


Thank you for purchasing a TBS Electronics Battery Monitor.

Please read this owner's manual for information about using the product correctly and safely. Keep this owner's manual close to the battery monitor for future reference.

TBS ELECTRONICS BV

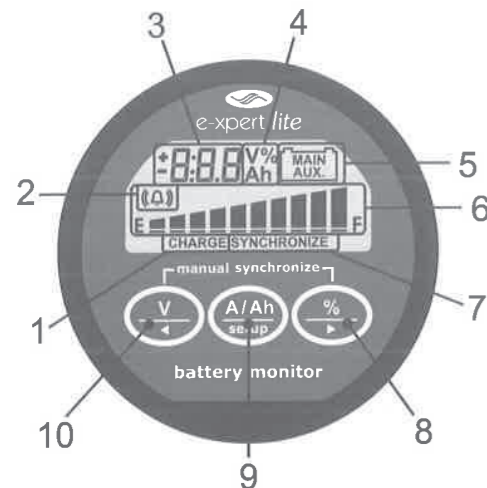
De Marowijne 3, 1689AR, Zwaag, The Netherlands

http://www.tbs-electronics.com

Kerkenbos 1015, 6546 BB Nijmegen • info@allpa.nl 

Before proceeding with this owner's manual, please make sure you have carefully read the enclosed installation guide as well!

1. E-xpert lite display and control overview



1. Charge battery indicator
2. Alarm activated indicator
3. Numeric value indicator field
4. Readout units
5. Main battery or Auxiliary battery indicator
6. State-of-charge bar
7. Synchronize indicator
8. Select State-of-charge readout, or next value (>)
9. Select current (A) or Amphour (Ah) readout, or enter / leave Setup menu
10. Select voltage readout (Main or Auxiliary), or previous value (<)

2. Synchronisation

In order to keep your battery monitor delivering accurate status information about your battery, it is important to regularly synchronize your battery monitor with your battery. As explained in the quick start guide, a synchronisation step is also needed before you can actually use your battery monitor. During operation, the battery monitor automatically indicates when a synchronisation is required, by displaying the message SYNCHRONIZE.

A synchronisation step means nothing more than performing a complete charge cycle on your battery. A charge cycle will be considered complete when all discharged energy is restored in the battery and both Auto-sync parameters F02 and F03 are met during at least 4 minutes. This typically means: when the battery charger switches to float mode. By meeting these conditions, the battery is considered full, which will be indicated by a flashing FULL message on the display. Besides this, the State-of-charge readout will be set to 100% and the Amphour readout reset to 0Ah. The FULL message will disappear when a key is pressed, or automatically, when the battery starts discharging again.

Performing synchronisations regularly is also important to keep your battery healthy and to increase its lifetime. You will notice that if you are often performing full charge cycles yourselves, the battery monitor will most likely not display the SYNCHRONIZE message, since the battery is already kept in good sync with the battery monitor.

Besides automatic synchronisations based on meeting the Auto-Sync Functions, you can also manually synchronize the battery monitor with your battery when you are sure your battery is fully charged. This can be accomplished by pressing both < and > keys simultaneously for three seconds. After these three seconds, the flashing FULL message appears on the the display just like when it is automatically synchronized.

3. Setup menu

Using the Setup menu, your battery monitor can be adjusted to fit into your system. A number of parameters, called Functions, can be set according to your needs. This menu can be accessed by the following sequence:



When the Setup menu is entered, you can use the < and > keys to browse through the different Functions. By pressing the SETUP key, the selected Function value can be viewed. The < and > keys can now be used to change this value. Pressing the SETUP key again, will then step back to the Setup menu. From any menu position, the Normal Operating Mode can be accessed again by pressing the SETUP key for 3 seconds. This will also save any Function value changes to internal memory. When no keys are pressed for 90 seconds while operating in the Setup menu, the battery monitor will automatically return to the Normal Operating Mode again without saving any Function value changes.

The factory settings are based on a 12V battery system with a capacity of 200Ah. For 12V systems, generally only Function F01 has to be checked for correct operation of your battery monitor. When your battery capacity is other than 200Ah, Function F01 has to be changed to a value that is equal to your battery capacity. All other Functions can be left unchanged if you are uncertain about adjusting these values yourselves.

When your battery system is 24V, besides checking battery capacity Function F01 for the correct value, you should also change the values of F02 and F05. Default 24V system values for F02 and F05 are respectively 26.4V and 21.0V.

The following Functions are available:

F01	Battery capacity. Your Main battery's C20 capacity in Amphours (Ah). Default : 200Ah Range : 20 - 999Ah Step size : 1Ah
F02	Charger's float voltage (Auto-sync parameter). This value must be equal to your battery charger's float voltage, which is the last stage of the charging process. In this stage the battery is considered full. Default : 13.2V Range : 8.0V - 33.0V Step size : 0.1V
F03	Charger's float current (Auto-sync parameter). When the charge current is below this percentage of the battery capacity (see Function F01), the battery will be considered as fully charged. Make sure this Function value is always greater than the minimum current at which the charger maintains the battery or stops charging. Default : 2.0% Range : 0.5 - 10.0% Step size : 0.1%
F04	Low battery alarm On (% SOC). When the State-of-charge percentage has fallen below this value, the alarm relay will be activated, the Charge battery indicator starts flashing and the State-of-charge bar is empty. Default : 50% Range : 0 - 99% Step size : 1%
F05	Low battery alarm On (Volts). When the battery voltage has fallen below this value, the alarm relay will be activated. Default : 10.5V Range : 8.0 - 33.0V Step size : 0.1V
F06	Low battery alarm Off (% SOC). When the State-of-charge percentage has risen above this value and the alarm relay was activated, the alarm relay will deactivate again. When "FULL" is selected, the alarm relay is deactivated when the Auto-sync parameters are met. Default : 80% Range : 1 - 100% / FULL Step size : 1%
F07	Peukert's exponent. The Peukert's exponent represents the effect of reducing battery capacity at higher discharge rates. When the Peukert value of your battery is unknown, it is recommended to keep this value at 1.25. A value of 1.00 disables the Peukert compensation and could be used for Lithium based batteries. Default : 1.25 Range : 1.00 - 1.50 Step size : 0.01

F08	Shunt Amp Rating. This Function represents the Amp rating of your shunt at 50mV. Included with your battery monitor is a 500Amp/50mV shunt, meaning that at 500A flowing through the shunt, a voltage of 50mV is generated across the small 'Kelvin' screw terminals of the shunt. This voltage will be used by the battery monitor to measure the amount of current. Default : 500A Range : 10 - 900A Step size : variable
F09	Backlight mode. Represents the duration of backlight activation in seconds after key-press. The backlight can also be set to be always "ON" or always "OFF". Function setting "AU", activates the backlight automatically when charge / discharge current exceeds 1Amp or when a key is pressed. Default : 30sec Range : OFF / 5...300 / ON / AU Step size : variable
F10	Alarm contact polarity. Enables selection between a normally open (NO) or normally closed (NC) contact. Default : NO Range : NO / NC
F11	Auto-sync sensitivity. Only change this setting when F02 and F03 are set correctly and automatic synchronization still fails. If automatic synchronization takes too long or does never occur, lower this value. When the battery monitor synchronizes too early, increase this value. Default : 5 Range : 0 - 10 Step size : 1
F12	Firmware version. Displays the firmware version of the battery monitor (read only). Default : x.xx

The last two Functions are so-called Reset Functions. By pressing the SETUP key the selected Reset Function can be viewed. The default value for all Reset Functions is "OFF". To actually reset the selected Function, use the < and > keys to change the value from "OFF" to "ON". Pressing the SETUP key again, will step back to the Setup menu. All reset items set to "ON" will only be reset once the Normal Operating Mode is accessed again by pressing the SETUP key for 3 seconds. The following Reset Functions are available:

r.b	Reset Battery status. Use this reset item to reset your current battery status, for example after you have installed a fresh battery of the same specifications as the previous one.
r.F	Reset Functions. This reset item can be used to reset all Function values to factory default values.
r.c	Reset zero-offset current. Use this reset item to remove small current readings on the display when no current is flowing in- or out of the battery. When performing this reset action, please be 100% sure that all DC consumers/chargers are disconnected or turned off.

4. Warranty conditions

TBS Electronics (TBS) warrants this product to be free from defects in workmanship or materials for 24 months from the date of purchase. During this period TBS will repair the defective product free of charge. TBS is not responsible for any costs of the transport of this product.

This warranty is void if the product has suffered any physical damage or alteration, either internally or externally, and does not cover damage arising from improper use¹⁾ or from use in an unsuitable environment.

This warranty will not apply where the product has been misused, neglected, improperly installed or repaired by anyone other than TBS. TBS is not responsible for any loss, damage or costs arising from improper use, use in an unsuitable environment or improper installing, setup and malfunctioning of the product.

Since TBS cannot control the use and installation (according to local regulations) of their products, the customer is always responsible for the actual use of these products. TBS products are not designed for use as critical components in life support devices or systems, that can potentially harm humans and/or the environment. The customer is always responsible when implementing TBS products in these kind of applications. TBS does not accept any responsibility for any violation of patents or other rights of third parties, resulting from the use of the TBS product. TBS keeps the right to change product specifications without previous notice.

¹⁾Examples of improper use are:

- too high input voltage applied
- wrong shunt connection
- applying battery voltage to shunt input
- mechanically stressed enclosure or internals due to harsh handling and/or incorrect packaging
- contact with any liquids or oxidation caused by condensation

5. Technical specifications

Parameter	E-xpert lite
Supply voltage range	9..35VDC
Supply current ¹⁾ :	
@Vin=24VDC	7mA
@Vin=12VDC	9mA
Input voltage range (auxiliary battery)	2..35VDC
Input voltage range (main battery)	0..35VDC
Input current range ¹⁾	-999..+999A
Battery capacity range	20..999Ah

Operating temperature range	-20..+50°C
Readout resolution:	
voltage (0..35V)	± 0.1V
current (0..100A)	± 0.1A
current (100..999A)	± 1A
amphours (0..99Ah)	± 0.1Ah
amphours (100..999Ah)	± 1Ah
state-of-charge (0..100%)	± 0.1%
Voltage measurement accuracy	± 0.3%
Current measurement accuracy	± 0.4%
Dimensions:	
frontpanel	ø 64mm
body diameter	ø 52mm
total depth	79mm
Weight	95grams
Shunt dimensions:	
footprint	45 x 87mm
height	17mm (base) / 35mm (M8 screws)
weight	145 grams
Protection class	IP20 (frontpanel only IP 65)
Accessories	- E-xpert professional connection kits - E-xpert quick connection kits

Note: the given specifications are subject to change without notice.

¹⁾ Measured with backlight and alarm relay turned off.
²⁾ Depends on selected shunt. With standard delivered 500A/50mV shunt (350A continuous), the range is limited to -600..+600A.

6. Declaration of conformity



MANUFACTURER : TBS Electronics BV
ADDRESS : De Marowijne 3
1689 AR Zwaag
The Netherlands

Declares that the following products:

PRODUCT TYPE : BATTERY MONITOR
MODEL : e-xpert lite

Conforms to the requirements of the following Directives of the European Union:
EMC Directive 2004/108/EC
RoHS Directive 2002/95/EC

The above product is in conformity with the following harmonized standards:
EN61000-6-3: 2001 EMC - Generic Emissions Standard
EN61000-6-2: 2005 EMC - Generic Immunity Standard



INSTALLATION GUIDE

Please read this document very carefully to avoid battery monitor malfunction and/or fire hazards!



INSTALLATIE VOORSCHRIFT

Bestudeer dit document uiterst zorgvuldig om schade aan de batterij monitor en/of brandgevaar te voorkomen!



MONTAGEANLEITUNG

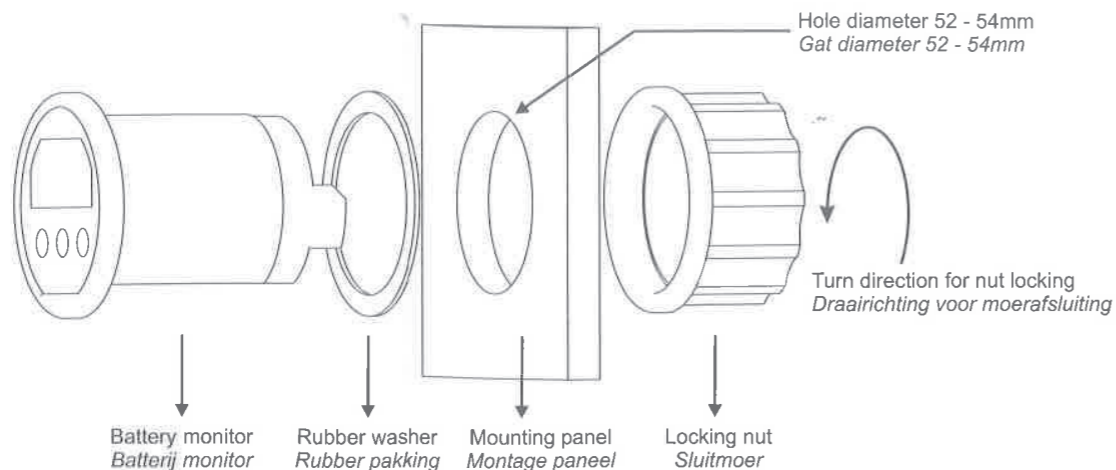
Bitte lesen Sie diese Montageanleitung sorgfältig durch, damit Ihr Batterie Monitor richtig arbeitet und/oder es zu keinem Brand kommt!



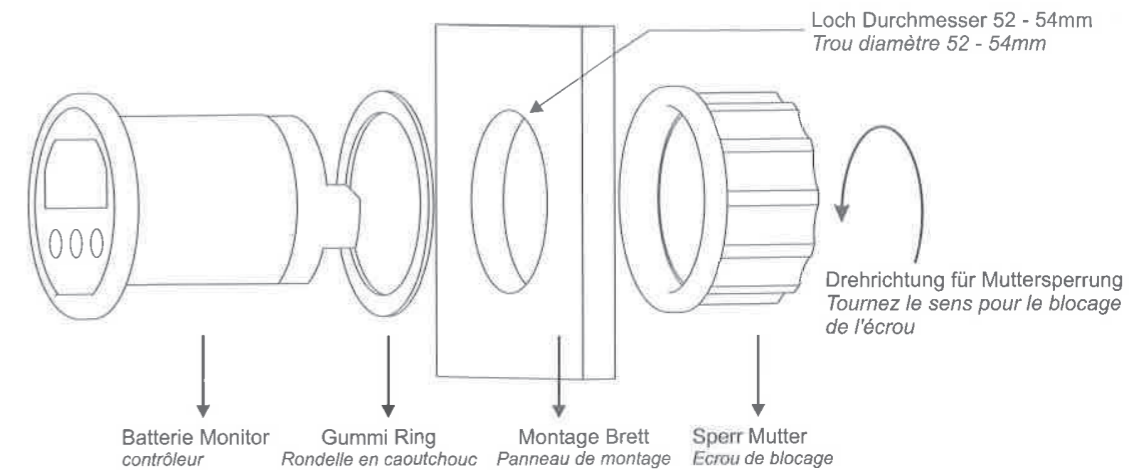
INSTRUCTIONS D'INSTALLATION

Veuillez les respecter scrupuleusement pour éviter tout dysfonctionnement et/ou risques d'incidents.

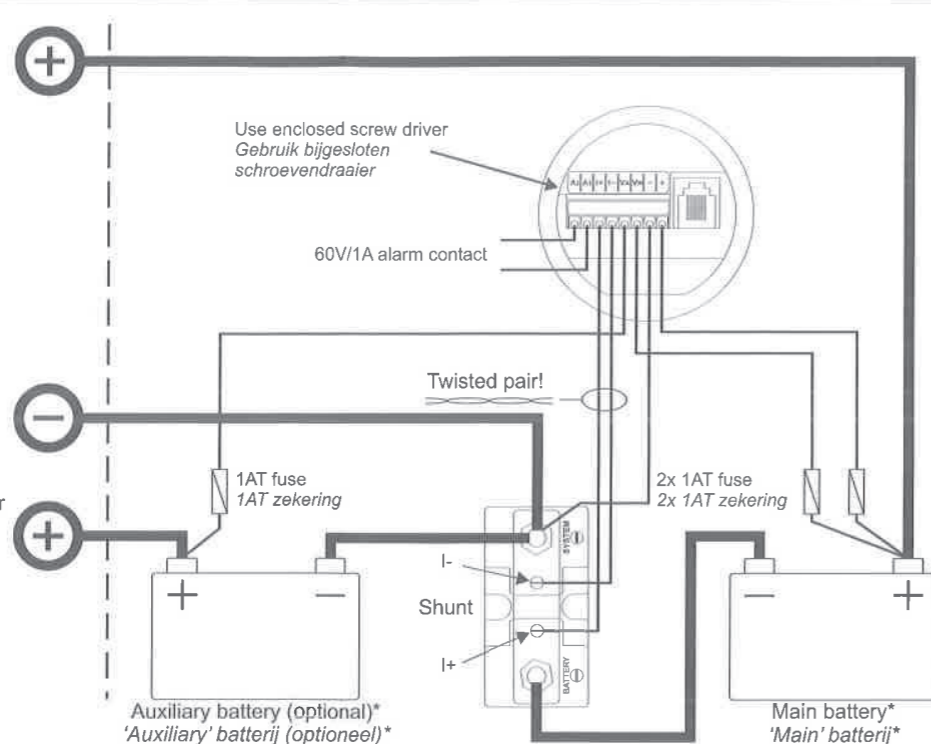
Mounting sequence
Montage volgorde



Montage Folge
Séquence de montage



Battery positive 'MAIN' (to load e.g. charger or inverter)
Batterij positief 'MAIN' (naar belasting b.v. lader of omvormer)

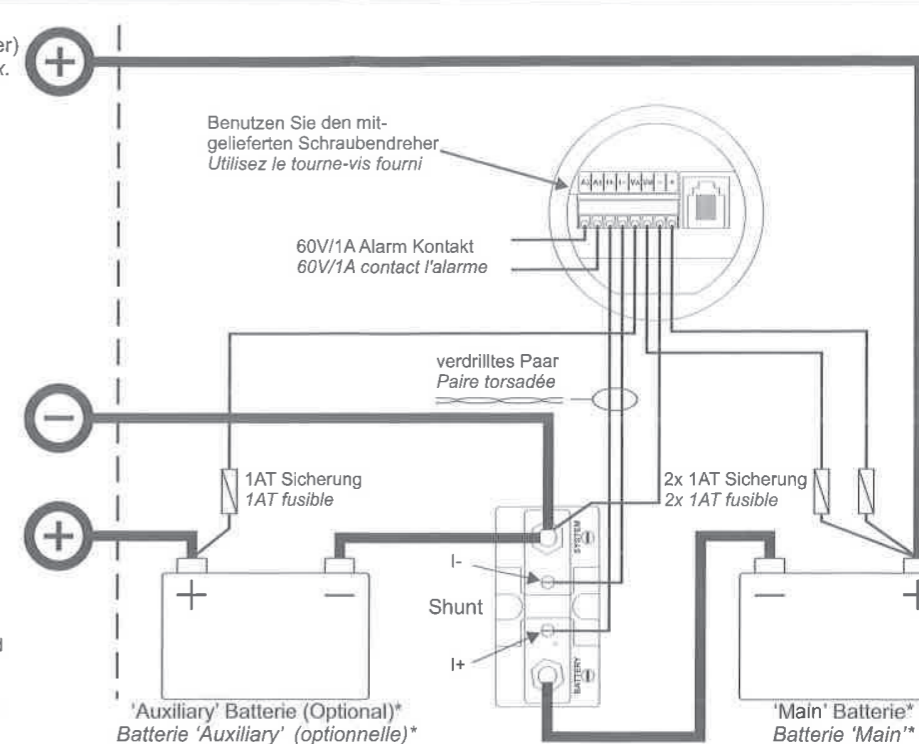


Battery negative (system ground)
Batterij negatief (systeem min)

Battery positive 'AUX' (to load e.g. charger or starter motor)
Batterij positief 'AUX' (naar belasting b.v. lader of startmotor)

- * Make sure the batteries you install are always in good health, preferably fully charged
- * Installeer alleen 'gezonde', bij voorkeur reeds volledig geladen, batterijen

Batterie Pluspol 'MAIN' (zu den Verbrauchern z.B. Ladegerät oder Inverter)
Positif batterie 'MAIN' (vers utilisations ex. Chargeur / convertisseur)



Batterie Minuspol (Systemerde)
Négatif batterie (- système)

Batterie Pluspol 'AUX' (zu den Verbrauchern z.B. Ladegerät)
Positif batterie 'AUX' (vers utilisations ex. Chargeur)

- * Vergewissern Sie sich, dass die von Ihnen eingebauten Batterien in gutem Zustand und am besten voll aufgeladen sind.
- * Assurez-vous que les batteries que vous installez sont toujours saines, de préférence chargées.



The shunt must always be installed into the **negative** line! Installing the shunt into the positive line may damage the battery monitor!



All fuses must be located as close as possible to the battery terminals. **Install the fuses only when all other connections are made and double checked!**



All **thick** lines in the above connection diagram, represent the main current lines. These lines must be wired with a wire type which can handle the full battery current!

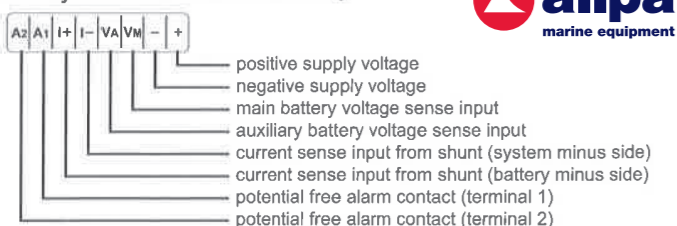


All thin lines (from and to battery monitor) in the above connection diagram, must have a minimum thickness of AWG24/0.2mm². Maximum distance between battery monitor and shunt is 30 meters.



To avoid large errors in current measurement, always twist the 'I+' and 'I-' shunt lines. Connect all wires to the shunt **exactly** as given in the connection diagram.

Battery monitor connection terminals :



De shunt moet altijd worden opgenomen in de **minleiding**. De batterij monitor kan beschadigen wanneer de shunt in de plusleiding wordt opgenomen!



Alle zekeringen moeten zo dicht mogelijk bij de batterij polen geplaatst worden. **Installeer de zekeringen pas wanneer alle overige aansluitingen gemaakt en nogmaals gecontroleerd zijn!**



Alle **vet** getekende lijnen in bovenstaand aansluitschema, geven het hoofdstroom circuit aan. Deze lijnen dienen bedraad te worden met een kabel diameter welke geschikt is voor de maximale batterij stroom.



Alle **dun** getekende lijnen (van en naar de batterij monitor) in bovenstaand schema, moeten minimaal een oppervlakte hebben van 0.2mm². De maximale afstand tussen batterij monitor en shunt is 30 meter.



Om grote meetfouten te voorkomen, moeten de 'I+' en 'I-' lijnen altijd in elkaar getwist worden. Zorg ervoor dat alle draden van en naar de shunt, exact zo aangesloten worden zoals aangegeven in bovenstaand schema!

Battery monitor aansluitingen :



Der Shunt muß immer in die **negative** Hauptversorgungsleitung angebracht werden. Das Anbringen des Shunts in die positive Leitung kann den Batterie Monitor beschädigen!



Alle Sicherungen muss sich so nah wie möglich an den Batterieanschlüssen befinden. Installieren Sie die Sicherungen erst dann, wenn alle anderen Anschlüsse verbunden und überprüft wurden!



Alle **dicken** Linien in der obigen Anschlusszeichnung stellen die Hauptstromleitungen dar. Diese Leitungen müssen mit Kabeln gezogen werden, die mit dem vollen Batteriestrom belastet werden können!

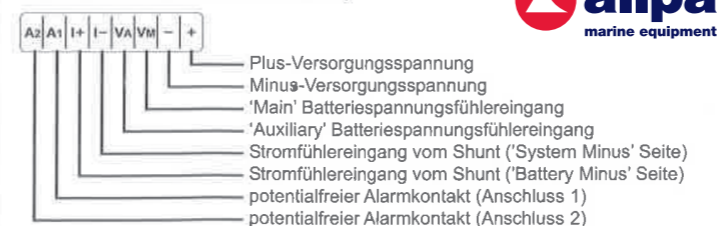


Alle **dünnen** Linien (vom und zum Batteriemonitor) in der obigen Anschlusszeichnung stellen Leitungen dar, die eine Minimal Querschnitt von AWG24/0,2mm² aufweisen müssen. Die maximale Entfernung zwischen Batteriemonitor und Shunt beträgt 30 Meter.



Um größeren Fehlern in der Strommessung vorzubeugen, verdrillen Sie die Shuntleitungen „I+“ und „I-“. Verbinden Sie alle Drähte mit dem Shunt auf genau die Weise, die in der Anschlusszeichnung angegeben wird!

Batterie Monitor Anschlussklemmen :



Le Shunt doit toujours être installé sur le **négatif** (câble noir)! Installer le Shunt sur le positif (câble rouge), endommagerait le contrôleur de batterie!



Tous les fusibles doivent être situés aussi près que possible des bornes de la batterie. Installez les fusibles uniquement lorsque toutes les autres connexions sont faites et que vous les avez à nouveau vérifiées.



Toutes les lignes épaisses du diagramme de connexion, représentent les lignes de courant principal. Ces lignes doivent être câblées avec un type de câble qui peut supporter le courant de la batterie pleine!



Toutes les lignes fines (depuis et vers le moniteur de la batterie) dans le diagramme de connexion ci-dessus, doivent avoir une épaisseur minimum de AWG24/0,2mm². La distance maximum entre le moniteur de la batterie et le shunt est 30 mètres.



Pour éviter de grosses erreurs de mesure de courant, veuillez toujours tourner les lignes shunt 'I+' et 'I-'. Connectez tous les câbles au shunt exactement comme indiqué sur le diagramme de connexion.

Raccordement de contrôleur :

