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- Bilge Water Alarms & Bilge Pump Controllers
- Windlass Controller/Chain Counters
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- Smart Four-Step Alternator Regulators
- Marine Security System
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- Digital Oil Pressure Gauge/Alarm
- Digital Water Temperature Gauge/Alarm
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- Solar Panel Charge Controllers 6/8/9 & 20 Amps
- 4 & 8 Channel NMEA Combiners/RS-232 Convertors
- Engine/Exhaust Temp. Monitor & Digital Pyrometer
- NMEA 0183 Remote Data Repeaters/w 4 Input Channels

# CruzPro®

## VAH-60



## Volts Amps Amp-Hour Monitor

**A** key while reapplying power to the instrument.

Use the ▲ and ▼ keys to make the displayed value read correctly. Press the + key for 1/2 second to save the calibration data to memory.

The VAH60 is designed to tell you when you should recharge your battery and when you can stop charging *while actually using your boat*. Keeping the amp-hours remaining above 50% full charge at all times will optimize battery life and prevent a dead battery. The instrument is not intended to, or accurate enough to track the amp-hours for weeks on end while your boat is at the slip not being used. Small calibration and measurement errors will eventually accumulate and cause the displayed amp-hours to slowly drift away from the actual amp-hours remaining in the battery. To minimize the long-term drift you can program a amp-hours

### Introduction

The VAH-60 Battery Monitor provides accurate low cost digital instrumentation for batteries between 9.5 and 33 Volts. The VAH-60 displays battery voltage and charging or discharge current and tells you how much battery capacity has been consumed and how much is remaining. It keeps track of all current entering and leaving the battery and applies the appropriate Peukert's and efficiency factors. You can set Low and High voltage alarms and Low Amp-Hours Remaining alarms. When activated, the VAH60 built-in 85 dB alarm will sound and the display will flash. Five levels of backlighting can be selected and all setup, calibration constants and alarm values are saved to nonvolatile memory. The VAH-60 comes complete with a calibrated 150 Amp shunt to measure current.

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drift compensation value between 0 and 100 into the VAH60. The nominal drift compensation value is 55. To change the drift value turn OFF the power then press and hold both the ▼ and + keys when applying power to the VAH60. Use the ▲ and ▼ keys to set the desired value. Press the + key for 1/2 second to save the new value.

If the displayed amp-hours is drifting down faster than it should, increase the drift compensation value slightly. Decrease the drift compensation value slightly if the amp-hours is drifting up faster than it should.

NMEA 0183 Sentences

**Volts:** \$IIXDR,U,xx.x,V,VAH30\*CS

**Amps:** \$IIXDR,I,xxxx,A,VAH30\*CS

**A-H Remaining:** \$IIXDR,G,xxxx,,VAH30\*CS

\*CS = Check Sum

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## Specifications

**Power supply:** 9.5 to 33.0 VDC, .018 amps nom.

**Operating temperature:** 32 to 122 F ( 0 to 50 C)

**Size:** 2.5" dia X 4.1" deep (61mm x 104 mm).

**Accuracy:** Better than +/- 0.1 VDC for volts and +/-1 Amp for amps, front panel adjustable.

**Ranges:** Volts - 9.5 to 33.0 VDC  
 Amps - -150 to +150 amps  
 Amp-Hours - 100 to 3000 A/H  
 Capacity Remaining - 0 to 100%

**Shunt:** 100 amp/50mV to 600 amp/50mV (150 amp 50mV shunt supplied, standard)

**Alarms:** High, Low Voltage & Low Amp-Hours


**Display:** 4 digit LCD, 5 levels of backlighting.

**NMEA 0183:** \$IIXDR,U; \$IIXDR,I; \$IIXDR,G

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## Setup, Calibration and Adjustments

The VAH60 amps scale must be zeroed before first use. To make the ammeter read zero when no current is being used, press and hold the + key for 10 seconds (until you hear a long beep) while viewing Amps. The VAH60 will automatically zero the amps reading and save the auto-zero information into memory.

The VAH60 is calibrated at time of manufacture, but can be re-calibrated at any time using the front panel keys. To calibrate the voltmeter, remove power to the VAH60 then press and hold the  key while reapplying power to the instrument. Use the ▲ and ▼ keys to make the displayed value read correctly. Press the + key for 1/2 second to save the calibration data to memory. Similarly, to calibrate the Ammeter, press and hold the

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## Changing Peukert's Exponent

Peukert's Exponent relates how efficiently you can draw current from a battery. The faster you drain the battery, the smaller it appears to be. The default Peukert's Exponent is 1.25 (shown as 125), which is typical for many batteries. To change it, turn OFF the power then press and hold the **+** and **▲** keys while re-applying power to the instrument. You will see this display:



Use the **▲** and **▼** keys to set the desired value. Press the **+** key for 1/2 second to save the new value.

If your battery seems to discharge faster than what the VAH60 is telling you, increase Peukert's Exponent slightly. Lower the exponent if the reverse is true. The correct setting will depend upon how your battery was manufactured and its age, etc.

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## Installation

Before starting the installation, please read this entire section first. Be sure to install the bulkhead gasket before you install the instrument. Finger tighten the screws that mount the instrument bracket - do not use tools.

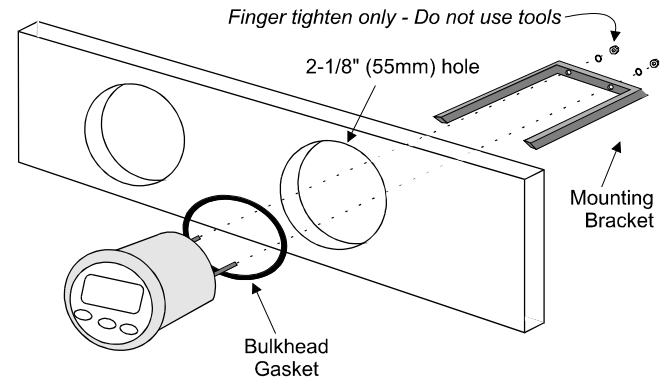


Figure 1

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## Setting Low Volts Alarm

While viewing battery Voltage, press the **▼** key for ten (10) seconds. You'll see:

Use the **▲** and **▼** keys to set the desired alarm value. Press the **+** key for 1/2 second to save the new alarm value.



## Setting Low Amp-Hours Alarm

The default Low Amp Hours Alarm value is 250 Amp-Hours. To change it, press and hold the **▼** key for ten (10) seconds while viewing Amp-Hours. You will hear a beep and see:

Use the **▲** and **▼** keys to change it. Press the **+** key for 1/2 second to save the new value.



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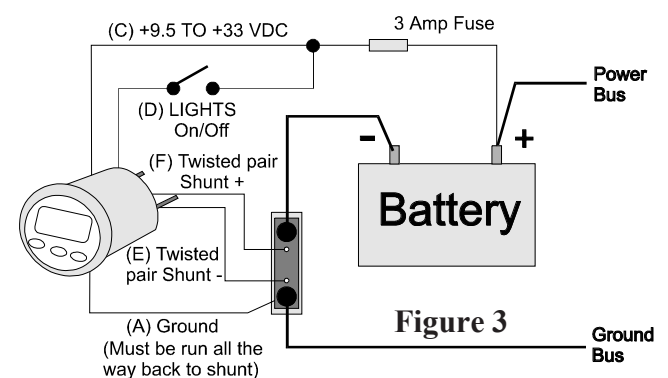


Figure 3

● Carefully check all your wiring against those shown in Figures 2 and 3. **Ground wire (A) must run all the way back to the shunt - do not share this wire with any other signal.** Be sure the bulkhead gasket is in place and use only finger tension to tighten the bracket hold-down nuts **Do not overtighten the bracket or you may damage the case - you do not need to use tools to tighten the nuts.**

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- Drill a 2-1/8" (55mm) mounting hole where you desire to mount the instrument (Figure 1).
- Bring the shunt wires, ground, and power lines out of the mounting hole and use a small flat screwdriver to make the connections to the screw terminal on the instrument case back as shown in Figure 2 and Figure 3.

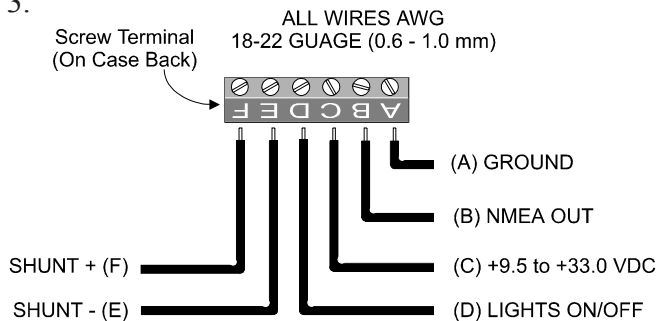


Figure 2

### Changing Battery Capacity

The default Battery Capacity is 500 Amp-Hours. To change it turn OFF the power, press and hold the ▲ key while re-applying power to the instrument. You'll see



this display: Use the ▲ and ▼ keys to change it. Press the + key to save it.




### Changing Charge Efficiency

The Default Charge Efficiency is 90% (meaning you can get 90% of what you put into the battery back out). To change it, turn OFF the power, press and hold both the ▲ and ▼ keys and re-apply power to the instrument. The Charge Efficiency is displayed. Use the ▲ and ▼ keys to change it. Press the + key for 1/2 second to save the new value to memory.

## Operation

**Important** - Be sure to read "Set-Up ..." page 13.

### Key Functions

The    keys are used to select what to display, set backlight level, calibration, toggle alarms on/off and set/change alarms and constants.






### Turning Alarms ON/OFF

Press the ▲ key 1/2 second to turn alarms ON. Press the ▼ key 1/2 second to turn alarms OFF. In Voltage mode, the decimal point blinks when the alarms are ON.

### Backlight Intensity

Press + the key to adjust the backlight level for nighttime viewing. Each time you press the "+" key, the level will get brighter 1, 2, 3, 4, OFF, 1, 2, ... etc.

### Display Volts/Amps/A-H/ A-H% Remaining

Quickpress the ,  or  keys to select Battery Voltage, Amps or Amp-Hours display. To display the Capacity Remaining (Amp-Hours % Remaining), quick press the  and  keys simultaneously.

### Setting High Volts Alarm

While viewing battery Voltage, press and hold the ▲ key for ten (10) seconds. You will hear a beep and see the following display:



Use the ▲ and ▼ keys to set the desired alarm value. Press + the key for 1/2 second to save the High Voltage Alarm value to memory and return to the Voltage display mode.