hold Time 0.0 Seconds
          Off        Auto        On
```

- ***Error Output*** responds to "low battery" or "failure to charge" conditions. Low battery is defined by a set point. Failure to charge means the PV fails to exceed the battery voltage by 3 Vdc for 26 consecutive hours. This can operate an alarm for an array problem.
  - ***Low Battery Voltage*** — The low-voltage setting for deactivation.

```
Auxiliary Output
Status Manual Off                Port 6
Aux Mode Error Output
Low Battery Voltage < 23.0 VDC
          Off        Auto        On
```

NOTE: This option is "Active Low" only.

- ***Remote*** allows the AUX output to be activated by manual or automatic commands based in the MATE3s (such as AGS).
  - Not depicted. No settable parameters.

- ***Night Light*** uses the PV voltage as a light sensor. When it drops below a settable voltage, the AUX output activates. It remains active for a certain amount of time. It can operate lights or devices after dark.
  - ***Active: High*** or ***Low*** — ***Active High*** activates the output when conditions are met; ***Active Low*** deactivates the output when the same conditions are met but activates it the rest of the time.

```
Auxiliary Output
Status Manual Off                Port 6
Aux Mode Night Light         Active Low
Threshold 20 VDC        ON Time 4 Hours
Hysteresis Time ON
          Off        Auto        On
```

  - ***Threshold*** — The low-voltage setting that activates the output (following the ***Hysteresis Time***).
  - ***ON Time*** — The length of time the output remains active.

- ***Diversion:Relay*** activates the AUX output upon reaching the target voltage for charging. See below.
- ***Diversion:Solid St*** activates the AUX output upon reaching the target voltage for charging. The output is pulse width modulated (PWM) for exact control.

Both functions are used to control a diversion load.

  - ***Active: High* or *Low*** — ***Active High*** activates the output when conditions are met; ***Active Low*** deactivates the output when the same conditions are met but activates it the rest of the time. (Not available in ***Diversion:Solid St.***)
  - ***Relative Voltage*** — Activates the output within a certain range of the target (Float, Absorb, etc.).
  - ***Hysteresis*** — Adjusts the allowable voltage range for the AUX to continue after activation.

```
Auxiliary Output
Status Manual Off                       Port 6
Aux Mode Diversion: Relay           Active Low
Relative Voltage 0.0  Hysteresis     0.2 VDC
Hold 0.1 Seconds      Delay    0 Seconds
          Off        Auto        On
```

```
Auxiliary Output
Status Manual Off                       Port 6
Aux Mode Diversion: Solid St        Active Low
Relative Voltage 0.0  Hysteresis     0.2 VDC
Hold 0.1 Seconds      Delay    0 Seconds
          Off        Auto        On
```

NOTE: All items function identically for both ***Diversion: Relay*** and ***Solid St***, except for ***Active: High*** or ***Low***.

  - ***Hold*** — Sets the amount of time allowed after exiting the range before the output is deactivated (if ***Active High***).
  - ***Delay*** — Adjusts the delay time before the output is activated (if ***Active High***).

- ***Float*** activates the AUX output when the charge controller enters the Float stage. It can operate a "charged" indicator.
  - Not depicted. No settable parameters.

- ***Low Batt Disconnect*** activates the AUX output upon reaching low battery voltage. It can be used to disconnect non-critical loads.
  - ***Disconnect*** — The low-voltage setting at which the output is activated after ***Disconnect Delay***.
  - ***Re-Connect*** — The setting at which the output is deactivated again after reaching ***Disconnect***.
  - ***Disconnect Delay*** — The time after reaching ***Disconnect*** before the output is activated.

```
Auxiliary Output
Status Manual Off                         Port 6
Aux Mode Low Batt Disconnect
Disconnect < 27.2  Re-Connect > 28.8 VDC
Disconnect Delay     1 Seconds
          Off        Auto        On
```

```
Charge Controller
Grid Tie Mode                    >>
Auxiliary Output                 >>
Restart Mode                     >>
Calibrate                        >>
Reset to Factory Defaults        >>
```

C-7. Restart Mode

This setting allows the user to choose between continuous MPP tracking, or occasional restarts of the sweeping process. A restart means the controller abandons the existing maximum power point. It then "re-sweeps", or begins gathering new power point data.

```
Restart Mode
                                 Port 6
Restart Mode 0
```

- ***Restart Mode* – *0*, *1***, or ***2***
  - **0** — Initial sweep and then continuous MPP tracking.
  - **1** — Automatic re-sweep every 90 minutes if controller is in an MPPT mode (***MPPT Float***, ***MPPT Bulk*** etc).
  - **2** — Automatic re-sweep every 90 minutes if controller is in any charging mode.

```
Charge Controller
Grid Tie Mode                    >>
Auxiliary Output                 >>
Restart Mode                     >>
Calibrate                        >>
Reset to Factory Defaults        >>
```

C-8. Calibrate

This menu allows adjustment of the voltmeter. Calibration can improve system performance. Multiple controllers can achieve voltage targets at the same time.

One or more uncalibrated controllers may stop charging because they read the batteries as fully charged. This is shown on the FLEXmax 60 or 80 display as a mode called "EX-ABSORB." (See the FLEXmax literature for more information.)

```
Calibrate
                                 Port 6
Battery Voltage     28.8 VDC     0.0
```

- ***Battery Voltage*** — Calibrates the DC voltage measurement made at the controller's battery terminals.

To calibrate the charge controller:

1. Place an accurate DC voltmeter at the battery terminals (not the controller terminals).
2. Operate the controller while delivering normal PV current, then adjust the ***Battery Voltage*** setting until the inverter's battery voltage matches the reading on the DC voltmeter.

IMPORTANT:
Calibration does not change the actual voltage of the charge controller, only the reading of that voltage.

C-9. Reset to Factory Defaults

This screen allows the user to erase the settings from the selected charge controller and start over with the values programmed at the factory. These values are listed in the charge controller *Owner's Manual*.

Entering this screen brings up the query ***Reset Charge Controller to Factory Defaults?***

```
Reset Charge Controller to
    Factory Defaults  ?    Port 6

No                             Yes
```

Use the soft keys to select ***No*** or ***Yes***.

- If <**No**> is selected, the screen returns to the ***Charge Controller*** menu. No changes will be made to any settings.
- If <**Yes**> is selected, the controller's settings immediately change to the original factory values. The screen displays the message ***Charge Controller Restored to Factory Defaults***. A <**Continue**> soft key will appear. Pressing this key returns the screen to the ***Charge Controller*** menu.

```
Charge Controller Restored to
      Factory Defaults
                           Port 1

Continue
```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Battery Monitor Settings (B)

```
Settings Menu
System                  >>
Inverter                >>
Charge Controller       >>
Battery Monitor         >>
MATE3s                  >>
```

- ***Battery Setup*** (**B-1**)
- ***Shunt Enable*** (**B-2**)
- ***FLEXnet Relay Mode*** (**B-3**)
- ***FLEXnet Relay Set Points*** (**B-4**)
- ***Reset to Factory Defaults*** (**B-5**)

B-1. Battery Setup

```
Battery Setup
Battery AH  400
Charged Voltage 29.2     Time   1 Minutes
Charged Return Amps 8.0
Charge Factor      94%
```

This menu sets the parameters used by the FLEXnet DC battery monitor (FN-DC) to track battery status. (Many of the figures must be given by the battery manufacturer.)

These settings are "fully charged" parameters. When they are met, the Home screen SOC percentage indicator meter will alternate between light and dark text. (See the *MATE3s Overview Guide*.)

- ***Battery Amp-hours*** — Identifies the total size of the battery bank in amp-hours.
- ***Charged Voltage*** — This is the minimum voltage that the batteries must reach during the Bulk or Absorption stages for the FN-DC to consider the batteries fully charged.
- ***Charged Return Amps*** — Sets the limit to which the current must "trickle down" or decrease before the batteries are considered charged.
- ***Time*** — Sets the duration the ***Charged Voltage*** and ***Charged Return Amps*** must be maintained before the charging cycle is considered finished.
- ***Charge Factor*** — Adjusts the anticipated charging efficiency of the batteries. Because the batteries cannot be 100% efficient, the battery monitor discounts a certain percentage of the energy used to charge them. This provides a more realistic estimate of the amount of charge that has been restored.

See the FLEXnet DC literature for more information on recommended settings.

See page 42 for the effects of the Profile Wizard on several of these settings.

B-2. Shunt Enable

```
Shunt Enable
Shunt A Enable Y
Shunt B Enable N
Shunt C Enable N
```

This menu allows the user to turn on or off any of three shunts (current sensors) used by the battery monitor. These are designated as shunts A, B, and C. For more information on the use of each shunt, see the *Owner's Manual* for the FLEXnet DC.

- ***Y*** (yes) — Instructs the battery monitor to measure the current running through a particular shunt.
- ***N*** (no) — Instructs the battery monitor to ignore the selected shunt.

NOTE: The MATE3s has certain additional functions that can be used with the FLEXnet DC. See **M-8** on page 38.

```
Battery Monitor
Battery Setup                 >>
Shunt Enable                  >>
FLEXnet Relay Mode            >>
FLEXnet Relay Set Points      >>
Reset to Factory Defaults     >>
```

B-3. FLEXnet Relay Mode

```
FLEXnet Relay Mode
Status  Off
Invert Logic

          Off      Auto      On
```

This menu allows the user to turn on or off an internal relay. The relay contacts are rated for 5 amps at 30 Vdc. (It provides no voltage of its own.) The relay can be used as a switch to turn other devices on or off. For more information, see the ***FLEXnet Relay Set Points*** menu and the FLEXnet DC literature.

- ***Status*** – The Relay output status is controlled by the <**Off**>,<**Auto**>, and <**On**> soft keys.
  - <**On**> activates the relay immediately. Its contacts will remain continuously closed until <**Off**> is selected.
  - <**Auto**> activates the relay by automatic criteria, according to the option selected in ***Relay Set Points***.
  - <**Off**> deactivates the relay and prevents any of the ***FLEXnet Relay Set Points*** options from working. Note that even if the relay output is set to <**Off**>, it may still be activated by an external option such as AGS. (See page 25.)
- ***Invert Logic*** – Switches the relay's function from N.O. (a normally open state) to N.C. (a normally closed state). The selections are ***N*** (no) and ***Y*** (yes). Since the default condition is N.O., the ***N*** selection means it remains in this state. Selecting ***Y*** inverts the logic to N.C. The relay will close with an audible click when this occurs.

B-4. FLEXnet Relay Set Points

```
FLEXnet Relay Set Points
Voltage: High     28.0 Vdc    Low  24.0 VDC
SOC:     High        0  %     Low       %
Delay:   High        1        Low     1 Minutes
```

This menu allows the user to adjust the criteria used by the ***Auto*** selection in the ***FLEXnet Relay Mode*** menu. For more information on these criteria, see the FLEXnet DC literature.

NOTE: The following set points assume N.O. logic as described in **B-3**. If N.C. logic is used, all uses of the words "close" or "open" are reversed.

- ***Voltage: High*** — The relay will close upon reaching a specified high voltage level following the appropriate delay.
- (Voltage) ***Low*** — After the relay was closed according to the ***High*** voltage set point, it will open again upon reaching a specified low voltage level (following the appropriate delay; see below).
- ***SOC: High*** — If voltage conditions are not met, the relay will close when the battery state of charge (SOC) increases to a specified percentage following the appropriate delay.
- (SOC) ***Low*** — After the relay was closed according to the ***High*** SOC set point, it will open again upon reaching a specified low SOC level following the appropriate delay.
- ***Delay: High*** — Sets the delay time before the relay closes due to a ***High*** set point. This applies to either the SOC or voltage settings.
- (Delay) ***Low*** — Sets the delay time before the relay opens due to a ***Low*** set point. This applies to either the SOC or voltage settings.

B-5. Reset to Factory Defaults

This screen allows the user to erase the settings from the selected charge controller and start over with the values programmed at the factory. These values are listed in the FLEXnet DC literature.

Entering this screen brings up the query
Reset FLEXnet DC to Factory Defaults?

```
Reset FLEXnet DC to
Factory Defaults  ?

No                    Yes
```

Use the soft keys to select ***No*** or ***Yes***.

- If <**No**> is selected, the screen returns to the ***Battery Monitor*** menu. No changes will be made to any settings.
- If <**Yes**> is selected, the battery monitor's settings immediately change to the original factory values. The screen displays the message ***FLEXnet DC Restored to Factory Defaults***. A <**Continue**> soft key will appear. Pressing this key returns the screen to the ***Battery Monitor*** menu.

```
FLEXnet DC Restored to
Factory Defaults

Continue
```


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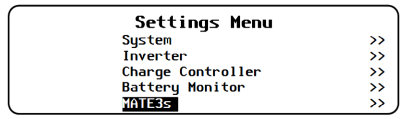
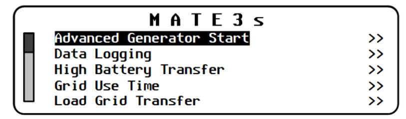
MATE3s Settings (M)



M-1. Advanced Generator Start (AGS)



CAUTION: Equipment Damage

This function can damage the generator or the batteries if either are not properly maintained. Be sure to follow all maintenance requirements for all the components in the system to prevent unnecessary and expensive damage.

AGS Connections

The AGS mode can start a generator using the AUX connections on various items of OutBack equipment. Some AUX connections deliver a 12-volt output while others are "dry" contacts with no voltage. Different generators may require either. It is more common for the start circuit on a two-wire-start generator to use dry contacts. Radian-class inverters and the FLEXnet DC Battery Monitor include dry contacts on their AUX Relay connection.

In the FXR-class or FX-class inverters, the AUX output delivers a 12-volt signal. This output can be used to drive the OBR-16-DIN (or a similar relay) which is equipped with dry-contact connections.

If using a generator with a three-wire-start circuit, a three-wire to two-wire conversion kit may be needed to use OutBack AUX connections. Atkinson Electronics (**http://atkinsonelectronics.com**) is one company which makes these kits. The Atkinson GSM-Mini is intended to work with OutBack inverters.

See the OutBack product literature for more information on wiring these devices.

AGS Operation

AGS starts the generator when any of its Start conditions are met and stops the generator when any of its Stop conditions are met. A Quiet Time schedule overrides most Start conditions to keep the generator from running at inappropriate hours. See page 31 for a list of conditions that will stop the generator.

To identify that the generator has started, the MATE3s uses the ***Input Status*** message located in the AC INPUT hot key screen. (See the *MATE3s Overview Guide*). If this item does not change to ***Use***, the MATE3s will display an ***AGS Fault*** message. See ***Fault Time*** and related topics throughout section **M-1**.

NOTE: AGS is intended to take control of the AUX output of OutBack inverters and charge controllers. For this function to work correctly, these products must be set to ***Remote***. (See pages 12 and 20.)

NOTE: ***Gen Alert*** is another way to automatically start a generator, but it does not offer the same range of programming options as AGS. AGS is a function of the MATE3s while ***Gen Alert*** is a function of the inverter, which is programmed using the MATE3s. Information on the ***Gen Alert*** function can be found on page 13 and in the inverter *Operator's Manual*.

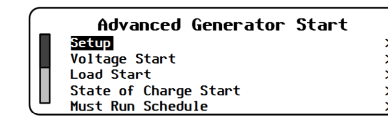
IMPORTANT:

- It is important not to confuse AGS with Gen Alert. These are two separate methods for requesting a generator to start. Gen Alert set points should not be used as AGS set points.
- The AC generator must connect to the inverter's **GEN** terminal input when using ***AGS***. If the input priority is set to **GRID** and the **GRID** terminals are energized, an automatically controlled generator will shut down.
- AGS turns on the inverter's charger even if it had previously been manually disabled.

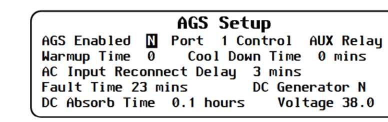
AGS Topics

These menus show the different topics, settings, and starting conditions for AGS.

AGS screens and topics included under M-1:



- ## AGS Setup



These items provide the basic operating parameters for AGS. Many of these settings are required for any sort of AGS operation. They should be adjusted before selecting starting criteria such as voltage or load start.

- ***AGS Enabled*** — either enables (***Y***) or disables (***N***) AGS operation.
- ***Port*** — designates a port on a HUB communications manager. This port becomes the recipient of AGS commands.
  - Select a specific inverter or other device for generator control. Set ***Port*** to the HUB port number (***1*** through ***10***) for that device.
  - If only one device is present and the HUB communications manager is not used, the ***Port*** for that device is designated zero (***0***).
- ***Fault Time*** — the period the generator is given for connection to the inverter system after the AUX output has been activated. If the generator fails to connect, the MATE3s displays an ***AGS Fault*** message on the GEN hot key screen. A fault is added to the event log. The EVENT LED indicator will illuminate. This period can be anywhere from ***5*** to ***30*** minutes.
- ***Control*** (Radian-class only) — selects which AUX terminals are used for AGS. In a Radian inverter, either the AUX Output or AUX Relay terminals may be used.
- ***Warmup Time*** — adjusts the time (in minutes) the generator is allowed to run with no load (before charging begins). This time can be from ***0*** to ***30*** minutes, but should follow the generator manufacturer's recommendations.
- ***AC Input Reconnect Delay*** — adjusts the time (in minutes) before the inverter is allowed to reconnect to the generator. This prevents accidental reconnection if the generator has a long automatic cool-down.
- ***Cool Down Time*** — adjusts the time (in minutes) the generator will run with no load before being shut off (after charging has finished). This time can be from ***0*** to ***30*** minutes, but should follow the generator manufacturer's recommendations.
- ***DC Generator*** — designates that a DC generator is in use instead of an AC generator. When this item is set to ***Y***, the automatic stop settings designated on the following pages do not apply. Instead, the following items apply.
  - ***DC Absorb Time*** is the amount of time that the batteries must remain at the ***DC Absorb Voltage***. Once this time expires, the MATE3s shuts the generator off.
  - ***DC Absorb Voltage*** is the voltage the batteries must reach while being charged by a DC generator.
  - The ***Stop SOC %*** setting (see page 27) can also be used to stop a DC generator.

NOTES

- These settings are only effective when ***DC Generator*** is set to ***Y***. This item also disables ***Cool Down*** and ***Warmup*** settings.
- If an AC generator is in use, this menu must be set to ***N***.
- See page 43 for the effects of the Profile Wizard on this setting.

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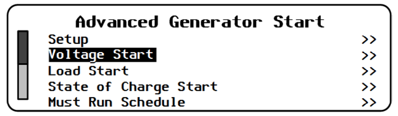
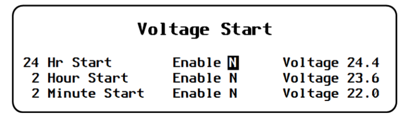


M-1. AGS continued

- ### Voltage Start



Three starting voltages are available. These are low-voltage set points which are linked to times of 24 hours, 2 hours, and 2 minutes.

These times indicate how long the batteries should be left at a particular low voltage before starting the generator for recharge.

- If the battery voltage drops below any of these set points, that timer starts counting down.
- If the voltage is above the set point, the timer counts up again.
- When any timer reaches zero (0), a start command is sent to the generator.
- The timers automatically reset to maximum when AGS stops the generator, or upon an AGS fault.
- See page 29 to view these timers.

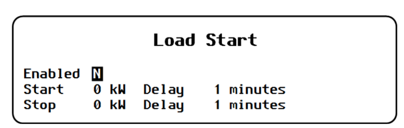
After a generator runs due to ***Voltage Start***, it will be stopped when the inverter completes the battery charging cycle.

- ***24 Hour Start Enable*** — enables (***Y***) or disables (***N***) the 24-hour timer. ***Voltage*** should be set for a mild discharge. The range varies with battery voltage.
- ***2 Hour Start Enable*** — enables (***Y***) or disables (***N***) the 2-hour timer. ***Voltage*** should be set for a major discharge. The range varies with battery voltage.
- ***2 Minute Start Enable*** — enables (***Y***) or disables (***N***) the 2-minute timer. ***Voltage*** should be set for a critical battery discharge and an emergency generator start. The range varies with battery voltage.

NOTE: The ***Quiet Time*** settings overrides the settings and prevents an automatic start. The exception is ***2 Minute Start***. As an emergency set point, it will start the generator regardless of ***Quiet Time*** settings.

IMPORTANT:
If ***DC Generator*** is set to ***Y***, the generator will only stop after reaching the DC generator parameters shown on page 25.

- ### Load Start

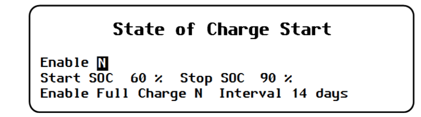


The generator can start whenever the system AC load exceeds the ***Start*** wattage for the programmed ***Delay*** time. The generator is stopped when the AC load drops below a ***Stop*** set point for the ***Delay*** time.

- ***Enabled*** — either enables (***Y***) or disables (***N***) the ***Load Start*** function.
- ***Start*** — the load size (***0*** to ***50*** kW) which requires the generator to start following the ***Delay*** time (***1*** to ***240*** minutes).
- ***Stop*** — the lower load setting (***0*** to ***49*** kW) which ends the generator operation following the ***Delay*** time (***1*** to ***240*** minutes).

IMPORTANT:
- Large, instantaneous loads can still overload the inverter if the generator does not start in time.
- When the generator is running because of ***Load Start***, the inverter will charge the batteries. However, it is not programmed to perform a complete charge cycle. If the generator reaches its ***Stop*** point, the charge might not be completed.

- ### State-of-Charge (SOC) Start



Occasionally it is not effective for the generator to start on the basis of voltage. AGS can operate the generator based on battery SOC information from the FLEXnet DC battery monitor (FN-DC).

- ***Enable*** — ***Y*** (Yes) causes the MATE3s to start and stop the generator based on the items below. ***N*** (no) disables this function.
- ***Start SOC*** — When the FN-DC shows an SOC below this setting (***0*** to ***99%***), the generator starts. (The SOC value is displayed on the Home screen. See the *MATE3s Overview Guide*.)
- ***Stop SOC*** — When the FN-DC shows that the SOC has exceeded this setting (***0*** to ***100%***), the generator stops.

  NOTE: In some cases the charger may not easily reach a setting of 100% SOC. It is recommended to set ***Stop SOC*** no higher than ***98%***.

If ***Stop SOC*** is not desirable, AGS can stop the generator by another means.

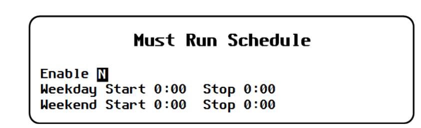
- ***Enable Full Charge*** — When set to ***Y*** (yes), the MATE3s completes a full charging cycle regardless of ***Stop SOC***.
- ***Interval*** — the days (***1*** to ***30***) before ***Enable Full Charge*** is used.

The MATE3s will perform ***Start SOC*** as normal. The MATE3s compares the ***Interval*** period against the ***Days Since Parms Met*** display. (See the *MATE3s Overview Guide*.) If ***Days Since Parms Met*** is equal or higher, then the generator will run until the FLEXnet DC's charge parameters are met, regardless of the SOC value. (See page 31 for more information.)

After the cycle is over, the SOC is automatically reset to 100% when the batteries begin to discharge for one minute.

Setting ***Enable Full Charge*** to ***N*** or setting the ***Interval*** to zero (0) days will disable the function.

- ### Must Run Schedule



This is a period of time when the generator is commanded to run regardless of other conditions. This is usually set because large loads are expected to be present. ***Must Run Schedule*** times can be set individually for weekdays and weekends.

- ***Enable*** — either enables (***Y***) or disables (***N***) the ***Must Run*** function.
- ***Weekday Start*** — the daily time (***00:00*** to ***23:59***, Monday through Friday) when the generator must start.
- Weekday ***Stop*** — the daily time (***00:00*** to ***23:59***, Monday through Friday) when the generator must stop after ***Weekday Start***.
- ***Weekend Start*** — the daily time (***00:00*** to ***23:59***, Saturday and Sunday) when the generator must start.
- Weekend ***Stop*** — the daily time (***00:00*** to ***23:59***, Saturday and Sunday) when the generator must stop after ***Weekend Start***.

The ***Must Run Schedule*** is disabled when ***Start*** and ***Stop*** are set to the same time, or if ***Enable*** is set to ***N***.

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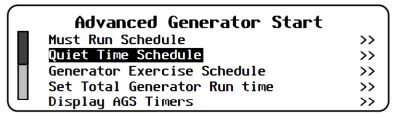
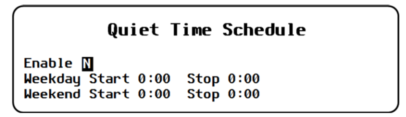


M-1. AGS continued

- ### Quiet Time Schedule



This is a period of time when the generator is commanded not to run regardless of other conditions. ***Quiet Time*** is usually set due to the risk of inappropriate noise or other reasons. ***Quiet Time*** can be set individually for weekdays and weekends.

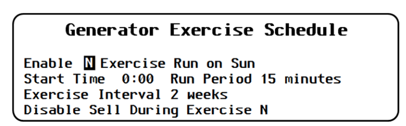
The ***Quiet Time*** function is disabled when ***Start*** and ***Stop*** are set to the same time, or if ***Enable*** is set to ***N***.

- ***Enable*** — either enables (***Y***) or disables (***N***) the ***Quiet Time*** function.
- ***Weekday Start*** — the beginning time (***00:00*** to ***23:59***, Monday through Friday) when the generator is not allowed to start.
- Weekday ***Stop*** — the ending time (***00:00*** to ***23:59***, Monday through Friday) after which the generator is allowed to start.
- ***Weekend Start*** — the beginning time (***00:00*** to ***23:59***, Saturday and Sunday) when the generator is not allowed to start.
- Weekend ***Stop*** — the ending time (***00:00*** to ***23:59***, Saturday and Sunday) after which the generator is allowed to start.

IMPORTANT:

Quiet Time overrides most of the starting set points (***Voltage***, ***Load***, ***Must Run***, ***Exercise*** etc.), preventing the generator from starting automatically. The only exception is ***2 Minute Start***, which is considered an "emergency" start set point and which will start the generator regardless of ***Quiet Time*** settings.

- ### Generator Exercise Schedule



This is a period of time when the generator is scheduled to run briefly regardless of other conditions. The exercise function can operate once a week or every few weeks.

- ***Enable*** — either enables (***Y***) or disables (***N***) the ***Exercise*** function.
- ***Exercise Run on*** — the day of the week (***Mon*** to ***Sun***) when ***Generator Exercise*** is scheduled.
- ***Start Time*** — the time (***00:00*** to ***23:59***) at which the generator starts.
- ***Run Period*** — the duration (***1*** to ***240*** minutes) of the exercise period.
- ***Exercise Interval*** — the number of weeks (***0*** to ***8***) that will pass between exercise periods.
- ***Disable Sell During Exercise*** — either prohibits (Y) or permits (N) a grid-interactive model from selling power during the exercise period. This is mostly applicable to DC generators.

IMPORTANT:

Regularly running a generator keeps engine components lubricated, expels excess moisture, charges the starting battery, and helps prevent carbon build-up. Consult the generator owner's manual for the appropriate length and frequency of exercise periods and what load to run during the exercise period.

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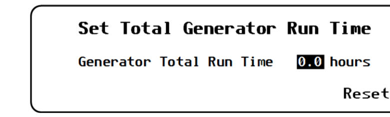
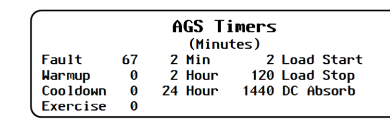
- ### Set Generator Total Run Time



The total running time for an automatic generator is displayed on the ***Generator Status*** screen, which is accessed with the Gen hot key. (See the *MATE3s Overview Guide*.) If the existing total is inaccurate in some way, it may need to be corrected or reset. This menu allows the timer to be set to a different figure. It can also be reset to zero.

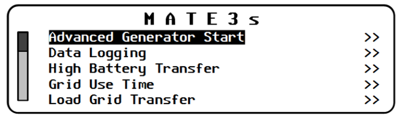
- ***Generator Total Run Time*** – ***0.0*** to ***999.9 hours***

- ### AGS Timers



This is a read-only screen that displays times and values for the MATE3s functions described on the preceding pages. Programming of these values is done in the ***Quiet Time Schedule***, ***Voltage Start***, ***Load Start***, ***Must Run Schedule***, or ***State of Charge Start*** menus described on the previous page.

- ***Fault*** begins counting from zero when no voltage is detected after a generator start. When the ***Fault Time*** setting is reached according to the ***AGS Setup*** screen on page 25, an AGS fault will be generated. An event will also be recorded. (See page 47).
- ***Warmup***, ***Cooldown***, and ***Exercise*** begin counting from zero when each stage begins. The generator will react accordingly when their respective times are reached according to the ***AGS Setup*** screen on page 25.
- ***2 Min***, ***2 Hour***, and ***24 Hour*** begin counting down from the maximum time when the respective conditions are reached for each setting. If any of these timers reach zero, the generator will be started.
- ***Load Start*** and ***Load Stop*** begin counting from zero when the respective conditions are reached for each setting. If either of these timers reach the delay time as set in the ***Load Start*** screen on page 28, the generator will be started or stopped as appropriate.
- ***DC Absorb*** is used with the DC generator settings shown on page 25. It begins counting from zero when the ***DC Absorb Voltage*** is reached. The generator will be stopped when the ***DC Absorb Time*** setting is reached.



M-1. AGS continued

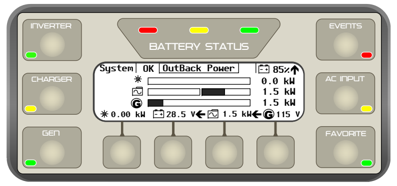
- ### AGS Functional Test

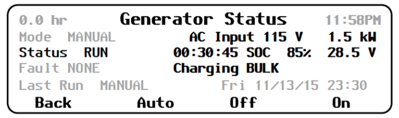
Before any further programming, confirm that the generator is working properly. Using the generator's own controls, manually turn it on and then shut it off.

Next, test the remote start functionality. Go to the ***Generator Status*** screen using the GEN hot key.

To test the AGS function through the MATE3s:

1. Press the **GEN** hot key to bring up the ***Generator Status*** screen.
2. Press the <**ON**> soft key and wait for the generator to start running.
3. Press the <**OFF**> soft key to shut the generator off.
4. Press the <**AUTO**> soft key to put the generator in **AUTO** mode. (Automatic functions need to be tested separately.)
5. Press the <**BACK**> soft key to return to the ***Home*** screen.



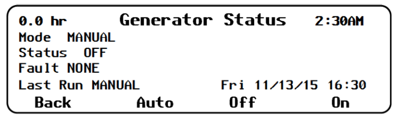


- ### AGS Troubleshooting

If the generator fails to start or connect, there are many possible reasons. The steps below provide initial guidance for troubleshooting.

Symptom	Possible Cause	Possible Remedy
AGS sends a command but the generator does not start.	Open circuit between AUX connection and generator.	Ensure the generator will start using its own controls. Ensure it will start using the <**ON**> soft key in the GEN hot key screen. Check all conductors, including external relays, contactors, or other devices.
AGS starts the generator but ***AGS Fault*** appears anyway.	Generator output is not reaching inverter input.	Check all circuit breakers and switches. Measure AC voltage at inverter input terminals.
	Generator output does not meet inverter requirements.	Check generator voltage and frequency. To clear an AGS fault, go to the GEN hot key screen. Press the <**OFF**> soft key.
AGS does not send a start command under expected conditions.	AGS is not enabled.	Check ***Mode*** in the GEN hot key screen. Ensure ***AGS Enabled*** is set to ***Y***. (See page 25.)
	The AGS timers have not been activated by the present conditions.	Check to make sure at least one AGS timer is active. (See page 29.) If the timers are not active, check the AGS settings. Compare all settings against the Start and Stop Reasons table. (See page 31.)
	A Stop condition is active. This could include Quiet Time.	Compare all settings against the Start and Stop Reasons table. (See page 31.)

- ### Start and Stop Reasons



After AGS has started the generator, the GEN hot key screen shows the reason for starting under ***Last Run***. The first two columns in the table below are a list of start reasons.

The remaining columns display the possible reasons for the generator to stop. The possible stop reasons are connected to the start reasons. For example, a generator which started due to Load kW can stop due to reduction of load kilowatts, due to Quiet Time, or manually. However, it will not stop due to battery state of charge (SOC) or any of the other reasons.

		STOP REASONS									
START REASONS	**Global Rebulk**	**Inverter in Float or Silent**	**Stop SOC %**	**Stop at 100% SOC**	**FN-DC Charge Parms Met (CPM)**	**Below Load kW**	**Quiet Time**	**Exercise Time Expires**	**Manual Stop**	**High Batt Voltage**	**Below Load kW**
2 Min Batt V	Yes	Stop			Stop				Stop	Stop	
2 Hour Batt V	Yes	Stop	Stop if days since CPM < setting	Stop if days since 100% > setting	Stop if days since CPM > setting		Stop		Stop	Stop	
24 Hour Batt V	Yes	Stop	Stop if days since CPM < setting	Stop if days since 100% > setting	Stop if days since CPM > setting		Stop		Stop	Stop	
Start SOC %	Yes	Stop	Stop if days since CPM < setting	Stop if days since 100% > setting	Stop if days since CPM > setting		Stop		Stop	Stop	
Load kW						Stop	Stop		Stop		
Exercise							Stop	Stop	Stop		
Must Run Start	Yes						Stop		Stop		Stop
Manual	Yes	If Auto selected	If Auto selected						Stop		

NOTES

- "Setting" refers to the ***Interval Days*** setting in the ***State-of-Charge (SOC) Start*** screen as depicted on page 28.
- "CPM" (Charged Parameters Met) refers to the full-charge parameters of the FLEXnet DC (FN-DC) Battery Monitor as defined on page 22. The FN-DC must be installed in the system.
- The conditions of the **Inverter In Float or Silent** column will stop the generator if the inverter reaches these charging stages before the conditions of the other columns take effect.
- The conditions of the **Stop SOC%** column apply as long as ***Days Since Parms Met*** does not exceed ***Interval Days***. The generator will be shut off upon reaching the ***Stop SOC%*** setting as shown on page 28.
- The conditions of the **Stop at 100% SOC** column apply if ***Days Since Parms Met*** equals or exceeds ***Interval Days***. The generator will ignore the ***Stop SOC%*** setting and continue running until the battery SOC is at 100%. (This function does not operate if ***Enable Full Charge*** is set at ***N***, or if the ***Interval*** is set at ***0***.)
- The conditions of the **FN-DC Charge Parms Met (CPM)** column apply when ***Days Since Parms Met*** equals or exceeds ***Interval Days*** and ***Enable Full Charge*** (100% SOC) is disabled as noted above. These conditions also apply if for any reason the charge parameters are not met when the batteries reach 100% SOC as noted above. The generator will continue to run until the FN-DC's charge parameters have been met.

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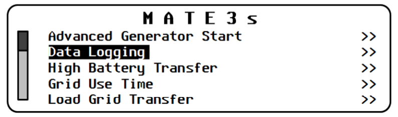
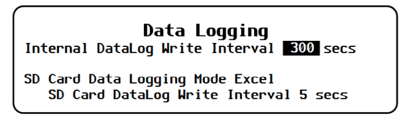
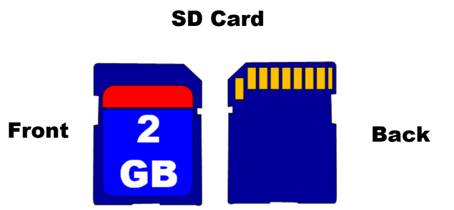


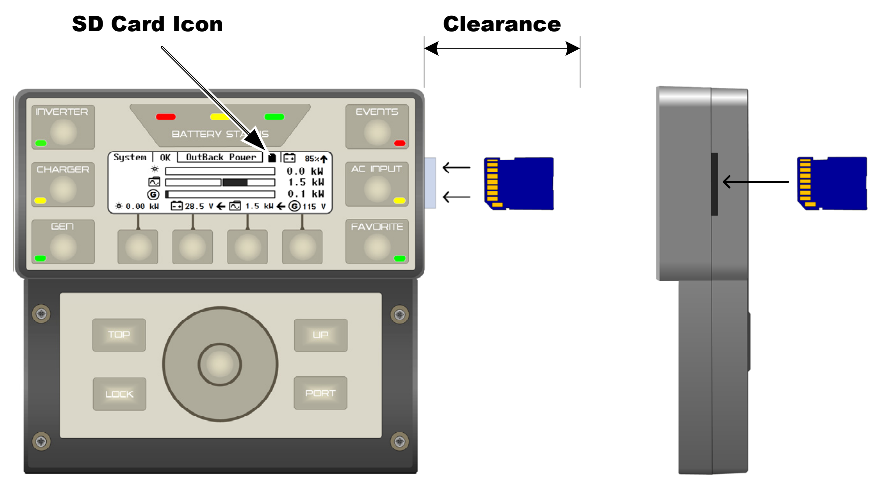
M-2. Data Logging



The ***Data Logging*** function enables the MATE3s to record operational status information about the system. Individual status information is recorded for each device connected to the MATE3s. This function will record data to the internal flash memory for up to one year and selectively to an SD memory card up to the capacity of the card.

- The MATE3s can use an SD card of up to 4 GB capacity.
- To accommodate the card, it is recommended to leave 2" clearance on the right side of the MATE3s.
- Inserting the card in the slot causes an SD card icon to appear on the Home screen.





- ***Internal Data Log Write Interval*** — the interval (***60*** to ***3600*** seconds) at which data is recorded for the MATE3s graphs.
- ***SD Card Data Logging Mode*** — the level of selectivity for downloading data to the SD card.
  - ***Excel*** records the full date and time for each interval recorded.
  - ***Disabled*** turns off data logging to the SD card. It does not turn off data logging to the internal flash memory.
  - ***Compact*** records only the minutes and seconds for each interval recorded.
- ***SD Card DataLog Write Interval*** — the interval (***1*** to ***60*** seconds) at which data is automatically downloaded to the SD card.

For instructions on downloading data logs for the charge controller, see page 45.
For instructions on downloading data logs for the FLEXnet DC Battery Monitor, see page 46.

Data Log File Format

Information generated by this function will be saved on the SD card in a generic .csv file format, which can be read by most spreadsheet programs. The file name on the .csv file will appear as follows:

Example: 11062722.csv (YYMMDDHR.csv)

Where: YY = Last 2 digits of the year, MM = Month (01-12), DD = Day (01-31), HR = Hour (00-23)

The data log shown in this example is arranged by date and time. It shows all devices connected to the HUB Communications Manager in order by port number. The table is broken into parts to emphasize that the data available for each device is not the same. Each type of OutBack device is noted by a particular Device Type designation. FX-class inverters use Device Type 2, while FLEXmax charge controllers are Type 3. The FLEXnet DC Battery Monitor is Device Type 4. Device Types not depicted here include FXR-class inverters (Type 5) and Radian-class inverters (Type 6).

This example shows a system with two FX(E) inverters, two FLEXmax controllers, and the FLEXnet DC.

NOTES:

- The headers shown above each part of the table are included for convenience. The headers are not included in the download.
- The data stream used to compile this download is the same as that used by the MATE3 USB Card. For more information on any of the table items, see the *MATE3 USB Card Owner's Manual*.

Date	Time	Port	Device Type	Invert Current	Charge Current	Buy Current	AC Input Voltage	AC Output Voltage	Sell Current	Operating Mode	Error Code	AC Mode	Battery Voltage	Miscellaneous	Warning Code
5/31/15	19:53:25	1	2	2	0	0	0	230	0	02	0	00	492	1	0
5/31/15	19:53:25	2	2	2	0	0	0	230	0	02	0	00	492	1	0

Date	Time	Port	Device Type	Unused	Charger Current	PV Current	PV Voltage	Daily kWh	CC Amps (tenths)	AUX Mode	Error Code	Mode	Battery Voltage	Amp-Hours	Unused
5/31/15	19:53:25	3	3	0	0	0	61	89	6	03	0	00	492	168	0
5/31/15	19:53:25	4	3	0	0	0	72	80	0	03	0	00	492	151	0

Date	Time	Port	Device Type	Shunt A Amps	Shunt B Amps	Shunt C Amps	Extra Data Identifier	Extra Data	Battery Voltage	SOC	Shunt Enable	Status Flag	Battery Temp	Unused	Unused
5/31/15	19:53:25	5	4	9	0	0	10	663	492	93	000	8	25	0	0

This shows the more of the data log as it actually appears. The rows for each field are repeated with updated information at the specified interval (5 seconds in this example).

Note that the order and designation of each column may change. Each row represents a different device. The columns are arranged appropriately for the device type and that particular device.

5/31/15	19:53:30	1	2	2	0	0	0	230	0	02	0	00	492	1	0
5/31/15	19:53:30	2	2	2	0	0	0	230	0	02	0	00	492	1	0
5/31/15	19:53:30	3	3	0	0	0	61	89	6	03	0	00	492	168	0
5/31/15	19:53:30	4	3	0	0	0	72	80	0	03	0	00	492	151	0
5/31/15	19:53:30	5	4	9	0	0	10	663	492	93	000	8	25	0	0
5/31/15	19:53:35	1	2	2	0	0	0	230	0	02	0	00	492	1	0
5/31/15	19:53:35	2	2	1	0	0	0	230	0	02	0	00	492	1	0
5/31/15	19:53:35	3	3	0	0	0	60	89	6	03	0	00	492	168	0
5/31/15	19:53:35	4	3	0	0	0	71	80	0	03	0	00	492	151	0
5/31/15	19:53:35	5	4	7	0	0	10	663	492	93	000	8	25	0	0

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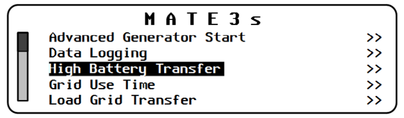
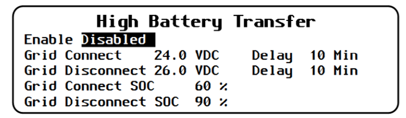


M-3 High Battery Transfer (HBX)



In High Battery Transfer (HBX) mode, the system is connected to an AC source such as the utility grid; however, it will use battery power as the first priority. The AC source is locked out until needed.

In this mode, the system runs on DC power for as long as the batteries can be sustained. It is expected that the batteries will be charged from renewable sources such as PV power. When the batteries become depleted, the system reconnects to the AC source to operate the loads.

The batteries may be recharged during this time using the renewable source. When the batteries are recharged to a high enough voltage, the system transfers back to the batteries as the primary source (hence the name High Battery Transfer).

HBX Mode commands the inverter to:

- Connect to an AC source if the battery voltage has fallen below the ***Grid Connect*** voltage for the amount of time set in the (connect) ***Delay*** set point
- Connect to an AC source if the battery state of charge (SOC) has fallen below the ***Grid Connect SOC*** for any amount of time
- Disconnect the AC source and switch to powering the loads from the battery bank if the battery voltage has risen above the ***Grid Disconnect*** voltage for the amount of time set in the (disconnect) ***Delay*** set point
- Disconnect the AC source and switch to powering loads from the battery bank if the battery state of charge (SOC) has risen above the ***Grid Disconnect SOC*** for any amount of time

IMPORTANT:

- ***HBX*** mode will control the master inverter in port 1 of a HUB Communications Manager. The master will then instruct all subphase masters and slaves to connect or disconnect from the AC input source.
- For best operation, the inverter's charger should be turned off when ***HBX*** mode is in use. This mode is intended for systems that rely primarily on the renewable energy source for charging. The settings of ***HBX*** mode allow it to disconnect from the utility grid whenever it can charge effectively using the renewable source. Use of the inverter's charger may interfere with these priorities. This may keep both ***HBX*** mode and the inverter's charger from working effectively. See the *MATE3s Overview Guide* (the CHARGER hot key) for instructions on shutting off the charger.

HBX Mode Default Set Points				
System Voltage	**12 V**	**24 V**	**36 V**	**48 V**
High Voltage	13	26	38	52
Low Voltage	12	24	36	48
Time	1 hour	1 hour	1 hour	1 hour

Menu Items

- ***Enabled/Disabled***
- ***Grid Connect — xx.x*** VDC (inverter-dependent)
  The low-voltage level that causes the system to reconnect to the utility grid.
- ***(Grid Connect) Delay — 0*** to ***240*** minutes
  The delay period after reaching ***Grid Connect*** before the system reconnects to the utility grid.
- ***Grid Disconnect — xx.x*** VDC (inverter-dependent)
  The high-voltage level that causes the system to disconnect from the utility grid.
- ***(Grid Disconnect) Delay — 0*** to ***240*** minutes
  The delay period after reaching ***Grid Disconnect*** before the system disconnects from the utility grid.
- ***Grid Connect SOC — 10%*** to ***100%***
  The low-battery state of charge that causes the system to reconnect to the utility grid immediately.
- ***Grid Disconnect SOC — 50%*** to ***100%***
  The high-battery state of charge that causes the system to disconnect from the utility grid immediately.

NOTES ON SETTINGS:

- The system must be in the ***Grid Disconnect*** state to allow HBX default settings to be changed.
- The ***Delay*** set points are used to prevent the inverter from switching to grid power in the event of a sudden, sizable demand for power that may momentarily drop the voltage below the ***Grid Connect*** value.
- The ***SOC*** set points are only usable by a system equipped with a battery monitor.

NOTES ON SELECTING HBX MODE:

- ***HBX*** mode has similar priorities to the ***Mini Grid*** mode used by FXR-class and Radian-class inverters. However, it is not compatible with ***Mini Grid*** and cannot be used at the same time. To prevent conflicts when using ***HBX*** mode, make certain not to select ***Mini Grid***. (Selection of AC input modes can be found on page 11. Information on ***Mini Grid*** and other modes can be found in the inverter *Operator's Manual*.)
- ***HBX*** is also incompatible with the ***Grid Use Time*** and ***Load Grid Transfer*** functions in the MATE3s. These functions do not have similar priorities to ***Mini Grid*** or ***HBX***, but they do control the inverter's connection and disconnection with the grid. ***HBX*** should not be used with these functions. (See pages 36 and 37.)
- When deciding whether to use ***Mini Grid*** mode or ***HBX***, the user should consider the aspects of each.
  - ***Mini Grid*** logic is based in the FXR inverter and can function in the absence of the MATE3s. ***HBX*** logic is based in the MATE3s and cannot function unless the MATE3s is installed and operating.
  - ***Mini Grid*** can use utility grid power to fully recharge the batteries every time it reconnects to the grid. ***HBX*** can only do so under specific circumstances.
  - ***HBX*** set points have a wide range of settings. ***Mini Grid*** uses settings intended to protect the batteries from excessive discharge; however, most of its settings are automatic and do not allow customization.
  - ***HBX*** works more efficiently with a larger renewable source, but there is no specification for renewable size. ***Mini Grid*** cannot work properly unless the source is larger than the size of the loads. If this condition is not met, ***Mini Grid*** will not disconnect the inverter from the utility grid.

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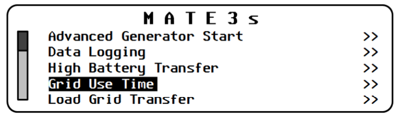
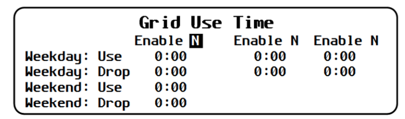


M-4. Grid Use Time

This function allows the system to connect to (use) the utility grid and disconnect from (drop) it on a schedule. ***Grid Use Time*** mode is programmed separately for weekday and weekend connect times. Before turning the ***Grid Use Time*** mode on, set all weekday and weekend time periods.

- Three ***Grid Use Time*** periods may be programmed on weekdays.
- Only one ***Grid Use Time*** may be programmed on a weekend.



- ***Enable*** — either enables (***Y***) or disables (***N***) the ***Grid Use Time*** function.
  Three ***Enable*** fields are present for the three possible weekday usages.
- ***Weekday: Use*** — the daily time (***00:00*** to ***23:59***, Monday through Friday) when the system is told to ***Use*** the utility grid.
  Three different *Use* times can be set.
- ***Weekday: Drop*** — the daily time (***00:00*** to ***23:59***, Monday through Friday) when the system is told to ***Drop*** the utility grid.
  Three different ***Drop*** times can be set.
- ***Weekend: Use*** — the daily time (***00:00*** to ***23:59***, Saturday and Sunday) when the system is told to ***Use*** the utility grid.
- ***Weekend: Drop*** — the daily time (***00:00*** to ***23:59***, Saturday and Sunday) when the system is told to ***Drop*** the utility grid.

IMPORTANT:

- The time and date must be accurately programmed for this mode to function properly.
- Care must be taken when programming weekday and weekend times that encompass ***USE*** periods past midnight (12:00 a.m.). The user must take into account weekday ***USE*** periods that will end on a Saturday.
- ***Grid Use Time*** cannot be used with ***HBX*** mode or ***Load Grid Transfer.*** These functions have incompatible priorities and will conflict with each other.
- ***Grid Use Time*** cannot be used if the inverter's ***Mini Grid*** AC input mode is used (see page 11).
  These functions have incompatible priorities and will conflict with each other.
- The MATE3s does not automatically adjust its clock for Daylight Savings Time. This may affect timing of grid usage.
- If a start time equals a stop time, no action will be taken and the time period is ignored.
- If the battery voltage falls below the inverter's ***Low Battery Cut-Out*** voltage, the inverter will automatically connect to the AC input source regardless of the time-of-day setting.

EXAMPLE #1:

Weekday Start — 6:00 AM Stop — 6:00 AM Weekend Start — 12:00 AM Stop — 12:00 AM

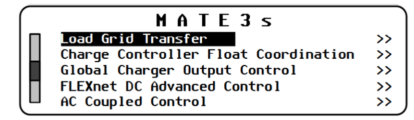
The weekend ***Use*** period has been left at its default (00:00 or 12:00 AM). Any time that a Start time equals a Stop time, no action will be taken and the time period is ignored. The above settings will have the following results:

- Monday – Friday evenings at 6 PM, the MATE3s issues a ***USE*** command to the inverter allowing the AC input source to be used.
- Monday – Friday mornings at 6 AM, a ***DROP*** command is issued.
- On Friday evening at 6 PM, a ***USE*** command is issued but since the weekend ***Start*** and ***Stop*** times are equal, the weekend use time is disabled. No ***DROP*** command will be issued until Monday morning at 6 AM.

EXAMPLE #2:

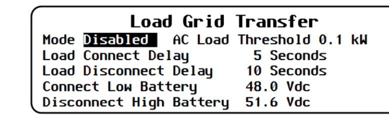
Weekday Start — 6:00 PM Stop — 6:00 AM Weekend Start — 4:00 PM Stop — 8:00 AM

- Monday – Thursday evenings at 6:00 PM, the MATE3s issues a ***USE*** command to the inverter allowing the AC input source to be used.
- Monday – Friday at 6:00 AM, a ***DROP*** command is issued. On Friday evening at 6:00 PM, a ***USE*** command is issued.
- Saturday morning a ***DROP*** command is issued at 8:00 AM. Saturday afternoon at 4:00 PM, the inverter will ***USE*** again until Sunday morning at 8:00 AM. Sunday evening at 4:00 PM., a ***USE*** time period will start, ending on Monday morning at 6:00 AM.



M-5. Load Grid Transfer

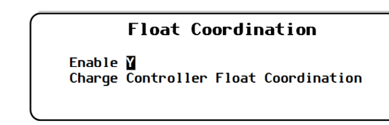
The MATE3s can force all inverters to automatically reconnect to the utility grid, even if the normal mode is to be disconnected.
Inverters can reconnect based on high output loads, or based on low battery voltage.



- ***Mode*** — ***Enabled*** allows automatic grid reconnection. ***Disabled*** means reconnection will only occur according to the inverter's own operating mode or other programming.
- ***AC Load Threshold*** — The amount of load which requires the inverter to connect.
- ***Load Connect Delay*** — The length of time the ***AC Load Threshold*** must be exceeded before the inverter connects.
- ***Load Disconnect Delay*** — The length of time the loads must remain below the ***AC Load Threshold*** before the inverter disconnects from the grid.
- ***Connect Low Battery*** — The low battery voltage level which requires the inverter to connect.
- ***Disconnect High Battery*** — The voltage which the batteries must reach before the inverter disconnects from the grid.

M-6. Charge Controller Float Coordination

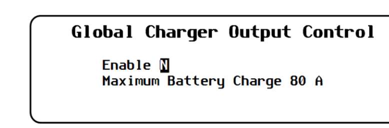
This menu enables the coordination of more than one OutBack FLEXmax charge controller. (This function also works on MX60 charge controllers with firmware revision 5.11). This enables the devices to enter the float stage, or perform other activities, simultaneously rather than individually. Float Coordination means that when one charge controller finishes a bulk charge and moves into the float stage, the MATE3s directs any other charge controllers into the float stage as well.



- ***Enable*** — either enables (***Y***) or disables (***N***) the ***Charge Controller Float Coordination*** function.

M-7. Global Charger Output Control

The global charger control allows the MATE3s to limit the DC current delivered by all FLEXmax charge controllers in the system. This menu specifies a maximum allowed charging current for the system. The total charge controller current cannot exceed this number.



NOTES:

- This function cannot limit charge current from inverters of any kind. However, inverter current is counted in the total. For example, if ***Maximum Battery Charge*** is set to 200 Adc and the inverters charge at 125 Adc, the charge controller current cannot exceed the difference, which is 75 Adc. The controller current will be limited as necessary.
- This function requires the system to have a FLEXnet DC battery monitor installed in the system.
- The FLEXmax charge controllers must be set to ***Grid-Tie Mode*** in order to establish priority for this function. (See page 19.) However, the inverters in the system cannot use grid-interactive functions (if any).

- ***Enable*** — either enables (***Y***) or disables (***N***) the ***Global Charger Output Control*** function.
- ***Maximum Battery Charge*** – the maximum combined charging current (**10** to **800** amps) allowed.

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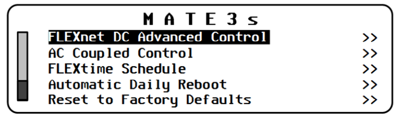
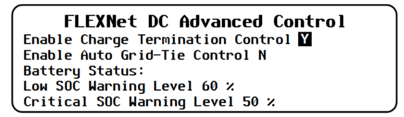


M-8. FLEXnet DC Advanced Control



This menu allows certain advanced functions to be used with the FLEXnet DC (FN-DC) if installed. See the FN-DC literature for more information.

- ***Enable Charge Termination Control*** — allows the battery charging to be stopped for all inverters on the system, once the charging parameters of the FN-DC have been met. (See page 22 for these parameters.) Options are ***N*** (no) or ***Y*** (yes).
- ***Enable Auto Grid-Tie Control*** — if grid-interactive inverters are present on the system, this control allows their grid-interactive function to be turned off at midnight each night. This function allows the charge controllers to complete a charge cycle at the beginning of the next day before the system begins selling. It prevents the batteries from remaining at or below the Sell voltage for extended periods without receiving a full charge.

  If grid-interactive inverters are not present, this item is inoperative. Options are ***N*** (no) or ***Y*** (yes). When ***Y*** is selected, "grid-tie" mode will be enabled on grid-interactive inverters anytime the battery monitor signals that charge parameters have been met.

  NOTE: When grid-tie mode is enabled with this function, the ***Offset Enable*** menu item (see page 15) will change to ***Y*** (yes). The inverter will become capable of selling even if the function had been previously turned off.

The next two items are related to the system indicators on the Home screen and are titled ***Battery Status*** on the screen. (See the *MATE3s Overview Guide* for home screens.)

- ***Low SOC Warning Level*** — if the batteries decrease to this state of charge (SOC), an event will be registered in the event log, and the Home screen will display **!**, a battery warning. (See page 50.) Settable range is ***20%*** to ***99%***.
- ***Critical SOC Warning Level*** — if the batteries decrease to this state of charge (SOC), an event will be registered in the event log, and the Home screen will display **X**, a warning that the batteries have been critically discharged. (See page 50.) Settable range is ***10%*** to ***98%***.

M-9. AC Coupled Control

This menu activates the AC Coupling function of a Radian-class inverter. Using the GSLC175-AC-120/240, the Radian's output can interface with the output of another grid-tied inverter.

When ***Enabled***, the Radian 12V AUX output closes the ROCB (remote-operated circuit breaker) in the GS Load Center. This connects the Radian inverter's output bus to that of the grid-tied inverter.

This function works with all Radian AC input modes except ***Generator***. It must be used on the **GRID** input. Connecting a source in ***Generator*** mode, or connecting to the **GEN** input in any mode, causes the ROCB to open.

While the grid is present, the following operations can occur.

- During the day, the Radian transfers excess AC power from the grid-tied inverter and back to the utility grid during the day. It also transfers grid power to the critical loads panel at night.

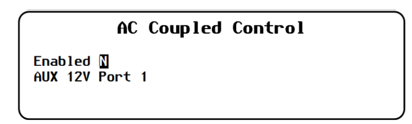
During a grid failure, the following operations can occur.

- The Radian's own output provides a stable AC source to the grid-tied inverter. This allows the grid-tied inverter to remain active without the grid. The grid-tied inverter continues to deliver power to any loads present on the Radian's output. This is applicable during a grid failure, or in an off-grid system.
- Any AC power not consumed by the loads is converted by the Radian to DC power and delivered to the battery bank.
- Power delivered to the battery bank is controlled by several reference (target) voltages, particularly the Radian battery charger settings. The settings ***Absorb Voltage*** and ***Float Voltage*** are used as reference voltages. These are the same voltages that are used by the inverter's Offset function. (See the *Operator's Manual* for more information on this function.)
- If the battery voltage exceeds the target, the 12V AUX output will open the ROCB. This removes the AC source from the grid-tied inverter, shutting it down. This will also remove the source of excess battery energy. The Radian still powers the critical loads.
- The 12V AUX output will reconnect the Radian's output to the grid-tied inverter when the battery voltage decreases to a safe level.

NOTES:

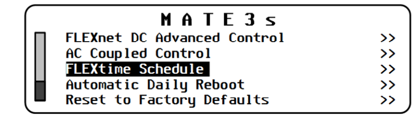
The ***GridZero*** AC input mode is not recommended in an AC-coupled system due to several incompatible priorities.

See the OutBack website, www.outbackpower.com, for detailed information on AC coupling.

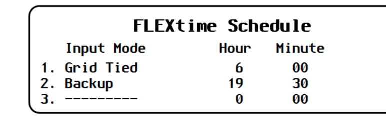


- ***Enabled*** — enables (***Y***) or disables (***N***) the AC Coupling function.
- ***AUX 12V Port*** — selects the HUB port with the designated AC-coupled Radian inverter.

NOTE: Only one Radian inverter can be AC Coupled with this programming.



M-10. FLEXtime Schedule



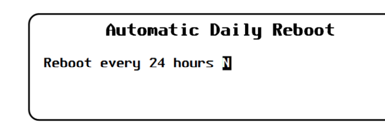
The inverter can switch between AC input modes based on time of day. The input mode selection, previously fixed, becomes flexible according to a schedule. Three mode and time selections are available.

- ***Input Mode*** — the mode used during the selected time.
- ***Hour*** and ***Minute*** — the selection (***00:00*** to ***23:59***) which defines that part of the schedule.

NOTES:

- The times under each selection are start times only. The stop time is defined by the start time for the next selection.
- Leaving a selection blank means it will be skipped. If all selections are blank, this function will not operate.
- ***FLEXtime Schedule*** is available for FXR-class and Radian-class inverters only.

M-11. Automatic Daily Reboot



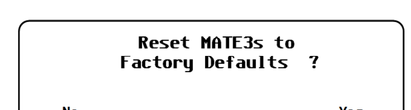
The MATE3s can reboot itself every 24 hours. This is a backup measure in the event of a display freeze or a disconnect from OPTICS RE.

- ***Reboot every 24 hours*** — enables (***Y***) or disables (***N***) this function.

NOTE: This function is not recommended if AGS is in use.

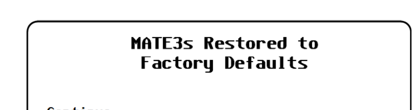
M-12. Reset to Factory Defaults

This screen allows the user to erase the settings from the MATE3s and start over with the values programmed at the factory. Entering this screen brings up the query ***Reset MATE3s to Factory Defaults?***

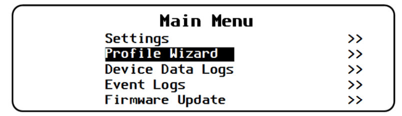


Use the soft keys to select ***No*** or ***Yes***.

- If **<No>** is selected, the screen returns to the ***Battery Monitor*** menu. No changes will be made to any settings.
- If **<Yes>** is selected, the battery monitor's settings immediately change to the original factory values. The screen displays the message ***MATE3s Restored to Factory Defaults***. A <**Continue**> soft key will appear. Pressing this key returns the screen to the ***MATE3s*** menu.



Profile Wizard (W)



The Profile Wizard is a guided program for rapidly configuring devices. It prevents the need for repetitive programming when multiple common devices are used.

The Wizard asks the user a series of questions that describe the system. The Wizard uses the answers to these questions to build a "profile" of the best settings for all devices. When prompted by the user, the Wizard will use the profile to communicate with the devices and program the settings.

An installer can create new profiles, use existing profiles, or restore profiles to their original state.

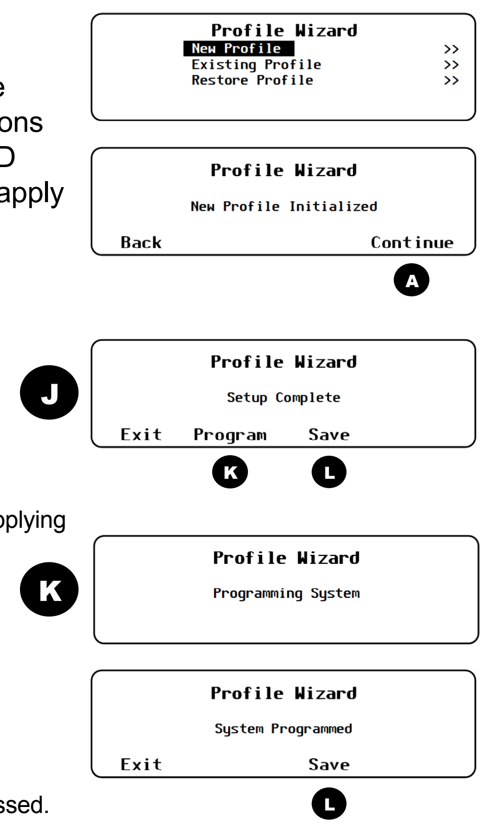
- ***Creating New Profiles*** (**W-1**)
- ***Using Existing Profiles*** (**W-2**)
- ***Restoring Profiles*** (**W-3**)
- ***Profile Settings*** (**W-4**)
- ***Saving the Profile to an SD Card*** (**W-5**)

Note that a Profile is not the same as a System Configuration as programmed in the ***System*** menu. See **S-2** on page 5. Additionally, see **W-4** on page 42 for other items not programmed by the Wizard.

IMPORTANT:
Please program the Profile Wizard in accordance with the Recommended Programming Order on page 4.

W-1. Creating New Profiles

Creating a profile involves customizing various aspects of a system. These include system type, battery charging and monitoring, and inverter interactions with both utility grid and generator. Once a custom profile is saved to an SD card, it can be re-applied if the settings are ever lost. An installer can also apply a configuration from an SD card to similar systems.



To create a new profile:

1. From the ***Profile Wizard*** menu, select ***New Profile***.
2. Press <**Continue**> to confirm a new profile. This enters a series of screens with settings. The screens are shown on page 42, beginning with ***System Type*** (**A**).
3. The last setup screen is the ***Setup Complete*** screen **J**. At this point the profile can be applied to the system (**K**), or it can be saved first (**L**).

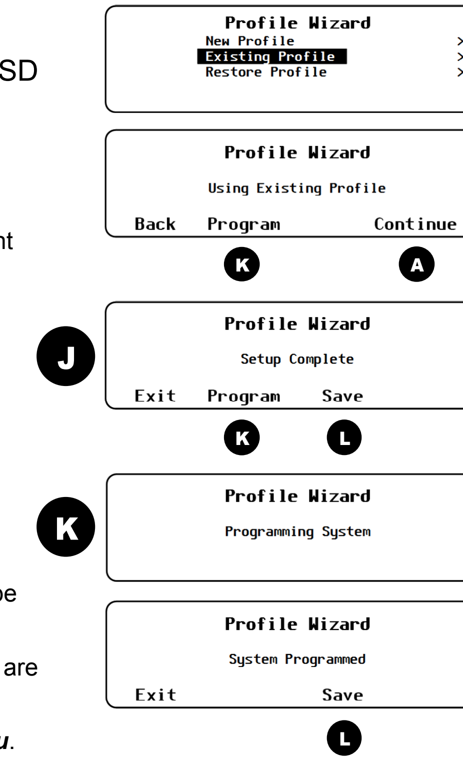
   NOTE: Pressing the <**Exit**> soft key will return to the ***Main Menu*** without saving or applying the profile. All changes will be lost.
4. The <**Program**> soft key (**K**) will apply the profile to the system. All settings will be programmed into the appropriate devices and will immediately take effect. The message ***Programming System*** will appear. When it is complete, ***System Programmed*** will appear. The <**Save**> soft key (**L**) will appear again.

   IMPORTANT:
   Making changes in steps 2 and 3 is not the same as programming them. Changes are **only** applied to the system once the <**Program**> soft key is pressed.
5. The <**Save**> soft key (**L**) saves the profile to the SD card. The screens are shown on page 43, beginning with the ***Save Profile Wizard*** screen (**L**).

   NOTE: Saving a profile will not apply it to the system, but a saved profile can be retrieved and applied later. See **W-2**.
6. Once programming and saving is complete, press <**Exit**> to return to the ***Main Menu***.

W-2. Using Existing Profiles

If the most recent profile was lost or changed, it can be retrieved from an SD card and applied to the system. If the profile was not ideal, any existing value can be changed before re-applying the profile.



To apply a profile that was previously saved:

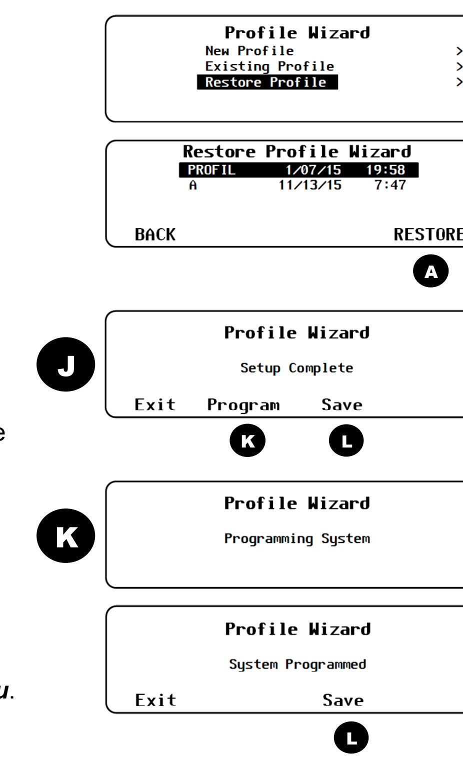
1. From the ***Profile Wizard*** menu, select ***Existing Profile***. This will take the most recent profile stored in the MATE3s and apply it to the system.

When ***Using Existing Profile*** is displayed:

2. If the profile needs to be changed, press the **<Continue>** soft key. This enters a series of screens with settings. The progression of screens is shown on page 42, beginning with ***System Type*** (**A**).
3. To retrieve and apply the most recent profile, press the **<Program>** soft key **K**. All settings will be programmed into the appropriate devices and will immediately take effect. The message ***Programming System*** will appear. When it is complete, ***System Programmed*** and the **<Save>** soft key (**L**) will appear. See Step 5.
4. The last setup screen is the ***Setup Complete*** screen **J**. At this point the profile can be applied to the system (**K**). Any changes can be saved first (**L**).
5. The **<Save>** soft key (**L**) allows the profile to be saved to the SD card. The screens are shown on page 43, beginning with the ***Save Profile Wizard*** screen (**L**).
6. Once programming and saving is complete, press **<Exit>** to return to the ***Main Menu***.

W-3. Restoring Profiles

Previously saved profiles can be selected and retrieved. If the profile was not ideal, any existing value can be changed. Once all values are confirmed, the profile can either be saved or applied.



To restore a profile that was previously saved:

1. From the ***Profile Wizard*** menu, select ***Restore Profile***. The MATE3s will access the SD card and display the names of the profiles available to be restored.
2. Use the control wheel to scroll through the names.
3. When the desired profile is selected, press the **<RESTORE>** soft key to start the restoration process. This will go through each screen to confirm it is accurate. The progression of screens is shown below, beginning with ***System Type*** (**A**).
4. The last setup screen is the ***Setup Complete*** screen **J**. At this point the profile can be applied to the system (**K**), or it can be saved first (**L**). See Step 6.
5. The **<Program>** soft key (**K**) will apply the profile to the system. All settings will be programmed into the appropriate devices and will immediately take effect. The message ***Programming System*** will appear. When it is complete, ***System Programmed*** and the **<Save>** soft key (**L**) will appear.
6. The **<Save>** soft key (**L**) allows the profile to be saved to the SD card. The screens are shown on page 43, beginning with the ***Save Profile Wizard*** screen (**L**).
7. Once programming and saving is complete, press **<Exit>** to return to the ***Main Menu***.

900-0125-12-01 Rev A

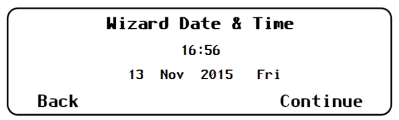
Profile Wizard

W-4. Profile Settings

This section shows the process of customizing all system elements. The screen progression shown is the same whether **A** is selected in the ***New Profile***, ***Existing Profile***, or ***Restore Profile*** menus.

Note that Wizard profiles are useful for rapid setup of multiple devices, but they do not configure the entire system. Items not covered include inverter stacking (see **I-9** on page 14), charge controller float coordination (see **M-6** on page 37), and many system settings (see **S-1** beginning on page 4). In addition, if settings are made in the wrong order, the Wizard may overwrite some customized settings. To ensure that **all** settings are made correctly and retained, make certain to follow the Recommended Programming Order on page 4.

A



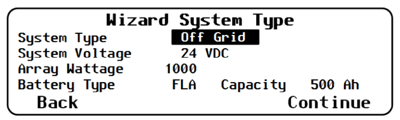
Wizard Date & Time (**A**):

- Hour, Minute, Day, Month, Year, Weekday

NOTE:

- See **S-6** on page 6 for more information on clock settings.

B



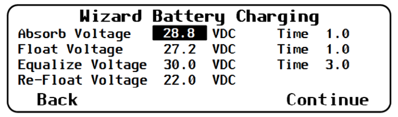
Wizard System Type (**B**):

- ***System Type*** (***Off Grid***, ***Grid Tied***, ***Backup***)
- ***System Voltage*** (Vdc)
- ***Array Wattage***
- ***Battery Type*** (***FLA***, ***Gel***, ***AGM***) and ***Capacity*** (Ah)

NOTES ON B:

- If ***System Type*** is set to ***Grid Tied***:
  - In FX-class inverters, ***Offset Enable*** changes to ***Y***. (See page 15.) For all other system types, this selection changes to ***N***.
  - In Radian-class inverters, the **Grid** AC input mode changes to ***Grid Tied***. The **Gen** AC input mode changes to ***Generator***.
  - In FXR-class inverters, ***Input Type*** changes to ***Grid***. The AC input modes used by ***Grid*** and ***Gen*** change to ***Grid Tied*** and ***Generator***.
  - ***Grid-Tie Mode*** in all charge controllers changes to ***Y***.
- If ***System Type*** is set to ***Off Grid***:
  - In Radian-class inverters, both the **Grid** and **Gen** AC input modes change to ***Generator***.
  - In FX-class or FXR-class inverters, ***Input Type*** changes to ***Gen***. In FXR-class, ***Generator*** is the AC input mode used by both ***Grid*** and ***Gen***.
- If ***System Type*** is set to ***Backup***:
  - In Radian-class inverters, the **Grid** AC input mode changes to ***Backup***. The **Gen** AC input mode changes to ***Generator***.
  - In FXR-class inverters, ***Input Type*** changes to ***Grid***. The AC input modes used by ***Grid*** and ***Gen*** change to ***Backup*** and ***Generator***.
- If ***Battery Type*** is set to ***FLA***, the FLEXmax charge controller's ***Temp Comp Mode*** selection changes to ***Wide***. (See page 18.) For ***GEL*** or ***AGM*** battery types, ***Temp Comp*** is ***Limited***. When ***Limited***, the ***Upper*** and ***Lower Battery Voltage*** equal the Wizard ***Absorb*** and ***Float*** settings respectively plus 0.2 Vdc (for a 12-volt system), 0.4 Vdc (24-volt), 0.6 Vdc (36-volt), or 0.8 Vdc (48-volt).
- See **S-1** on page 4 for more information on various ***System Types***.

C



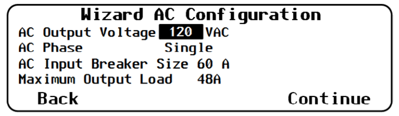
Wizard Battery Charging (**C**):

- ***Absorb Voltage/Time***
- ***Float Voltage/Time***
- ***Equalize Voltage/Time***
- ***Re-Float Voltage***

NOTES:

- In grid-interactive models, ***Float Voltage*** also controls the ***Sell Voltage*** setting on page 15. ***Sell Voltage*** equals ***Float Voltage*** minus 0.2 Vdc (for a 24-volt system) or 0.4 Vdc (for a 48-volt system).
- ***Absorb Voltage*** and ***Float Voltage*** also control the equivalent settings in FLEXmax charge controllers. (See page 18.) The controller voltages equal the Wizard voltages plus 0.1 Vdc (for 12- or 24-volt systems) or 0.2 Vdc (for 36- or 48-volt systems).
- This menu also controls items in the ***Battery Setup*** menu for the FN-DC. (See page 22.) ***Full Charge Voltage*** equals the Wizard ***Absorb Voltage*** minus 0.2 Vdc (for a 12-volt system), 0.4 Vdc (24-volt), 0.6 Vdc (36-volt), or 0.8 Vdc (48-volt). ***Parms Met Time*** equals 5% of the Wizard ***Absorb Time***. Note also that ***Return Amps*** equals 3% of the battery ***Capacity*** in **B** above.
- See **I-6** on page 12 for more information on battery charging.

D



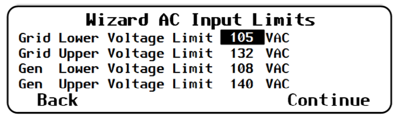
Wizard AC Configuration (**D**):

- ***AC Output Voltage*** (Vac)
- ***AC Phase*** (***Single***, ***Split***, ***3-Phase***)
- ***AC Input Breaker Size*** (Aac)
- ***Maximum Output Load*** (Aac)

NOTES:

- ***AC Input Breaker Size*** controls ***Grid Input AC Limit.*** (See page 10.)
- As shown in **F**, if ***Generator Start*** is set to ***Manual*** or ***Generator Type*** is ***DC***, then ***AC Input Breaker Size*** controls both the ***Gen Input AC Limit*** and the ***Charger AC Limit***. (See page 10.)
- If the settings in **F** are ***Auto*** or ***AC***, then the ***Gen*** AC limit is set using ***Size*** from **F**, ***AC Output Voltage*** from **D**, and the total number of inverters. The charger limit is either the ***Gen*** AC limit or ***AC Input Breaker Size***, whichever is larger.
- See **I-3** on page 11 and **I-9** on page 14 for more information on AC configuration.

E



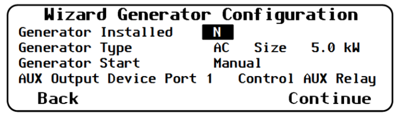
Wizard AC Input Limits (**E**):

- ***Grid Lower Voltage Limit*** (Vac)
- ***Grid Upper Voltage Limit*** (Vac)
- ***Gen Lower Voltage Limit*** (Vac)
- ***Grid Upper Voltage Limit*** (Vac)

NOTE:

- See **I-2** on page 10 for more information .

F



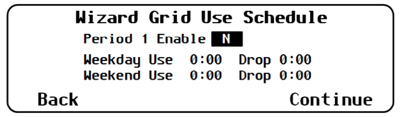
Wizard Generator Configuration (**F**):

- ***Generator Installed*** (***Y*** or ***N***)
- ***Generator Type*** (***AC*** or ***DC***) and ***Size*** (kW)
- ***Generator Start*** (***Manual*** or ***Auto***)
- ***AUX Output Port***

NOTES:

- If ***Generator Type*** is ***DC***, the stop voltage setting changes to the Wizard ***Absorb Voltage*** plus 0.1 Vdc. (See **C**.)
- See **S-1** on page 4 and **M-1** on page 24 for more information on generator settings.
- In Radian-class models, ***Control AUX*** can select ***Relay*** or ***12V.***

G



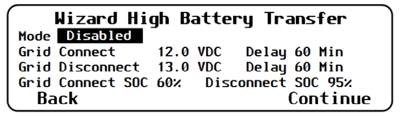
Wizard Grid Use Schedule (**G**):

- ***Period 1, 2,*** and ***3 Enable —*** (***N*** or ***Y***)
- ***Weekday***
  - ***Use — 0:00*** to ***23:59***
  - ***Drop — 0:00*** to ***23:59***
- ***Weekend***
  - ***Use — 0:00*** to ***23:59***
  - ***Drop — 0:00*** to ***23:59***

NOTES:

- This screen is only present when ***System Type*** (**A**) is ***Grid Tied*** or ***Backup***.
- The screen is repeated for ***Periods 1***, ***2***, and ***3***.
- See **M-4** on page 36 for more information on the ***Grid Use Timer***.

H



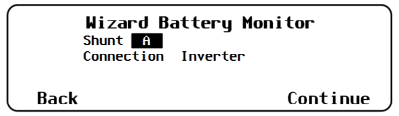
Wizard High Battery Transfer (**H**):

- ***Mode*** (***Enabled*** or ***Disabled***)
- ***Grid Connect***
  - ***xx.x VDC***
  - ***Delay xx Min***
  - ***SOC xx%***
- ***Grid Disconnect***
  - ***xx.x VDC***
  - ***Delay xx min***
  - ***SOC xx%***

NOTES:

- When enabled, this menu controls the inverter ***Low Battery Cut-Out*** and ***Cut-In***. (See page 12). These change to 10.5 Vdc and 12.5 Vdc (or equivalent values for systems higher than 12 volts).
- The MATE3s HBX ***Grid Connect*** changes to 12.2 Vdc (or equivalent values for systems higher than 12 volts). Note that other items are set by the Wizard battery charger. ***Grid Disconnect*** is equal to the Wizard ***Absorb*** setting. The ***Disconnect Delay*** is 25% of the Wizard ***Absorb Time.***
- See **M-3** on page 34 for more information on HBX.

I



Wizard Battery Monitor (**I**)

- ***Shunt A***
  - ***Connection — Disabled, Inverter, Charge Controller, DC Load, DC Gen, Wind Turbine, Hydro*** (these names can be used to identify each shunt)

NOTES:

- This screen is only present if the FN-DC is installed.
- It is repeated for shunts B and C (if installed).
- See page 22 for more information on the FN-DC.

NOTE: Pressing ***Continue*** on the last screen (screen **I** in this example) returns to the ***Setup Complete*** screen **J**. (See **W-1**, **W-2**, or **W-3** as appropriate.)

W-5. Saving the Profile to an SD card

This section shows the process of saving the profile and creating names for each file. The screen progression shown here is the same whether **A** is selected in the ***New Profile***, ***Existing Profile***, or ***Restore Profile*** menus.

To save a profile to an SD card:

If other profiles have been saved on the SD card, a list will be displayed (**L**). Choose Option 1 or 2 below.

NOTE: If the SD card is empty, pressing <**Save**> will automatically default to Option 2 below.

1. Select a name on the list with the control wheel. Press the <**Save**> soft key (**N**) to save the new settings over the selected profile. ***Saving to SD Card*** will be displayed. Proceed to 3.

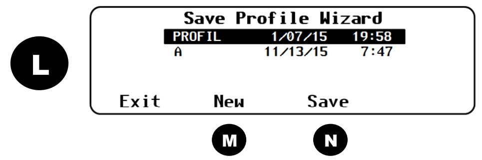
OR

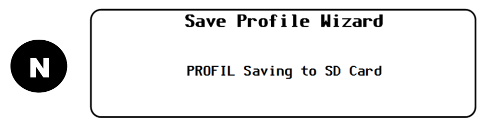
2. Press the <**New**> soft key (**M**) to create a new profile name. (8 characters maximum)
   - Use the control wheel to scroll through the available characters.
   - Use <🡒> or <🡐> to move to the desired character location.
   - Use <**Delete**> to erase characters when highlighted.

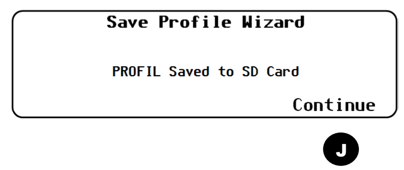
   Press <**Save**> to save the new profile name. ***Saving to SD Card*** will be displayed.

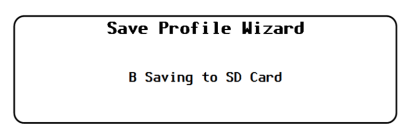
In either case:

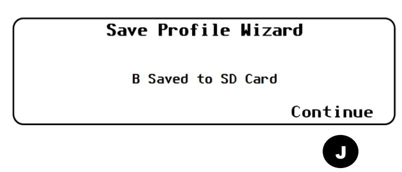
3. Wait for the confirmation screen to appear. After the screen appears, press <**Continue**> to return to the ***Setup Complete*** screen **J**.







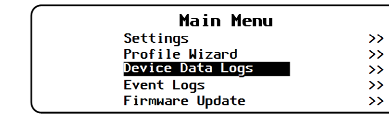




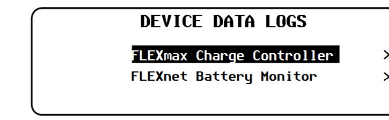
Device Data Logs (D)

Users can create Device Data Logs for the FLEXmax (FM) Charge Controller and the FLEXnet (FN) DC Battery Monitor. The data logs can then be uploaded and saved to an SD card, or erased. Data logs can be converted to spreadsheets and graphs. They can be used to evaluate performance and trends.

- ***Saving Data Logs for the FLEXmax Charge Controller*** (**D-1**)
- ***Saving Data Logs for the FLEXnet DC Battery Monitor*** (**D-2**)
- ***Erasing Data Logs*** (**D-3**)



D-1. Saving Data Logs for the FLEXmax Charge Controller



To create a data log for the FLEXmax Charge Controller:

1. From the ***DEVICE DATA LOGS*** menu, select ***FLEXmax Charge Controller***.
2. From the ***FM Charge Controller Data Log*** menu, select ***Upload and Save Data Log***.
3. If other data logs have been saved on the SD card, a list will be displayed. To save over a current log, choose option A. To save the log as new, choose B.

A. Select a name on the list with the control wheel. Press **<Save>** to save the new data over the selected data log. ***Saving to SD Card*** will be displayed. Proceed to C.

NOTE: If the SD card is empty, pressing the **<Save>** soft key will automatically default to Option B.

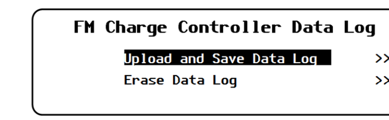
OR

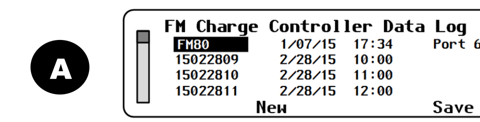
B. Press **<New>** to create a unique name for the new data log. (8 characters maximum)
- Use the control wheel to scroll through the available characters.
- Use <🡒> or <🡐> to move to the desired character location.
- Use **<Delete>** to erase characters when highlighted.

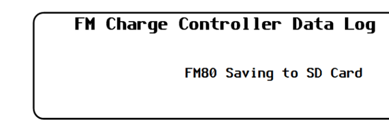
Press **<Save>** to save the new data log name. ***Saving to SD Card*** will be displayed.

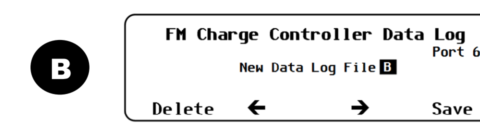
In either case:

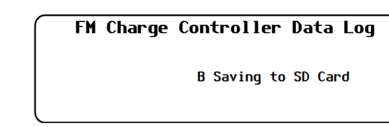
C. Wait for the confirmation screen to appear. After the screen appears, press **<Continue>** to return to ***Upload and Save Data Log***.

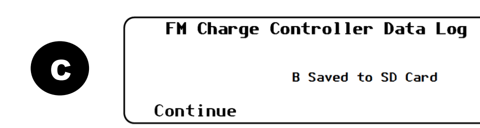












NOTE: This header line is included in the download.

FLEXmax Data Log									
Date	**AH**	**kWh**	**Max Amps**	**Max Watts**	**Absorb Time**	**Float Time**	**Min Battery V**	**Max Battery V**	**Max Voc**
6/13/15	0	0	38	52	0:00	0:00	24.1	29.1	122
6/12/15	38	0.9	36	48	0:00	0:00	24.1	29.0	122
6/11/15	32	0.8	1 hour	1 hour	0:00	0:00	24.1	28.7	120

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```
Main Menu
Settings                    >>
Profile Wizard              >>
Device Data Logs            >>
Event Logs                  >>
Firmware Update             >>
```

D-2. Saving Data Logs for the FLEXnet DC

To create a data log for the FLEXnet DC:

1. From the ***DEVICE DATA LOGS*** menu, select ***FLEXnet Battery Monitor***.
2. From the ***FN Battery Monitor Data Log*** menu, select ***Upload and Save Data Log***.
3. If other data logs have been saved on the SD card, a list will be displayed. To save over a current log, choose option **A**. To save the log as new, choose **B**.
   - **A**. Select a name on the list with the control wheel. Press **<Save>** to save the new data over the selected log. ***Saving to SD Card*** will be displayed. Proceed to **C**.

     NOTE: If the SD card is empty, pressing the **<Save>** soft key will automatically default to option **B**.

   OR
   - **B**. Press **<New>** to create a unique name for the new data log. (8 characters maximum)
     - Use the control wheel to scroll through the available characters.
     - Use <**➔**> or <**🡐**> to move to the desired character location.
     - Use **<Delete>** to erase characters when highlighted.

     Press **<Save>** to save the new data log name. ***Saving to SD Card*** will be displayed.

   In either case:
   - **C**. Wait for the confirmation screen to appear. After the screen appears, press **<Continue>** to return to ***Upload and Save Data Log***.

```
DEVICE DATA LOGS
FLEXmax Charge Controller          >>
FLEXnet Battery Monitor            >>
```

```
FN Battery Monitor Data Log
Upload and Save Data Log           >>
Erase Data Log                     >>
```

A
```
FN Battery Monitor Data Log
FNDC          1/07/15  17:30     Port 7
15022809      2/27/15  10:00
15022810      2/27/15  11:00
15022811      2/27/15  12:00
        New                      Save
```

```
FN Battery Monitor Data Log
FNDC Saving to SD Card
```

B
```
FN Battery Monitor Data Log
                                 Port 7
New Data Log File C
Delete    🡐          ➔          Save
```

```
FN Battery Monitor Data Log
C Saving to SD Card
```

C
```
FN Battery Monitor Data Log
C Saved to SD Card
Continue
```

FLEXmax Data Log							
Date	**In AH**	**In kWh**	**Out AH**	**Out kWh**	**Net AH**	**Net kWh**	**Min SOC**
6/13/15	0	0	1	0.01	-1	-0.01	99
6/12/15	81	2.17	9	0.11	72	2.06	98
6/11/15	63	1.67	9	0.12	54	1.55	98

NOTE: This header line is included in the download.

D-3. Erasing Data Logs

To erase a data log for either the FLEXmax controller or the FLEXnet DC:

1. From the ***DEVICE DATA LOGS*** menu, select the appropriate device. ***FLEXnet DC*** is depicted here.
2. From the ***Data Log*** menu for that device, select ***Erase Data Log***.
3. A query screen will appear. Press **<Yes>** to erase the data log. Pressing **<No>** returns to the ***Data Log*** menu for that device.
4. Wait for the confirmation screen to appear. After the screen appears, press **<Continue>** to return to ***Upload and Save Data Log***.

```
DEVICE DATA LOGS
FLEXmax Charge Controller          >>
FLEXnet Battery Monitor            >>
```

```
FN Battery Monitor Data Log
Upload and Save Data Log           >>
Erase Data Log                     >>
```

```
FN Battery Monitor Data Log
Erase FLEXnet Battery Monitor Data Log?
No                                 Yes
```

```
FN Battery Monitor Data Log
FLEXnet Battery Monitor Data Log Erased
Continue
```


Event Logs (E)

When events occur that affect the system or cause a shutdown, an event message occurs. Events are recorded at intervals to the MATE3s flash memory at intervals programmed in the settings. (See page 31.) To investigate event messages, see page 47.

Event logs can be downloaded to an SD Card or deleted from the MATE3s internal memory.

- ***To Save an Event Log*** (**E-1**)
- ***To Read an Event Log File from the SD Card*** (**E-2**)
- ***To Delete an Event Log*** (**E-3**)

```
Main Menu
Settings                    >>
Configuration Wizard        >>
Device Data Logs            >>
Event Logs                  >>
Firmware Update             >>
```

E-1. To Save an Event Log

To create a data log for the FLEXmax Charge Controller:

1. From the ***Event Logs*** menu, select ***Save Events to SD Card***.
2. On the ***Date Range*** set point, use the control wheel to select the date for the event log (or logs) to be saved to the SD card. The range will start with ***All*** and will move backward to ***yesterday***, up to one year's worth of logs.
3. If other event logs have been saved on the SD card, a list will be displayed. Choose Option A or B. **NOTE**: If the SD card is empty, pressing the **<Save>** soft key will automatically default to Option B.
   - **A.** Select a name on the list with the control wheel. Press **<Save>** to save the new events over the selected event log. ***Saving to SD Card*** will be displayed. Proceed to C.

   OR
   - **B.** Press **<New>** to create a unique name for the new event log. (8 characters maximum)
     - Use the control wheel to scroll through the available characters.
     - Use <**➔**> or <**🡐**> to move to the desired character location.
     - Use **<Delete>** to erase characters when highlighted.

     Press **<Save>** to save the new event log name. ***Saving to SD Card*** will be displayed.
   - **C.** Wait for the confirmation screen to appear. After the screen appears, press **<Continue>** to return to ***Event Logs***.

```
Event Logs
Save Events to SD Card             >>
Delete Events                      >>
```

```
Save Events to SD Card
Date Range All
Continue
```

A
```
Save Events to SD Card
File Name A           11/13/15     12:56
Back        New                  Save
```

```
Save Events to SD Card
A Saving to SD Card
```

B
```
Save Events to SD Card
New Data Log File B
Delete     <--        -->        Save
```

```
Save Events to SD Card
B Saving to SD Card
```

C
```
Save Events to SD Card
B Saved to SD Card
Continue
```

E-2. To Read an Event Log File from the SD Card

When an Event Log is downloaded to an SD card, an **.elg** file is created. This file can be opened in Notepad or MS Word as a text file. Event logs can be used to identify repeated symptoms and other patterns.

A partial Event Log is depicted here.

```
6/16/15,12:16:09,FX-1,IN AC Voltage OK,119 VAC
6/16/15, 6:25:13,Remote Power Up
6/16/15, 6:25:13,Remote Power Down
6/09/15,15:40:08,Remote Power Up
6/09/15,15:36:55,Remote Power Down
6/08/15,15:31:14,Remote Power Up
6/08/15,10:51:44,Remote Power Down
6/07/15,14:32:09,Remote Power Up
6/07/15,14:31:59,Remote Power Down
6/07/15,14:30:21,Remote Power Up
5/31/15,15:35:01,Remote Power Down
5/31/15,15:34:51,FX-1,IN AC Freq OK, 59.0 Hz
5/31/15,15:34:51,FX-1,IN AC Voltage Too Low, 118 VAC
5/31/15,15:33:25,FX-1,IN AC Freq Too Low, 51.0 Hz
5/31/15,15:33:25,FX-1,IN AC Voltage Too Low, 95 VAC
```

```
Main Menu
Settings                    >>
Configuration Wizard        >>
Device Data Logs            >>
Event Logs                  >>
Firmware Update             >>
```

E-3. To Delete an Event Log

To erase a MATE3s event log :

1. From the ***Event Logs*** menu, select ***Delete Events***.
2. On the ***Date Range*** set point, use the control wheel to select the date for the event log (or logs) to be deleted. The range will start with ***All*** and will move backward to ***yesterday***, up to one year's worth of logs.
3. If a log with a specific date is desired, then use the control wheel to scroll through the list. When the name to be deleted is selected, press <**Continue**>.
4. A query screen will appear. Press <**Yes**> to erase the data log. Pressing <**No**> returns to the ***Date Range*** screen.
5. Wait for the confirmation screen to appear. After the screen appears, press <**Continue**> to return to ***Event Logs***.

```
Event Logs
Save Events to SD Card      >>
Delete Events               >>
```

```
Delete Events
Date Range All

Continue
```

```
Delete Events
Delete All Events?

Back      Yes      No
```

```
Delete Events
Deleting Events, Please Wait
```

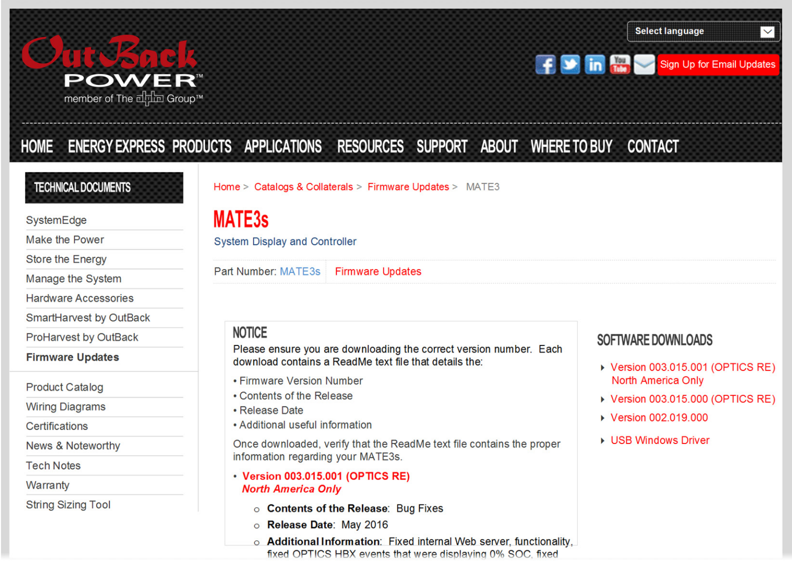
```
Delete Events
Events Deleted

Continue
```

Firmware Update

The MATE3s can be updated to the latest revision by installing the latest firmware. Firmware can be ordered on a preloaded SD card, or downloaded from www.outbackpower.com. For the exact update procedure, refer to the *MATE3s Overview Guide*.

CAUTION: EQUIPMENT DAMAGE

Make certain to follow all steps listed in the *Overview Guide*. Failing to follow any steps could result in permanent failure of the MATE3s.



Troubleshooting

Common Problems

Symptom	Possible Cause	Possible Remedy
MATE3s does not power up.	The MATE3s is powered by the OutBack product to which it is connected. The OutBack products may not be powered up or connected.	Check all OutBack devices for correct operation. Check or replace the CAT5 cable running from the MATE3s to the OutBack product.
	The left-hand RJ45 port on the back of the MATE3s is used for computer communications. It cannot power a MATE3s.	Make sure the CAT5 cable is plugged into the correct RJ45 port. This is the right-hand port when looking at the rear of the MATE3s.
HUB product loses power when cable is plugged into MATE3s.	The left-hand RJ45 port on the back of the MATE3s is wired differently from the HUB port. It may short out a HUB product.	Make sure the CAT5 cable is plugged into the correct RJ45 port. This is the right-hand port when looking at the rear of the MATE3s.
MATE3s does not display a particular device, meter, or setting.	The CAT5 cable may have an open or broken conductor.	Check or replace the CAT5 cable running from the MATE3s to the OutBack product. Check all OutBack devices for correct operation. Make sure no OutBack devices have been moved, unplugged, or added.
	The OutBack products may not be powered up or connected.	
MATE3s voltmeter for a particular device or screen is inaccurate.	Meter could be incorrectly calibrated.	Confirm correct voltage with an accurate voltmeter. (Make all tests on the terminals of the OutBack product.) If necessary, adjust the MATE3s meter using the ***Calibration*** menus. See pages 16 and 21.

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Troubleshooting

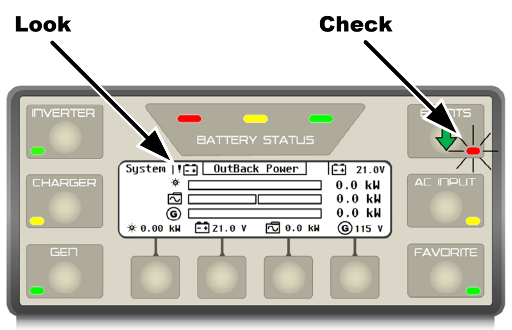
Event Messages

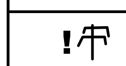
The EVENTS indicator shows that an event has occurred which requires attention. If this LED illuminates, follow these steps to help determine the nature of the fault. This may also help resolve the problem.

See the *MATE3s Overview Guide* for more information on the EVENTS indicator.

To investigate event messages:

1. Look at the system indicator on the Home screen. The icon will change to indicate the device that needs attention.



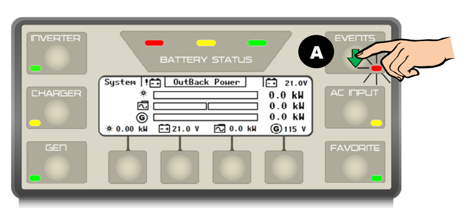
Symbol	Message
OK	System operational
	Check Battery (if FN-DC is present)
	Battery Critical (if FN-DC is present)
	Check Generator (Off Grid system type only)
	Check Inverter
	Check Utility Grid (Grid Tied system type only)

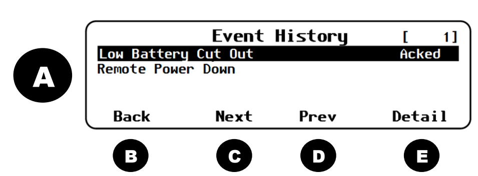
These system indicators are often specific to certain products or configurations. See the *MATE3s Overview Guide* for more information on home screen symbols.

2. Check the LED indicator.
   - A flashing EVENTS indicator means a warning has occurred.
   - A solid EVENTS indicator may mean that the system has shut down due to an error. If Advanced Generator Start (AGS) is in use, it may also mean the system has suffered an AGS fault.

   See the *MATE3s Overview Guide* and the inverter literature for more information on warnings and errors. See page 30 for more information on testing AGS.

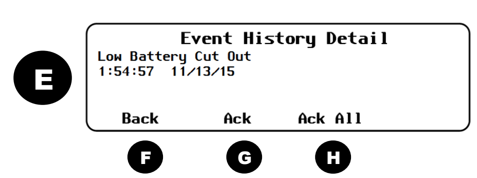
3. Press the EVENTS hot key **A** to display the ***Event History*** screen. The ***Event History*** screen will appear with a list of events that have occurred.
   - The **<Next>** soft key **C** selects the next event in the list.
   - The **<Prev>** soft key **D** selects the previous event in the list.
   - The control wheel will also scroll up and down the list.
   - The **<Back>** soft key **B** returns to the Home screen.





4. Press the **<Detail>** soft key **E** when the desired event is highlighted in the list. This opens the ***Event History Detail*** screen.
   - Using the control wheel will display the details for the previous, or next events.
   - The **<ACK>** soft key **G** will acknowledge one open event.
   - The **<ACK ALL>** soft key **H** will acknowledge all open events.

     Once acknowledged, the EVENTS indicator will turn off. An acknowledgement (***ACKED***) will replace the word ***Fault*** in the ***Event History*** screen.
   - The **<Back>** soft key **F** returns to the ***Event History*** screen.
   - Press **<Back>** again (**B**) to return to the Home screen.



5. If the event involves another device within the system, then refer to that device's manual for troubleshooting advice.

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MATE3s Specifications

Mechanical	
Dimensions (H x W x D)	7 ½ x 7 1/16" x 1 5/8" (19 x 17.9 x 4.2 cm)
Shipping Dimensions (H x W x D)	3 ¼ x 9 x 13 ½" (33.7 x 22.9 x 34.3 cm)
Weight	1.4 lb (0.64 kg)
Shipping Weight	3.0 lb (1.36 kg)
Ports	RJ45 for proprietary OutBack HUB communication (x1), RJ45 Ethernet port (x1)
Nonvolatile Memory	64 Mb (for internal data logs and MATE3s configuration settings)
Interface Display	Liquid Crystal Display (LCD)
Control Keypad	4 soft keys, 6 hot keys 4 navigation keys, 1 control wheel with Enter button
Status Indicators	9 LED indicators
Battery (for real-time clock and internal memory)	CR2032
Communication Protocol	Proprietary OutBack network
Interconnection Cabling Standard	Category 5 OutBack proprietary
PC Interface	Category 5
Environmental Rating	Indoor only
Warranty	5-year standard
Regulatory	
Emissions	Indoor only
Listings	UL 1741 1st Edition; 2005 Version, CSA 107.1-01
Compliance	CE Conformance European EN 55022 Class B

Firmware Revision

This manual applies to MATE3s System Display and Controllers with a firmware version of 001.001.xxx or higher.

FCC Information to the User

This equipment has been tested and found to comply with the limits for a Class B digital device when powered by a DC source, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Consult the dealer or an experienced radio/TV technician for help.