Blue Sea Systems

VSM 422 Installation and Configuration Manual

BLUE SEA SYSTEMS

Innovative marine electrical products—Built to Last

VSM 422

1800

Installation and Configuration Manual

- **Four meters in one**
  - AC Multimeter
  - DC Multimeter including Amp Hours
  - Tank Monitoring
  - Bilge Cycling
- **Twenty-two measurements**
- **Fifteen programmable alarms**

BLUE SEA SYSTEMS

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- ☐ Read Warning and Cautions (page 3)
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- ☐ Follow Initial System Setup instructions (page 13)
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SPECIFICATIONS

DC Specifications:

Nominal System Voltage	12 or 24 Volts
Operating Voltage	8.5–33.0 Volts
Minimum Current Draw	35mA@9.5 Volts, 18.8mA@24 Volts
Voltage Accuracy	+/- 0.5%
Current Range	0–500 Amps
Current Accuracy	+/- 1.0%

AC Specifications:

Nominal System Voltage	120 Volts@60 Hz—North America 230 Volts@50 Hz—Typical of Europe
Operating Voltage	0–300 Volts
Voltage Accuracy (RMS)	+/- 0.5%
Current Range	0–150 Amps
Current Accuracy (RMS)	+/- 2.0%
Frequency	40–90 Hz

Regulatory

EC Declaration of Conformity (page 92)

VSM 422 Surface Mount Gasket creates an IP67 waterproof seal on unit face—temporary immersion for 30 minutes

NOTE: Panel mount configurations are not waterproof.

Magnetic Compass Deviation

Compass safe working distance is 10.00" (250mm) from VSM 422 Head Unit.

RESOURCE INFORMATION

Application Briefs:

State of Charge (SOC)	http://bluesea.com/viewresource/1324
AC Current Measurement	http://bluesea.com/viewresource/86

WARNING AND CAUTION SYMBOLS

⚠ WARNING

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

⚠ CAUTION

The CAUTION symbol 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 VSM 422 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 AC generator is installed on the vessel, it must be stopped and rendered inoperable before the unit is installed.
- ☑ Verify that no other DC or AC sources are connected to the vessel’s 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.

SYSTEM OVERVIEW

Optional Input:

The pin three connection can be configured as one of three options: a third tank, a third battery, or bilge monitoring.

AC Functions:

The AC system allows for monitoring of the AC voltage, frequency and current levels. High and low alarms can be configured for each of these.

DC Functions:

The DC system monitors the voltage levels on up to three batteries, as well as the current draw on the battery on which state of charge is being monitored. High and low limits can be set for the voltage on each battery. A high current alarm can also be set on the battery monitored for State of Charge.

State of Charge (SOC):

State of Charge gives feedback on how “full” the battery is with usable energy. The system keeps track of the amp hours (Ah) remaining on the battery, the charge cycles on the battery, and the temperature of the battery. Low State of Charge and high battery temperature alarms can be set. With the low state of charge alarm set, the VSM 422 shows the time remaining until the alarm will activate, at both the current power usage and at the average power usage for the last 20 minutes.

Tank Functions:

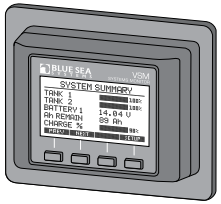
The VSM 422 is capable of monitoring up to three tanks. The system has an auto calibration routine for generating a tank shape profile for non-rectangular tanks. Tank status can be represented in both capacity (gallons or liters) or as a percentage of capacity. Anti-slosh routines are built in to increase accuracy of readings. Both high and low level alarms can be set for all tanks.

Bilge Functions:

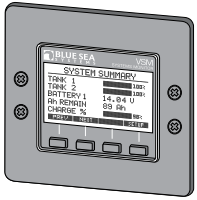
The VSM 422 monitors the current run status of the pump, the time running in the last hour, the cycles in the last 24 hours, and the total cycles since the last cycle reset. High alarms can be set for both the minutes of run time in the last hour, as well as the number of cycles in the last 24 hours.

MOUNTING CONSIDERATIONS

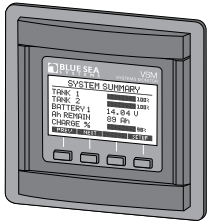
The Vessel System Monitor has three mounting methods: surface mount, flat panel mount, and 360 panel mount. When surface mounted using the supplied gasket, an IP67 waterproof rating is created for the front of the unit. Because panel mounting systems are not waterproof, the unit should not be panel mounted in an exposed location. For all mountings, the back of the unit is not waterproof and must be kept dry.



Surface Mount



Flat Panel Mount



360 Panel Mount

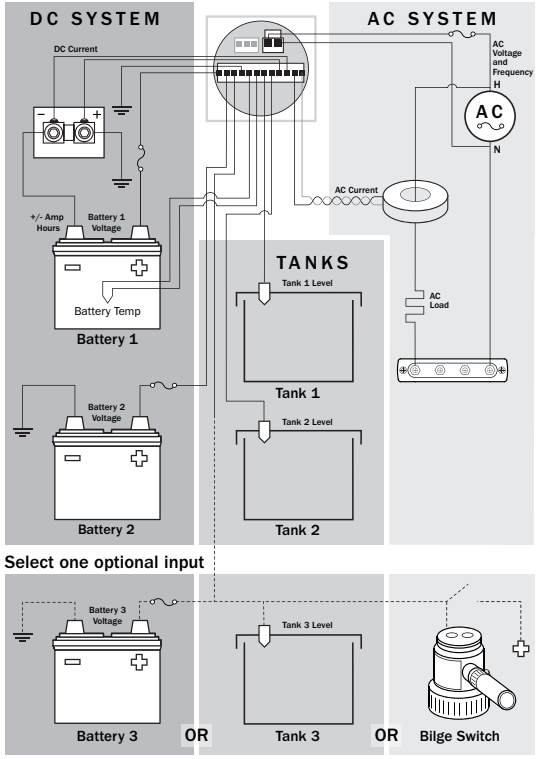
INSTALLATION NOTES

1. The unit must be connected to a non-switched circuit to ensure accurate and consistent State of Charge monitoring.
2. Make all connections to the unit's terminal block before connecting the terminal block to the unit. Keep hands away from the terminal block when applying power to the unit.
3. As the final DC connection, insert a fuse into the in-line fuse holder on the wire to the positive battery terminal.

Specifications subject to change. See www.bluesea.com for current information.

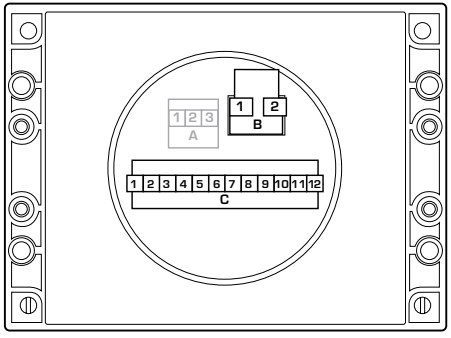
DETAILED WIRING

IMPORTANT! The Sensing Description section of this manual gives important details to the location of sensors in the AC and DC electrical systems of the boat. Improper location and configuration of sensors can result in erroneous readings and possible damage to components.



Specifications subject to change. See www.bluesea.com for current information.

CONNECTIONS



Connector Pin Assignment Table

Connector	Function
Header A	**Communication***
Pin 1	Communication
Pin 2	Communication
Pin 3	Communication
Header B	**AC**
Pin 1	AC Line
Pin 2	AC Neutral
Header C	**Sensors and Power**
Pin 1	DC Voltage Battery 1 (Unit Power)†
Pin 2	DC Voltage Battery 2
Pin 3ǂ	DC Voltage Battery 3, Tank Level 3, or Bilge Function
Pin 4	DC Negative
Pin 5	Battery Temperature (Positive)
Pin 6	Battery Temperature (Negative)
Pin 7	Tank Level 1
Pin 8	Tank Level 2
Pin 9	DC Shunt (Positive)
Pin 10	DC Shunt (Negative)
Pin 11	AC Current Coil (Positive)
Pin 12	AC Current Coil (Negative)

* Communication port is for use with future modules
† Ampere hours are measured for Battery 1 ONLY
ǂ Three input options available

SENSORS

DC Current
The shunt must be placed between the negative terminal on Battery 1 and the main negative bus. **All loads and charge sources should have their negative terminals on the main negative bus**, with the exception of the VSM 422 negative source which must be connected directly to the battery side of the shunt. Shunt sense wires must be a twisted pair from shunt to VSM 422 for proper calculation of State of Charge (SOC). Twisted pair wire can be purchased from electrical supply companies, or made by twisting by hand or with an electric drill motor. The current reading for Battery 1 when it is not being charged and has a load should be negative. If it is not, reverse the DC shunt leads. (see page 95)

DC Voltage
Voltage lines to the VSM 422 should be directly connected to the positive battery terminal with a dedicated wire ahead of any other connections. This will ensure correct voltage and SOC monitoring. Use an appropriate in-line fuse (5A suggested) on the positive wire.

AC Current
In most cases the AC Current Transformer should be located on the main AC feed before any other devices. See http://bluesea.com/viewresource/86 for more information on AC Current Transformer location. The location does not affect state of charge (SOC) calculations.

The Current Transformer does not indicate polarity. If AC voltage is applied and current shows greater than zero but the power reading is zero or a negative value, reverse the AC Current Transformer leads. The leads should be twisted to reduce the effects of interference.

AC Voltage
The ungrounded AC line should be fused inline with a fast acting fuse of 0.25A to 0.5A to protect against shorts.

Bilge Sensor
Connect “switch on” lead of bilge pump to the VSM 422 unit. This wire should read +12/24V when running and 0V when off.

SENSORS (continued)

Temperature Sensor

The battery temperature sensor should be located near the State of Charge battery. It can be mounted to a battery box using the hole, or cable-tied to the negative battery terminal. **IMPORTANT! Do not fasten the Temperature Sensor directly to the battery in any way that may puncture or damage the battery.**

Tank Sender

The VSM 422 is compatible with three sender protocols.

Resistive 2 Wire Senders: (see page 94 for Installation Diagram)
10 – 180 Ω *VDO*—Typical of Europe
240 – 33 Ω *Teleflex*—North America

Ultrasonic 3 Wire Senders: (see page 94 for Installation Diagram)
Blue Sea Systems PN 1810 and PN 1811.

Blue Sea Systems ultrasonic sender PN 1810 is used for water, waste, and diesel fuel tanks up to 32" (812mm) in depth. Blue Sea Systems ultrasonic sender PN 1811 is used for gasoline tanks up to 24" (609mm) in depth.

When connecting the tank sender to ground it is important to connect them as directly as possible to the main negative bus to prevent high loads such as battery chargers from affecting the tank readings.

The VSM 422 will not produce accurate readings if a second gauge is connected to the same tank sender. Install a sender for each gauge if you wish to read a tank level from more than one location.

The Blue Sea Systems ultrasonic sender requires an external power source. When power to the sender is lost, the VSM 422 will read the tank as full, and may trigger the tank's high level alarm.

For each tank the sender must be specified, and the shape of the tank set as rectangular or auto-calibrated before accurate readings are displayed.

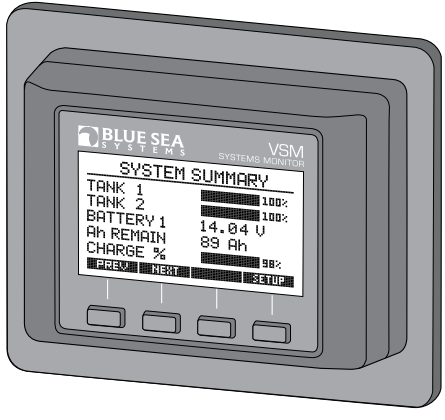
USER INTERFACE OVERVIEW

BOLD text designates a button.
Italicized text designates text on the VSM 422 screen.

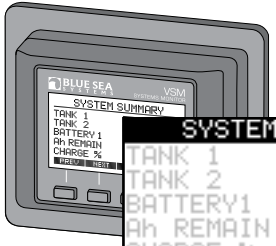
The user interface is controlled by the four buttons located below the display. Each one of the buttons corresponds to the text at the bottom of the screen.

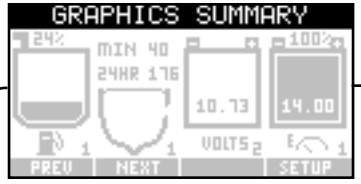
System information is displayed with eight screens: *SYSTEM SUMMARY*, *GRAPHICS SUMMARY*, *DC POWER*, *STATE OF CHARGE*, *AC POWER*, *BILGE STATUS*, *TANK STATUS*, and *LARGE DISPLAY*.

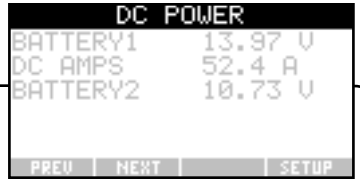
Some screens such as *STATE OF CHARGE* and *LARGE DISPLAY* have a **MORE** button; this can be used to cycle through the information that is not visible on one screen. In some setup screens **<-** and **->** arrows will be shown. These indicate that the selection options continue on a screen that is displayed when the user has scrolled past the top or bottom of the screen. The data fields for both summary screens can be customized through display setup.

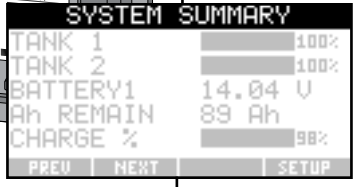


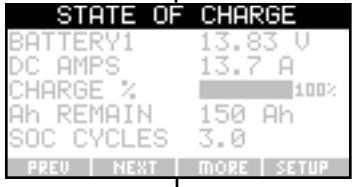
MAIN DISPLAY STRUCTURE

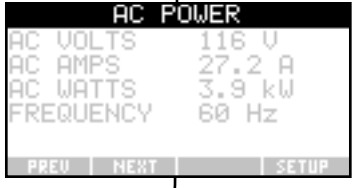










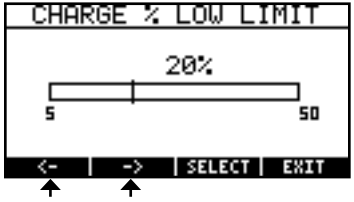


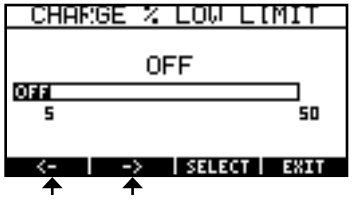
Specifications subject to change. See www.bluesea.com for current information.

Many setup screens require that the user enter data. There are two methods of entering data.

Scroll Bar Method:

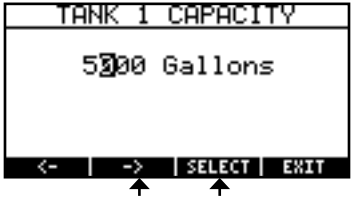
The numbers on the left and right represent the high and low range of the value selected, and the number in the middle is the current value. To adjust the value use the **<-** and **->** buttons. Turn off an alarm by scrolling all the way to the left for a low limit or all the way to the right for a high limit. The current value will show *OFF*. Pressing **SELECT** will set the value; pressing **EXIT** will cancel the change.

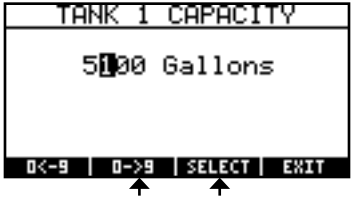




Character Selection Method:

Change the value by selecting the character using the **<-** and **->** buttons and pressing **SELECT** when the character is highlighted. The left two buttons then become **A<-Z** and **A->Z** if a name is being changed or **0<-9** and **0->9** if a number is being changed. Use these buttons to change to the desired value for the character. Numerals **0** through **9** and a blank space are available after **Z** when the characters are in the "name" mode. Press **SELECT** to lock the character. The buttons will then return to **<-** and **->** and another character can be highlighted. When all of the characters have been set press **EXIT**.

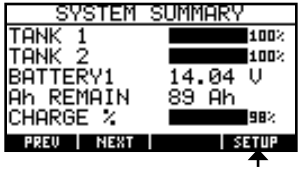




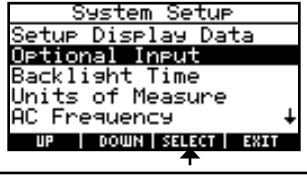
Optional Input Configuration

Connection to pin 3 on Header C can be configured to one of three options, battery 3 monitoring, tank 3 monitoring, or bilge monitoring.

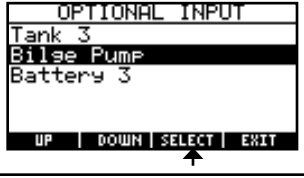
1. Page through main screens by pressing **NEXT** until the *SYSTEM SUMMARY* page is visible.
2. Press **SETUP**



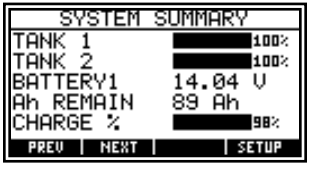
3. Scroll to and press **SELECT** on *OPTIONAL INPUT*



4. Scroll to and press **SELECT** on desired optional input for system.

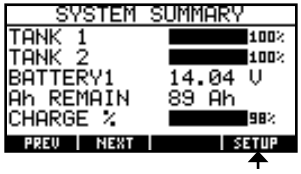


5. Press **EXIT** to return to main system screens.

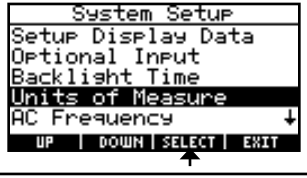


Units of Measure Setup

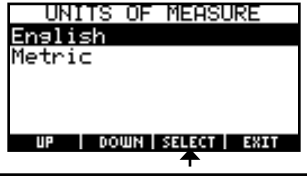
1. Page through main screens by pressing **NEXT** until the *SYSTEM SUMMARY* page is visible.
2. Press **SETUP.**



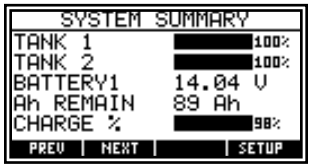
3. Scroll to and press **SELECT** on *Units of Measure.*



4. Scroll to and press **SELECT** on desired unit system.



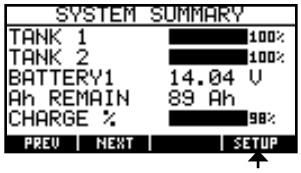
5. Press **EXIT** to return to main system screens.



Specifications subject to change. See www.bluesea.com for current information.

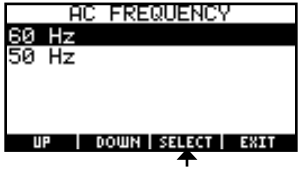
AC System Configuration

1. Page through main screens by pressing **NEXT** until the *SYSTEM SUMMARY* page is visible.
2. Press **SETUP.**

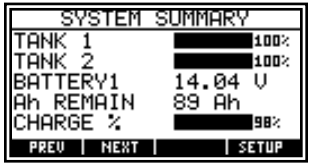


3. Scroll to and press **SELECT** on *AC Frequency.*

4. Scroll to and press **SELECT** on desired frequency.
   60 Hz—North America
   50 Hz—Typical of Europe



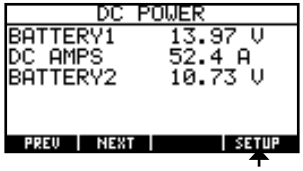
5. Press **EXIT** to return to main system screens.



Specifications subject to change. See www.bluesea.com for current information.

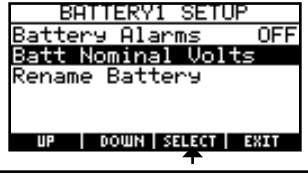
DC System Configuration

1. Page through main screens by pressing **NEXT** until the *DC POWER* page is visible.
2. Press **SETUP.**

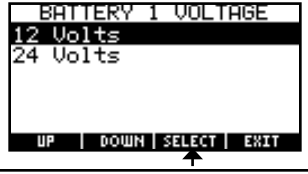


3. Scroll to and press **SELECT** on battery.

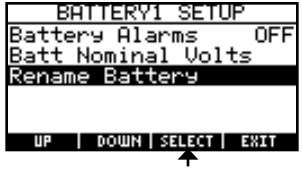
4. Scroll to and press **SELECT** on *Batt Nominal Volts*.



5. Scroll to and press **SELECT** on desired nominal voltage.



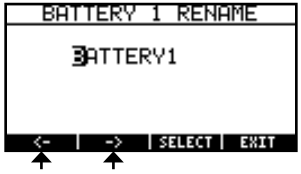
6. Scroll to and press **SELECT** on *Rename Battery*.



Specifications subject to change. See www.bluesea.com for current information.

DC System Configuration (continued)

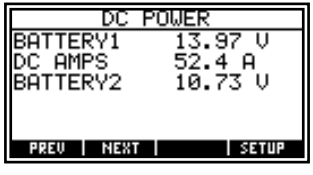
7. Set battery name using the Character Selection method. (page 13)



8. Press **EXIT**

9. Repeat steps 2 to 8 for each battery.

10. Press **EXIT** to return to main system screens.

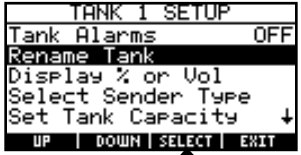


Tank Configuration

1. Page through main screens by pressing **NEXT** until the *TANK STATUS* page is visible.
2. Press **SETUP.**

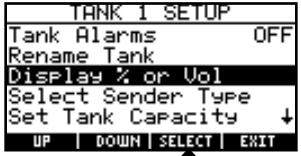
3. Scroll to and press **SELECT** on tank.

4. Scroll to and press **SELECT** on *Rename Tank*.



5. Set tank name using the Character Selection method. (page 13)
6. Press **EXIT**

7. Scroll to and press **SELECT** on *Display % or Vol*.



Specifications subject to change. See www.bluesea.com for current information.

Tank Configuration (continued)

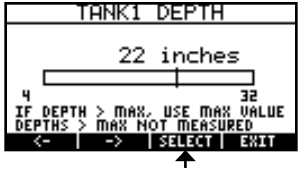
8. Scroll to and press **SELECT** on desired display format.

9. Scroll to and press **SELECT** on *Select Sender Type*.

10. Scroll to and press **SELECT** on desired sender.

11. If an ultrasonic sensor is being used scroll to and press **SELECT** on *Set Tank Depth*.

12. Set the tank depth using the Slide Bar method.
13. Press **SELECT**.



Specifications subject to change. See www.bluesea.com for current information.

Tank Configuration (continued)

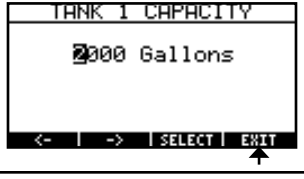
There are two ways to calibrate tanks with the VSM 422: Rectangular Calibration and Auto Calibration. Rectangular tanks are tanks where the shape of the tank does not change based on the height. Auto Calibration is ideal if a non-rectangular tank is being used. Use either Rectangular or Auto Calibration to complete tank configuration.

Tank Configuration (Rectangular Calibration)

Make sure that the tank sensor is properly adjusted for the tank depth. For ultrasonic sensors this means setting the tank depth.
Follow tank configuration steps 1–13 on pages 25–27 for tank setup. Then use the steps below to calibrate for a rectangular tank. The steps below are not required if the monitor will be displaying the tank in percent.

1. Scroll to an press **SELECT** on *Set Tank Capacity*

2. Set tank volume using the Character Selection method. (page 13)
3. Press **EXIT**.



4. Press **EXIT**.
5. Repeat Tank Setup starting with step 3 for all remaining tanks.

Specifications subject to change. See www.bluesea.com for current information.

After following steps 1–13 on pages 25–27, continue with the appropriate Auto Calibration procedure.

When running the Auto Calibration it is important that the current tank's alarms are turned off and that the boat will not trigger any alarm for other systems. If an alarm occurs, auto calibration must be run again for accurate tank metering. It is recommended that tank levels are as low as safely possible before running calibration. For gray and black water tanks, fresh water may be used to fill the tank during calibration.

There are three different Auto Calibration procedures that can be run depending on what information is known. Use the Auto Calibration Procedure Selection Charts on page 32 to determine the needed information and the appropriate procedure number.

Tank calibration is most accurate if performed when the tank is as close to empty as possible.

Auto Calibration Procedure Selection Charts

If the tank is near empty: ≤10% Full
(the current tank level will be assumed to be the empty point by the meter)

		The amount of liquid added during calibration can be measured	
		YES	NO
The empty tank capacity is known	YES	Procedure 1 (page 33)	Procedure 1 (page 33)
	NO	Procedure 1 (page 33)	Procedure 1* (page 33)

If the tank is not empty: >10%–30% Full

		The amount of liquid added during calibration can be measured	
		YES	NO
The empty tank capacity is known	YES	Procedure 2 (page 37)	Procedure 3† (page 41)
	NO	Procedure 3* † (page 41)	Procedure 3* † (page 41)

* Monitor will only be able to correctly display percentage. Use 100 as the full tank capacity.

† Must be able to estimate the percentage of the tank that is filled at the start of Auto Calibration.

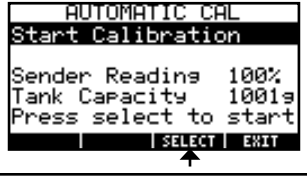
Tank Configuration (Auto Calibration Procedure 1)

1. Scroll to and press **SELECT** on *Set Tank Shape*.

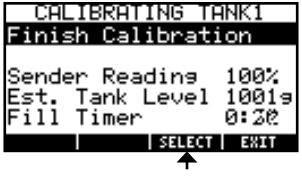
2. Scroll to and press **SELECT** on *Use Auto Calibration*.

3. Scroll to and press **SELECT** on *Automatic Calibration*.

4. When tank is empty press **SELECT** on *Start Calibration*.
   Fill tank at a steady rate.

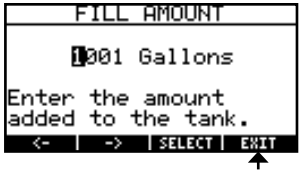


5. When the tank is full press **SELECT**.

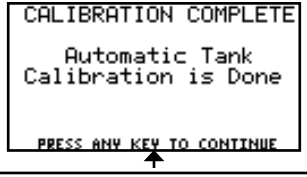


Tank Configuration (Auto Calibration Procedure 1)

6. Keep the default fill amount. Press **EXIT**.



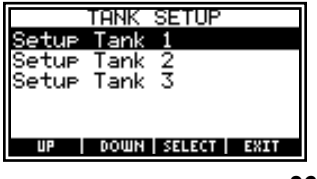
7. Press any key to continue.



8. Scroll to and press **SELECT** on *Set Tank Capacity.*

9. Set tank volume to known tank volume or metered fill amount using the Character Selection method. (page 13)
10. Press **EXIT**.

11. Press **EXIT**.
12. Repeat Tank Setup starting with step 3 for all remaining tanks.



Tank Configuration (Auto Calibration Procedure 2)

1. Scroll to and press **SELECT** on *Set Tank Shape*.

2. Scroll to and press **SELECT** on *Use Auto Calibration*.

3. Scroll to and press **SELECT** on *Set Tank Capacity.*

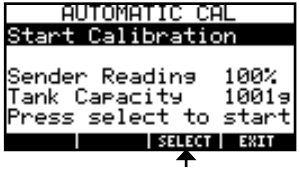
4. Set tank volume to known tank volume or metered fill amount using the Character Selection method. (page 13)
5. Press **EXIT**.

6. Scroll to and press **SELECT** on *Automatic Calibration*.

Specifications subject to change. See www.bluesea.com for current information.

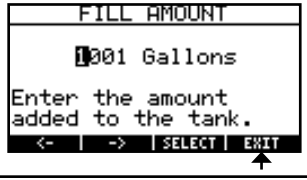
Tank Configuration (Auto Calibration Procedure 2)

7. When tank is empty press **SELECT** on *Start Calibration*.
   Fill tank at a steady rate.

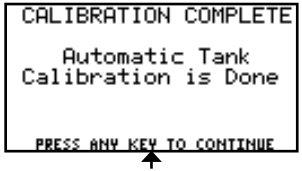


8. When the tank is full press **SELECT**.

9. Enter metered amount as fill amount using the Character Selection method. (page 13)
10. Press **EXIT.**



11. Press any key to continue.



12. Press **EXIT**.
13. Repeat Tank Setup starting with step 3 for all remaining tanks.

Specifications subject to change. See www.bluesea.com for current information.

Tank Configuration (Auto Calibration Procedure 3)

1. Scroll to and press **SELECT** on *Set Tank Shape*.

2. Scroll to and press **SELECT** on *Use Auto Calibration*.

3. Scroll to and press **SELECT** on *Set Tank Capacity.*

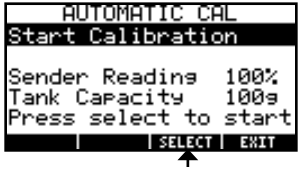
4. Set tank volume as 100.
5. Press **EXIT**.

6. Scroll to and press **SELECT** on *Automatic Calibration*.

Specifications subject to change. See www.bluesea.com for current information.

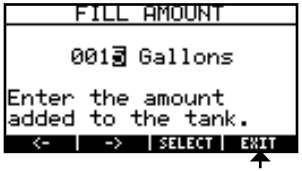
Tank Configuration (Auto Calibration Procedure 3)

7. Press **SELECT** on *Start Calibration*.
   Fill tank at a steady rate.

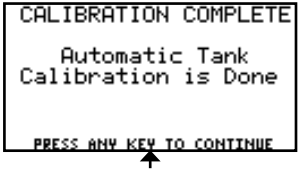


8. When the tank is full press **SELECT**.

9. Enter (100 - Start Estimate Percent) as fill amount using the Character Selection method. (page 13)
10. Press **EXIT.**



11. Press any key to continue.



12. Scroll to and press **SELECT** on *Set Tank Capacity.*

Specifications subject to change. See www.bluesea.com for current information.

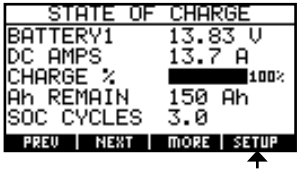
Tank Configuration (Auto Calibration Procedure 3)

13. Set tank capacity to known tank capacity or metered fill amount using the Character Selection method. (page 13)
14. Press **EXIT**.

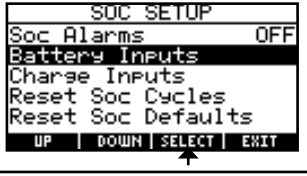
15. Press **EXIT**.
16. Repeat Tank Setup starting with step 3 for all remaining tanks.

State of Charge Configuration

1. Page through main screens by pressing **NEXT** until the *STATE OF CHARGE* page is visible.
2. Press **SETUP.**

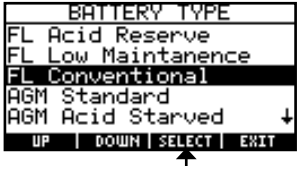


3. Scroll to and press **SELECT** on *Battery Inputs.*

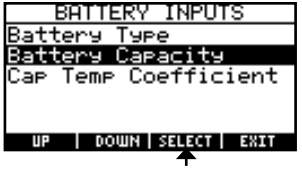


4. Scroll to and press **SELECT** on *Battery Type.*

5. Scroll to and press **SELECT** on desired battery type.



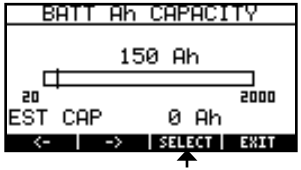
6. Scroll to and press **SELECT** on *Battery Capacity.*



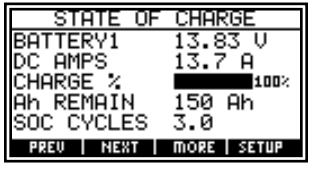
Specifications subject to change. See www.bluesea.com for current information.

State of Charge Configuration (continued)

7. Set battery capacity using the Scroll Bar method.
8. Press **SELECT.**



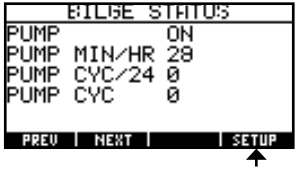
9. Press **EXIT** twice to return to main system screens



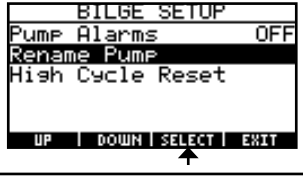
Charge Inputs and *Capacity Temperature Coefficient* are best left to factory settings.

Bilge Pump Configuration

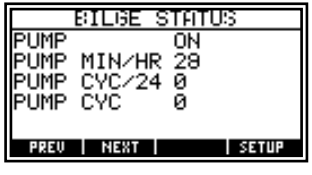
1. Page through main screens by pressing **NEXT** until the *BILGE STATUS* page is visible.
2. Press **SETUP.**



3. Scroll to and press **SELECT** on *Rename Pump.*

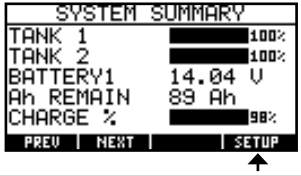


4. Set pump name using the Character Selection method. (page 13)
5. Press **EXIT** twice to return to main system screens.



Backlight Time Setup

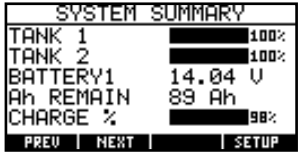
1. Page through main screens by pressing **NEXT** until the *SYSTEM SUMMARY* page is visible.
2. Press **SETUP**



3. Scroll to and press **SELECT** on *Backlight Time*.

4. Scroll to and press **SELECT** on desired timeout.

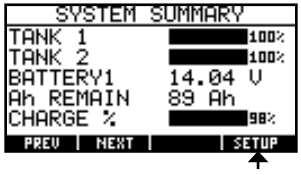
5. Press **EXIT** to return to main system screens.



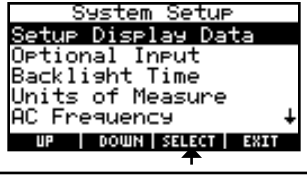
Specifications subject to change. See www.bluesea.com for current information.

System Summary Setup

1. Page through main screens by pressing **NEXT** until the *SYSTEM SUMMARY* page is visible.
2. Press **SETUP**



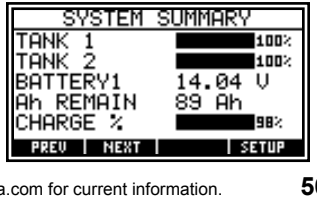
3. Scroll to and press **SELECT** on *Setup Display Data.*



4. Scroll to and press **SELECT** on data slot.

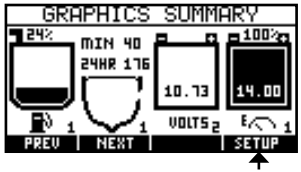
5. Scroll to and press **SELECT** on data.

6. Press **EXIT** twice to return to main system screens.

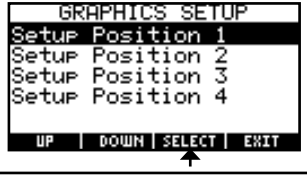


Graphics Summary Setup

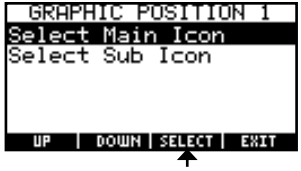
1. Page through main screens by pressing **NEXT** until the *GRAPHICS SUMMARY* page is visible.
2. Press **SETUP**



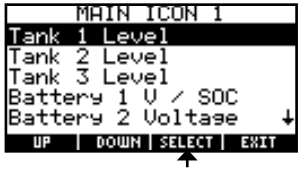
3. Scroll to and press **SELECT** on data position.



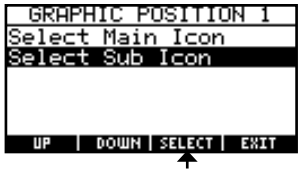
4. Scroll to and press **SELECT** on *Select Main Icon*.



5. Scroll to and press **SELECT** on icon.



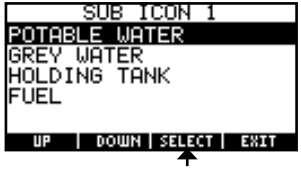
6. Scroll to and press **SELECT** on *Select Sub Icon*.



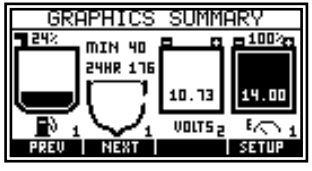
Specifications subject to change. See www.bluesea.com for current information.

Graphics Summary Setup (continued)

7. Scroll to and press **SELECT** on icon. (The options depend on the Main Icon that was selected in step 5)



6. Press **EXIT** twice to return to main system screens.



ALARM SETUP

When an alarm is triggered, the screen will change to an alarm summary screen displaying the:

- Alarm type—AC, DC, State of Charge, Bilge and Tank
- Alarm limit—High and Low
- Alarm limit value
- Sensor reading value

Silence the alarm by pressing **QUIET.** The summary screen will remain visible until **CLOSE** is pressed**.**

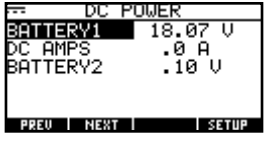
Note: When AC is disconnected, alarms for frequency and low voltage will sound if these alarms are set. Press the **QUIET** and **CLOSE** buttons to silence these alarms. The alarms will not become active again until power is restored and within limits. If starting a new power source such as a generator or inverter, check the readings to see that they are within limits and that the alarm is returned to normal.

A flashing icon representing the alarm type will be displayed in the upper left-hand corner of all screens. This icon remains in this location until the problem is resolved.

The label for the value that has been triggered will also flash in all screens where it is normally shown.

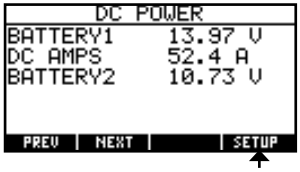
Alarm Icons:

Tank	
DC	
AC	
State of Charge	
Bilge	



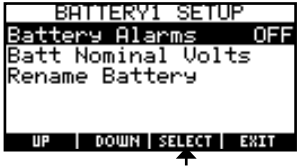
Battery Voltage Alarm Setup

1. Page through main screens by pressing **NEXT** until the *DC POWER* page is visible.
2. Press **SETUP**

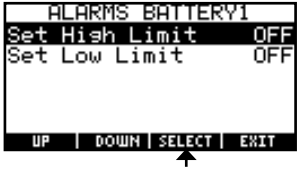


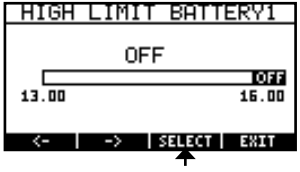
3. Scroll to and press **SELECT** on battery.

4. Scroll to and press **SELECT** on *Battery Alarms*.

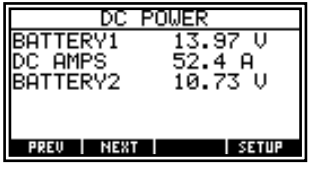


5. Scroll to and press **SELECT** on limit and use the Scroll Bar method to set limit.



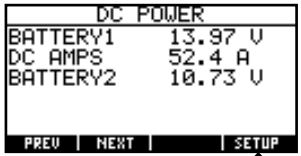


6. Press **EXIT** three times to return to main system screens.



DC Current Alarm Setup

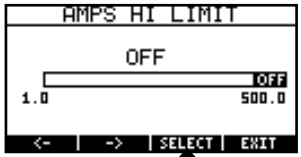
1. Page through main screens by pressing **NEXT** until the *DC POWER* page is visible.
2. Press **SETUP**



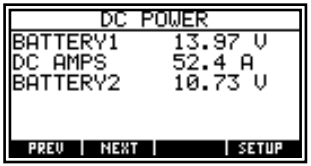
3. Scroll to and press **SELECT** on *DC Amps Alarm.*

4. Press **SELECT** on *Set High Limit*.

5. Use the Scroll Bar method to set limit.

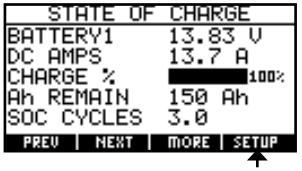


6. Press **EXIT** twice to return to main system screens.

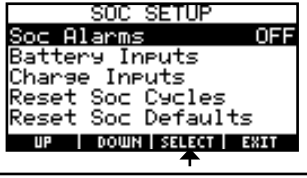


Charge Percentage Alarm Setup

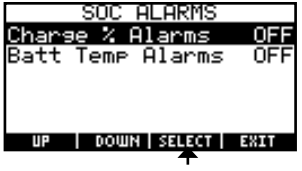
1. Page through main screens by pressing **NEXT** until the *STATE OF CHARGE* page is visible.
2. Press **SETUP**



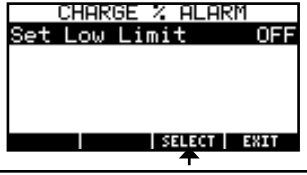
3. Scroll to and press **SELECT** on *Soc Alarms*.

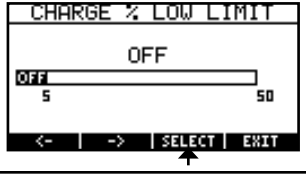


4. Scroll to and press **SELECT** on *Charge % Alarms*.

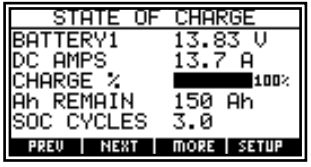


5. Press **SELECT** on *Set Low Limit*. Use the Scroll Bar method to set limit.





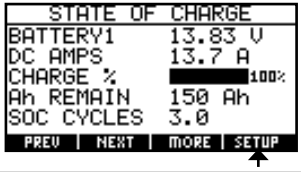
6. Press **EXIT** three times to return to main system screens.



Specifications subject to change. See www.bluesea.com for current information.

Battery Temperature Alarm Setup

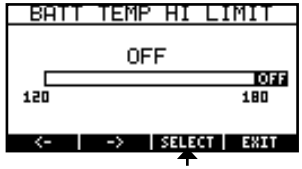
1. Page through main screens by pressing **NEXT** until the *STATE OF CHARGE* page is visible.
2. Press **SETUP**



3. Scroll to and press **SELECT** on *Soc Alarms.*

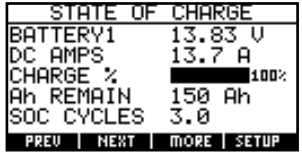
4. Scroll to and press **SELECT** on *Batt Temp Alarms*.

5. Press **SELECT** on *Set High Limit*. Use the Scroll Bar method to set limit.*



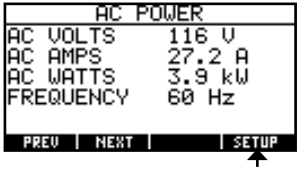
* If metric units of measure are selected (page 17) the *High Limit* range will be 48–82.

6. Press **EXIT** three times to return to main system screens.



AC Current Alarm Setup

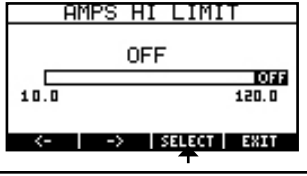
1. Page through main screens by pressing **NEXT** until the *AC POWER* page is visible.
2. Press **SETUP**



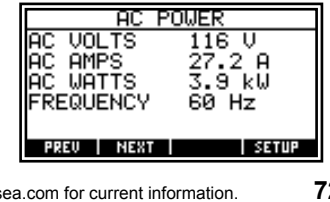
3. Scroll to and press **SELECT** on *Amps Alarm.*

4. Scroll to and press **SELECT** on *Set High Limit*.

5. Use the Scroll Bar method to set limit.



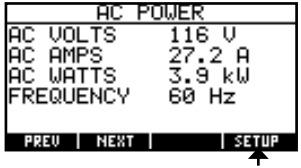
6. Press **EXIT** twice to return to main system screens.



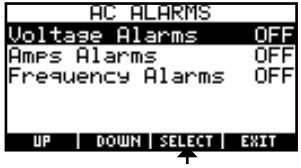
Specifications subject to change. See www.bluesea.com for current information.

AC Voltage Alarm Setup

1. Page through main screens by pressing **NEXT** until the *AC POWER* page is visible.
2. Press **SETUP**

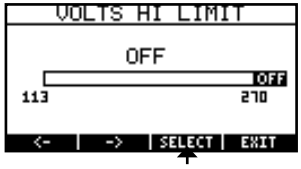


3. Scroll to and press **SELECT** on *Voltage Alarms.*

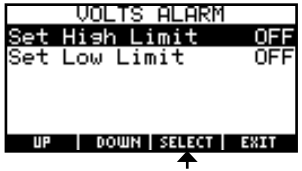


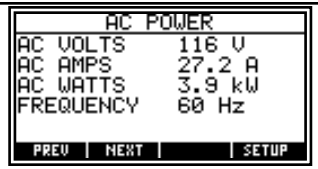
4. Scroll to and press **SELECT** on limit.

5. Use the Scroll Bar method to set limit.



6. Press **EXIT** twice to return to main system screens.

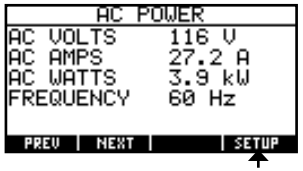




Specifications subject to change. See www.bluesea.com for current information.

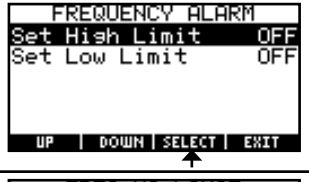
AC Frequency Alarm Setup

1. Page through main screens by pressing **NEXT** until the *AC POWER* page is visible.
2. Press **SETUP**

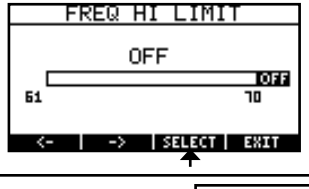


3. Scroll to and press **SELECT** on *Frequency Alarms.*

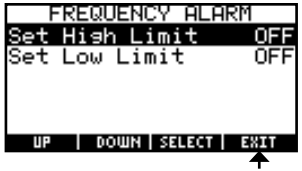
4. Scroll to and press **SELECT** on limit.

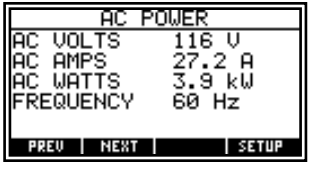


5. Use the Scroll Bar method to set limit.



6. Press **EXIT** twice to return to main system screens.





Specifications subject to change. See www.bluesea.com for current information.

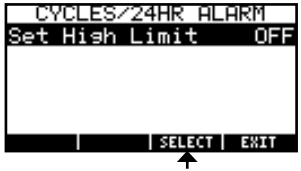
Bilge Cycles/24 Hours Alarm Setup

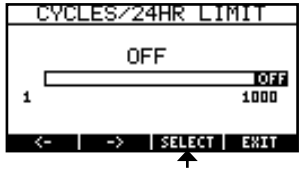
1. Page through main screens by pressing **NEXT** until the *BILGE STATUS* page is visible.
2. Press **SETUP**

3. Scroll to and press **SELECT** on *Pump Alarms*.

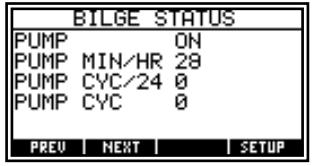
4. Scroll to and press **SELECT** on *Cycles/24 HR Alarm*.

5. Scroll to and press **SELECT** on *Set High Limit*.
6. Use the Scroll Bar method to set limit.





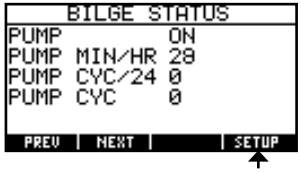
7. Press **EXIT** three times to return to main system screens.



Specifications subject to change. See www.bluesea.com for current information.

Run Time/Hour Alarm Setup

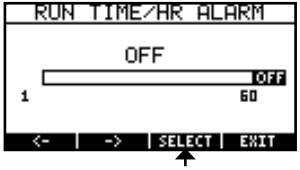
1. Page through main screens by pressing **NEXT** until the *BILGE STATUS* page is visible.
2. Press **SETUP**



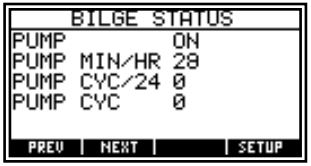
3. Scroll to and press **SELECT** on *Pump Alarms*.

4. Scroll to and press **SELECT** on *Run Time/Hr Alarm*.

5. Scroll to and press **SELECT** on *Set High Limit*.
6. Use the Scroll Bar method to set limit.



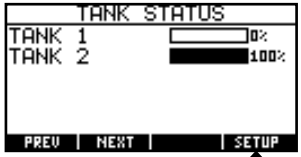
7. Press **EXIT** three times to return to main system screens.



Specifications subject to change. See www.bluesea.com for current information.

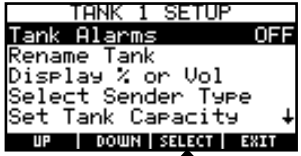
Tank Alarm Setup

1. Page through main screens by pressing **NEXT** until the *TANK STATUS* page is visible.
2. Press **SETUP**

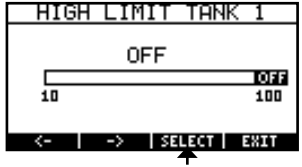


3. Scroll to and press **SELECT** on tank.

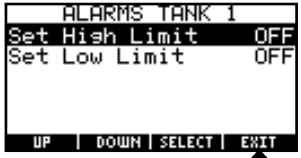
4. Scroll to and press **SELECT** on *Tank Alarms*.

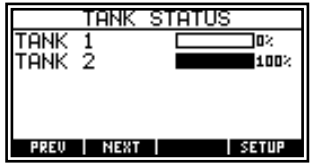


5. Scroll to and press **SELECT** on limit.
6. Use the Scroll Bar method to set limit.



7. Press **EXIT** three times to return to main system screens.

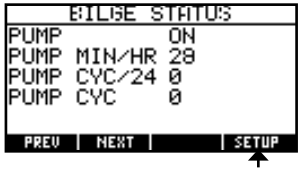




Specifications subject to change. See www.bluesea.com for current information.

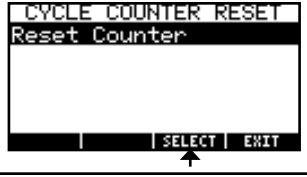
Bilge Cycle Reset

1. Page through main screens by pressing **NEXT** until the *BILGE STATUS* page is visible.
2. Press **SETUP**

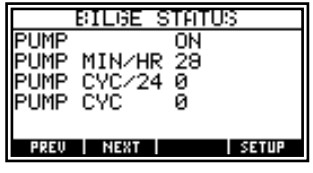


3. Scroll to and press **SELECT** on *Cycle Counter Reset.*

4. Scroll to and press **SELECT** on *Reset Counter*.

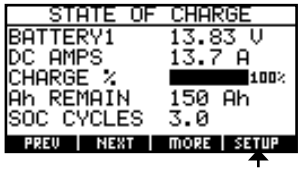


5. Press **EXIT** to return to main system screens.

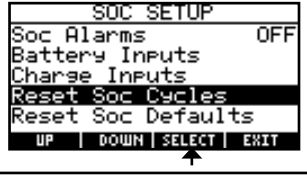


Battery Cycle Reset

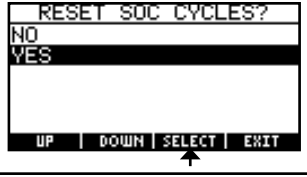
1. Page through main screens by pressing **NEXT** until the *STATE OF CHARGE* page is visible.
2. Press **SETUP**



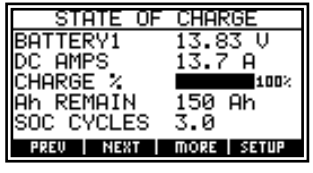
3. Scroll to and press **SELECT** on *Reset Soc Cycles.*



4. Scroll to and press **SELECT** on YES.

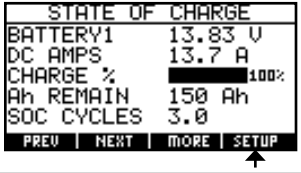


5. Press **EXIT** to return to main system screens.



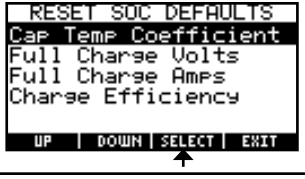
State of Charge Defaults Reset

1. Page through main screens by pressing **NEXT** until the *STATE OF CHARGE* page is visible.
2. Press **SETUP**

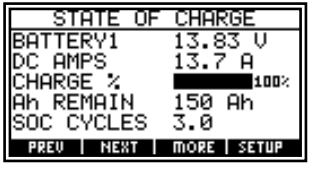


3. Scroll to and press **SELECT** on *Reset SOC Defaults*.

4. Scroll to and press **SELECT** on value.

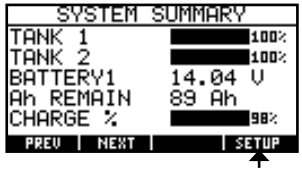


5. Press **EXIT** to return to main system screens.



Restore to Factory Defaults

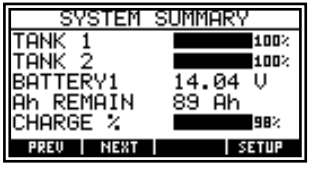
1. Page through main screens by pressing **NEXT** until the *SYSTEM SUMMARY* page is visible.
2. Press **SETUP**



3. Scroll to and press **SELECT** on *Restore Fac Defaults.*

4. Scroll to and press **SELECT** on *YES*.

5. Press **EXIT** to return to main system screens.



Specifications subject to change. See www.bluesea.com for current information.

TROUBLESHOOTING

Tank level readings change when electronics are turned on.
Make sure that the negative feeds to the tank sensors are connected as close to the battery as possible.
When using ultrasonic sensors, high level tank alarm sounds when power is turned off.
Ultrasonic sensors require power to operate correctly and will show a full tank when not powered.
State of Charge (SOC) stays at 100% even when the batteries are being discharged.
Check to make sure that when the batteries are being discharged the DC current is negative. If it is positive, reverse shunt sense wires.
Unexpected voltage readings are shown on meter.
Make sure that all of the battery grounds are connected to each other. The VSM uses one common ground reference.
AC current shows greater than zero but the power reading is zero or a negative value.
Reverse the AC current transformer leads. Follow WARNING on page 3 to avoid possibly lethal shock.
A calibration error screen keeps appearing.
Contact Blue Sea Systems Technical Support for repair or replacement.

EC DECLARATION OF CONFORMITY

Manufacturer: Blue Sea Systems
425 Sequoia Dr.
Bellingham, WA
98226 USA
(360) 738-8230

Product: Vessel Systems Monitor
VSM 422

The undersigned hereby declares, on behalf of Blue Sea Systems Inc., that the above-referenced product, to which this declaration relates, is in conformity with the provisions of the following Directive of the European Union:

EU 2004/108/EC/EMC Directive

The above-referenced product is in conformity with the following harmonized standards:

Shipboard Bridge-Deck Equipment

Conducted Emissions Standard:	IEC 60945:2002
Radiated Emissions Standard:	IEC 60945:2002
Electrostatic Discharge Immunity Standard:	IEC 60945:2002
Electrical Fast Transient/Burst Immunity Standard:	IEC 60945:2002

The Technical Construction File required by this Directive is maintained at the corporate headquarters of Blue Sea Systems Inc., 425 Sequoia Dr., Bellingham, Washington.

Scott Renne
President

WARRANTY

All Blue Sea Systems digital meters are warranted to be free from defects in materials or workmanship for three years from the date of first purchase.

“Date of first purchase” means:

(i) the date on which the product was purchased by the first retail customer.

(ii) the date on which the first retail customer purchases a vessel on which the product was installed.

Blue Sea Systems will (at its sole discretion) repair or replace any product which is:

(i) proven to be defective in materials or workmanship.

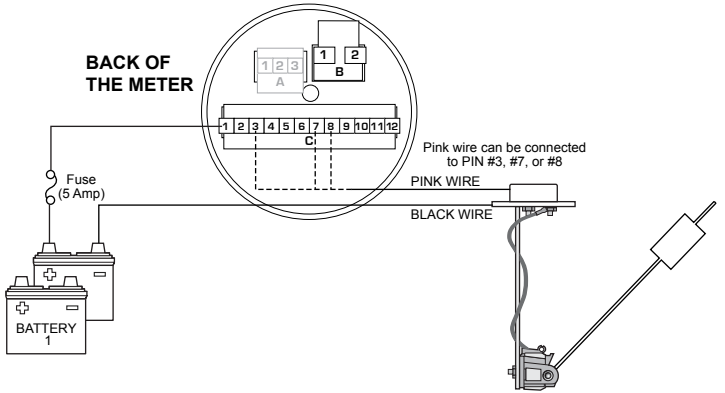
(ii) returned to Blue Sea Systems (or its agent) during the warranty period in accordance with this warranty.

Replacement products may be new or refurbished in as-new condition. Such repair or replacement will be the sole remedy by Blue Sea Systems under this warranty. Any repaired or replacement product will be warranted in accordance with this warranty, for the unexpired balance of the warranty period on the original product.

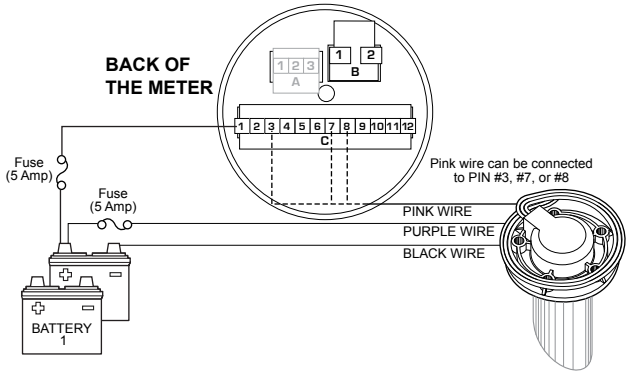
WARRANTY REGISTRATION

Blue Sea Systems is committed to exceptional customer service. Please allow us to serve you better by registering your product online at http://bluesea.com/viewresource/1325. If you would prefer to register your product by fax, please call (360) 738-8230 or Toll Free in the USA and Canada (800) 222-7617 for a fax-ready Warranty Registration card.

TANK LEVEL SENDER INSTALLATION DIAGRAMS

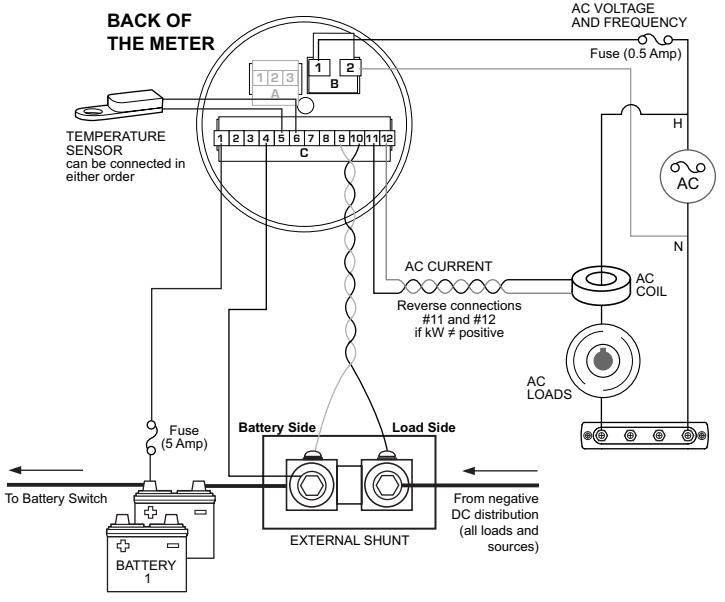


Resistive 2 Wire Sender



Ultrasonic 3 Wire Sender
PN 1810 and PN 1811

INSTALLATION DIAGRAM



Install shunt for DC current measurement:

IMPORTANT! The shunt must be installed in the negative line to avoid damage. Positive voltage applied to terminals #9 and #10 will cause damage to the meter.

Install the shunt at any point in the DC negative feed line.Short sense wires minimize voltage loss and interference, and result in the most accurate metering.

There must be no loads connected to the battery terminal or the shunt of Battery 1 or the Amp-Hour Function will not operate correctly.