CruzPro®

VAH-65

Advanced
3 Bank Volts,
1 Bank Amps/Amp-Hour
Monitor/w Alarms & NMEA 0183

To set the lower charge control output limit in percent (charger turn-ON point), press both the ✚ and ▲ keys to display Amp-Hours Remaining in percent. Then hold down both the ▼ key for 10 seconds (until you hear a long beep). The lower charge control limit will be displayed in percent. Use the ▼ and ▲ keys to set the desired value. Press the ✚ key to save the new value to memory.

Resetting Amp-Hours Remaining

While viewing Amp-Hours Remaining, press and hold the ▲ key for 10 seconds (until you hear a long beep). The Amp-Hours Remaining will be reset to the full amp-hour capacity of the battery.

Introduction

The VAH-65 Battery Monitor provides accurate instrumentation for 3 banks of batteries between 9.5 and 33.0 Volts. The VAH-65 displays voltage for three banks and amps or amp-hours for your house bank. It tracks all current entering and leaving the house bank and applies Peukert's and efficiency factors. You can set Low and High voltage alarms and Low Amp-Hours Remaining alarms. When activated, the built-in 85 dB alarm will sound and the display will flash. The VAH-65 outputs NMEA 0183 serial data or the data line can be programmed as an external alarm output or as a charger ON/OFF control. Five levels of backlighting can be selected and all set-up, calibration constants and alarm values are saved to nonvolatile memory. The VAH-65 comes complete with a precision shunt and is designed to work with 50 to 600 amp 50mV shunts.

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http://www.cruzpro.com   Made in New Zealand

Notes and Warnings

a) When setting functions that require you to hold down a key while applying power - turn OFF the power first, then hold the key(s) down during and for at least 3 seconds AFTER the power has been reapplied.

b) A display of " **- - - -** " means the unit thinks the amp reading is greater than -450 amps (450 amps is the limit for calculating discharge current).

c) It is ***important*** to run a *dedicated* ground wire from pin A all the way back to the shunt negative terminal. Do not share this ground wire with any other equipment. Use a separate wire - do not share this connection with the shunt- signal wire.

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% +/-1 Amp for amps, front panel adjustable.

Ranges: Volts 1,2 & 3 -   9.5 to 33.0 VDC
         Amps   -   -450 to 450 Amps
         Amp-Hours   -   100 to 3000 A/H
         Capacity Remaining - 0 to 100%

Shunt: 450 Amp 50mV shunt.

Alarms: High, Low Voltage & Low Amp-Hours

Display: 4 digit LCD, 5 levels of backlighting.

Output Signal: NMEA 0183, External Alarm or
         Automatic Charger Control

Setting Charge Control ON/OFF Limits

If the Charger Control function is selected for screw terminal (B), the VAH65 can be programmed to turn a charger on/off automatically when required, depending on Amp-Hours Remaining. The factory default value is to switch the charge source ON when Amp-Hours Remaining drops down to 50% of battery capacity and switch OFF when Amp-Hours Remaining is back up to 90% of battery capacity. Screw terminal (B) will output a +5V signal when the charger is to be activated.

To set the upper charge control output limit (charger turn OFF point) in percent, press both the ✚ and ▲ keys to display Amp-Hours Remaining in percent. Then hold down the ▲ key for 10 seconds (until you hear a long beep). The upper charge control limit will be displayed in percent.   Use the ▼ and ▲ keys to set the desired value. Press the ✚ key to save the new value to memory.

Select NMEA, Ext. Alarm or Charger Control Output

Screw terminal pin (B) can be programmed as a NMEA 0183 data output, External Alarm Output or as a Charger ON/OFF Control line. The factory default is NMEA 0183 serial data.

To toggle Screw Terminal Pin (B) between NMEA 0183, External Alarm Output and Charger Control, press and hold down both the ▼ and ▲ keys for 10 seconds (until you hear a long beep). The display will toggle between showing "dAtA", "E-AL" or "-CC-" to show you which mode is selected. The new output mode is automatically saved to memory.

A 5V signal (10 mA Max.) is output on screw terminal (B) whenever an alarm condition exists and the alarms are enabled or whenever a charger is to be turned ON automatically.

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.**
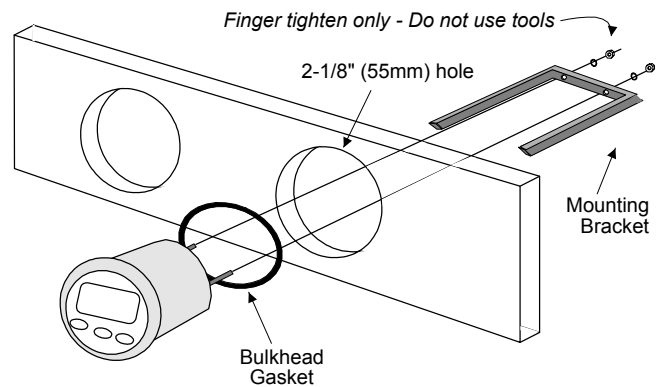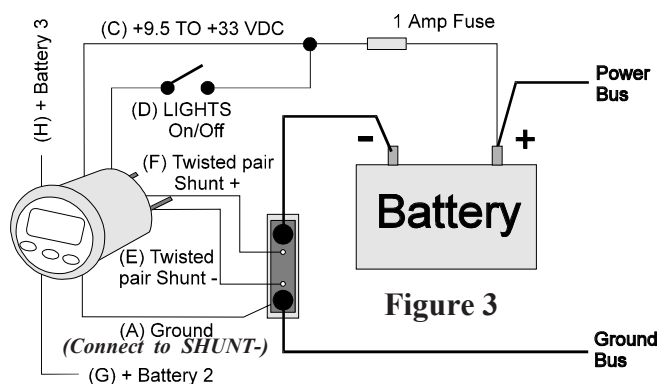

Finger tighten only - Do not use tools
2-1/8" (55mm) hole
Mounting Bracket
Bulkhead Gasket

Figure 1

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discussed above, then press and hold the **A** key while applying 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 amps calibration data to memory.

The VAH65 is not 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 drift compensation value between 0 and 100 into the VAH65. The nominal drift compensation value is 55. To change the amp-hour drift value press and hold both the ▼ and ✚ keys when applying power to the VAH65. Use the ▲

(H) + Battery 3
(C) +9.5 TO +33 VDC
1 Amp Fuse
Power Bus
(D) LIGHTS On/Off
(F) Twisted pair Shunt +
Battery
(E) Twisted pair Shunt -
Figure 3
(A) Ground *(Connect to SHUNT-)*
(G) + Battery 2
Ground Bus

● Carefully check all your wiring against figures 2 and 3. You can then mount the VAH65 in the instrument hole. Insure that 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. Check the Notes and Warning on page 19 for wiring the ground connection.*

● 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 screw-driver to make the connections to the screw terminal on the instrument case back as shown in Figure 2 and Figure 3.
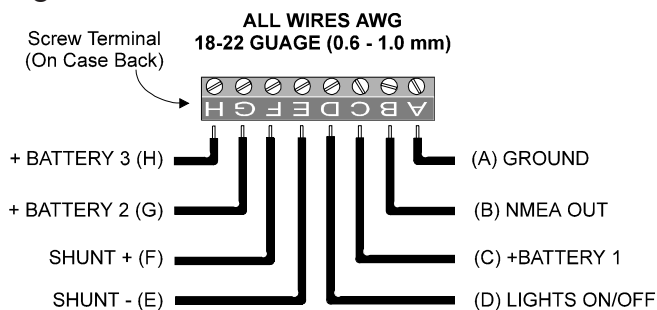

ALL WIRES AWG 18-22 GUAGE (0.6 - 1.0 mm)

Screw Terminal (On Case Back)

A B C D E F G H

+ BATTERY 3 (H) (A) GROUND
+ BATTERY 2 (G) (B) NMEA OUT
SHUNT + (F) (C) +BATTERY 1
SHUNT - (E) (D) LIGHTS ON/OFF

Figure 2

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

The VAH65 can output serial data of battery voltage, amps and amp-hours remaining in NMEA 0183 format. The sentences are output on screw terminal (B) in the following formats:

Volts: $IIXDR,U,xx.x,V,VAH35*CS
Amps: $IIXDR,I,xxxx,A,VAH35*CS
A-H Remaining: $IIXDR,G,xxxx,,VAH35*CS
*CS = Check Sum

Operation

Key Functions

▽   ✛   △

The (V) (A) (H) keys are used to select what to display, backlights, calibrate volts/amps, turn alarms on/off, set alarms and set/change con-stants. New information is automatically saved to memory when the ✛ key is pressed.

Turning Alarms ON/OFF

Press the ▲ key 1/2 second to turn alarms ON. In Voltage mode, the Battery 1 icon will blink. Press the ▼ key 1/2 second to turn the alarms OFF.

Backlight Intensity

Press ✛ the key 1/2 second to adjust the backlight level for night viewing. Each time you press the ✛ key 1/2 second, the level will get brighter 1, 2, 3, 4, OFF,

Calibration/Zeroing/Adjusting Amp-Hour Drift

The VAH-65 is calibrated at time of manufacture, but can be calibrated using the front panel keys. To calibrate the voltmeter, press and hold the (V) key while applying 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.

To make the ammeter read zero when no current is being used, press and hold the ✛ key for 10 seconds while viewing Amps. The VAH65 will display "AUTO", automatically zero the reading and save the auto-zero information into memory.

To calibrate the Ammeter, first zero the amps scale as

Changing Peukert's Exponent

Peukert's Exponent relates how efficiently you can draw current from a battery. Because of inefficiencies, the faster you drain the battery, the smaller the battery appears to be. The default Peukert's Exponent is 1.25 (shown as 125), which is typical for many batteries. To change Peukert's Exponent, press and hold the ✚ and ▲ keys while applying power to the instrument. Peukert's exponent will be displayed. 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 VAH-65 is telling you, try increasing Peukert's Exponent slightly. Lower the exponent if the reverse is true. The correct setting will depend upon how your battery was manufactured and it's age, etc.

1, 2, ... etc. Screw terminal pin (D) must be switched ON for the backlights to work.

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

Quick press the (V), (A) or (H) keys to select Battery Voltage, Amps or Amp-Hours display. Pressing the (V) key repeatedly will step the display through Battery 1, 2, 3, 1, etc. To display the Capacity Remaining (Amp-Hours % Remaining), press the (A) and (H) keys simultaneously.

Setting High Volts Alarm

While viewing Battery #1 volts, press and hold the ▲ key for ten (10) seconds (until you hear a long beep).

The High Volts alarm value will be displayed. Use the ▼ and ▲ keys to set the desired alarm value. Press the ✚ key for 1/2 second to save the High Volts Alarm value to memory.

Setting Low Volts Alarm

While viewing Battery #1 volts, press the ▼ key for ten (10) seconds. You will hear a beep and the Low Volts alarm value will be displayed. 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

While viewing Amp-Hours, press and hold the ▼ key for ten (10) seconds (until you hear a long beep). The Low Amp-Hours alarm value will be displayed. Use the ▼ and ▲ keys to change it. Press the ✚ key

for 1/2 second to save the new value.

Changing Battery Capacity

Press and hold the ▲ key while applying power to the VAH65. The Battery Capacity (in Amp-Hours) will be displayed. Use the ▼ and ▲ keys to change it. Press the ✚ key for 1/2 second to save it.

Changing Charge Efficiency

The Default Charge Efficiency is 80% (meaning you get back 80% of what you put into the battery. To change it, press and hold both the ▼ and ▲ keys and apply power to the VAH65. Charge Efficiency % is displayed. Use the ▼ and ▲ keys to change it. Press the ✚ key for 1/2 second to save the new value.