

**BEP**

# **600-ACSM**

## **AC SYSTEMS MONITOR**

**Installation and Operating Instructions**

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# 1. Basics

## WARNING AND CAUTION

### WARNING

WARNING refers to possible injury to the user or significant damage to the meter if the user does not follow the procedures.

### CAUTION

CAUTION refers to restrictions and rules with regard to preventing damage.

### WARNING

Verify that all AC sources are disconnected before connecting or disconnecting the current transformer. Failure to do so will generate lethal voltages on the current transformer.

If you are not knowledgeable about electrical systems, have an electrical professional install this unit. The diagrams in these instructions pertain to the installation of the 600-ACSM and not to the overall wiring of the vessel.

If an inverter is installed on the vessel, its power leads must be disconnected at the battery before the unit is installed. Many inverters have a 'sleep mode' in which their voltage potential may not be detectable with measuring equipment.

If an inverter is installed on the vessel, it must be stopped and rendered inoperable before the unit is installed.

Verify that no other DC or AC is connected to the vessels wiring before installing the unit.

If the meter must be removed, connect the current transformer leads together before restoring power to the AC system.

### CAUTION

The back of the unit is not waterproof. Do not install where the back of the meter is exposed to water.

## Features

The 600-ACSM Monitor offers the following features:

- 2.8" TFT LCD 16 Bit colour screen.
- 4 button user interface with white backlighting.
- Voltage monitoring for up to three AC voltage inputs, 0-300V AC RMS
- Frequency of each AC voltage input.
- Current monitoring for up to three AC current inputs, 0-120A AC RMS
- selectable legends eg: Ships Power, Shore Power etc.
- Hi/Low Voltage, Current and Power alarms with adjustable set points and snooze timers.
- Load shedding relay output with adjustable set point times.
- Adjustable backlighting, backlighting on with key press, input for external dimming control.
- Remote alarm output.
- Load shedding relay input.
- Splash proof design.

The 600-ACSM is designed to be surface mounted or recessed into a 2.5mm panel

## Specifications

### General

Power Source	8-32V DC
Max. Current Consumption	140mA
Min. Current Consumption	90mA (Powerdown)

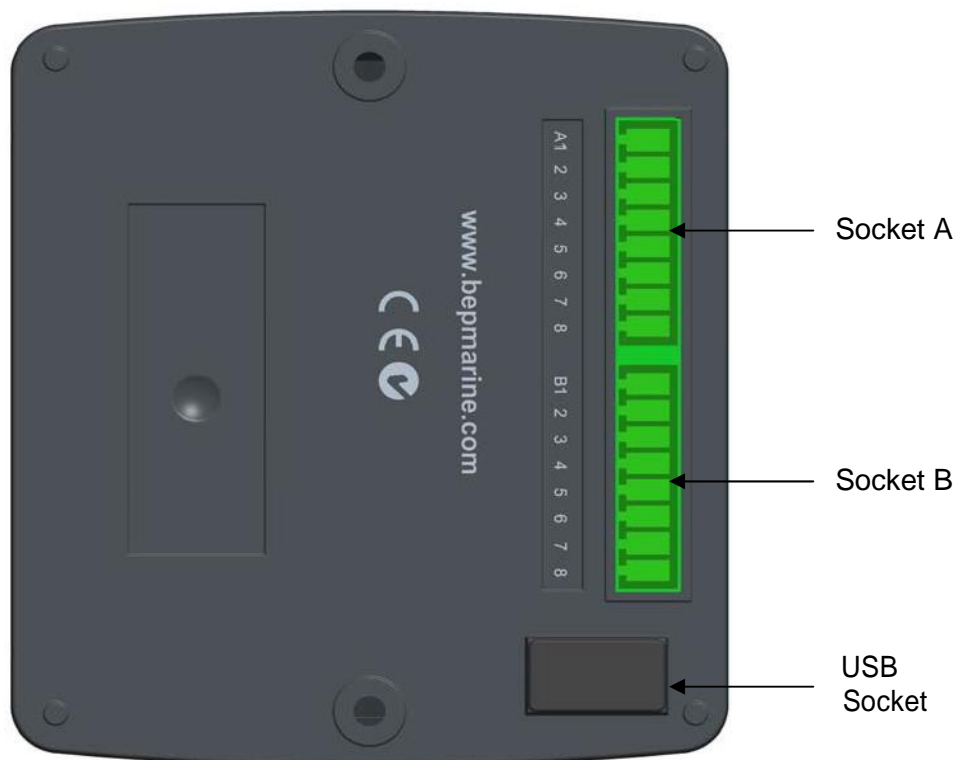
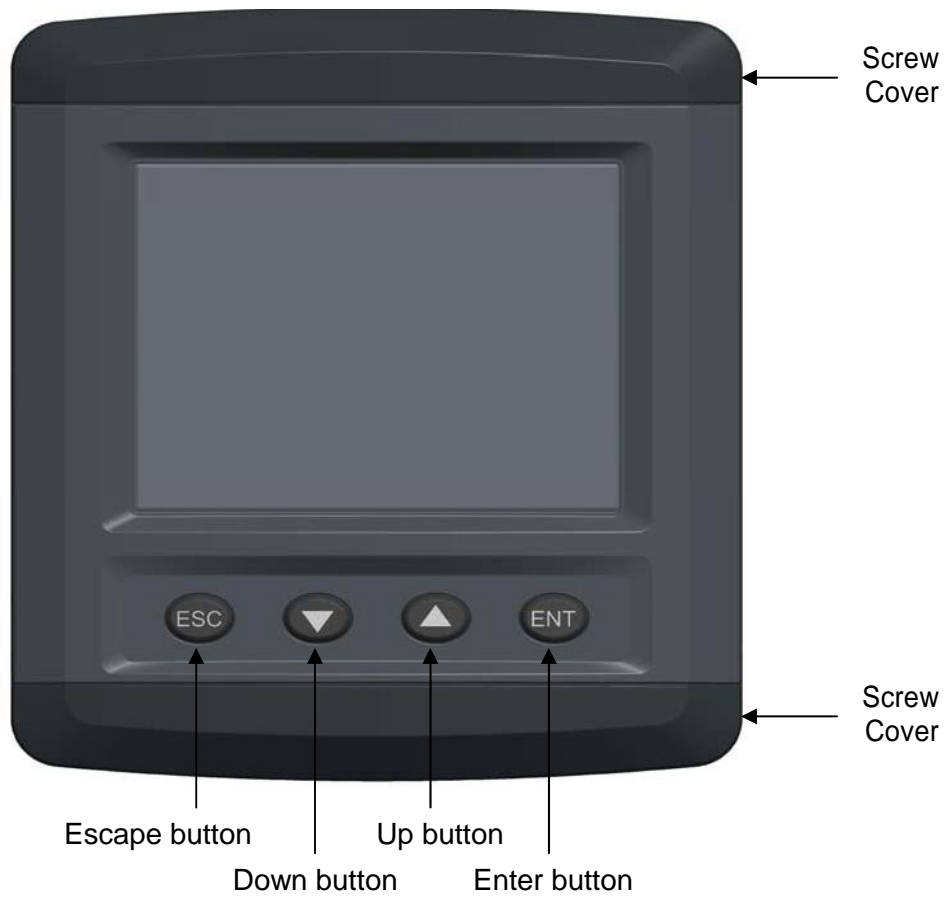
### Input Specifications

AC Voltage	0-300V AC
AC Current	0-120A AC
Backlighting Control Input	0-32V DC
Loadshed Relay Output	1A <sub>MAX</sub> @ 12 V DC Sink to ground
Remote Alarm Output	1A <sub>MAX</sub> @ 12 V DC Sink to ground

### USB

Specification	USB 2.0 full speed
File System	FAT, FAT32

## Hardware Layout



## Button Function

### Escape Button

Exits from the page or menu you are currently on and brings up the previous page or menu.

### Down Button

Moves down in page number or down the list on a menu. When inputting text button moves cursor to the left.

### Up Button

Moves up in page number or up the list on a menu. When inputting text button moves cursor to the right.

### Enter Button

Brings up 'Main menu' from any of the status pages. Enters the desired selection from a menu. Enters selected character on a calibration page.

## Status Page

A Status Page is the first screen that the meter will show after booting. To navigate through the enabled status pages press the '**Up**' or '**Down**' button.



### Label

All inputs have a label assigned to it for identification. It can be chosen from a preset list of labels or custom set using the onscreen keyboard.

### Page Numbers

Every time you enable an input to a status page it will be given a page number.

## Alarm Icon

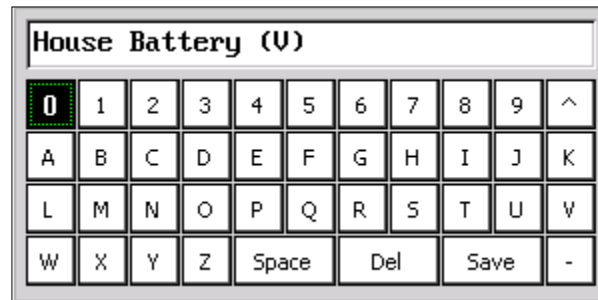
The alarm icon is a visual warning to show the status of all alarms. Green means no alarm, red means alarming.

For more information on alarms & alarm icons refer to the Alarms Configuration section.

## Onscreen Keyboard

Use the onscreen keyboard to enter text such as custom labels, numerical values for Voltage, Amps and Timer values. The two types of keyboards are listed below:

### Text/Numeric Keyboard (Custom Labels)



### Step 1

Press the meters **Up** or **Down** button to move the selection box to the character of choice then press the **Enter** button to accept. Any existing labels will be overwritten by first character input.

*Tip. To quickly move selection box through the keyboard press and hold the **Up** or **Down** buttons.*

### Step 2

Repeat Step 1 until the required label is finished. If there are any mistakes select 'Del' to delete the previous character. Note the text will change from Upper to Lower case after the first character is input.

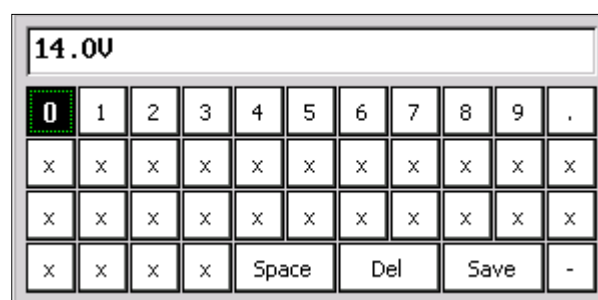


Press this button to toggle between Upper and Lower case text.

### Step 3

Select the **Save** button to accept the desired Label and exit the keyboard screen. If you are not happy with the label, press **Esc** to cancel and revert to the previous label. Note the label will not be saved until you accept the Save Settings prompt when you exit to the Main Screen.

### Numeric Keyboard (High/Low Levels/Timers)



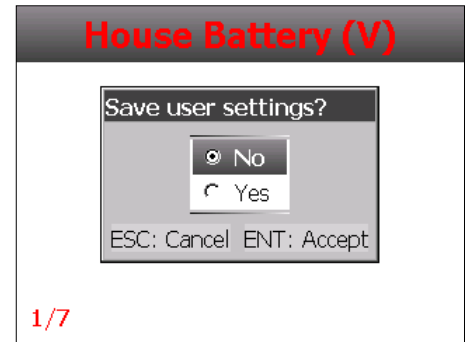


When prompted to change a numerical value for High/Low Limits, Current/Voltage settings, you will see a Numerical keyboard. It is used exactly the same as the Text/Numeric Keyboard. Note, the unit of measure (V,A etc) does not need to be entered. It is set by default.

## Saving

When any meter settings have been changed a save settings prompt will open when exiting to the main screen. Selecting 'yes' will overwrite the user settings file with these changes, selecting 'no' will keep the changes, however the user settings file will not be overwritten and meter will revert back to last save on power up.

*Note: Refer to the Settings chapter for more information on user settings.*



## Lock/Unlock the Screen

The ACSM has a function to lock the screen, stopping any accidental changes being made to the settings or system. This is indicated by displaying "Locked" in the bottom left hand corner of the screen. All functionality is locked while in this state.

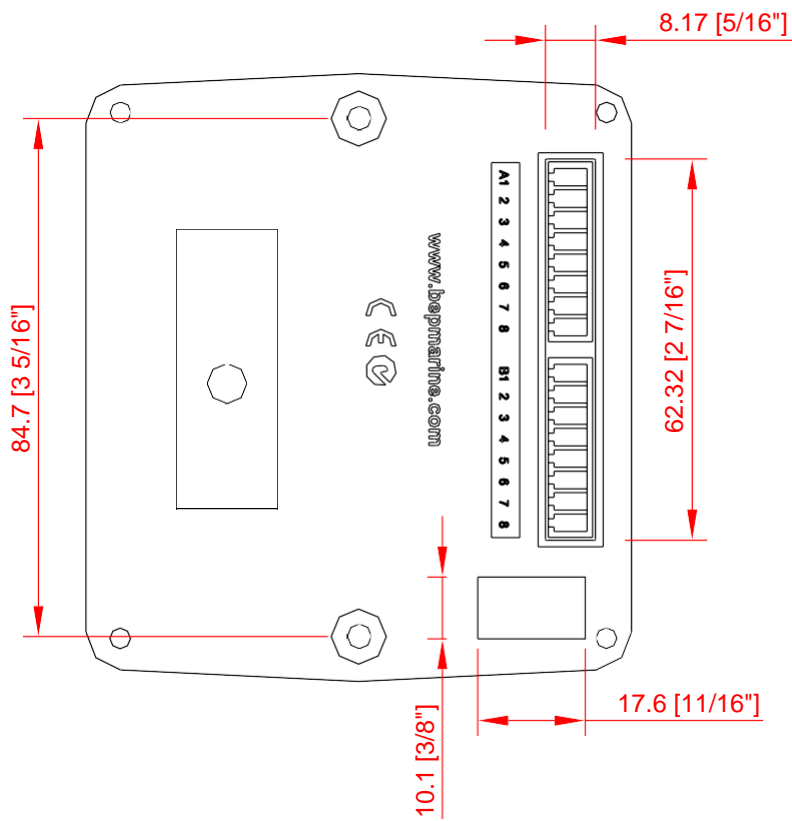
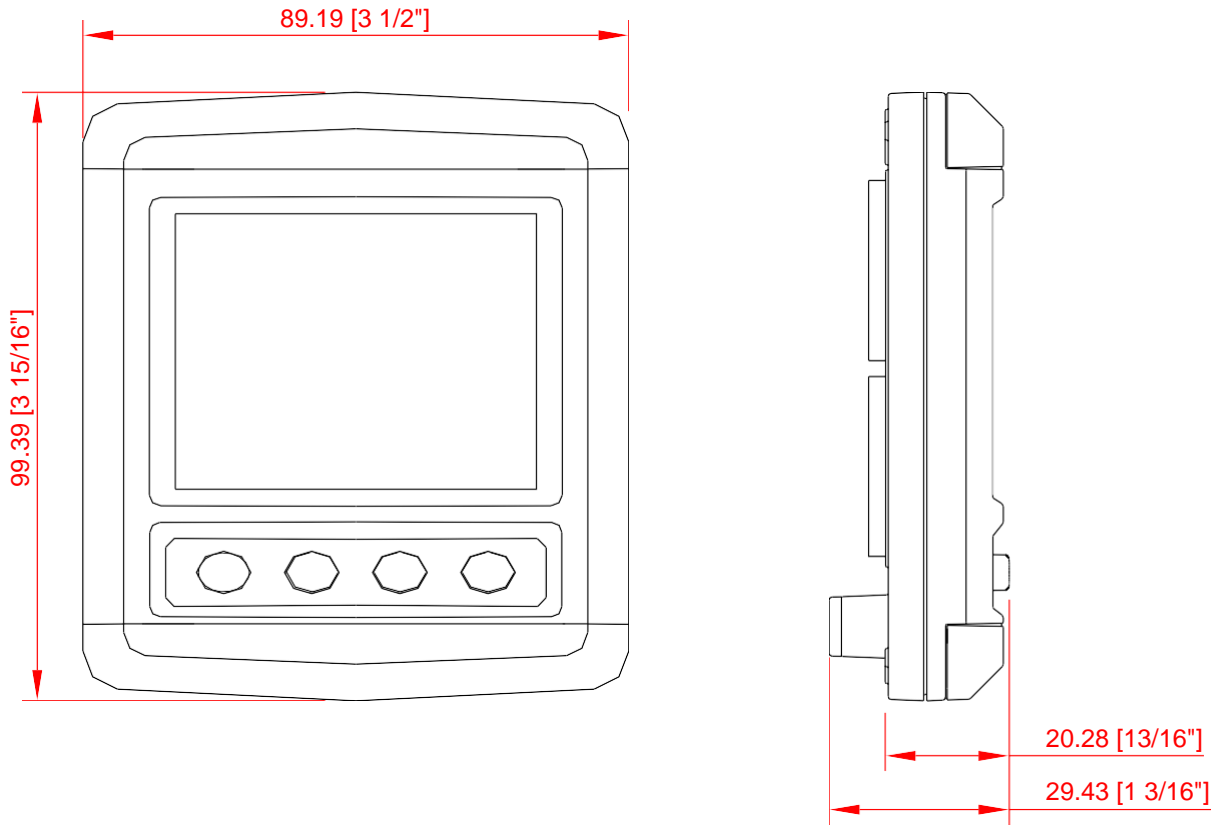
### To Lock/Unlock the ACSM

Press and hold "↓" for 20 seconds to lock the screen

Press and hold "↑" for 20 seconds to unlock the screen



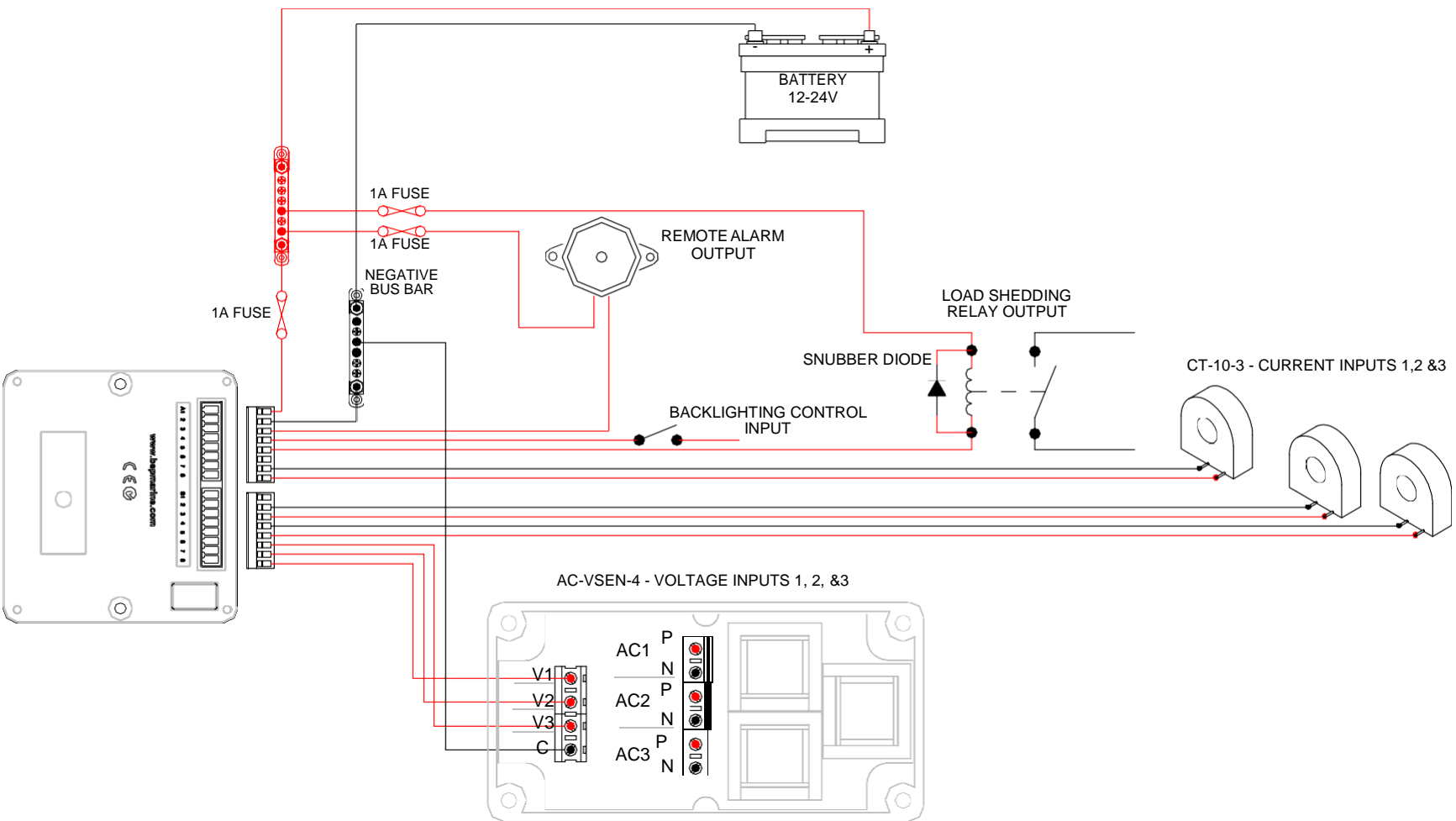
# Dimensions



## 2. Installation

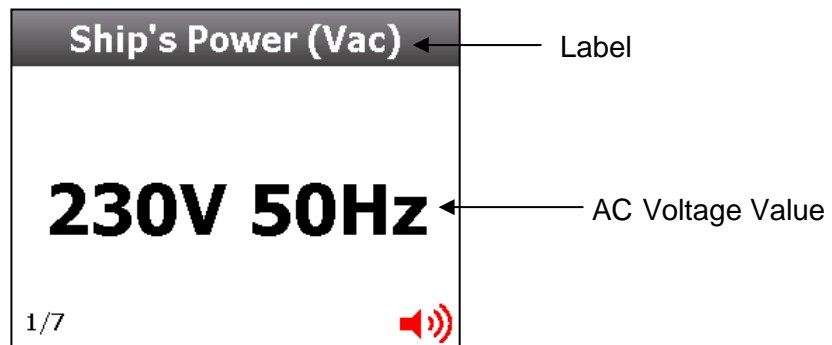
### Plug Information.

PIN	FUNCTION
A1	Positive DC supply from battery (8 to 32V DC)
A2	Negative DC supply from battery (8 to 32V DC)
A3	Remote alarm output (1A @ 12V DC)
A4	Backlight Control input (0 to 32V DC)
A5	Load shedding relay input (1A @ 12V DC)
A6	
A7	Current 3, black negative wire CT-10-3
A8	Current 3, red positive wire CT-10-3 (0-120A AC RMS)
B1	
B2	Current 2, black negative wire CT-10-3
B3	Current 2, red positive wire CT-10-3 (0-120A AC RMS)
B4	Current 1, black negative wire CT-10-3
B5	Current 1, red positive wire CT-10-3 (0-120A AC RMS)
B6	Voltage 3, red positive wire AC-VSEN-4 (0-300V AC)
B7	Voltage 2, red positive wire AC-VSEN-4 (0-300V AC)
B8	Voltage 1, red positive wire AC-VSEN-4 (0-300V AC)



## 3. Configuration

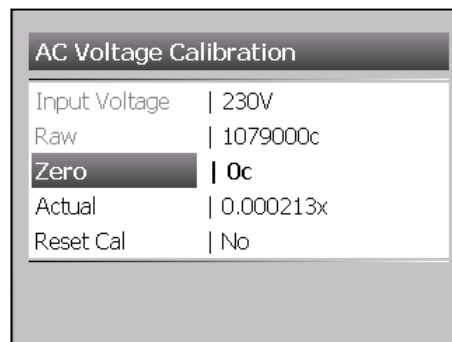
### AC Voltage



### Voltage Calibration

Voltage Calibration is factory set. If you need to alter the calibration follow the steps below:

Go to Main Menu > Setup > Input(s) > 'Choose Voltage Input' > Calibration.



#### Step 1

Insert a ground wire into the pin of the input you are configuring. Select 'Zero' on the meter and then select 'Yes'.

#### Step 2

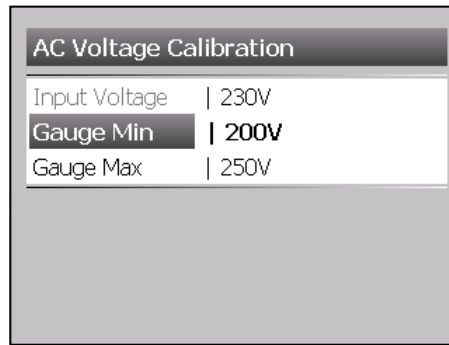
Remove ground and then wire the Input (AC Positive) into the same pin.

#### Step 3

Check voltage using a calibrated voltmeter, when 'Input Voltage' is in a steady state select 'Actual' and enter the correct voltage and then select 'Save'.

### Settings

Go to Main Menu > Setup > Input(s) > 'Choose Voltage Input' > Set



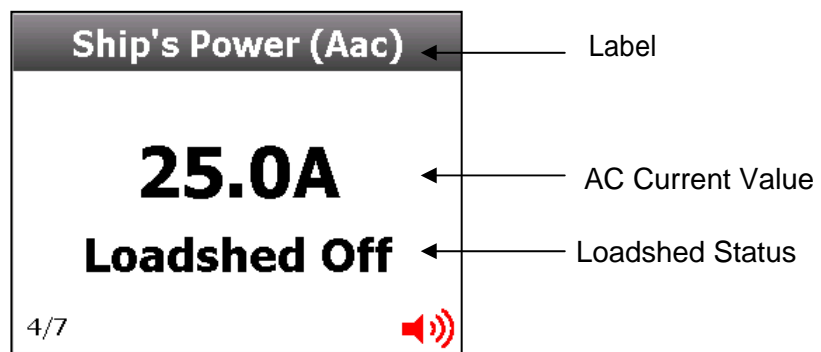
### Gauge Min

This is the minimum scale for Gauge View

### Gauge Max

This is the maximum scale for Gauge View

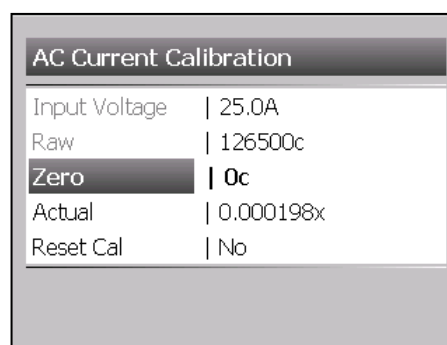
## AC Current



## Current Calibration

Current Calibration is factory set. If you need to alter the calibration follow the steps below:

Go to Main Menu > Setup > Input(s) > 'Choose Current Input' > Calibration



### Step 1

Select 'Zero'. Ensure there is zero current then select 'Yes' to confirm.

### Step 2

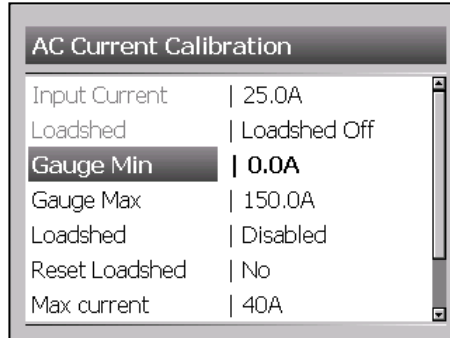
Turn on a steady load on the line you are calibrating i.e. lights. The maximum load possible will give the best results. Please wait for at least 10 seconds for the 'Raw' value to settle, then check current draw with a calibrated Ammeter at the CT.

### Step 3

Select 'Actual' and enter the correct current value and then select 'Save'.

## Settings

Go to Main Menu > Setup > Input(s) > 'Choose Current Input' > Settings



### Gauge Min

This is the minimum scale for Gauge View.

### Gauge Max

This is the maximum scale for Gauge View.

## Configuring Loadshed relay operation.

All three 'Current' status pages have the ability to drive the Loadshed relay output on the back of the meter.

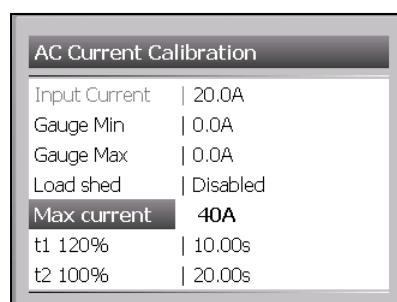
This is provided so the operator can automatically drop a **NON-ESSENTIAL** section of their AC loads. Preventing a current rise to a level that will overload the ships generators and cause the Circuit Breaker to trip and lose power to all AC consumers.

Wire the Loadshed relay as per the 'Wiring Diagram' at the front of the booklet, please note that a snubber diode is required to be fitted across the relay coil for inductive loads.

Each 'Current' status page can be set at a different level but please note the output will be active from the first 'Loadshed' becoming active until the last one clears.

To set the 'Loadshed' value, navigate to, 'Main Menu' > 'Setup' > 'Input' "required current status page" > 'Settings' > 'Max Current'.

A default value of 40A is preset. Select 'Max Current' then enter then required value.



The Load shed current has two timers the first one of which to expire will activate the Load shed relay output.

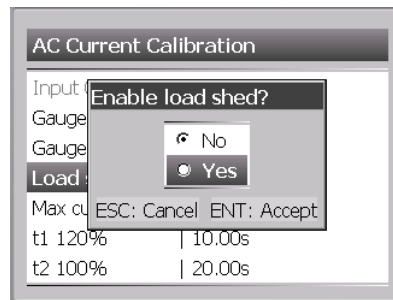
The timers begin counting at different current levels and continue to count as long as current stays above the set point. If at any point the current drops below the measuring point the timer will reset.

The first t1 begins counting as current rises above 120% of Max current. t2 begins counting when current rises above 100% of Max current.

The counter times are set to default values. These can be changed by the following method.

**Step 1.** From the 'AC Current Calibration' select 't1 120% and/or t2 100%'.

**Step 2.** Use the soft keyboard to enter new timer value.

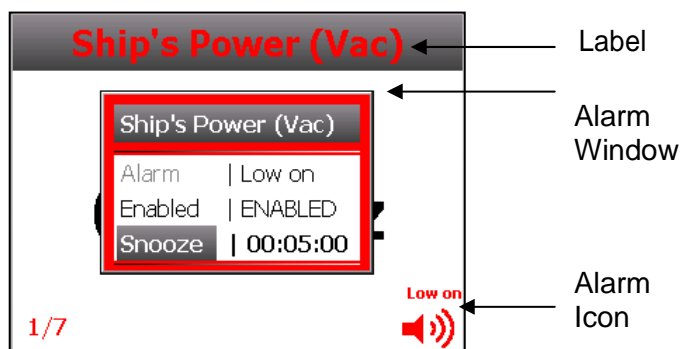


**Step 3.** When both the timers have been set you are able to 'Enable Load Shed' at the 'Load shed' function.

## Alarms

All inputs have the ability to have a high or low warning alarm. Depending on what type of meter configuration you are running, some of these alarms will be enabled by default.

### Answering Alarms



When an alarm is active you will see an Alarm Window for each active alarm and the buzzer/external alarm will sound. The Alarm Window will tell you which input is alarming and what type of alarm it is i.e. Low On or Low Voltage. The label for all alarming circuits will be red also.

To remove the Alarm Window from the Status Page you have 2 options:

#### Disable the alarm

You will get no further alarms from this input until it is re-enabled.

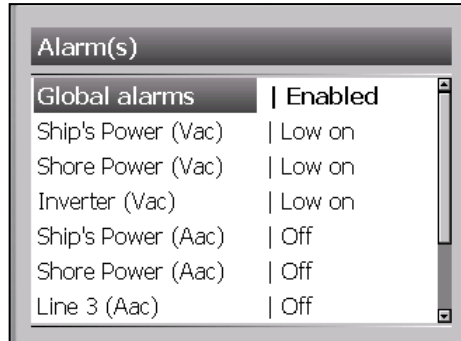
#### Snooze the alarm



The alarm will go in to snooze mode for the default time and will pop up again when the timer expires and the input is still in an alarm state.

If there is more than one alarming circuit, a new Alarm Window will pop up after the previous alarm is acknowledged.

*Note: to avoid unwanted alarms on meter start up there is a 20 second delay after status screen is loaded when alarms will not be active.*



### Alarm Icons

The Alarm Icon is a global warning and does not refer to any individual alarms. The meaning of the icons is explained below:

Icons	Icon Colour	Description
	Green	Alarms Enabled / No Alarm Active
	Red	Alarms Enabled / Alarm Active
	Grey	Alarms Disabled
	Red or Green	Alarms Muted

### Configuring Alarms

All inputs have two alarm parameters that can be set, a High Level and Low Level. The units will change depending on what type of input is being configured.

*Note: If only 1 alarm is needed, say a Low Level and not a High Level, enter a unit of Zero for the unused alarm.*

### Global Alarm Settings

Go to Main Menu > Alarms to see the status of all enabled alarms.

### Global Alarms

Use this setting to disable or enable all alarms.

*Note: This overwrites all enabled alarms so you will not receive any further warnings until global alarms are enabled again.*

### Input Alarm Settings

Go to Main Menu > Setup > Input(s) > 'Choose Input' > Alarm

Alarm	
Enabled	ENABLED
Type	BEEP
Mute	NO
Snooze	00:00:00
Default Snooze	00:05:00
High Level	245V
Low Level	215V

### Enabled

Use this setting to disable the alarms for the selected input. All other alarms will remain enabled.

### Type

This is the type of sound the buzzer produces on alarm. It can be a Beep or Constant alarm.

### Mute

Use this setting to mute the alarms for the selected input. All other alarms will remain unmuted.

### Snooze

This is a non selectable option. When alarm is in snooze mode it will show the countdown of remaining snooze time.

### Default Snooze

Use this setting to change the default snooze time for selected input. Default is 5 minutes but can be changed from 1, 5 and 10 minutes or a custom value.

### High Level

This is the High Level Alarm for the chosen circuit. The units will default to the type of input chosen i.e. Volts, Amps.

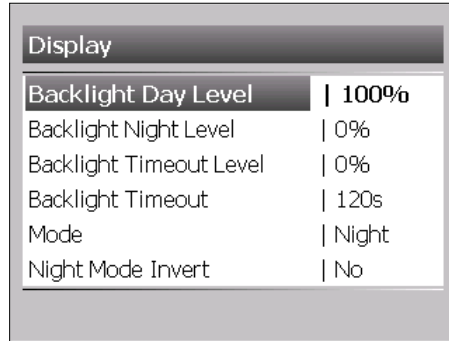
### Low Level

This is the Low Level Alarm for the chosen circuit. The units will default to the type of input chosen i.e. Volts, Amps.

# 4. Settings

## Display Settings

Choose Main Menu > Setup > Display to access Display Settings



Display	
Backlight Day Level	100%
Backlight Night Level	0%
Backlight Timeout Level	0%
Backlight Timeout	120s
Mode	Night
Night Mode Invert	No

### Backlight Day Level

The backlighting level for when meter is set to Day Mode. Set as a percentage between 0-100%. 100% being the brightest.

### Backlight Night Level

The backlighting level for when meter is set to Night Mode. Set as a percentage between 0-100%. 100% being the brightest.

### Backlight Timeout Level

The backlighting level for when meter is running in Timeout Mode. Set as a percentage between 0-100%. 100% being the brightest.

### Backlight Timeout

This is the time from last user input to when the backlighting dims to the Timeout Level (set above). A lower value is recommended to reduce current draw when meter is not in use.

### Mode

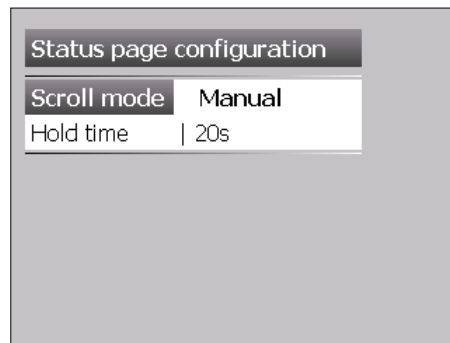
Use this option to toggle between Day and Night Modes.

### Night Mode Invert

When set to Yes, the display colours will invert when changed to Night Mode.

## Status Pages

Choose Main Menu > Setup > Status Pages to access Status Page settings



### Scroll Mode

The scroll mode is how the meter changes from one Status Page to the next. Manual mode requires the user to press the Up or Down button to move through pages. Automatic mode will change between pages at a predetermined hold time (see below).

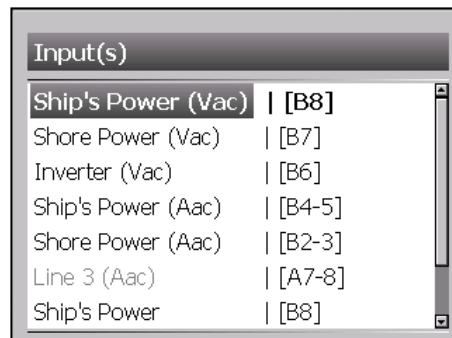
### Hold Time

The hold time is the time it takes for the meter to change from one Status Page to the next in Automatic Scroll mode.

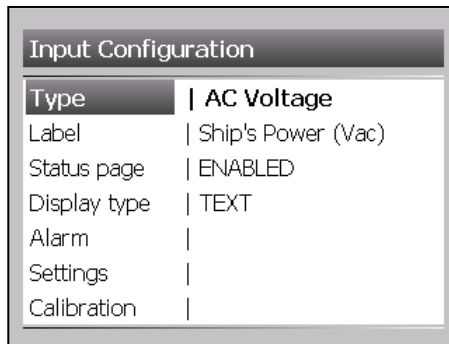
## Inputs

Choose Main Menu > Setup > Input(s) to access Input Settings.

The main input configuration screen shows all inputs with their associated pin/connector number next to it. Enabled inputs are black, disabled inputs are grey.



Press Enter on the input you would like to configure. The input settings will vary depending on what type of Input you are using.



### Label

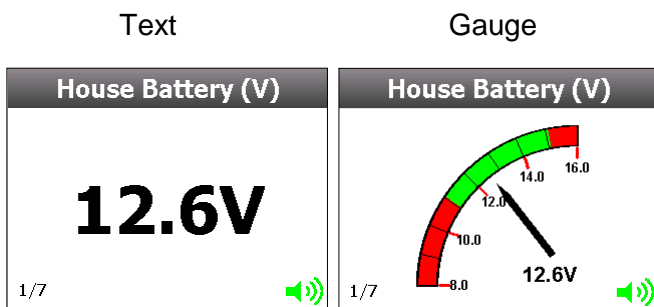
The input label can be selected from a list of input specific standard labels, or a custom label using the onscreen keyboard.

### Status Page

Select enabled to have the input shown on a Status Page. Select disabled and the meter will keep all the settings for that input but it will not be shown on a Status Page.

### Display Type

There are 2 Display Types that can be chosen from. Not all Display Types are available on all inputs.



Below is a table showing what Display Types are available for each Input Type

Input Type	Display Type
AC Voltage	Text, Gauge
AC Current	Text, Gauge
Power	Text

### Alarm

Refer to Alarm Configuration section.

### Settings

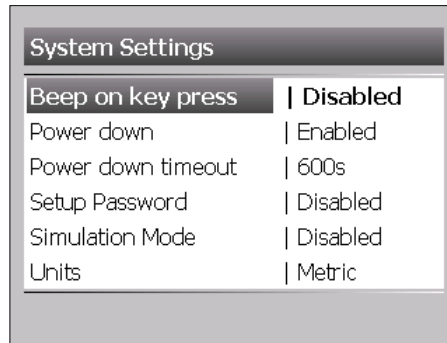
The Settings options are specific to the Input Type. Refer to the Configuration section for more detail.

### Calibration

The Calibration options are specific to the Input Type. Refer to the Configuration section for more detail.

## System

Choose Main Menu > Setup > System to access System Settings



System Settings	
Beep on key press	Disabled
Power down	Enabled
Power down timeout	600s
Setup Password	Disabled
Simulation Mode	Disabled
Units	Metric

### Beep on Key Press

Selecting disabled will stop the meter from beeping on every key press.

### Power Down

Power Down will put the meter in to a low power state after a predetermined time. This will include shutting down the LCD screen. The meter will exit power down mode at any key press.

### Power Down Timeout

This is the time from last user input to when the meter enters power down mode.

### Setup Password

The password feature will protect the meter from unnecessary modifications. When any settings are modified and the save prompt window opens, the password will need to be entered.

To set up a new password select 'Setup Password' and then 'New Password'. The password will need to be entered twice for confirmation. Once this is done the new password will be set up.

To disable the password select 'Setup Password' and then 'Disable'. The current password will need to be entered again to disable it.

*Note: Passwords are case sensitive*

### Simulation Mode

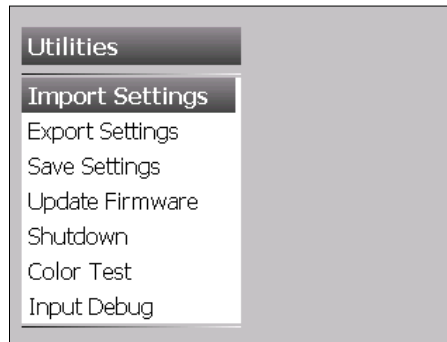
Simulation Mode is used for demonstration purposes. When in simulation mode the units will change to random values showing moving gauge needles, bar graphs and voltage/current text values.

### Units

The Units of Measure will change how tank values are displayed. It can be chosen from Metric (Litres), English (Gallons) and US (Gallons).

## Utilities

Choose Main Menu > Setup > Utilities to access Utilities Settings



### Import/Export Settings



User settings can be saved onto a Memory/Flash USB Device for back up purposes or upgrading other meters.

Insert a supported memory stick into the USB Socket.

### Exporting Settings

Select Export Settings. It will take a few seconds for the meter to search for the device. Once the device has been found select Accept. The user will be prompted to enter the filename. The default filename is 'user.ini' so this filename or a custom filename can be chosen.

*Note: If there is already a file with the same name on the memory stick, please choose another filename.*

### Import Settings

Select Import Settings. Choose the file you would like to use, there may be more than one depending on how many times the settings have been exported. Select Yes to upgrade meter.

*Note: All stored settings will be lost when importing from memory stick so take caution before upgrading.*

### Save Settings

The Save Settings function will save all current changes to the meter settings file.

### Update Firmware

To ensure your meter is using the latest software, please check the BEP Marine website regularly.

To find out the current firmware version choose Main Menu > Setup > About.

To upgrade firmware insert memory stick in to USB socket with preloaded firmware named 'application.tar.gz'. Follow the onscreen prompts until meter has finished upgrading and performed a reboot.

*Note: It is very important not to disconnect power supply from meter during a firmware upgrade as it can cause the meter to become unusable.*

### Shutdown

This option will shut down the meter completely. Turn the meter supply off and then on again for a reboot.

### Colour Test

General colour test for LCD screen.

### Factory Reset

At any time the meter can be restored to a factory state. This can be very helpful if settings have been corrupted or the meter needs to be used in another application i.e. changing a DCM to a SOM.

If the meter will not boot to a status page or the settings become corrupted reboot the meter and hold the Down button. This will bring up the 'Utilities' menu where a Factory reset can be performed.

*Note: Please be aware that all stored settings will be erased when doing a factory reset.*

### Input Debug

Use this function to see a technical overview of all inputs.



# Programming Menu Flow Diagram

