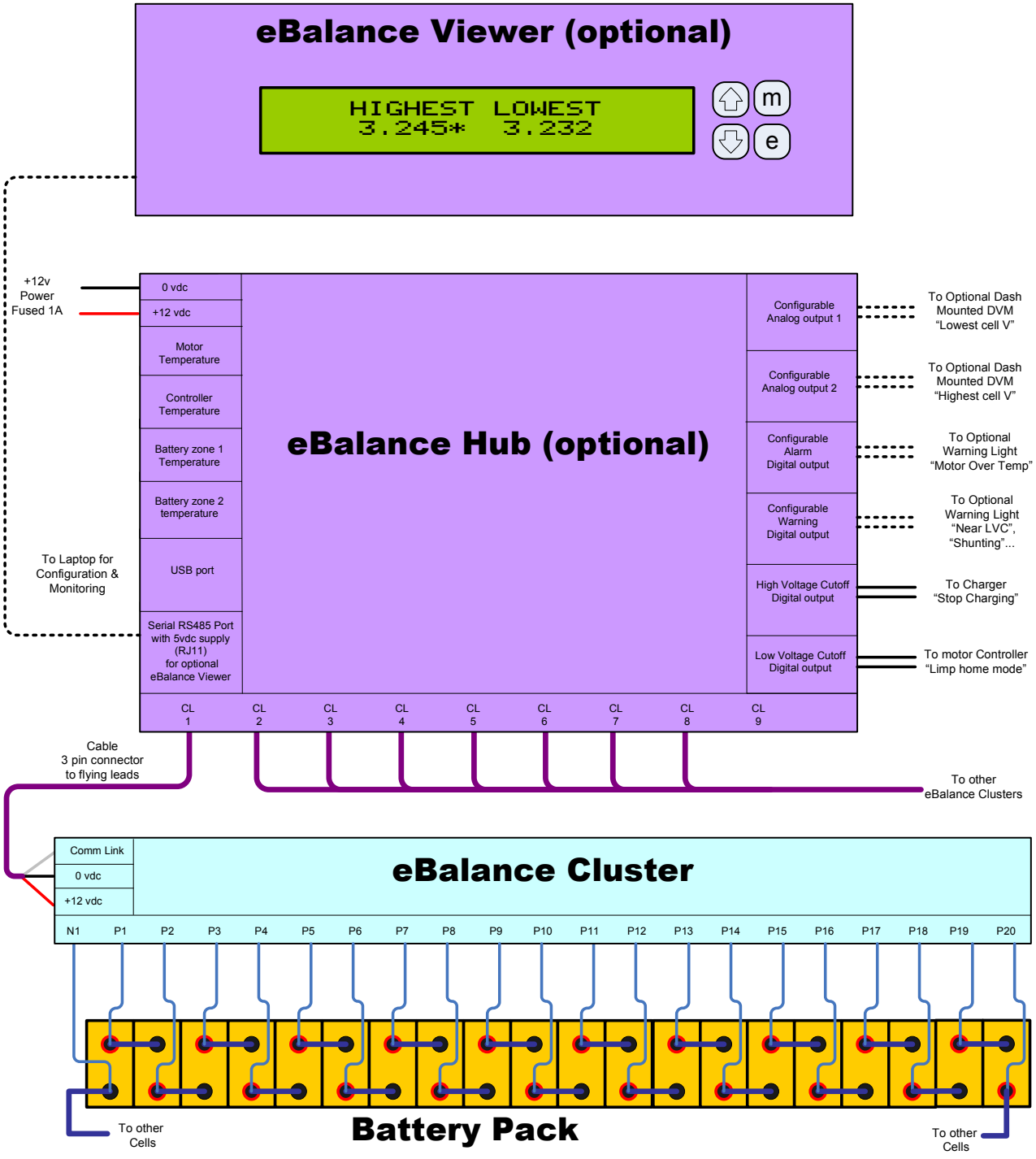
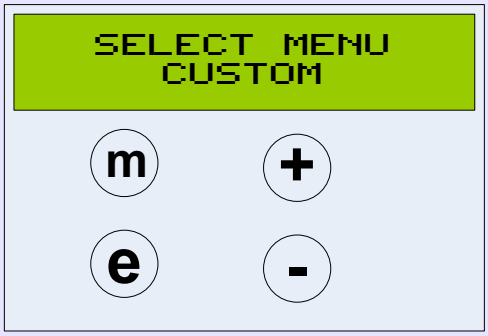
What does the eBalance system do?

Lithium battery cells are easily damaged if they are over charged or over discharged. eBalance is a programmable battery management system which allows users to monitor, protect, and balance each cell within a battery pack. The eBalance system makes use of distributed I/O to reduce wiring and improve reliability. The optional Viewer allows users to view statistical battery information and configure alarm limits. Another option for displaying data is to connect eBalance analog outputs to dash moutned Digital Volt meters.



MAIN MENU



There are four buttons on the LCD

(m) selects menu items

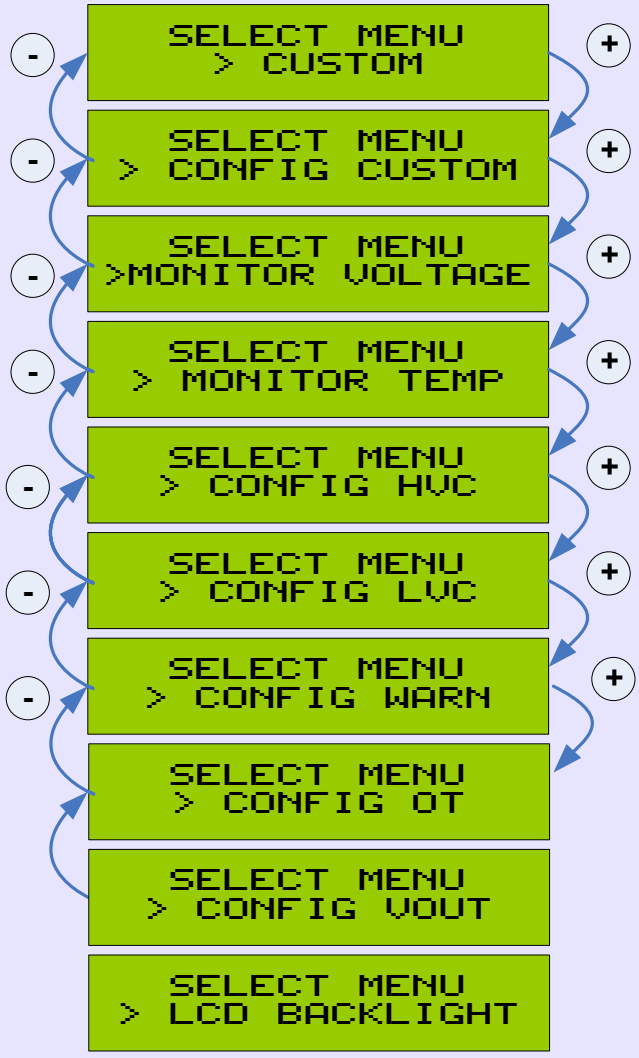
(e) acts like an “escape” or “back” button returning to menu selection mode.

(+) scrolls though menu items and can change set point values.

(-) scrolls though menu items in reverse and can change set point values.

e Press (e) multiple times until “Select Menu” is displayed

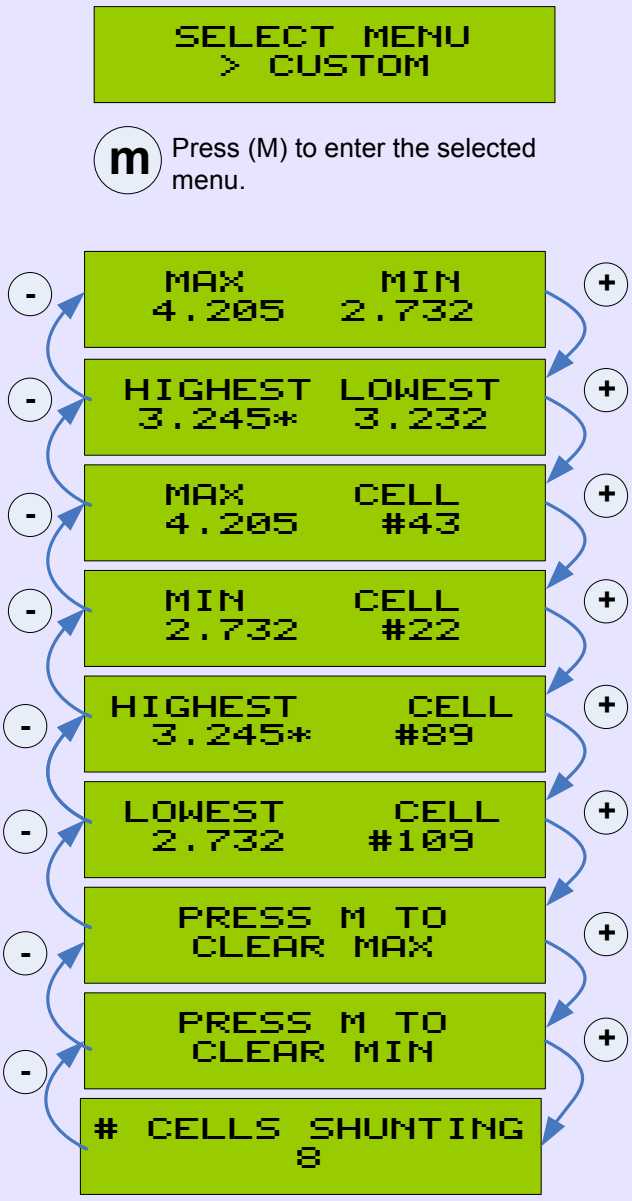
\+ Press (+) or (-)
To select a sub menu
“Custom menu” is the first choice



To return to the main menu, press (e) until “SELECT MENU” is displayed on the LCD.

MENU > CUSTOM

The custom menu displays only the information which is important to you.
The tags displayed in the >CUSTOM menu are selected in the >CONFIGURE CUSTOM menu.



MAX and MIN are stored values.

MIN indicates the lowest voltage a cell has ever reached, this would typically be the sag voltage under full load.

MAX indicates the highest voltage a cell has ever reached, this would typically be during charging, or regen braking.

The MAX and MIN values can be reset if the tag is added to the custom menu.

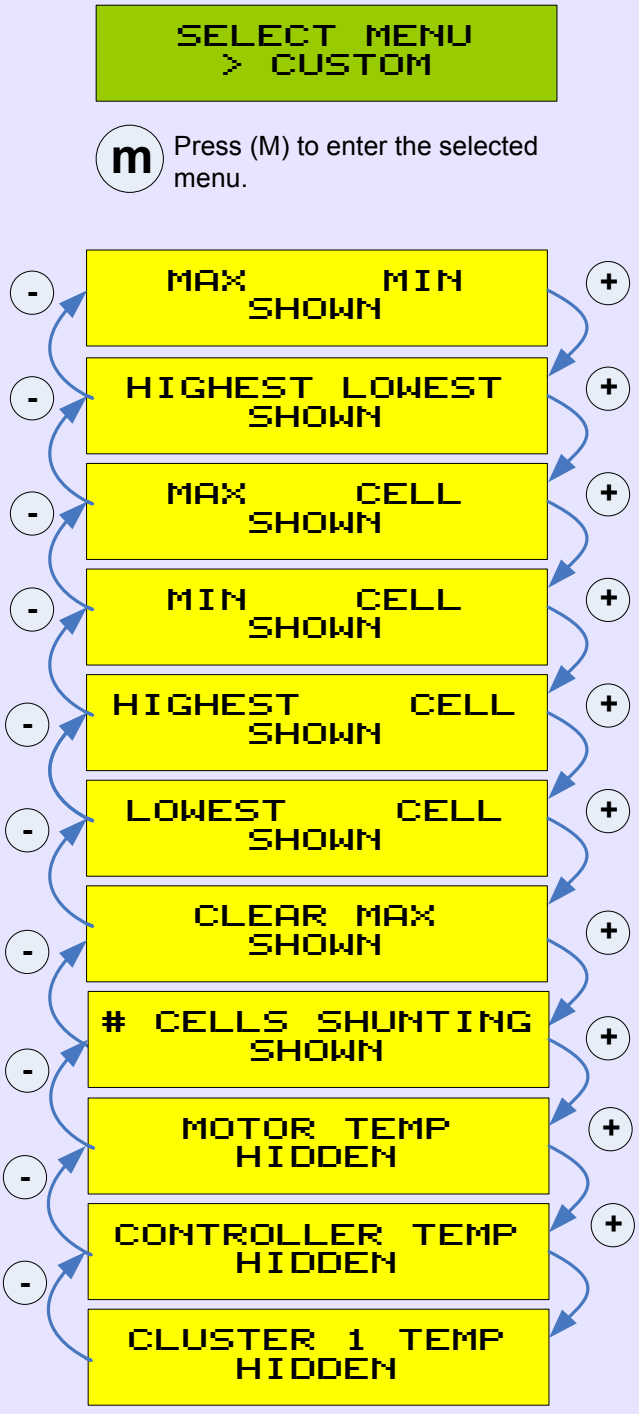
HIGHEST and LOWEST are live values. These values are helpful in determining the state of charge of the pack.

An Asterisk indicates the cell is currently being shunted.

MENU > CONFIGURE CUSTOM

The >CONFIGURE CUSTOM menu allows you to define what is displayed in the >CUSTOM menu.

In addition to the menu items listed below, the user can select any of 160 cell voltages and 6 temperature zones. A limited menu is shown for simplicity



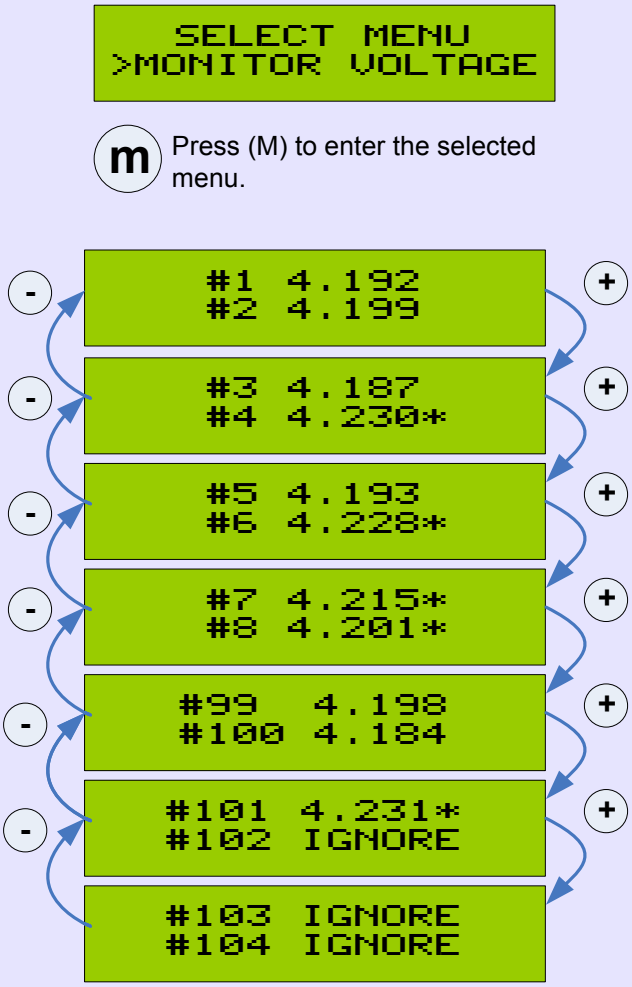
The back lighting color changes to yellow for menu items which are settable.

Pressing the (m) button followed by (+) or (-) will increase or decrease the set point. (e) will escape back to the menu selection

MENU > MONITOR VOLTAGE

The >MONITOR VOLTAGE menu displays the voltage of each cell.

A limited menu is shown below for simplicity



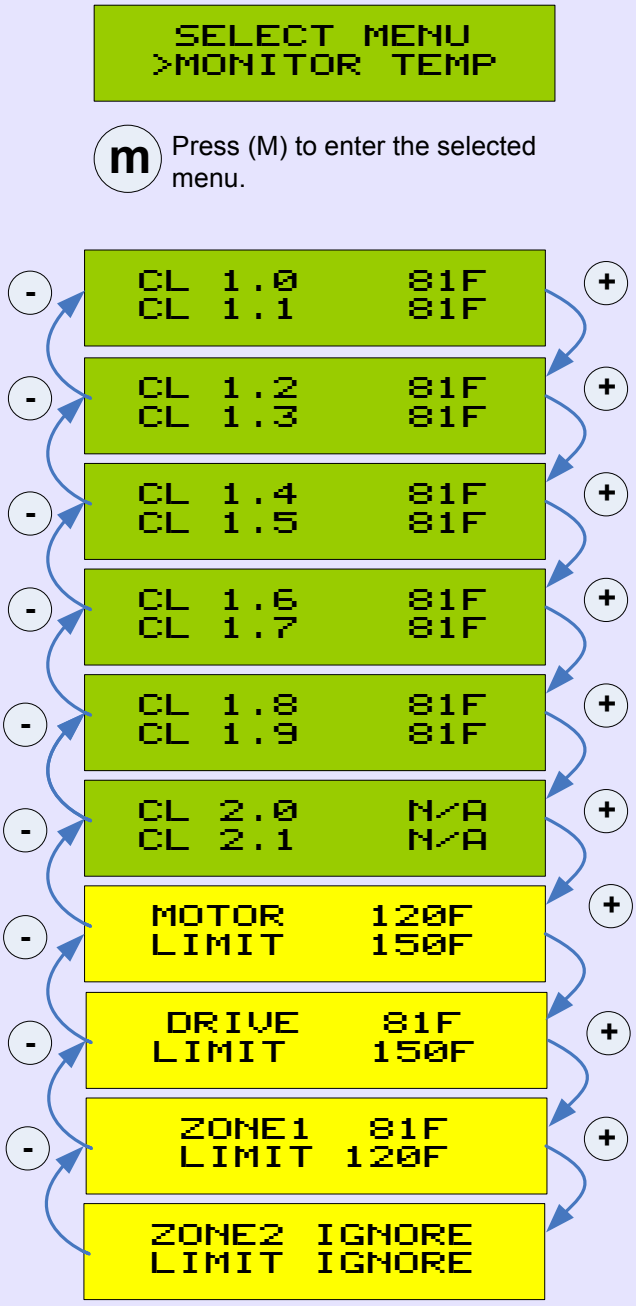
An Asterisk indicates the cell is currently being shunted.

If a cell input is not being used, it should be set to ignore to prevent false alarms. This is done by connecting a computer and USB connection to the Hub.

MENU > MONITOR TEMPERATURE

The >MONITOR TEMPERATURE menu displays the six external temperature zones and the 9 temperature zones within each cluster.

A limited menu is shown for simplicity



If a temperature input is not being used, it should be set to ignore to prevent false alarms. This is done by connecting a computer and USB connection to the Hub.

If a cluster is not connected, the temperature display will read N/A

Motor temperature, Drive (motor controller) temperature, and 4 battery temperature zones can be displayed. A temperature probe must be connected to the hub.

An alarm limit for each of the six external temperature zones can be set using the (m) key followed by (+) or (-).

An alarm limit for cluster temperatures can be configured using a computer and USB connection to the Hub.

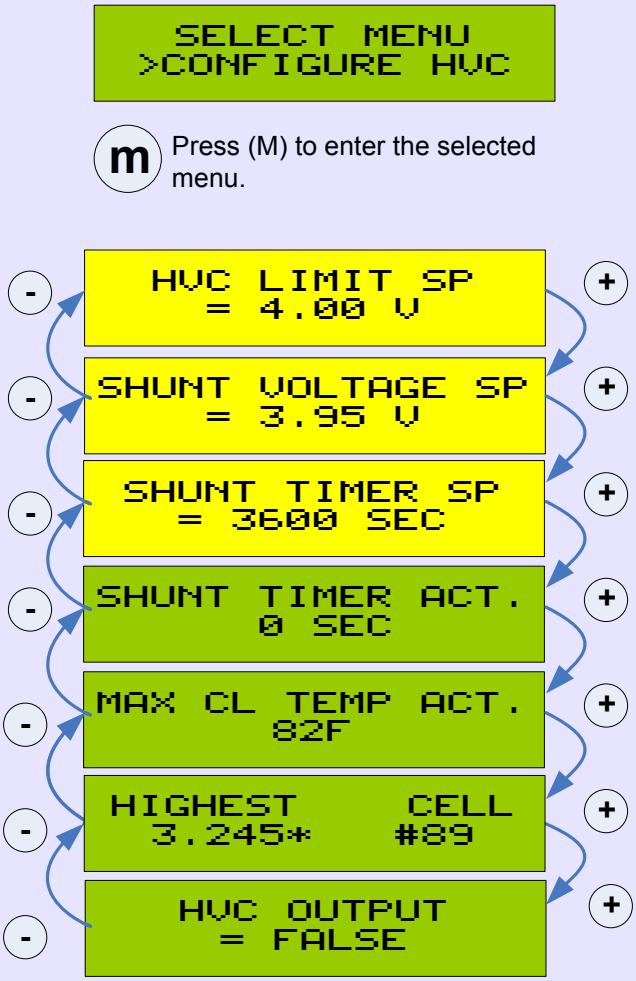
The back lighting color changes to yellow for menu items which are settable.

Pressing the (m) button followed by (+) or (-) will increase or decrease the set point. (e) will escape back to the menu selection

MENU > CONFIGURE HVC

The >CONFIGURE HVC (high voltage cutoff) menu allows the user to configure when the HVC digital output will energize.

HVC is a relay output preprogrammed to command your charger to stop charging.



Pressing the (m) button followed by (+) or (-) will enable the user to change the value of a set point. Pressing (e) will return to the menu.

HVC signal is de-energized when any of the following conditions are true:

1) Highest Cell Voltage exceeds HVC Limit set point.

2) Shunt Timer Actual exceeds Shunt Timer Set Point. Shunting duration can be set from 0 – 3600 seconds.

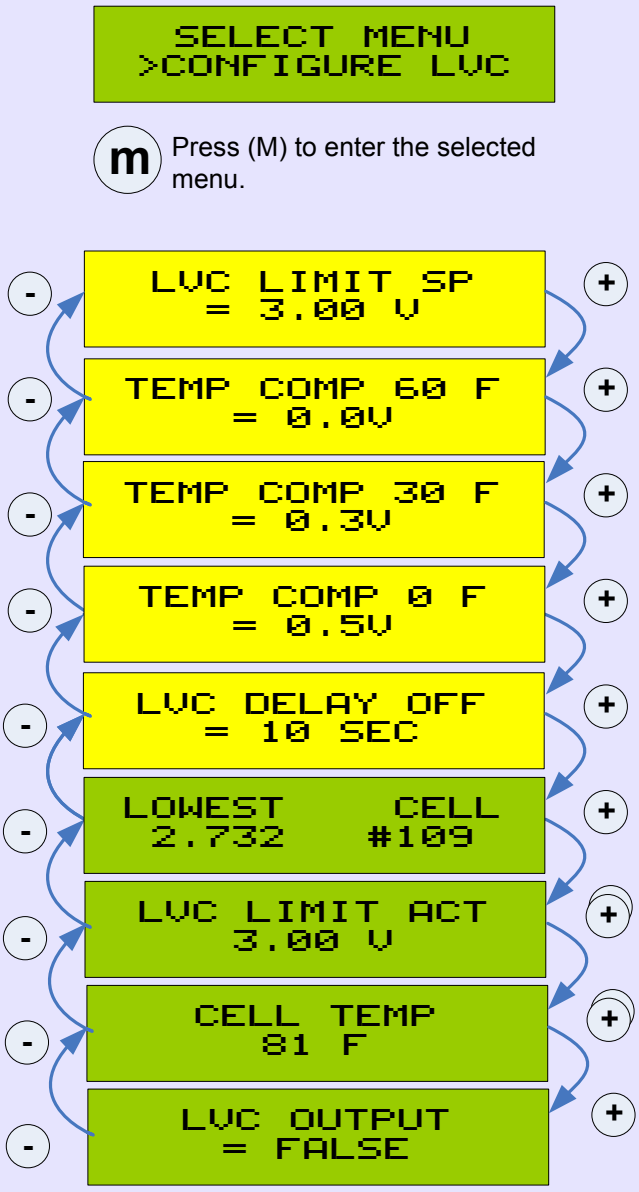
3) Max Cluster Temperature Actual exceeds 140 degrees F.

The back lighting color changes to yellow for menu items which are settable

MENU > CONFIGURE LVC

The >CONFIGURE LVC (low voltage cutoff) menu allows the user to configure when the LVC digital output will energize.

LVC is a relay output preprogrammed to command your motor controller to reduce current. The LVC signal may also be connected to a “Low battery” warning light.



The back lighting color changes to yellow for menu items which are settable.

Pressing the (m) button followed by (+) or (-) will increase or decrease the set point. (e) will escape back to the menu selection

Pressing the (m) button followed by (+) or (-) will enable the user to change the value of a set point. Pressing (e) will return to the menu.

HVC signal is energized when any of the following conditions are true:

1) Lowest Cell Voltage drops below LVC Limit Set Point.

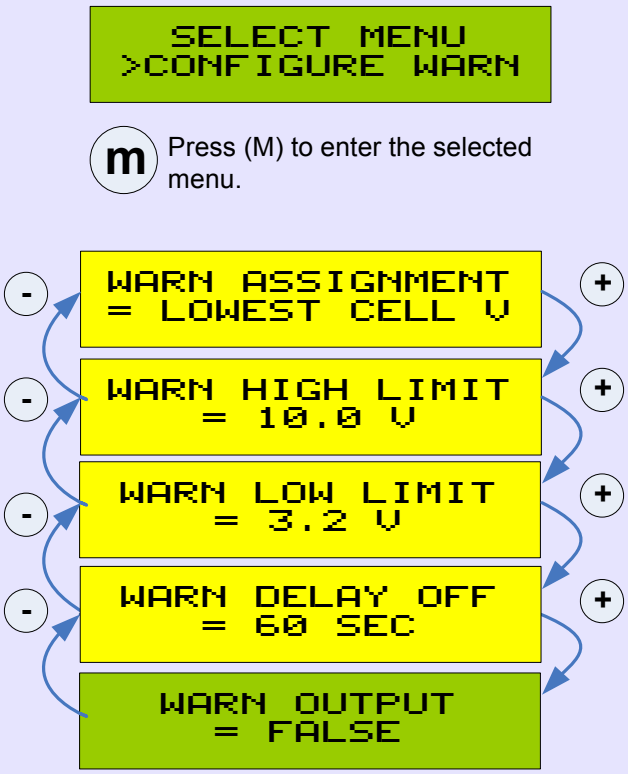
Temperature Compensation allows the user to automatically reduce the LVC Limit Set Point in cold weather.

For the settings shown,
LVC @ 60 degrees F will be 3.00v
LVC @ 45 degrees F will be 2.85v
LVC @ 30 degrees F will be 2.70v
LVC @ 15 degrees F will be 2.60v
LVC @ 0 degrees F will be 2.50v

MENU > CONFIGURE WARN

The >CONFIGURE WARN (warning) menu allows the user to configure when the Warn digital output will energize.

WARN is a relay output which can be configured by the user.
This output may be used to illuminate a "Low battery" indicator light.
It may also be wired to command a charger to reduce charging current.



Pressing the (m) button followed by (+) or (-) will enable the user to change the value of a set point. Pressing (e) will return to the menu.

HVC signal is energized when any of the following conditions are true:

1) Lowest Cell Voltage drops below LVC Limit Set Point.

Temperature Compensation allows the user to automatically reduce the LVC Limit Set Point in cold weather.

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LVC @ 0 degrees F will be 2.50v

The back lighting color changes to yellow for menu items which are settable.

Pressing the (m) button followed by (+) or (-) will increase or decrease the set point. (e) will escape back to the menu selection

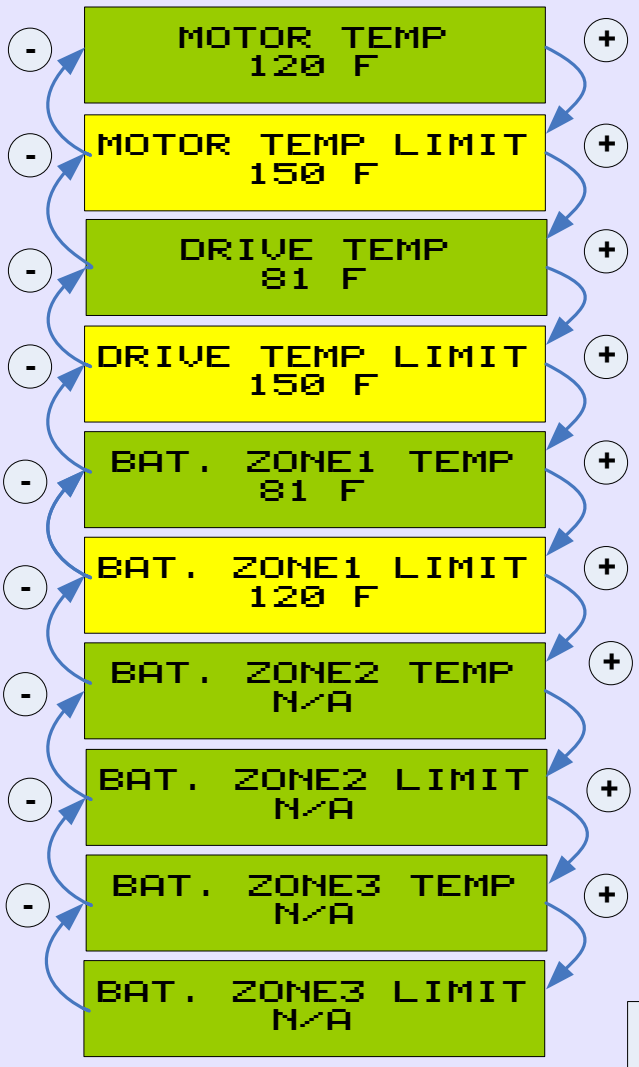
MENU > CONFIGURE TEMPERATURE

The >CONFIGURE TEMPERATURE menu displays the six external temperature zones and allows the user to set alarm limits.

If any of the six alarm limits are exceeded the “OT” over temperature Digital Output will energize

SELECT MENU
>CONFIGURE TEMP

(m) Press (M) to enter the selected menu.



If an assigned temperature probe is not connected, N/A will be displayed.

Motor temperature, Drive (motor controller) temperature, and 4 battery temperature zones can be displayed. A temperature probe must be connected to the hub.

An alarm limit set point for each of the six external temperature zones can be set using the (m) key followed by (+) or (-).

The alarm limit for cluster temperatures is set using a computer and USB connection.

The back lighting color changes to yellow for menu items which are settable

MENU > CONFIGURE VOUT

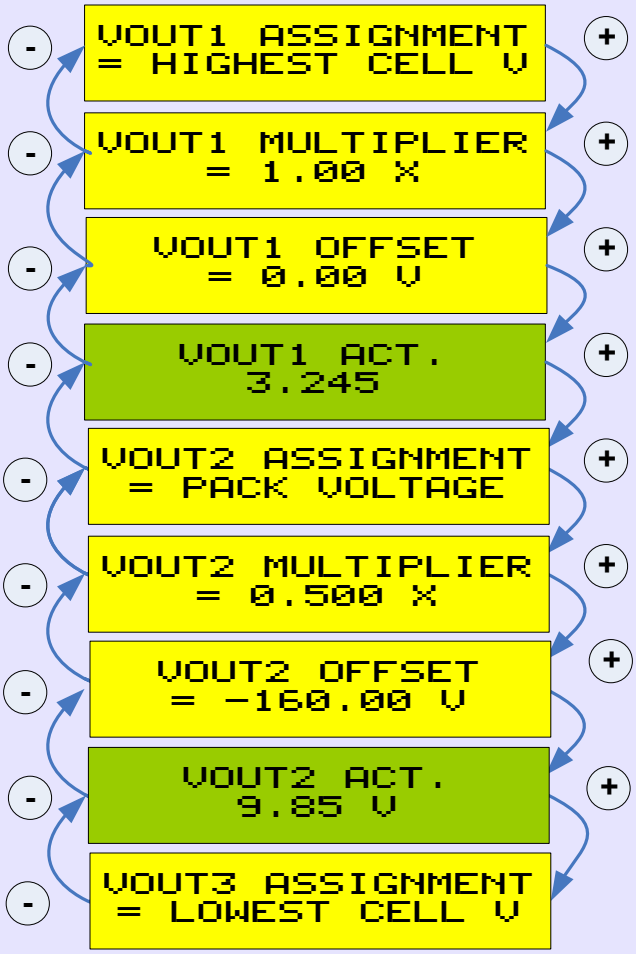
The >CONFIGURE VOUT menu displays allows the user to assign and scale analog outputs..

Analog outputs may be connected to a 0-10V Digital Volt Meter to display “highest cell voltage” and “lowest cell voltage”. It may also be used to control the charging current of a charger.

A limited menu is shown below for simplicity

SELECT MENU
>CONFIGURE VOUT1

(m) Press (M) to enter the selected menu.



Each analog output can be assigned one of the following signals:

1) Highest Cell Voltage
2) Lowest Cell Voltage
3) Max Cell Voltage
4) Min Cell Voltage
5) Number of cells shunting
   (up to max of 10 volts)
6) Total Pack Voltage
   (output scaled to max of 10 volts.
   example: 3.45v = 345v)

Each analog output can be scaled according to the following formula.

Signal x (multiplier) + Offset = VOut

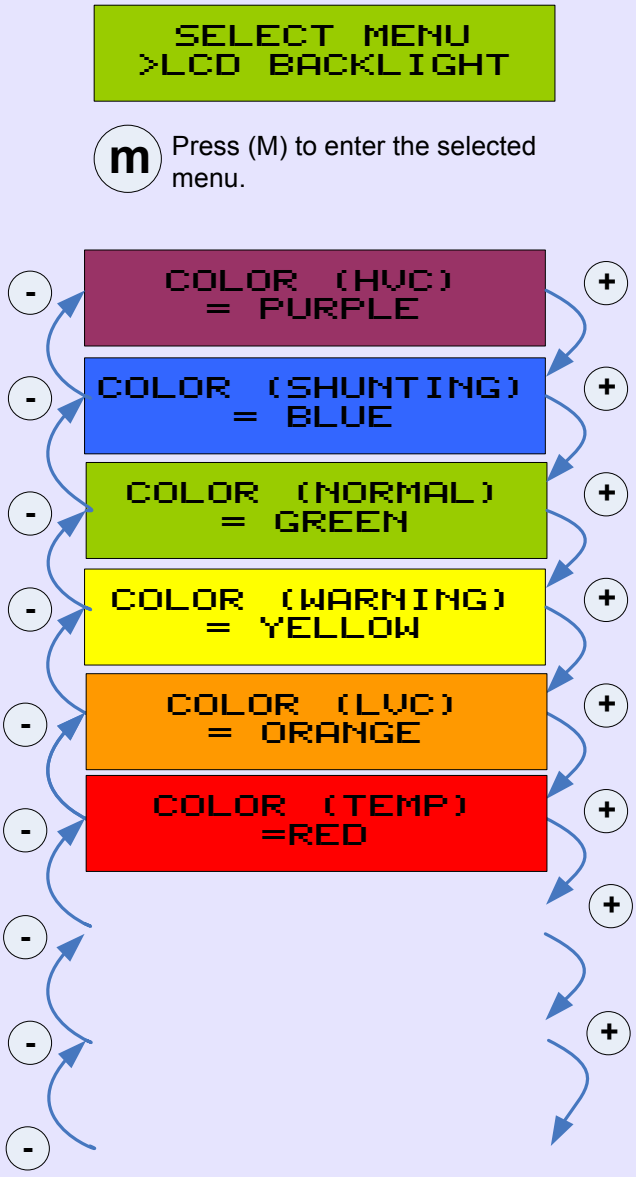
This formula can transform
300-320v into 0-10v
As shown in the example of VOut2

The back lighting color changes to yellow for menu items which are settable

MENU > LCD BACKLIGHT

The >LCD BACKLIGHT menu displays allows the user to set the backlight color.

The color of the back light can be changed if an alarm condition exists.



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The back lighting color changes to yellow for menu items which are settable