



INVOICE

Invoice No: F20180524-035 1(8)

Customer No: 1382

Lorenzo Medici

Torpvägen 7

147 63 Uttran

Marin Elkraft och Elektronik

Referens: Offer 2018-021R1 Work completed: 2018-05-24
 Beskrivning: **Li-Ion batteries, relocation of the Batteribox and the shore power transformer.**
 Båt: M/S Olivia
 Plats: Biskopsuddens Marina and Norr Mälarstrand.

This invoice is the final invoice for the work listed in offer 2018-021R1,
 The payment for the up-front invoice is deducted.
 Some additional work has been performed, some on your request, and some forced by unforeseen circumstances.

See page 2 for specification of material.
 See page 3 for warranty.
 See page 4-8 for description of the installation.

Posts	Qty	A-price ex. moms	Tot row ex. Moms	Info Tot row incl. moms
Per Offert 2018-021R1	1	162 525 kr	162 525 kr	203 156 kr
Labour related to additional work.	24	840 kr	20 160 kr	25 200 kr
- Rearranging the 24V installation och the Stb engine room wall.				
- New main switch by the machineroom door.				
- New charger for the Li-ion battery installed.				
- Moving the old charger, connecting it to start battery only.				
- Building and installing a controlbox for the inverter and shorepower, with a remote switch in the bedroom electrical cabinet.				
- Fault insulation of the ground shortage found in the windshield whiper, also causing many hours of dubious thoughts and trials regarding the alternator.				
- Installation of a Wi-Fi transmitter.				
Material related to additional work.				
- Charger, Victron Skylla TG 24/50	1	8 656 kr	8 656 kr	10 820 kr
- Controlbox, Shore v.s. Inverter power	1	1 871 kr	1 871 kr	2 338 kr
- Single main switch at machinroom door	1	612 kr	612 kr	765 kr
- Wi-Fi transmitter, USB-WIFI Starteck	1	881 kr	881 kr	1 102 kr
- Box for Controlpanel Color Control.	1	441 kr	441 kr	551 kr
- V-belts 13x875	2	83 kr	166 kr	208 kr
- Fuseholder Terminal on the Alternator	1	237 kr	237 kr	296 kr
- Fuses Terminal 225A, one installed, one spare.	2	160 kr	320 kr	400 kr
Total additional work			33 343 kr	41 679 kr
Total, Offer and additional work			195 868 kr	244 835 kr
Already paid per up-front invoice F20180412-021	1	-108 281 kr	-108 281 kr	-135 351 kr
Summary left to pay from offer and additional work.		exclusive moms	87 587 kr	
		moms	21 897 kr	
Amount to pay to Bankgiro 689-5155		inclusive moms	109 484 kr	

Due date 2018-06-23.

Normally the due date would be 2018-06-13, 20 days from when the work was completed. But since the invoice is issued late an additional 10 days has been added.

Best Regards / Med vänlig hälsning 2018-06-10

Olof Jederström
SlaveSea AB



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Material specification

	Qty	A-price ex. moms	Tot row ex. Moms	Info Tot row incl. moms
BAT524120300 Lithium Hybrid batteri 24V 200Ah	1	46 504 kr	46 504 kr	58 130 kr
LYN050140000 Lynx ION BMS 400A	1	13 216 kr	13 216 kr	16 520 kr
PIN245020000 Phoenix Inverter 24/5000	1	20 952 kr	20 952 kr	26 190 kr
BPP000300100R Controlpanel Color Control, grey plastic	1	5 392 kr	5 392 kr	6 740 kr
ASS050400000 Box for Controlpanel Color Control.	1	441 kr	441 kr	551 kr
SP-3L 97EHD-190-24-IG, Alt.190a, 24v, SaddleMT, 4i, IG	1	31 175 kr	31 175 kr	38 969 kr
UBB Belt Buddy, w/UAA Universal Adjustment Arm	1	990 kr	990 kr	1 238 kr
ALT072241000 Regulator MaxCharge 24V P-typ	1	5 160 kr	5 160 kr	6 450 kr
V-belts 13x875	2	83 kr	166 kr	208 kr
Charger, Victron Skylla TG 24/50	1	8 656 kr	8 656 kr	10 820 kr
Controlbox, Shore v.s. Inverter power	1	1 871 kr	1 871 kr	2 338 kr
772-DBC Single main switch at machinroom door	1	612 kr	612 kr	765 kr
BPP900200100 Wi-Fi transmitter, USB-WIFI Starteck	1	881 kr	881 kr	1 102 kr
5191B Fuseholder Terminal on the Alternator	1	237 kr	237 kr	296 kr
5188 Fuses Terminal 225A	2	160 kr	320 kr	400 kr
Inst.mtrl: Cables, connectors , screws, tielace etc.	1	4 000 kr	4 000 kr	5 000 kr
Material summary		exclusive moms	140 572 kr	
		moms	35 143 kr	
Value of installed material		inclusive moms	175 715 kr	



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Warranty.

This invoice is your receipt and proof of warranty. Units sold and installed by us is listed by partnumber and serial numbers if they are marked as such. The manufacturers factory warranty is stated and is valid from when the work was completed 2018-05-24. In general the swedish konsumentköplagen (the swedish law regarding private consumers rights) is valid.

PartNo.	SerialNo.	Manufactorer	Product.	Factory warranty
BAT524120300	HQ1803Z86DE	Victron	Lithium Hybrid batteri 24V 200Ah	3 years
LYN050140000	HQ1602UN2Q4	Victron	Lynx ION BMS 400A	5 years
PIN245020000	HQ1748BDJ8Y	Victron	Phoenix Inverter 24/5000	5 years
BPP000300100R	HQ1746ECN89	Victron	Controlpanel Color Control	5 years
SDTG2400501	HQ17377V9UR	Victron	Charger, Skylla TG 24/50	5 years
97EHD-190-24-IG	O218	Balmar	Alternator190A/24V, 2-pole	1 year
ALT072241000	---	MaxCharge	Alternator regulator 24V, programmable	1 year
BPP900200100	15A246000120	Starteck	Wi-Fi transmitter, USB-WIFI	1 year

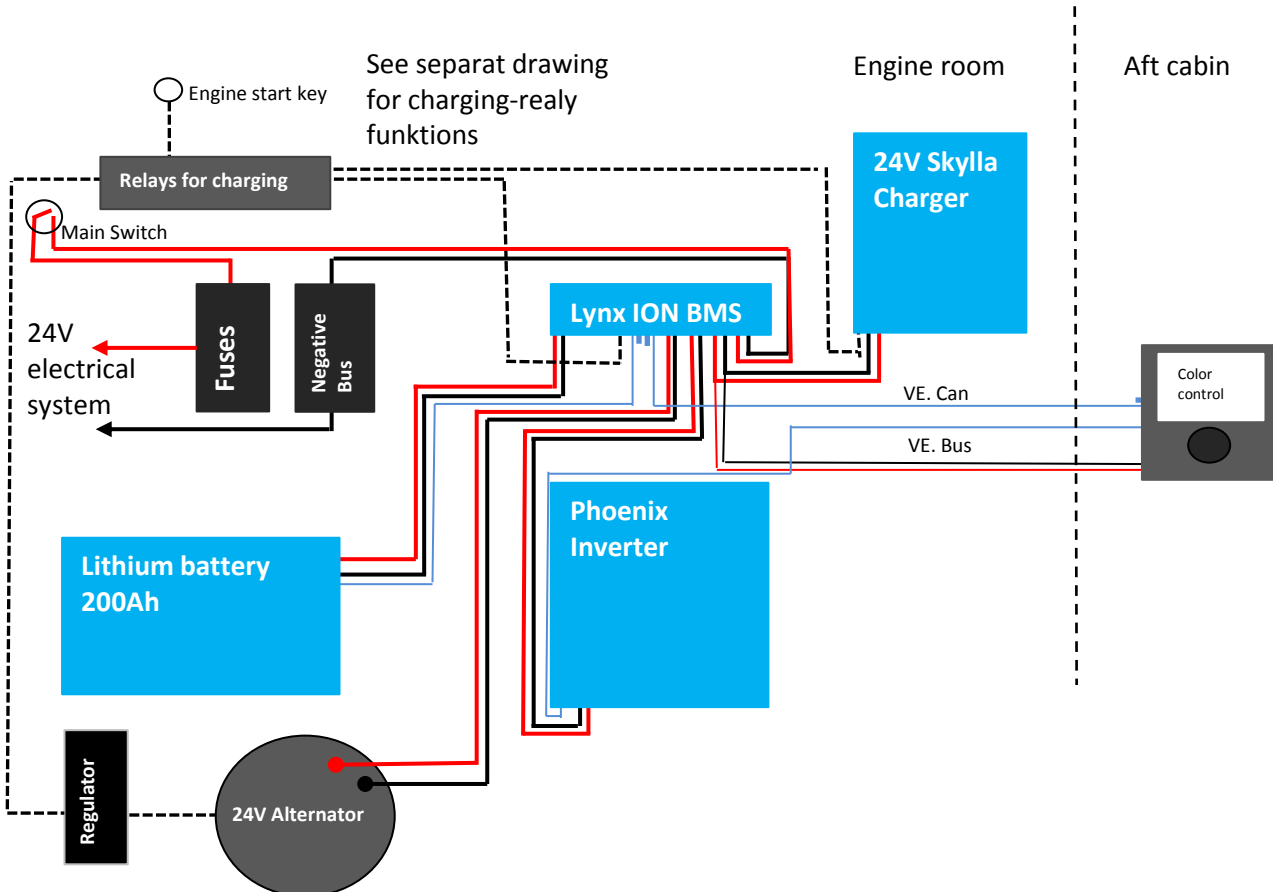


Description of the installation

The work started with planning of the installation and some arrangements together with craftsmen that you had hired for welding: Relocation of the batterybox, making of rails for cables, shelves and attachment points for all units and fuses

The House 24V power supply system:

- A Victron Lithium Hybrid batteri 24V 200Ah battery.
- A Victron Lynx ION BMS 400A, battery management system.
- A Victron Phoenix Inverter 24/5000.
- A Victron Skylla TG 24/50 charger
- A Victron Color Control, controlpanel.
- The house battery alternator was replaced with a 190A/24V alternator.

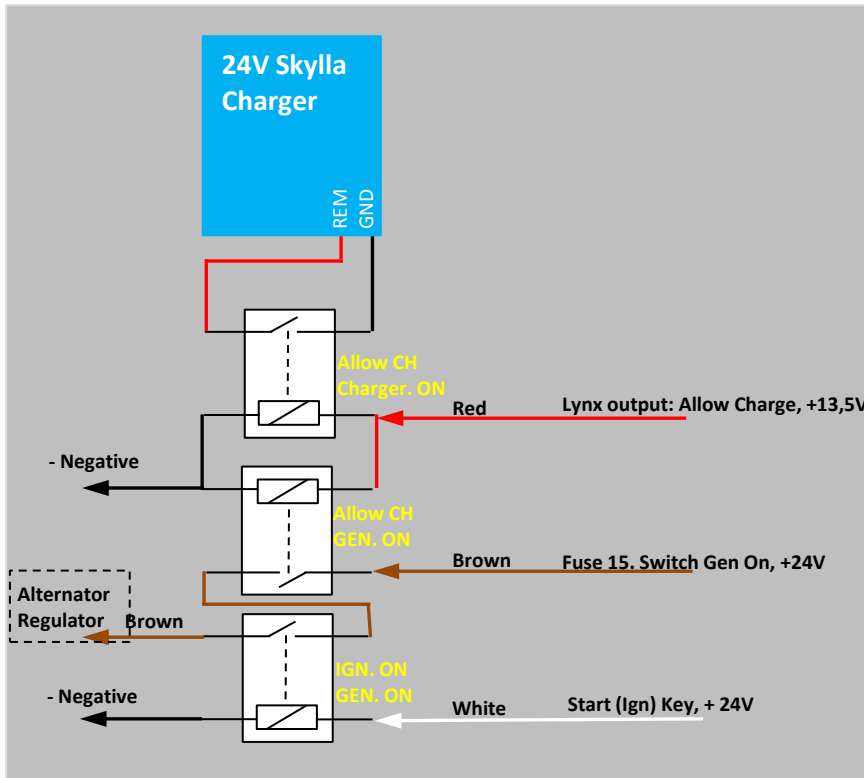
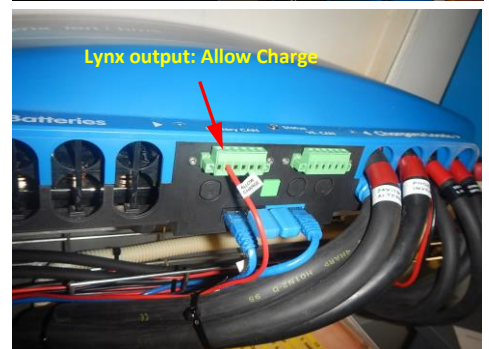
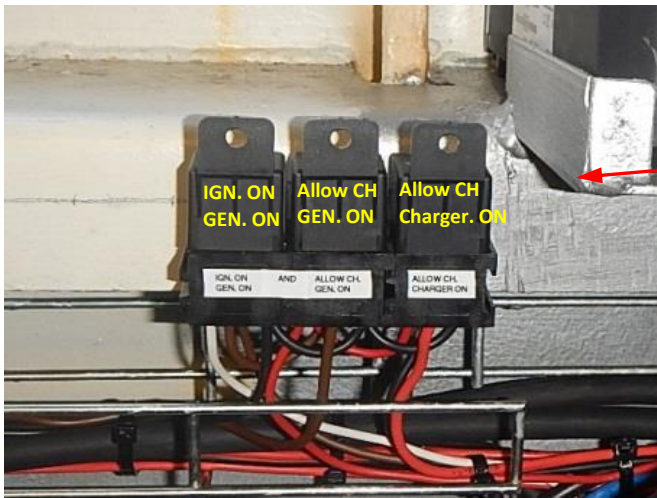




Charging.

The charging of the Lithium battery is controlled by the Lynx ION BMS and is activated by "Battery CAN" output 2 -"allow charge". When the battery is in need of charge the "allow charge" output is activated and delivers a continuous 13,5 Voltage signal . When the battery reaches the charge level 100% the "allow charge" output is deactivated, i.e. 0V output. When the battery is discharged the "allow charge" output remains deactivated until the charging level of the battery has decreased to 80% and below, then the "allow charge" output is activated again.

This output is used to control on/off switching of the two charging devices, the 24V alternator and the 24V Skylla charger. For the 24V alternator to be activated it is also required that the Engine Start Key (IGN) is activated. For the 24V Skylla charger to be activated it is also required that it has 230VAC power supply and that the charger is switched ON.





Main Switch

The Main switch is placed near the engine room door.
The switch controls both the House power (1) and the Engine start power (2).

The switch has four positions/modes
OFF: Both circuits (House and Engine) is cut off.
1 ON: The House power is ON, the Engine power is OFF
1 ON 2: Both House power and Engine power is ON.
Parallel: Connects Both batteries, Both are ON.

The Parallel mode is for emergency lights and VHF transmission in case of loss of power from the house battery.

WARNING regarding the Parallel mode:
- This mode connects the House battery (Li-Ion) with the start battery (Led based) wich may be damaged.
- In case of loss of power in the Start battery.
Do not attempt to start the Engine or operate the Bow thruster via the House battery. The house battery main fuse in the Lynks is only 100Amp and will blow if loded by engine start or bow thruster.



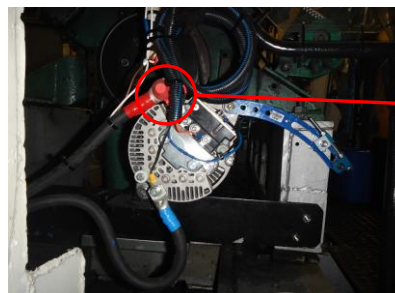
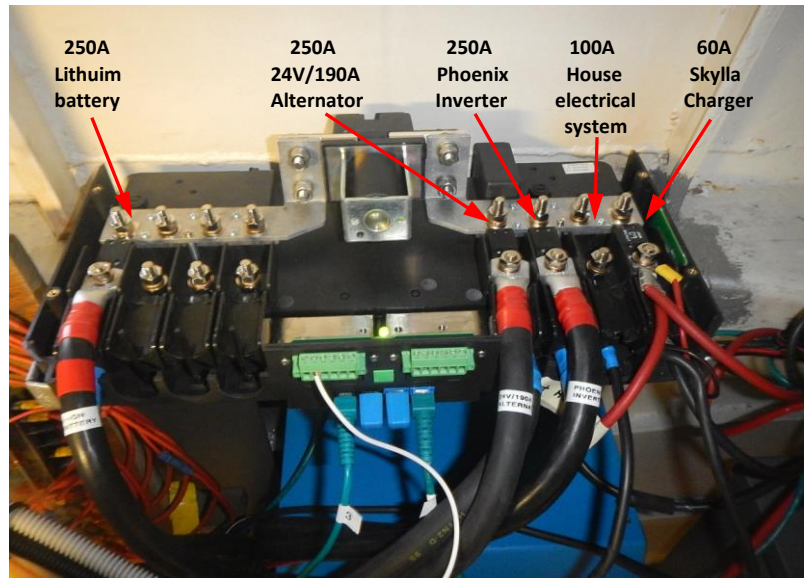
Fuses

Above the main switch is the Bow Thruster fuse.
Size: 250A
Type: ANL
Make: BEP (and others)

Below the main switch is the Engine Start motor fuse.
Size: 425A
Type: ANL
Make: BEP (and others)

In the Lynx ION BMS there are several fuses.
(not alla of them are installed when the picture was taken and the white wire is now replaced with a red wire).
Size: Se picture
Type: AMI / MIDI
Make: BlueSea systems (and others)

On the Generator + cable there is a fuse.
Size: 225A
Type: MRBF Terminal Fuse Block
Make: BlueSea systems (and others)





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The engine start power supply system

The start batteries, two 12V Led based in series, delivers 24V.
The main switch operates the on/off power from these batteries.
They get there charge from the old Waeco charger next to the Inverter.



WiFi

A WiFi transmitter is connected to the Color control panel in the aft cabin. This allows remote system surveillance from a smartphone or equivalent equipment.



Shore power transformer.

This unit was relocated from the aft cabin to the engine room.



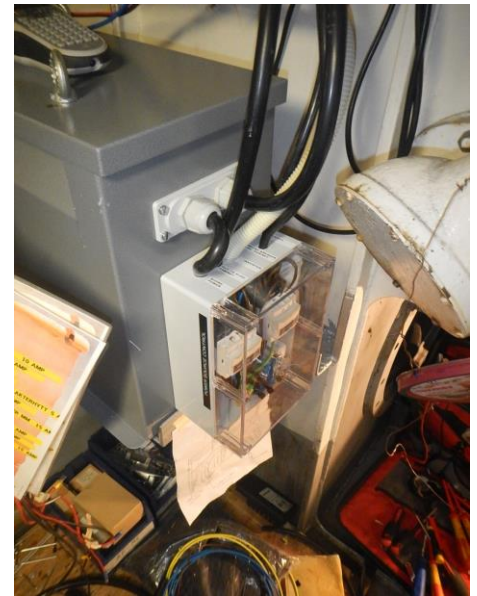


230VAC system

A relay module was installed to enable remote switch between Shore Power and Inverter Power from the electrical cabinet in the aft cabin.

When Shore Power is activated 3-phases are distributed to the electrical cabinet per the same circuit break-up as before, nothing is changed regarding that, i.e. everything in the electrical system is powered.

When the Inverter Power is activated it is different. The Inverter only has 1-phase which is distributed parallelly to the circuit break-up. However, the Skylla charger is automatically disconnected in this mode to avoid power cycling of the Lithium battery.



24V Skylla Charger

